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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".

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].

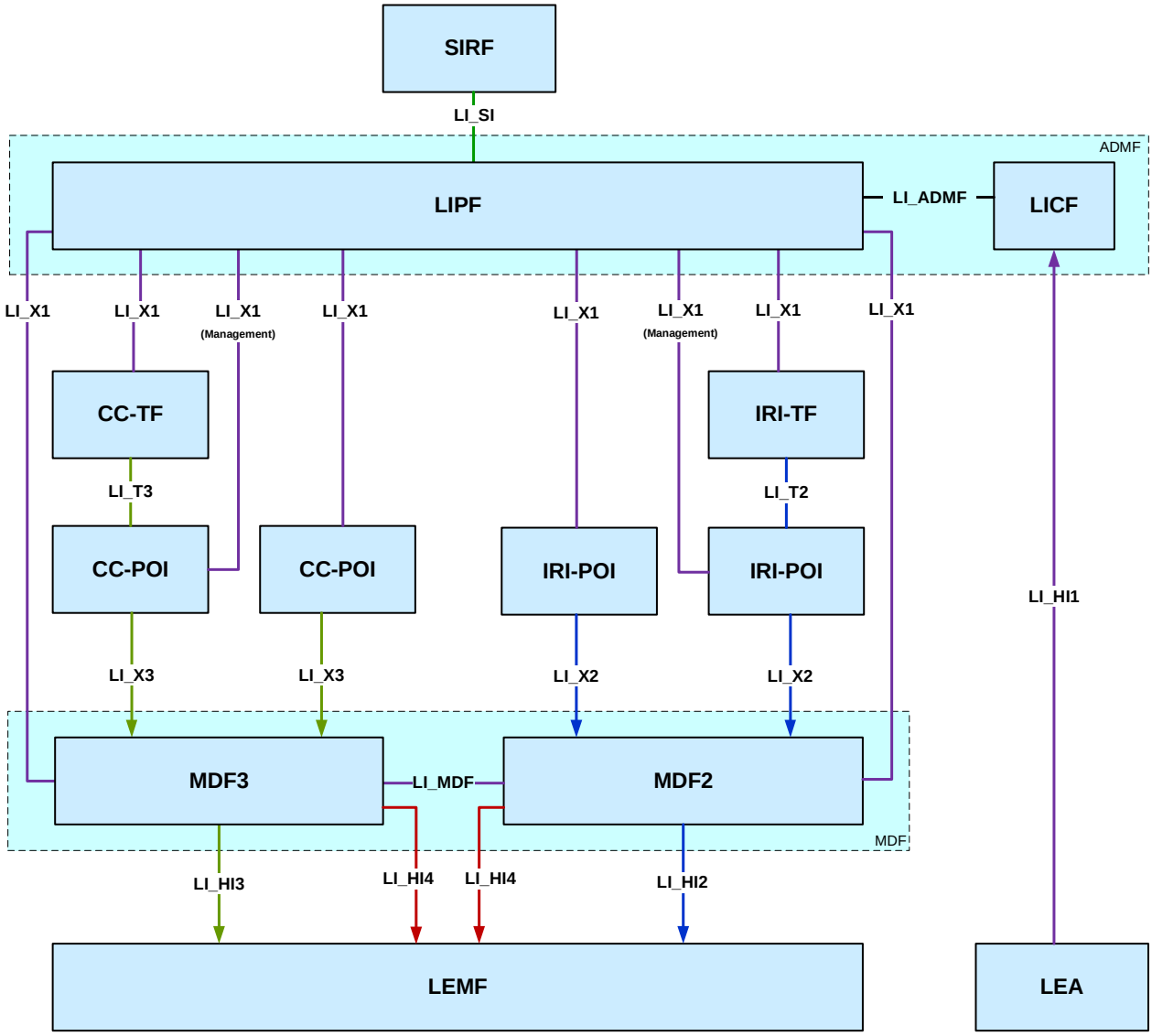
ADMF	LI Administration Function
CC	Content of Communication
CSP	Communication Service Provider
CUPS	Control and User Plane Separation
IRI	Intercept Related Information
LALS	Lawful Access Location Services
LEA	Law Enforcement Agency
LEMF	Law Enforcement Monitoring Facility
LI	Lawful Interception
LICF	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
LIPF	Lawful Interception Provisioning Function
LIR	Location Immediate Request
LI_SI	Lawful Interception System Information Interface
LI_X1	Lawful Interception Internal Interface 1
LI_X2	Lawful Interception Internal Interface 2
LI_X3	Lawful Interception Internal Interface 3
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
SIRF	System Information Retrieval Function
SOI	Start Of Interception
TF	Triggering 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:



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_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.	

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 section 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 section 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 section 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 section 5.6

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 that 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.

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”.

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 a TF and a triggered POI, the 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 POI plays the role of the “NE”.

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

5.2.6 Usage for realising LI_T3

For the purposes of realising LI_T3 between a TF and a triggered POI, the 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 POI plays the role of the “NE”.

In case the TF receives from the Triggered POI an error in the answer to a triggering message, the 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 TF shall set the Product ID field in any ActivateTask or ModifyTask message issued to a triggered POI (see ETSI TS 103 221-1 [7] clause 6.2.1.2). The TF shall set the Product ID to the XID of the Task object associated with the interception at the TF in order to allow correlation of LI product at the MDF3.

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 (see ETSI TS 103 221-2 [8] clause 5.3.19) may be omitted by the POI if the other target identifiers known to the POI are already included in the payload.

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).

5.6 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.

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.

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.

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*), see Annex A.	C
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, 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

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 ProvideLocInfo, ProvidePosInfo, NotifiedPosInfo and AmfEventReport (see TS 29.518 [22]).

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 *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).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*), see Annex A.	C
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, 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

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.		

6.2.2.3 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 6.2.2-6 shows the IRI type (see ETSI TS 102 232-1 [9] clause 5.2.10) to be used for each IRI message.

Table 6.2.2-6: IRI type for IRI messages

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

6.2.3 LI for SMF/UPF

6.2.3.1 Provisioning of SMF over LI_X1

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.

If packet header reporting is required, parameters specified in table 6.2.3-9: ActivatePDHReporting parameters shall be provided as part of the LI_X1 provisioning message.

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 clause 9.4 of TS 24.501 [13].	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, 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
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, 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
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

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 implicitly 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

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, 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

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, 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.		

6.2.3.3 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, 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 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.	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	ETSI TS 103 221-1 TargetIdentifier type	Definition
GTP Tunnel ID	gtpuTunnelId	F-TEID (see XSD schema)
UE IP Address	ipAddress	See ETSI TS 103 221-1 [7]
UE IP Address and port	ipAddressPort	See ETSI TS 103 221-1 [7]
PFCP Session ID	TargetIdentifierExtension / FSEID	F-SEID (see XSD schema)
PDR ID	TargetIdentifierExtension / PDRID	32 bit unsigned integer (see XSD schema)
QER ID	TargetIdentifierExtension / QERID	32 bit unsigned integer (see XSD schema)
Network Instance	TargetIdentifierExtension / NetworkInstance	Octet string (see XSD schema)
GTP Tunnel Direction	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 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, and if the approach 1 as specified in TS 33.127 [5] for packet data information reporting is used, the IRI-TF in the SMF sends 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, it shall send an activation message to the IRI-POI in the UPF over the LI_T2 interface. 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 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].	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.	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 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 an 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-POI 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 a warrant that does not include the service scoping of CC (but includes the service scoping of IRI) 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, if the approach 1 specified in TS 33.127 [5] 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 received from the IRI-TF in the SMF.	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

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.

Table 6.2.3-13: PDSummaryReport record

Field name	Description	M/C/O
pDUSessionID	The PDU session ID received from the IRI-TF in the SMF.	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: 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"; 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.	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

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 GTP-U packet given using the GTP-U message payload format value 12 (see ETSI TS 103 221-2 [8] table 7 in clause 5.4 and clause 5.4.13).

6.2.3.7 Generation of IRI over LI_HI2

When an xIRI is received over LI_X2 from the IRI-POI in SMF, 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
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 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. 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.

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 at MDF2

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

TS 33.127 [5] provides two approaches for the generation of such IRI messages. In approach 1, the IRI-POI present in the UPF based on a trigger received from IRI-TF present in the SMF constructs and delivers the xIRIs to the MDF2. The details of this 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 6.2.3.5. 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 clause 6.2.3.5, table 6.2.3-11. 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.

6.2.4 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 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.

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 a SMCP message CP-DATA_RPDATA [SUBMIT_SMS] from a target UE (via AMF in Nsmsf_SMService_UplinkSMS message) or from any UE with TP-DA field within the SUBMIT_SMS containing a target non-Local ID and SMSF returns the SMCP: CP-ACK to that originating UE.
- The SMSF receives a Nsmsf_SMService_UplinkSMS with SmsRecordData IE containing the SMCP message CP-DATA_RP-ACK [SMS-DELIVER-REPORT] in response to a previously sent SMCP: Namf_Communication_N1N2MessageTransfer with N1MessageContainer having the SMCP message CP-DATA_RP-DATA [SMS-DELIVER].

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.

Table 6.2.5-1: 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
transferStatus	Indicates whether the transfer succeeded or not. 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
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
location	Location information associated with the target sending or receiving the SMS, if available. See NOTE 7. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
sMSTPDUData	SMS TPDU, encoded as per TS 23.040 [18] clause 9. See NOTE 8.	C

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 (SUBMIT-MS) 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]).

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) 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]).

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 [SUBMIT SMS] 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 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-answer [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-Answer [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 SMS-MO case, the SMCP message is CP-DATA_RP-DATA [SMS-SUBMIT] and for the SMS-MT case, the SMCP message is CP-DATA-RP-ACK [SMS-DELIVER-REPORT].

NOTE 8: According to the intercept related data provisioning received over the LI_X1 reference point from the LIPF, the IRI-POI present in the SMSF may discover that the Interception Product may not include the CC. In this case, the IRI-POI present in the SMSF may remove the sMSTPDUDATA from the SMSMessage record sent to the MDF2. When multiple warrants are issued on a target UE, the SMSF may deliver the SMSMessage record with the sMSTPDUDATA present to the MDF2. In that case, the MDF2 is expected to remove the equivalent information from the IRI message sent over the LI_HI2 reference point when it discovers from the intercept related data provisioned to it over LI_X1 reference point.

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 the LI_X2. The SMSMessage 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 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).

National regulations may require that the MDF2 removes information regarded as content from the smsTPDUData field in case of an IRI only warrant. The details of what needs be removed, and under what circumstances this is for national regulation, are outside the scope of the present document.

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

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].

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".

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.

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).

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 12.2.1.1, 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.

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.

NOTE: The present document supports only the xIRIs containing the UDMServingSystemMessage record.

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 in the Nudm_UEContextManagement_Registration message (see TS 29.503 [25], clause 5.3.2.2.2).
- When the UDM receives the amfNon3GPPAccessRegistration from the AMF in the Nudm_UEContextManagement_Registration message (see TS 29.503 [25], clause 5.3.2.2.3).
- When the UDM receives the amf3GPPAccessRegistration from the MME via the AMF in the Nudm_UEContextManagement_Registration message (see TS 23.501 [2], clause 5.17.2.3.2) during inter-system handover.

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

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 receives the same from the MME via the AMF.

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

Subscriber record change is not supported in the present document.

7.2.2.3.4 Cancel location

Cancel location is not supported in the present document.

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: - SUPI. - PEI. - GPSI.	M
DeliveryType	Set to “X2Only”.	M
ListOfDIDs	Delivery endpoints of LI_X2 interface or MDF2 address. 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/ 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 IRI-TF (LTF) 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.

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 of the following: - SUPI. - PEI. - GPSI.	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, provisioned as described in clause 7.3.1.2.2, triggers the triggered IRI-POI provided by the LI-LCS client 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 the LTF provisioning 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 LIPF 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 implicitly deactivate the task 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-CS 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 of the following, per LTF provisioning: - SUPI. - PEI. - GPSI.	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
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
pEI	PEI of the target, if used for the service (see NOTE).	C
gPSI	GPSI 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: At least one of the SUPI, PEI or GPSI fields shall be present.		

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 7.5.1.1-1.

Table 7.5.1.1-1: TargetIdentifier Types for PTC service

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

7.5.2 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 7.5.2.1-1: 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 7.5.2.2-1: 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 7.5.2.3-1: 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 7.5.2.4-1: 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 7.5.2.5-1: 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 7.5.2.6-1: 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 7.5.2.7-1: 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 7.5.2.8-1: 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 7.5.2.9-1: 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 7.5.2.10-1: 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 7.5.2.11-1: 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 7.5.2.12-1: 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 7.5.2.13-1: 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 7.5.2.14-1: 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 7.5.2.15-1: 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 7.5.2.16-1: 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 7.5.2.17-1: 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 7.5.2.18-1: 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

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) version3(3)}

DEFINITIONS IMPLICIT TAGS EXTENSIBILITY IMPLIED ::=

BEGIN

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

tS33128PayloadsOID          RELATIVE-OID ::= {threeGPP(4) ts33128(19) r16(16) version3(3)}

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
    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
}

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

}

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
}

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

-- 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
}

-- 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
}

-- 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
}

-- 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
}

-- 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
}

-- 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
}

-- =================
-- 5G SMF parameters
-- =================

SMFFailedProcedureType ::= ENUMERATED
{
    pDUSessionEstablishment(1),
    pDUSessionModification(2),
    pDUSessionRelease(3)
}

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

-- =================
-- 5G UDM parameters
-- =================

UDMServingSystemMethod ::= ENUMERATED
{
    amf3GPPAccessRegistration(0),
    amfNon3GPPAccessRegistration(1),
    unknown(2)
}

-- ===================
-- 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,
    transferStatus              [4] SMSTransferStatus,
```

```
    otherMessage                [5] SMSOtherMessageIndication OPTIONAL,
    location                    [6] Location OPTIONAL,
    peerNFAddress               [7] SMSNFAddress OPTIONAL,
    peerNFType                  [8] SMSNFType OPTIONAL,
    sMSTPDUData                 [9] SMSTPDUData OPTIONAL
}

-- ==================
-- 5G SMSF parameters
-- ==================

SMSParty ::= SEQUENCE
{
    sUPI        [1] SUPI OPTIONAL,
    pEI         [2] PEI OPTIONAL,
    gPSI        [3] GPSI 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)
}

SMSTPDUData ::= CHOICE
{
    sMSTPDU [1] SMSTPDU
}


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

-- ===============
-- MMS definitions
-- ===============

MMSSend ::= SEQUENCE
{
    transactionID       [1]  UTF8String,
    version             [2]  MMSVersion,
    dateTime            [3]  Timestamp,
    originatingMMSParty [4]  MMSParty,
    terminatingMMSParty [5]  SEQUENCE OF MMSParty OPTIONAL,
    cCRecipients        [6]  SEQUENCE OF MMSParty OPTIONAL,
    bCCRecipients       [7]  SEQUENCE OF MMSParty OPTIONAL,
    direction           [8]  MMSDirection,
    subject             [9]  MMSSubject OPTIONAL,
    messageClass        [10]  MMSMessageClass OPTIONAL,
    expiry              [11] MMSExpiry,
    desiredDeliveryTime [12] Timestamp OPTIONAL,
    priority            [13] MMSPriority OPTIONAL,
    senderVisibility    [14] BOOLEAN OPTIONAL,
    deliveryReport      [15] BOOLEAN OPTIONAL,
    readReport          [16] BOOLEAN OPTIONAL,
    store               [17] BOOLEAN OPTIONAL,
    state               [18] MMState OPTIONAL,
    flags               [19] MMFlags OPTIONAL,
    replyCharging       [20] MMSReplyCharging OPTIONAL,
    applicID            [21] UTF8String OPTIONAL,
    replyApplicID       [22] UTF8String OPTIONAL,
    auxApplicInfo       [23] UTF8String OPTIONAL,
```

```
    contentClass        [24] MMSContentClass OPTIONAL,
    dRMContent          [25] BOOLEAN OPTIONAL,
    adaptationAllowed   [26] MMSAdaptation OPTIONAL,
    contentType         [27] MMSContentType,
    responseStatus      [28] MMSResponseStatus,
    responseStatusText  [29] UTF8String OPTIONAL,
    messageID           [30] UTF8String
}

MMSSendByNonLocalTarget ::= SEQUENCE
{
    version             [1]  MMSVersion,
    transactionID       [2]  UTF8String,
    messageID           [3]  UTF8String,
    terminatingMMSParty [4]  SEQUENCE OF MMSParty,
    originatingMMSParty [5]  MMSParty,
    direction           [6]  MMSDirection,
    contentType         [7]  MMSContentType,
    messageClass        [8]  MMSMessageClass OPTIONAL,
    dateTime            [9]  Timestamp,
    expiry              [10] MMSExpiry OPTIONAL,
    deliveryReport      [11] BOOLEAN OPTIONAL,
    priority            [12] MMSPriority OPTIONAL,
    senderVisibility    [13] BOOLEAN OPTIONAL,
    readReport          [14] BOOLEAN OPTIONAL,
    subject             [15] MMSSubject OPTIONAL,
    forwardCount        [16] INTEGER OPTIONAL,
    previouslySentBy    [17] MMSPreviouslySentBy OPTIONAL,
    prevSentByDateTime  [18] Timestamp OPTIONAL,
    applicID            [19] UTF8String OPTIONAL,
    replyApplicID       [20] UTF8String OPTIONAL,
    auxApplicInfo       [21] UTF8String OPTIONAL,
    contentClass        [22] MMSContentClass OPTIONAL,
    dRMContent          [23] BOOLEAN OPTIONAL,
    adaptationAllowed   [24] MMSAdaptation OPTIONAL
}

MMSNotification ::= SEQUENCE
{
    transactionID           [1]  UTF8String,
    version                 [2]  MMSVersion,
    originatingMMSParty     [3]  MMSParty OPTIONAL,
    direction               [4]  MMSDirection,
    subject                 [5]  MMSSubject OPTIONAL,
    deliveryReportRequested [6]  BOOLEAN OPTIONAL,
    stored                  [7]  BOOLEAN OPTIONAL,
    messageClass            [8]  MMSMessageClass,
    priority                [9]  MMSPriority OPTIONAL,
    messageSize             [10]  INTEGER,
    expiry                  [11] MMSExpiry,
    replyCharging           [12] MMSReplyCharging OPTIONAL
}

MMSSendToNonLocalTarget ::= SEQUENCE
{
    version             [1]  MMSVersion,
    transactionID       [2]  UTF8String,
    messageID           [3]  UTF8String,
    terminatingMMSParty [4]  SEQUENCE OF MMSParty,
    originatingMMSParty [5]  MMSParty,
    direction           [6]  MMSDirection,
    contentType         [7]  MMSContentType,
    messageClass        [8]  MMSMessageClass OPTIONAL,
    dateTime            [9]  Timestamp,
    expiry              [10] MMSExpiry OPTIONAL,
    deliveryReport      [11] BOOLEAN OPTIONAL,
    priority            [12] MMSPriority OPTIONAL,
    senderVisibility    [13] BOOLEAN OPTIONAL,
    readReport          [14] BOOLEAN OPTIONAL,
    subject             [15] MMSSubject OPTIONAL,
    forwardCount        [16] INTEGER OPTIONAL,
    previouslySentBy    [17] MMSPreviouslySentBy OPTIONAL,
    prevSentByDateTime  [18] Timestamp OPTIONAL,
    applicID            [19] UTF8String OPTIONAL,
    replyApplicID       [20] UTF8String OPTIONAL,
    auxApplicInfo       [21] UTF8String OPTIONAL,
    contentClass        [22] MMSContentClass OPTIONAL,
    dRMContent          [23] BOOLEAN OPTIONAL,
```

```
    adaptationAllowed   [24] MMSAdaptation OPTIONAL
}

MMSNotificationResponse ::= SEQUENCE
{
    transactionID [1] UTF8String,
    version       [2] MMSVersion,
    direction     [3] MMSDirection,
    status        [4] MMStatus,
    reportAllowed [5] BOOLEAN OPTIONAL
}

MMSRetrieval ::= SEQUENCE
{
    transactionID       [1]  UTF8String,
    version             [2]  MMSVersion,
    messageID           [3]  UTF8String,
    dateTime            [4]  Timestamp,
    originatingMMSParty [5]  MMSParty OPTIONAL,
    previouslySentBy    [6]  MMSPreviouslySentBy OPTIONAL,
    prevSentByDateTime  [7]  Timestamp OPTIONAL,
    terminatingMMSParty [8]  SEQUENCE OF MMSParty OPTIONAL,
    cCRecipients        [9]  SEQUENCE OF MMSParty OPTIONAL,
    direction           [10] MMSDirection,
    subject             [11] MMSSubject OPTIONAL,
    state               [12] MMState OPTIONAL,
    flags               [13] MMFlags OPTIONAL,
    messageClass        [14] MMSMessageClass OPTIONAL,
    priority            [15] MMSPriority,
    deliveryReport      [16] BOOLEAN OPTIONAL,
    readReport          [17] BOOLEAN OPTIONAL,
    replyCharging       [18] MMSReplyCharging OPTIONAL,
    retrieveStatus      [19] MMSRetrieveStatus OPTIONAL,
    retrieveStatusText  [20] UTF8String OPTIONAL,
    applicID            [21] UTF8String OPTIONAL,
    replyApplicID       [22] UTF8String OPTIONAL,
    auxApplicInfo       [23] UTF8String OPTIONAL,
    contentClass        [24] MMSContentClass OPTIONAL,
    dRMContent          [25] BOOLEAN OPTIONAL,
    replaceID           [26] UTF8String OPTIONAL,
    contentType         [27] UTF8String OPTIONAL
}

MMSDeliveryAck ::= SEQUENCE
{
    transactionID [1] UTF8String,
    version       [2] MMSVersion,
    reportAllowed [3] BOOLEAN OPTIONAL,
    status        [4] MMStatus,
    direction     [5] MMSDirection
}

MMSForward ::= SEQUENCE
{
    transactionID         [1]  UTF8String,
    version               [2]  MMSVersion,
    dateTime              [3]  Timestamp OPTIONAL,
    originatingMMSParty   [4]  MMSParty,
    terminatingMMSParty   [5]  SEQUENCE OF MMSParty OPTIONAL,
    cCRecipients          [6]  SEQUENCE OF MMSParty OPTIONAL,
    bCCRecipients         [7]  SEQUENCE OF MMSParty OPTIONAL,
    direction             [8]  MMSDirection,
    expiry                [9]  MMSExpiry OPTIONAL,
    desiredDeliveryTime   [10] Timestamp OPTIONAL,
    deliveryReportAllowed [11] BOOLEAN OPTIONAL,
    deliveryReport        [12] BOOLEAN OPTIONAL,
    store                 [13] BOOLEAN OPTIONAL,
    state                 [14] MMState OPTIONAL,
    flags                 [15] MMFlags OPTIONAL,
    contentLocationReq    [16] UTF8String,
    replyCharging         [17] MMSReplyCharging OPTIONAL,
    responseStatus        [18] MMSResponseStatus,
    responseStatusText    [19] UTF8String  OPTIONAL,
    messageID             [20] UTF8String OPTIONAL,
    contentLocationConf   [21] UTF8String OPTIONAL,
    storeStatus           [22] MMSStoreStatus OPTIONAL,
    storeStatusText       [23] UTF8String OPTIONAL
}
```

```
MMSDeleteFromRelay ::= SEQUENCE
{
    transactionID        [1] UTF8String,
    version              [2] MMSVersion,
    direction            [3] MMSDirection,
    contentLocationReq   [4] SEQUENCE OF UTF8String,
    contentLocationConf  [5] SEQUENCE OF UTF8String,
    deleteResponseStatus [6] MMSDeleteResponseStatus,
    deleteResponseText   [7] SEQUENCE OF UTF8String
}

MMSMBoxStore ::= SEQUENCE
{
    transactionID       [1] UTF8String,
    version             [2] MMSVersion,
    direction           [3] MMSDirection,
    contentLocationReq  [4] UTF8String,
    state               [5] MMState OPTIONAL,
    flags               [6] MMFlags OPTIONAL,
    contentLocationConf [7] UTF8String OPTIONAL,
    storeStatus         [8] MMSStoreStatus,
    storeStatusText     [9] UTF8String OPTIONAL
}

MMSMBoxUpload ::= SEQUENCE
{
    transactionID       [1]  UTF8String,
    version             [2]  MMSVersion,
    direction           [3]  MMSDirection,
    state               [4]  MMState OPTIONAL,
    flags               [5]  MMFlags OPTIONAL,
    contentType         [6]  UTF8String,
    contentLocation     [7]  UTF8String OPTIONAL,
    storeStatus         [8]  MMSStoreStatus,
    storeStatusText     [9]  UTF8String OPTIONAL,
    mMessages           [10] SEQUENCE OF MMBoxDescription
}

MMSMBoxDelete ::= SEQUENCE
{
    transactionID       [1] UTF8String,
    version             [2] MMSVersion,
    direction           [3] MMSDirection,
    contentLocationReq  [4] SEQUENCE OF UTF8String,
    contentLocationConf [5] SEQUENCE OF UTF8String OPTIONAL,
    responseStatus      [6] MMSDeleteResponseStatus,
    responseStatusText  [7] UTF8String OPTIONAL
}

MMSDeliveryReport ::= SEQUENCE
{
    version             [1] MMSVersion,
    messageID           [2] UTF8String,
    terminatingMMSParty [3] SEQUENCE OF MMSParty,
    mMSDateTime         [4] Timestamp,
    responseStatus      [5] MMSResponseStatus,
    responseStatusText  [6] UTF8String OPTIONAL,
    applicID            [7] UTF8String OPTIONAL,
    replyApplicID       [8] UTF8String OPTIONAL,
    auxApplicInfo       [9] UTF8String OPTIONAL
}

MMSDeliveryReportNonLocalTarget ::= SEQUENCE
{
    version             [1]  MMSVersion,
    transactionID       [2]  UTF8String,
    messageID           [3]  UTF8String,
    terminatingMMSParty [4]  SEQUENCE OF MMSParty,
    originatingMMSParty [5]  MMSParty,
    direction           [6]  MMSDirection,
    mMSDateTime         [7]  Timestamp,
    forwardToOriginator [8]  BOOLEAN OPTIONAL,
    status              [9]  MMStatus,
    statusExtension     [10] MMStatusExtension,
    statusText          [11] MMStatusText,
    applicID            [12] UTF8String OPTIONAL,
    replyApplicID       [13] UTF8String OPTIONAL,
```

```
    auxApplicInfo       [14] UTF8String OPTIONAL
}

MMSReadReport ::= SEQUENCE
{
    version             [1] MMSVersion,
    messageID           [2] UTF8String,
    terminatingMMSParty [3] SEQUENCE OF MMSParty,
    originatingMMSParty [4] SEQUENCE OF MMSParty,
    direction           [5] MMSDirection,
    mMSDateTime         [6] Timestamp,
    readStatus          [7] MMSReadStatus,
    applicID            [8] UTF8String OPTIONAL,
    replyApplicID       [9] UTF8String OPTIONAL,
    auxApplicInfo       [10] UTF8String OPTIONAL
}

MMSReadReportNonLocalTarget ::= SEQUENCE
{
    version             [1] MMSVersion,
    transactionID       [2] UTF8String,
    terminatingMMSParty [3] SEQUENCE OF MMSParty,
    originatingMMSParty [4] SEQUENCE OF MMSParty,
    direction           [5] MMSDirection,
    messageID           [6] UTF8String,
    mMSDateTime         [7] Timestamp,
    readStatus          [8] MMSReadStatus,
    readStatusText      [9] MMSReadStatusText OPTIONAL,
    applicID            [10] UTF8String OPTIONAL,
    replyApplicID       [11] UTF8String OPTIONAL,
    auxApplicInfo       [12] UTF8String OPTIONAL
}

MMSCancel ::= SEQUENCE
{
    transactionID [1] UTF8String,
    version       [2] MMSVersion,
    cancelID      [3] UTF8String,
    direction     [4] MMSDirection
}

MMSMBoxViewRequest ::= SEQUENCE
{
    transactionID   [1]  UTF8String,
    version         [2]  MMSVersion,
    contentLocation [3]  UTF8String OPTIONAL,
    state           [4]  SEQUENCE OF MMState OPTIONAL,
    flags           [5]  SEQUENCE OF MMFlags OPTIONAL,
    start           [6]  INTEGER OPTIONAL,
    limit           [7]  INTEGER OPTIONAL,
    attributes      [8]  SEQUENCE OF UTF8String OPTIONAL,
    totals          [9]  INTEGER OPTIONAL,
    quotas          [10] MMSQuota OPTIONAL
}

MMSMBoxViewResponse ::= SEQUENCE
{
    transactionID   [1]  UTF8String,
    version         [2]  MMSVersion,
    contentLocation [3]  UTF8String OPTIONAL,
    state           [4]  SEQUENCE OF MMState OPTIONAL,
    flags           [5]  SEQUENCE OF MMFlags OPTIONAL,
    start           [6]  INTEGER OPTIONAL,
    limit           [7]  INTEGER OPTIONAL,
    attributes      [8]  SEQUENCE OF UTF8String OPTIONAL,
    mMSTotals       [9]  BOOLEAN OPTIONAL,
    mMSQuotas       [10] BOOLEAN OPTIONAL,
    mMessages       [11] SEQUENCE OF MMBoxDescription
}

MMBoxDescription ::= SEQUENCE
{
    contentLocation          [1]  UTF8String OPTIONAL,
    messageID                [2]  UTF8String OPTIONAL,
    state                    [3]  MMState OPTIONAL,
    flags                    [4]  SEQUENCE OF MMFlags OPTIONAL,
    dateTime                 [5]  Timestamp OPTIONAL,
    originatingMMSParty      [6]  MMSParty OPTIONAL,
```

```
    terminatingMMSParty      [7]  SEQUENCE OF MMSParty OPTIONAL,
    cCRecipients             [8]  SEQUENCE OF MMSParty OPTIONAL,
    bCCRecipients            [9]  SEQUENCE OF MMSParty OPTIONAL,
    messageClass             [10] MMSMessageClass OPTIONAL,
    subject                  [11] MMSSubject OPTIONAL,
    priority                 [12] MMSPriority OPTIONAL,
    deliveryTime             [13] Timestamp OPTIONAL,
    readReport               [14] BOOLEAN OPTIONAL,
    messageSize              [15] INTEGER OPTIONAL,
    replyCharging            [16] MMSReplyCharging OPTIONAL,
    previouslySentBy         [17] MMSPreviouslySentBy OPTIONAL,
    previouslySentByDateTime [18] Timestamp OPTIONAL,
    contentType              [19] UTF8String OPTIONAL
}

-- =========
-- MMS CCPDU
-- =========

MMSCCPDU ::= SEQUENCE
{
    version    [1] MMSVersion,
    transactionID [2] UTF8String,
    mMSContent    [3] OCTET STRING
}

-- ==============
-- MMS parameters
-- ==============

MMSAdaptation ::= SEQUENCE
{
    allowed   [1] BOOLEAN,
    overriden [2] BOOLEAN
}

MMSCancelStatus ::= ENUMERATED
{
    cancelRequestSuccessfullyReceived(1),
    cancelRequestCorrupted(2)
}

MMSContentClass ::= ENUMERATED
{
    text(1),
    imageBasic(2),
    imageRich(3),
    videoBasic(4),
    videoRich(5),
    megaPixel(6),
    contentBasic(7),
    contentRich(8)
}

MMSContentType ::= UTF8String

MMSDeleteResponseStatus ::= ENUMERATED
{
    ok(1),
    errorUnspecified(2),
    errorServiceDenied(3),
    errorMessageFormatCorrupt(4),
    errorSendingAddressUnresolved(5),
    errorMessageNotFound(6),
    errorNetworkProblem(7),
    errorContentNotAccepted(8),
    errorUnsupportedMessage(9),
    errorTransientFailure(10),
    errorTransientSendingAddressUnresolved(11),
    errorTransientMessageNotFound(12),
    errorTransientNetworkProblem(13),
    errorTransientPartialSuccess(14),
    errorPermanentFailure(15),
    errorPermanentServiceDenied(16),
    errorPermanentMessageFormatCorrupt(17),
    errorPermanentSendingAddressUnresolved(18),
    errorPermanentMessageNotFound(19),
    errorPermanentContentNotAccepted(20),
```

```
    errorPermanentReplyChargingLimitationsNotMet(21),
    errorPermanentReplyChargingRequestNotAccepted(22),
    errorPermanentReplyChargingForwardingDenied(23),
    errorPermanentReplyChargingNotSupported(24),
    errorPermanentAddressHidingNotSupported(25),
    errorPermanentLackOfPrepaid(26)
}

MMSDirection ::= ENUMERATED
{
    fromTarget(0),
    toTarget(1)
}

MMSElementDescriptor ::= SEQUENCE
{
    reference [1] UTF8String,
    parameter [2] UTF8String     OPTIONAL,
    value     [3] UTF8String     OPTIONAL
}

MMSExpiry ::= SEQUENCE
{
    expiryPeriod [1] INTEGER,
    periodFormat [2] MMSPeriodFormat
}

MMFlags ::= SEQUENCE
{
    length     [1] INTEGER,
    flag       [2] MMStateFlag,
    flagString [3] UTF8String
}

MMSMessageClass ::= ENUMERATED
{
    personal(1),
    advertisement(2),
    informational(3),
    auto(4)
}

MMSParty ::= SEQUENCE
{
    mMSPartyIDs [1] SEQUENCE OF MMSPartyID,
    nonLocalID  [2] NonLocalID
}

MMSPartyID ::= CHOICE
{
    e164Number   [1] E164Number,
    emailAddress [2] EmailAddress,
    iMSI         [3] IMSI,
    iMPU         [4] IMPU,
    iMPI         [5] IMPI,
    sUPI         [6] SUPI,
    gPSI         [7] GPSI
}

MMSPeriodFormat ::= ENUMERATED
{
    absolute(1),
    relative(2)
}

MMSPreviouslySent ::= SEQUENCE
{
    previouslySentByParty [1] MMSParty,
    sequenceNumber        [2] INTEGER,
    previousSendDateTime  [3] Timestamp
}

MMSPreviouslySentBy ::= SEQUENCE OF MMSPreviouslySent

MMSPriority ::= ENUMERATED
{
    low(1),
    normal(2),
```

```
    high(3)
}

MMSQuota ::= SEQUENCE
{
    quota     [1] INTEGER,
    quotaUnit [2] MMSQuotaUnit
}

MMSQuotaUnit ::= ENUMERATED
{
    numMessages(1),
    bytes(2)
}

MMSReadStatus ::= ENUMERATED
{
    read(1),
    deletedWithoutBeingRead(2)
}

MMSReadStatusText ::= UTF8String

MMSReplyCharging ::= ENUMERATED
{
    requested(0),
    requestedTextOnly(1),
    accepted(2),
    acceptedTextOnly(3)
}

MMSResponseStatus ::= ENUMERATED
{
    ok(1),
    errorUnspecified(2),
    errorServiceDenied(3),
    errorMessageFormatCorrupt(4),
    errorSendingAddressUnresolved(5),
    errorMessageNotFound(6),
    errorNetworkProblem(7),
    errorContentNotAccepted(8),
    errorUnsupportedMessage(9),
    errorTransientFailure(10),
    errorTransientSendingAddressUnresolved(11),
    errorTransientMessageNotFound(12),
    errorTransientNetworkProblem(13),
    errorTransientPartialSuccess(14),
    errorPermanentFailure(15),
    errorPermanentServiceDenied(16),
    errorPermanentMessageFormatCorrupt(17),
    errorPermanentSendingAddressUnresolved(18),
    errorPermanentMessageNotFound(19),
    errorPermanentContentNotAccepted(20),
    errorPermanentReplyChargingLimitationsNotMet(21),
    errorPermanentReplyChargingRequestNotAccepted(22),
    errorPermanentReplyChargingForwardingDenied(23),
    errorPermanentReplyChargingNotSupported(24),
    errorPermanentAddressHidingNotSupported(25),
    errorPermanentLackOfPrepaid(26)
}

MMSRetrieveStatus ::= ENUMERATED
{
    success(1),
    errorTransientFailure(2),
    errorTransientMessageNotFound(3),
    errorTransientNetworkProblem(4),
    errorPermanentFailure(5),
    errorPermanentServiceDenied(6),
    errorPermanentMessageNotFound(7),
    errorPermanentContentUnsupported(8)
}

MMSStoreStatus ::= ENUMERATED
{
    success(1),
    errorTransientFailure(2),
    errorTransientNetworkProblem(3),
```

```
    errorPermanentFailure(4),
    errorPermanentServiceDenied(5),
    errorPermanentMessageFormatCorrupt(6),
    errorPermanentMessageNotFound(7),
    errorMMBoxFull(8)
}

MMState ::= ENUMERATED
{
    draft(1),
    sent(2),
    new(3),
    retrieved(4),
    forwarded(5)
}

MMStateFlag ::= ENUMERATED
{
    add(1),
    remove(2),
    filter(3)
}

MMStatus ::= ENUMERATED
{
    expired(1),
    retrieved(2),
    rejected(3),
    deferred(4),
    unrecognized(5),
    indeterminate(6),
    forwarded(7),
    unreachable(8)
}

MMStatusExtension ::= ENUMERATED
{
    rejectionByMMSRecipient(0),
    rejectionByOtherRS(1)
}

MMStatusText ::= UTF8String

MMSSubject ::= UTF8String

MMSVersion ::= SEQUENCE
{
    majorVersion [1] INTEGER,
    minorVersion [2] INTEGER
}

-- ==================
-- 5G PTC definitions
-- ==================

PTCRegistration  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCServerURI                  [2] UTF8String,
    pTCRegistrationRequest        [3] PTCRegistrationRequest,
    pTCRegistrationOutcome        [4] PTCRegistrationOutcome
}

PTCSessionInitiation  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCServerURI                  [3] UTF8String,
    pTCSessionInfo                [4] PTCSessionInfo,
    pTCOriginatingID              [5] PTCTargetInformation,
    pTCParticipants               [6] SEQUENCE OF PTCTargetInformation OPTIONAL,
    pTCParticipantPresenceStatus  [7] MultipleParticipantPresenceStatus OPTIONAL,
    location                      [8] Location OPTIONAL,
    pTCBearerCapability           [9] UTF8String OPTIONAL,
    pTCHost                       [10] PTCTargetInformation OPTIONAL
}

PTCSessionAbandon  ::= SEQUENCE
```

```
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCSessionInfo                [3] PTCSessionInfo,
    location                      [4] Location OPTIONAL,
    pTCAbandonCause               [5] INTEGER
}

PTCSessionStart  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCServerURI                  [3] UTF8String,
    pTCSessionInfo                [4] PTCSessionInfo,
    pTCOriginatingID              [5] PTCTargetInformation,
    pTCParticipants               [6] SEQUENCE OF PTCTargetInformation OPTIONAL,
    pTCParticipantPresenceStatus  [7] MultipleParticipantPresenceStatus OPTIONAL,
    location                      [8] Location OPTIONAL,
    pTCHost                       [9] PTCTargetInformation OPTIONAL,
    pTCBearerCapability           [10] UTF8String OPTIONAL
}

PTCSessionEnd  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCServerURI                  [3] UTF8String,
    pTCSessionInfo                [4] PTCSessionInfo,
    pTCParticipants               [5] SEQUENCE OF PTCTargetInformation OPTIONAL,
    location                      [6] Location OPTIONAL,
    pTCSessionEndCause            [7] PTCSessionEndCause
}

PTCStartOfInterception  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    preEstSessionID               [3] PTCSessionInfo OPTIONAL,
    pTCOriginatingID              [4] PTCTargetInformation,
    pTCSessionInfo                [5] PTCSessionInfo OPTIONAL,
    pTCHost                       [6] PTCTargetInformation OPTIONAL,
    pTCParticipants               [7] SEQUENCE OF PTCTargetInformation OPTIONAL,
    pTCMediaStreamAvail           [8] BOOLEAN OPTIONAL,
    pTCBearerCapability           [9] UTF8String OPTIONAL
}

PTCPreEstablishedSession  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCServerURI                  [2] UTF8String,
    rTPSetting                    [3] RTPSetting,
    pTCMediaCapability            [4] UTF8String,
    pTCPreEstSessionID            [5] PTCSessionInfo,
    pTCPreEstStatus               [6] PTCPreEstStatus,
    pTCMediaStreamAvail           [7] BOOLEAN OPTIONAL,
    location                      [8] Location OPTIONAL,
    pTCFailureCode                [9] PTCFailureCode OPTIONAL
}

PTCInstantPersonalAlert  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCIPAPartyID                 [2] PTCTargetInformation,
    pTCIPADirection               [3] Direction
}

PTCPartyJoin  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCSessionInfo                [3] PTCSessionInfo,
    pTCParticipants               [4] SEQUENCE OF PTCTargetInformation OPTIONAL,
    pTCParticipantPresenceStatus  [5] MultipleParticipantPresenceStatus OPTIONAL,
    pTCMediaStreamAvail           [6] BOOLEAN OPTIONAL,
    pTCBearerCapability           [7] UTF8String OPTIONAL
}

PTCPartyDrop  ::= SEQUENCE
```

```
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCSessionInfo                [3] PTCSessionInfo,
    pTCPartyDrop                  [4] PTCTargetInformation,
    pTCParticipantPresenceStatus  [5] PTCParticipantPresenceStatus OPTIONAL
}

PTCPartyHold  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCSessionInfo                [3] PTCSessionInfo,
    pTCParticipants               [4] SEQUENCE OF PTCTargetInformation OPTIONAL,
    pTCHoldID                     [5] SEQUENCE OF PTCTargetInformation,
    pTCHoldRetrieveInd            [6] BOOLEAN
}

PTCMediaModification  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCSessionInfo                [3] PTCSessionInfo,
    pTCMediaStreamAvail           [4] BOOLEAN OPTIONAL,
    pTCBearerCapability           [5] UTF8String
}

PTCGroupAdvertisement  ::=SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCIDList                     [3] SEQUENCE OF PTCTargetInformation OPTIONAL,
    pTCGroupAuthRule              [4] PTCGroupAuthRule OPTIONAL,
    pTCGroupAdSender              [5] PTCTargetInformation,
    pTCGroupNickname              [6] UTF8String OPTIONAL
}

PTCFloorControl  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCSessioninfo                [3] PTCSessionInfo,
    pTCFloorActivity              [4] SEQUENCE OF PTCFloorActivity,
    pTCFloorSpeakerID             [5] PTCTargetInformation OPTIONAL,
    pTCMaxTBTime                  [6] INTEGER OPTIONAL,
    pTCQueuedFloorControl         [7] BOOLEAN OPTIONAL,
    pTCQueuedPosition             [8] INTEGER OPTIONAL,
    pTCTalkBurstPriority          [9] PTCTBPriorityLevel OPTIONAL,
    pTCTalkBurstReason            [10] PTCTBReasonCode OPTIONAL
}

PTCTargetPresence  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCTargetPresenceStatus       [2] PTCParticipantPresenceStatus
}

PTCParticipantPresence  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCParticipantPresenceStatus  [2] PTCParticipantPresenceStatus
}

PTCListManagement  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
    pTCDirection                  [2] Direction,
    pTCListManagementType         [3] PTCListManagementType OPTIONAL,
    pTCListManagementAction       [4] PTCListManagementAction OPTIONAL,
    pTCListManagementFailure      [5] PTCListManagementFailure OPTIONAL,
    pTCContactID                  [6] PTCTargetInformation OPTIONAL,
    pTCIDList                     [7] SEQUENCE OF PTCIDList OPTIONAL,
    pTCHost                       [8] PTCTargetInformation OPTIONAL
}

PTCAccessPolicy  ::= SEQUENCE
{
    pTCTargetInformation          [1] PTCTargetInformation,
```

```
    pTCDirection                [2] Direction,
    pTCAccessPolicyType         [3] PTCAccessPolicyType OPTIONAL,
    pTCUserAccessPolicy         [4] PTCUserAccessPolicy OPTIONAL,
    pTCGroupAuthRule            [5] PTCGroupAuthRule OPTIONAL,
    pTCContactID                [6] PTCTargetInformation OPTIONAL,
    pTCAccessPolicyFailure      [7] PTCAccessPolicyFailure OPTIONAL
}


-- =================
-- 5G PTC parameters
-- =================

PTCRegistrationRequest  ::= ENUMERATED
{
    register(1),
    reRegister(2),
    deRegister(3)
}

PTCRegistrationOutcome  ::= ENUMERATED
{
    success(1),
    failure(2)
}

PTCSessionEndCause  ::= ENUMERATED
{
    initiaterLeavesSession(1),
    definedParticipantLeaves(2),
    numberOfParticipants(3),
    sessionTimerExpired(4),
    pTCSpeechInactive(5),
    allMediaTypesInactive(6)
}

PTCTargetInformation  ::= SEQUENCE
{
    identifiers             [1] SEQUENCE SIZE(1..MAX) OF PTCIdentifiers
}

PTCIdentifiers  ::= CHOICE
{
    mCPTTID                 [1] UTF8String,
    instanceIdentifierURN   [2] UTF8String,
    pTCChatGroupID          [3] PTCChatGroupID,
    iMPU                    [4] IMPU,
    iMPI                    [5] IMPI
}

PTCSessionInfo  ::= SEQUENCE
{
    pTCSessionURI           [1] UTF8String,
    pTCSessionType          [2] PTCSessionType
}

PTCSessionType  ::= ENUMERATED
{
    ondemand(1),
    preEstablished(2),
    adhoc(3),
    prearranged(4),
    groupSession(5)
}

MultipleParticipantPresenceStatus  ::= SEQUENCE OF PTCParticipantPresenceStatus

PTCParticipantPresenceStatus  ::= SEQUENCE
{
    presenceID              [1] PTCTargetInformation,
    presenceType            [2] PTCPresenceType,
    presenceStatus          [3] BOOLEAN
}

PTCPresenceType  ::= ENUMERATED
{
    pTCClient(1),
    pTCGroup(2)
```

```
}

PTCPreEstStatus  ::= ENUMERATED
{
    established(1),
    modified(2),
    released(3)
}

RTPSetting  ::= SEQUENCE
{
    iPAddress                   [1] IPAddress,
    portNumber                  [2] PortNumber
}

PTCIDList  ::= SEQUENCE
{
    pTCPartyID                  [1] PTCTargetInformation,
    pTCChatGroupID                  [2] PTCChatGroupID
}

PTCChatGroupID  ::= SEQUENCE
{
    groupIdentity               [1] UTF8String
}

PTCFloorActivity  ::= ENUMERATED
{
    tBCPRequest(1),
    tBCPGranted(2),
    tBCPDeny(3),
    tBCPIdle(4),
    tBCPTaken(5),
    tBCPRevoke(6),
    tBCPQueued(7),
    tBCPRelease(8)
}

PTCTBPriorityLevel  ::= ENUMERATED
{
    preEmptive(1),
    highPriority(2),
    normalPriority(3),
    listenOnly(4)
}

PTCTBReasonCode  ::= ENUMERATED
{
    noQueuingAllowed(1),
    oneParticipantSession(2),
    listenOnly(3),
    exceededMaxDuration(4),
    tBPrevented(5)
}

PTCListManagementType  ::= ENUMERATED
{
  contactListManagementAttempt(1),
  groupListManagementAttempt(2),
  contactListManagementResult(3),
  groupListManagementResult(4),
  requestUnsuccessful(5)
}


PTCListManagementAction  ::= ENUMERATED
{
  create(1),
  modify(2),
  retrieve(3),
  delete(4),
  notify(5)
}

PTCAccessPolicyType  ::= ENUMERATED
{
    pTCUserAccessPolicyAttempt(1),
    groupAuthorizationRulesAttempt(2),
```

```
    pTCUserAccessPolicyQuery(3),
    groupAuthorizationRulesQuery(4),
    pTCUserAccessPolicyResult(5),
    groupAuthorizationRulesResult(6),
    requestUnsuccessful(7)
}

PTCUserAccessPolicy  ::= ENUMERATED
{
    allowIncomingPTCSessionRequest(1),
    blockIncomingPTCSessionRequest(2),
    allowAutoAnswerMode(3),
    allowOverrideManualAnswerMode(4)
}

PTCGroupAuthRule  ::= ENUMERATED
{
    allowInitiatingPTCSession(1),
    blockInitiatingPTCSession(2),
    allowJoiningPTCSession(3),
    blockJoiningPTCSession(4),
    allowAddParticipants(5),
    blockAddParticipants(6),
    allowSubscriptionPTCSessionState(7),
    blockSubscriptionPTCSessionState(8),
    allowAnonymity(9),
    forbidAnonymity(10)
}

PTCFailureCode  ::= ENUMERATED
{
    sessionCannotBeEstablished(1),
    sessionCannotBeModified(2)
}

PTCListManagementFailure  ::= ENUMERATED
{
    requestUnsuccessful(1),
    requestUnknown(2)
}

PTCAccessPolicyFailure  ::= ENUMERATED
{
    requestUnsuccessful(1),
    requestUnknown(2)
}

-- ====================
-- 5G LALS definitions
-- ====================

LALSReport ::= SEQUENCE
{
    sUPI                [1] SUPI OPTIONAL,
    pEI                 [2] PEI OPTIONAL,
    gPSI                [3] GPSI OPTIONAL,
    location            [4] Location OPTIONAL
}

-- ======================
-- PDHR/PDSR definitions
-- ======================

PDHeaderReport ::= SEQUENCE
{
    pDUSessionID                [1] PDUSessionID,
    sourceIPAddress             [2] IPAddress,
    sourcePort                  [3] PortNumber OPTIONAL,
    destinationIPAddress        [4] IPAddress,
    destinationPort             [5] PortNumber OPTIONAL,
    nextLayerProtocol           [6] NextLayerProtocol,
    iPv6flowLabel               [7] IPv6FlowLabel OPTIONAL,
    direction                   [8] Direction,
    packetSize                  [9] INTEGER
}

PDSummaryReport ::= SEQUENCE
{
```

```
    pDUSessionID                [1] PDUSessionID,
    sourceIPAddress             [2] IPAddress,
    sourcePort                  [3] PortNumber OPTIONAL,
    destinationIPAddress        [4] IPAddress,
    destinationPort             [5] PortNumber OPTIONAL,
    nextLayerProtocol           [6] NextLayerProtocol,
    iPv6flowLabel               [7] IPv6FlowLabel OPTIONAL,
    direction                   [8] Direction,
    pDSRSummaryTrigger          [9] PDSRSummaryTrigger,
    firstPacketTimestamp        [10] Timestamp,
    lastPacketTimestamp         [11] Timestamp,
    packetCount                 [12] INTEGER,
    byteCount                   [13] INTEGER
}

-- ====================
-- PDHR/PDSR parameters
-- ====================

PDSRSummaryTrigger ::= ENUMERATED
{
    timerExpiry(1),
    packetCount(2),
    byteCount(3)
}

-- ============================
-- LI Notification definitions
-- ============================

LINotification ::= SEQUENCE
{
    notificationType                    [1] LINotificationType,
    appliedTargetID                     [2] TargetIdentifier OPTIONAL,
    appliedDeliveryInformation          [3] SEQUENCE OF LIAppliedDeliveryInformation OPTIONAL,
    appliedStartTime                    [4] Timestamp OPTIONAL,
    appliedEndTime                      [5] Timestamp OPTIONAL
}

-- ==========================
-- LI Notification parameters
-- ==========================

LINotificationType ::= ENUMERATED
{
    activation(1),
    deactivation(2),
    modification(3)
}

LIAppliedDeliveryInformation ::= SEQUENCE
{
    hI2DeliveryIPAddress                [1] IPAddress OPTIONAL,
    hI2DeliveryPortNumber               [2] PortNumber OPTIONAL,
    hI3DeliveryIPAddress                [3] IPAddress OPTIONAL,
    hI3DeliveryPortNumber               [4] PortNumber OPTIONAL
}

-- ===============
-- MDF definitions
-- ===============

MDFCellSiteReport ::= SEQUENCE OF CellInformation

-- =================
-- Common Parameters
-- =================

AccessType ::= ENUMERATED
{
    threeGPPAccess(1),
    nonThreeGPPAccess(2),
    threeGPPandNonThreeGPPAccess(3)
}

Direction ::= ENUMERATED
{
    fromTarget(1),
```

```
    toTarget(2)
}

DNN ::= UTF8String

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

EmailAddress ::= UTF8String

FiveGGUTI ::= SEQUENCE
{
    mCC         [1] MCC,
    mNC         [2] MNC,
    aMFRegionID [3] AMFRegionID,
    aMFSetID    [4] AMFSetID,
    aMFPointer  [5] AMFPointer,
    fiveGTMSI   [6] FiveGTMSI
}

FiveGMMCause ::= INTEGER (0..255)

FiveGSMRequestType ::= ENUMERATED
{
    initialRequest(1),
    existingPDUSession(2),
    initialEmergencyRequest(3),
    existingEmergencyPDUSession(4),
    modificationRequest(5),
    reserved(6),
    mAPDURequest(7)
}

FiveGSMCause ::= INTEGER (0..255)

FiveGTMSI ::= INTEGER (0..4294967295)

FTEID ::= SEQUENCE
{
    tEID        [1] INTEGER (0.. 4294967295),
    iPv4Address [2] IPv4Address OPTIONAL,
    iPv6Address [3] IPv6Address OPTIONAL
}

GPSI ::= CHOICE
{
    mSISDN      [1] MSISDN,
    nAI         [2] NAI
}

GUAMI ::= SEQUENCE
{
    aMFID       [1] AMFID,
    pLMNID      [2] PLMNID
}

GUMMEI ::= SEQUENCE
{
    mMEID       [1] MMEID,
    mCC         [2] MCC,
    mNC         [3] MNC
}

HomeNetworkPublicKeyID ::= OCTET STRING

HSMFURI ::= UTF8String

IMEI ::= NumericString (SIZE(14))

IMEISV ::= NumericString (SIZE(16))

IMPI ::= NAI

IMPU ::= CHOICE
{
    sIPURI [1] SIPURI,
    tELURI [2] TELURI
}
```

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

Initiator ::= ENUMERATED
{
    uE(1),
    network(2),
    unknown(3)
}

IPAddress ::= CHOICE
{
    iPv4Address [1] IPv4Address,
    iPv6Address [2] IPv6Address
}

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

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

IPv6FlowLabel ::= INTEGER(0..1048575)

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

MCC ::= NumericString (SIZE(3))

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

MMEID ::= SEQUENCE
{
    mMEGI       [1] MMEGI,
    mMEC        [2] MMEC
}

MMEC ::= NumericString

MMEGI ::= NumericString

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

NAI ::= UTF8String

NextLayerProtocol ::= INTEGER(0..255)

NonLocalID ::= ENUMERATED
{
    local(1),
    nonLocal(2)
}

NSSAI ::= SEQUENCE OF SNSSAI

PLMNID ::= SEQUENCE
{
    mCC [1] MCC,
    mNC [2] MNC
}

PDUSessionID ::= INTEGER (0..255)

PDUSessionType ::= ENUMERATED
{
    iPv4(1),
    iPv6(2),
    iPv4v6(3),
    unstructured(4),
    ethernet(5)
}

PEI ::= CHOICE
{
    iMEI        [1] IMEI,
    iMEISV      [2] IMEISV
}

PortNumber ::= INTEGER(0..65535)

ProtectionSchemeID ::= INTEGER (0..15)
```

```
RATType ::= ENUMERATED
{
    nR(1),
    eUTRA(2),
    wLAN(3),
    virtual(4),
    nBIOT(5),
    wireline(6),
    wirelineCable(7),
    wirelineBBF(8),
    lTEM(9),
    nRU(10),
    eUTRAU(11),
    trustedN3GA(12),
    trustedWLAN(13),
    uTRA(14),
    gERA(15)
}

RejectedNSSAI ::= SEQUENCE OF RejectedSNSSAI

RejectedSNSSAI ::= SEQUENCE
{
    causeValue  [1] RejectedSliceCauseValue,
    sNSSAI      [2] SNSSAI
}

RejectedSliceCauseValue ::= INTEGER (0..255)

RoutingIndicator ::= INTEGER (0..9999)

SchemeOutput ::= OCTET STRING

SIPURI ::= UTF8String

Slice ::= SEQUENCE
{
    allowedNSSAI        [1] NSSAI OPTIONAL,
    configuredNSSAI     [2] NSSAI OPTIONAL,
    rejectedNSSAI       [3] RejectedNSSAI OPTIONAL
}

SMPDUDNRequest ::= OCTET STRING

SNSSAI ::= SEQUENCE
{
    sliceServiceType    [1] INTEGER (0..255),
    sliceDifferentiator [2] OCTET STRING (SIZE(3)) OPTIONAL
}

SUCI ::= SEQUENCE
{
    mCC                         [1] MCC,
    mNC                         [2] MNC,
    routingIndicator            [3] RoutingIndicator,
    protectionSchemeID          [4] ProtectionSchemeID,
    homeNetworkPublicKeyID      [5] HomeNetworkPublicKeyID,
    schemeOutput                [6] SchemeOutput
}

SUPI ::= CHOICE
{
    iMSI        [1] IMSI,
    nAI         [2] NAI
}

SUPIUnauthenticatedIndication ::= BOOLEAN

TargetIdentifier ::= CHOICE
{
    sUPI                [1] SUPI,
    iMSI                [2] IMSI,
    pEI                 [3] PEI,
    iMEI                [4] IMEI,
    gPSI                [5] GPSI,
    mSISDN              [6] MSISDN,
    nAI                 [7] NAI,
    iPv4Address         [8] IPv4Address,
```

```
    iPv6Address         [9] IPv6Address,
    ethernetAddress     [10] MACAddress
}

TargetIdentifierProvenance ::= ENUMERATED
{
    lEAProvided(1),
    observed(2),
    matchedOn(3),
    other(4)
}

TELURI ::= UTF8String

Timestamp ::= GeneralizedTime

UEEndpointAddress ::= CHOICE
{
    iPv4Address         [1] IPv4Address,
    iPv6Address         [2] IPv6Address,
    ethernetAddress     [3] MACAddress
}

-- ==================
-- Location parameters
-- ==================

Location ::= SEQUENCE
{
    locationInfo                [1] LocationInfo OPTIONAL,
    positioningInfo             [2] PositioningInfo OPTIONAL,
    locationPresenceReport      [3] LocationPresenceReport OPTIONAL
}

CellSiteInformation ::= SEQUENCE
{
    geographicalCoordinates     [1] GeographicalCoordinates,
    azimuth                     [2] INTEGER (0..359) OPTIONAL,
    operatorSpecificInformation [3] UTF8String OPTIONAL
}

-- TS 29.518 [22], clause 6.4.6.2.6
LocationInfo ::= SEQUENCE
{
    userLocation                [1] UserLocation OPTIONAL,
    currentLoc                  [2] BOOLEAN OPTIONAL,
    geoInfo                     [3] GeographicArea OPTIONAL,
    rATType                     [4] RATType OPTIONAL,
    timeZone                    [5] TimeZone OPTIONAL,
    additionalCellIDs           [6] SEQUENCE OF CellInformation OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.7
UserLocation ::= SEQUENCE
{
    eUTRALocation               [1] EUTRALocation OPTIONAL,
    nRLocation                  [2] NRLocation OPTIONAL,
    n3GALocation                [3] N3GALocation OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.8
EUTRALocation ::= SEQUENCE
{
    tAI                         [1] TAI,
    eCGI                        [2] ECGI,
    ageOfLocatonInfo            [3] INTEGER OPTIONAL,
    uELocationTimestamp         [4] Timestamp OPTIONAL,
    geographicalInformation     [5] UTF8String OPTIONAL,
    geodeticInformation         [6] UTF8String OPTIONAL,
    globalNGENbID               [7] GlobalRANNodeID OPTIONAL,
    cellSiteInformation         [8] CellSiteInformation OPTIONAL,
    globalENbID                 [9] GlobalRANNodeID OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.9
NRLocation ::= SEQUENCE
{
    tAI                         [1] TAI,
```

```
    nCGI                        [2] NCGI,
    ageOfLocatonInfo            [3] INTEGER OPTIONAL,
    uELocationTimestamp         [4] Timestamp OPTIONAL,
    geographicalInformation     [5] UTF8String OPTIONAL,
    geodeticInformation         [6] UTF8String OPTIONAL,
    globalGNbID                 [7] GlobalRANNodeID OPTIONAL,
    cellSiteInformation         [8] CellSiteInformation OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.10
N3GALocation ::= SEQUENCE
{
    tAI                         [1] TAI OPTIONAL,
    n3IWFID                     [2] N3IWFIDNGAP OPTIONAL,
    uEIPAddr                    [3] IPAddr OPTIONAL,
    portNumber                  [4] INTEGER OPTIONAL
}

-- TS 38.413 [23], clause 9.3.2.4
IPAddr ::= SEQUENCE
{
    iPv4Addr                    [1] IPv4Address OPTIONAL,
    iPv6Addr                    [2] IPv6Address OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.28
GlobalRANNodeID ::= SEQUENCE
{
    pLMNID                      [1] PLMNID,
    aNNodeID                    [2] ANNodeID,
    nID                         [3] NID OPTIONAL
}

ANNodeID ::= CHOICE
{
    n3IWFID [1] N3IWFIDSBI,
    gNbID   [2] GNbID,
    nGENbID [3] NGENbID,
    eNbID   [4] ENbID
}

-- TS 38.413 [23], clause 9.3.1.6
GNbID ::= BIT STRING(SIZE(22..32))

-- TS 29.571 [17], clause 5.4.4.4
TAI ::= SEQUENCE
{
    pLMNID                      [1] PLMNID,
    tAC                         [2] TAC,
    nID                         [3] NID OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.5
ECGI ::= SEQUENCE
{
    pLMNID                      [1] PLMNID,
    eUTRACellID                 [2] EUTRACellID,
   nID                         [3] NID OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.6
NCGI ::= SEQUENCE
{
    pLMNID                      [1] PLMNID,
    nRCellID                    [2] NRCellID,
    nID                         [3] NID OPTIONAL
}

RANCGI ::= CHOICE
{
    eCGI                        [1] ECGI,
    nCGI                        [2] NCGI
}

CellInformation ::= SEQUENCE
{
    rANCGI                      [1] RANCGI,
    cellSiteinformation         [2] CellSiteInformation OPTIONAL,
```

```
    timeOfLocation              [3] Timestamp OPTIONAL
}

-- TS 38.413 [23], clause 9.3.1.57
N3IWFIDNGAP ::= BIT STRING (SIZE(16))

-- TS 29.571 [17], clause 5.4.4.28
N3IWFIDSBI ::= UTF8String

-- TS 29.571 [17], table 5.4.2-1
TAC ::= OCTET STRING (SIZE(2..3))

-- TS 38.413 [23], clause 9.3.1.9
EUTRACellID ::= BIT STRING (SIZE(28))

-- TS 38.413 [23], clause 9.3.1.7
NRCellID ::= BIT STRING (SIZE(36))

-- TS 38.413 [23], clause 9.3.1.8
NGENbID ::= CHOICE
{
    macroNGENbID                [1] BIT STRING (SIZE(20)),
    shortMacroNGENbID           [2] BIT STRING (SIZE(18)),
    longMacroNGENbID            [3] BIT STRING (SIZE(21))
}
-- TS 23.003 [19], clause 12.7.1 encoded as per TS 29.571 [17], clause 5.4.2
NID ::= UTF8String (SIZE(11))

-- TS 36.413 [38], clause 9.2.1.37
ENbID ::= CHOICE
{
    macroENbID                  [1] BIT STRING (SIZE(20)),
    homeENbID                   [2] BIT STRING (SIZE(28)),
    shortMacroENbID             [3] BIT STRING (SIZE(18)),
    longMacroENbID              [4] BIT STRING (SIZE(21))
}


-- TS 29.518 [22], clause 6.4.6.2.3
PositioningInfo ::= SEQUENCE
{
    positionInfo                [1] LocationData OPTIONAL,
    rawMLPResponse              [2] RawMLPResponse OPTIONAL
}

RawMLPResponse ::= CHOICE
{
    -- The following parameter contains a copy of unparsed XML code of the
    -- MLP response message, i.e. the entire XML document containing
    -- a <slia> (described in OMA-TS-MLP-V3_5-20181211-C [20], clause 5.2.3.2.2) or
    -- a <slirep> (described in OMA-TS-MLP-V3_5-20181211-C [20], clause 5.2.3.2.3) MLP message.
    mLPPositionData             [1] UTF8String,
    -- OMA MLP result id, defined in OMA-TS-MLP-V3_5-20181211-C [20], Clause 5.4
    mLPErrorCode                [2] INTEGER (1..699)
}

-- TS 29.572 [24], clause 6.1.6.2.3
LocationData ::= SEQUENCE
{
    locationEstimate            [1] GeographicArea,
    accuracyFulfilmentIndicator [2] AccuracyFulfilmentIndicator OPTIONAL,
    ageOfLocationEstimate       [3] AgeOfLocationEstimate OPTIONAL,
    velocityEstimate            [4] VelocityEstimate OPTIONAL,
    civicAddress                [5] CivicAddress OPTIONAL,
    positioningDataList         [6] SET OF PositioningMethodAndUsage OPTIONAL,
    gNSSPositioningDataList     [7] SET OF GNSSPositioningMethodAndUsage OPTIONAL,
    eCGI                        [8] ECGI OPTIONAL,
    nCGI                        [9] NCGI OPTIONAL,
    altitude                    [10] Altitude OPTIONAL,
    barometricPressure          [11] BarometricPressure OPTIONAL
}

-- TS 29.518 [22], clause 6.2.6.2.5
LocationPresenceReport ::= SEQUENCE
{
    type                        [1] AMFEventType,
    timestamp                   [2] Timestamp,
    areaList                    [3] SET OF AMFEventArea OPTIONAL,
```

```
    timeZone                    [4] TimeZone OPTIONAL,
    accessTypes                 [5] SET OF AccessType OPTIONAL,
    rMInfoList                  [6] SET OF RMInfo OPTIONAL,
    cMInfoList                  [7] SET OF CMInfo OPTIONAL,
    reachability                [8] UEReachability OPTIONAL,
    location                    [9] UserLocation OPTIONAL,
    additionalCellIDs           [10] SEQUENCE OF CellInformation OPTIONAL
}

-- TS 29.518 [22], clause 6.2.6.3.3
AMFEventType ::= ENUMERATED
{
    locationReport(1),
    presenceInAOIReport(2)
}

-- TS 29.518 [22], clause 6.2.6.2.16
AMFEventArea ::= SEQUENCE
{
    presenceInfo                [1] PresenceInfo OPTIONAL,
    lADNInfo                    [2] LADNInfo OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.27
PresenceInfo ::= SEQUENCE
{
    presenceState               [1] PresenceState OPTIONAL,
    trackingAreaList            [2] SET OF TAI OPTIONAL,
    eCGIList                    [3] SET OF ECGI OPTIONAL,
    nCGIList                    [4] SET OF NCGI OPTIONAL,
    globalRANNodeIDList         [5] SET OF GlobalRANNodeID OPTIONAL,
    globalENbIDList             [6] SET OF GlobalRANNodeID OPTIONAL
}

-- TS 29.518 [22], clause 6.2.6.2.17
LADNInfo ::= SEQUENCE
{
    lADN                        [1] UTF8String,
    presence                    [2] PresenceState OPTIONAL
}

-- TS 29.571 [17], clause 5.4.3.20
PresenceState ::= ENUMERATED
{
    inArea(1),
    outOfArea(2),
    unknown(3),
    inactive(4)
}

-- TS 29.518 [22], clause 6.2.6.2.8
RMInfo ::= SEQUENCE
{
    rMState                     [1] RMState,
    accessType                  [2] AccessType
}

-- TS 29.518 [22], clause 6.2.6.2.9
CMInfo ::= SEQUENCE
{
    cMState                     [1] CMState,
    accessType                  [2] AccessType
}

-- TS 29.518 [22], clause 6.2.6.3.7
UEReachability ::= ENUMERATED
{
    unreachable(1),
    reachable(2),
    regulatoryOnly(3)
}

-- TS 29.518 [22], clause 6.2.6.3.9
RMState ::= ENUMERATED
{
    registered(1),
    deregistered(2)
}
```

```
-- TS 29.518 [22], clause 6.2.6.3.10
CMState ::= ENUMERATED
{
    idle(1),
    connected(2)
}

-- TS 29.572 [24], clause 6.1.6.2.5
GeographicArea ::= CHOICE
{
    point                       [1] Point,
    pointUncertaintyCircle      [2] PointUncertaintyCircle,
    pointUncertaintyEllipse     [3] PointUncertaintyEllipse,
    polygon                     [4] Polygon,
    pointAltitude               [5] PointAltitude,
    pointAltitudeUncertainty    [6] PointAltitudeUncertainty,
    ellipsoidArc                [7] EllipsoidArc
}

-- TS 29.572 [24], clause 6.1.6.3.12
AccuracyFulfilmentIndicator ::= ENUMERATED
{
    requestedAccuracyFulfilled(1),
    requestedAccuracyNotFulfilled(2)
}

-- TS 29.572 [24], clause 6.1.6.2.17
VelocityEstimate ::= CHOICE
{
    horVelocity                         [1] HorizontalVelocity,
    horWithVertVelocity                 [2] HorizontalWithVerticalVelocity,
    horVelocityWithUncertainty          [3] HorizontalVelocityWithUncertainty,
    horWithVertVelocityAndUncertainty   [4] HorizontalWithVerticalVelocityAndUncertainty
}

-- TS 29.572 [24], clause 6.1.6.2.14
CivicAddress ::= SEQUENCE
{
    country                             [1] UTF8String,
    a1                                  [2] UTF8String OPTIONAL,
    a2                                  [3] UTF8String OPTIONAL,
    a3                                  [4] UTF8String OPTIONAL,
    a4                                  [5] UTF8String OPTIONAL,
    a5                                  [6] UTF8String OPTIONAL,
    a6                                  [7] UTF8String OPTIONAL,
    prd                                 [8] UTF8String OPTIONAL,
    pod                                 [9] UTF8String OPTIONAL,
    sts                                 [10] UTF8String OPTIONAL,
    hno                                 [11] UTF8String OPTIONAL,
    hns                                 [12] UTF8String OPTIONAL,
    lmk                                 [13] UTF8String OPTIONAL,
    loc                                 [14] UTF8String OPTIONAL,
    nam                                 [15] UTF8String OPTIONAL,
    pc                                  [16] UTF8String OPTIONAL,
    bld                                 [17] UTF8String OPTIONAL,
    unit                                [18] UTF8String OPTIONAL,
    flr                                 [19] UTF8String OPTIONAL,
    room                                [20] UTF8String OPTIONAL,
    plc                                 [21] UTF8String OPTIONAL,
    pcn                                 [22] UTF8String OPTIONAL,
    pobox                               [23] UTF8String OPTIONAL,
    addcode                             [24] UTF8String OPTIONAL,
    seat                                [25] UTF8String OPTIONAL,
    rd                                  [26] UTF8String OPTIONAL,
    rdsec                               [27] UTF8String OPTIONAL,
    rdbr                                [28] UTF8String OPTIONAL,
    rdsubbr                             [29] UTF8String OPTIONAL,
    prm                                 [30] UTF8String OPTIONAL,
    pom                                 [31] UTF8String OPTIONAL
}

-- TS 29.572 [24], clause 6.1.6.2.15
PositioningMethodAndUsage ::= SEQUENCE
{
    method                              [1] PositioningMethod,
    mode                                [2] PositioningMode,
    usage                               [3] Usage
```

```
}

-- 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),
    barometricPresure(4),
    wLAN(5),
    bluetooth(6),
    mBS(7),
    motionSensor(8)
}

-- 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)
}

-- 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

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:v2"
           targetNamespace="urn:3GPP:ns:li:3GPPX1Extensions:r16:v2"
           elementFormDefault="qualified">

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

<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: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: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: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"></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:simpleType name="TimerExpiryInSeconds">
    <xs:restriction base="xs:nonNegativeInteger">
    </xs:restriction>
  </xs:simpleType>

</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 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	33.128 LALS Reference Corr (Rel-16)	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 in TS 33.128	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
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 to TS 33.128	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

History

Document history		
V16.3.0	November 2020	Publication
V16.4.0	November 2020	Publication