

# ETSI TS 133 128 V15.1.0 (2019-07)



TECHNICAL SPECIFICATION

**LTE;  
5G;**

**Digital cellular telecommunications system (Phase 2+) (GSM);  
Universal Mobile Telecommunications System (UMTS);**

**Security;**

**Protocol and procedures for Lawful Interception (LI);  
Stage 3**

**(3GPP TS 33.128 version 15.1.0 Release 15)**



---

**Reference**RTS/TSGS-0333128v10

---

**Keywords**5G,GSM,LTE,SECURITY,UMTS

---

**ETSI**650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

---

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

---

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at [www.etsi.org/deliver](http://www.etsi.org/deliver).

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

---

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2019.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

## Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

---

# Legal Notice

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

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

---

# Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

# Contents

Intellectual Property Rights .....	2
Legal Notice .....	2
Modal verbs terminology.....	2
Foreword.....	6
Introduction .....	6
1 Scope .....	7
2 References .....	7
3 Definitions, symbols and abbreviations .....	8
3.1 Definitions .....	8
3.2 Symbols.....	8
3.3 Abbreviations .....	9
4 General .....	9
4.1 Introduction .....	9
4.2 Basic principles for internal interfaces .....	10
4.3 Basic principles for external handover interfaces.....	11
5 Transport and Communications Protocol.....	11
5.1 General .....	11
5.2 Protocols for LI_X1 and LI_T interfaces .....	11
5.2.1 General usage of ETSI TS 103 221-1 .....	11
5.2.2 Usage for realising LI_X1 .....	12
5.2.3 Usage for realising LI_X1 (management).....	12
5.2.4 Service scoping .....	12
5.2.4.1 General .....	12
5.2.4.2 CSP service type .....	12
5.2.4.3 Interception type .....	12
5.2.4.4 Location .....	12
5.2.4.5 Roaming.....	13
5.2.5 Usage for realising LI_T2.....	13
5.2.6 Usage for realising LI_T3.....	13
5.3 Protocols for LI_X2 and LI_X3.....	13
5.3.1 General usage of ETSI TS 103 221-2 .....	13
5.3.2 Usage for realising LI_X2 .....	13
5.3.3 Usage for realising LI_X3 .....	13
5.4 Protocols for LI_HI1 .....	14
5.4.1 General.....	14
5.5 Protocols for LI_HI2 and LI_HI3.....	14
5.5.1 General.....	14
5.5.2 Usage for realising LI_HI2 .....	14
5.5.3 Usage for realising LI_HI3 .....	14
5.6 Protocols for LI_HI4 .....	14
5.6.1 General.....	14
5.6.2 Usage for realising LI_HI4 .....	14
6 Network Layer Based Interception.....	15
6.1 Introduction .....	15
6.2 5G.....	15
6.2.1 General.....	15
6.2.2 LI at AMF.....	15
6.2.2.1 Provisioning over LI_X1.....	15
6.2.2.2 Generation of xIRI over LI_X2.....	15
6.2.2.2.1 General .....	15
6.2.2.2.2 Registration .....	16
6.2.2.2.3 Deregistration .....	16

6.2.2.2.4	Location update .....	17
6.2.2.2.5	Start of interception with registered UE .....	18
6.2.2.2.6	AMF unsuccessful procedure .....	19
6.2.2.3	Generation of IRI over LI_HI2 .....	20
6.2.2.4	Identity privacy .....	20
6.2.3	LI for SMF/UPF .....	20
6.2.3.1	Provisioning of SMF over LI_X1 .....	20
6.2.3.2	Generation of xIRI at IRI-POI in SMF over LI_X2 .....	21
6.2.3.2.1	General .....	21
6.2.3.2.2	PDU session establishment .....	21
6.2.3.2.3	PDU session modification .....	22
6.2.3.2.4	PDU session release .....	23
6.2.3.2.5	Start of interception with an established PDU session .....	23
6.2.3.2.6	SMF unsuccessful procedure .....	25
6.2.3.3	Triggering of the CC-POI from CC-TF over LI_T3 .....	25
6.2.3.3.1	LI_T3 interface specifics .....	25
6.2.3.3.2	CC interception with multi-homed PDU session .....	27
6.2.3.3.3	CC Interception only at PDU Session Anchor UPFs .....	27
6.2.3.4	IRI-POI in UPF triggering over LI_T2 .....	27
6.2.3.5	Generation of xIRI at UPF over LI_X2 .....	29
6.2.3.5.1	Packet data header reporting .....	29
6.2.3.5.2	Fragmentation .....	29
6.2.3.5.3	Packet Data Header Reporting (PDHR) .....	29
6.2.3.5.4	Packet Data Summary Reporting (PDSR) .....	31
6.2.3.6	Generation of xCC at CC-POI in the UPF over LI_X3 .....	32
6.2.3.7	Generation of IRI over LI_HI2 .....	32
6.2.3.8	Generation of CC over LI_HI3 .....	32
6.2.3.9	Packet Data Information Reporting at MDF2 .....	32
6.2.4	LI at UDM for 5G .....	33
6.2.4.1	General description .....	33
6.2.5	LI at SMSF .....	33
6.2.5.1	Provisioning over LI_X1 .....	33
6.2.5.2	Generation of xIRI over LI_X2 .....	33
6.2.5.3	SMS Message .....	33
6.2.5.4	Generation of IRI over LI_HI2 .....	35
6.2.6	LI support at NRF .....	35
6.3	4G .....	35
6.4	3G .....	35
7	Service Layer Based Interception .....	35
7.1	Introduction .....	35
7.2	Central Subscriber Management .....	35
7.2.1	General description .....	35
7.2.2	LI at UDM .....	36
7.2.2.1	General description .....	36
7.2.2.2	Provisioning over LI_X1 .....	36
7.2.2.3	Generation of xIRI over LI_X2 .....	36
7.2.2.3.1	General description .....	36
7.2.2.3.2	Serving system .....	36
7.2.2.3.3	Subscriber record change .....	36
7.2.2.3.4	Cancel location .....	37
7.2.2.3.5	Location information request .....	37
7.2.2.4	Generation of IRI over LI_HI2 .....	37
7.2.3	LI at HSS .....	37
7.3	Location .....	37
7.3.1	Lawful Access Location Services (LALS) .....	37
7.3.1.1	General description .....	37
7.3.1.2	Provisioning over LI_X1 .....	37
7.3.1.2.1	Target positioning service .....	37
7.3.1.2.2	Triggered location service .....	38
7.3.1.3	Triggering over LI_T2 .....	39
7.3.1.4	Generation of xIRI over LI_X2 .....	39

7.3.1.5	Generation of IRI over LI_HI2 .....	39
7.3.2	Cell database information reporting.....	40
7.3.2.1	General description .....	40
7.3.2.2	Generation Cell Site Report IRI over LI_HI2 .....	40
<b>Annex A (normative):</b>	<b>Structure of both the Internal and External Interfaces .....</b>	<b>41</b>
<b>Annex B (normative):</b>	<b>LI Notification.....</b>	<b>59</b>
<b>Annex C (normative):</b>	<b>XSD Schema for LI_X1 extensions .....</b>	<b>61</b>
<b>Annex D (informative):</b>	<b>Drafting Guidance .....</b>	<b>65</b>
D.1	Introduction .....	65
D.2	Drafting conventions .....	65
D.3	Naming conventions.....	65
D.4	ASN.1 Syntax conventions.....	66
<b>Annex Z (informative):</b>	<b>Change history .....</b>	<b>67</b>
History .....		68

**iTeh STANDARD PREVIEW**  
 (standards.iteh.ai)

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/aa10a03-d40e-475f-b3b3-24535a043fed/etsi-ts-133-128-v15.1.0-2019-07>

---

## Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

---

## 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); Part 1: Internal Network Interface X1 for Lawful Interception".
- [8] ETSI TS 103 221-2: "Lawful Interception: Internal Network Interface 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-V3-4-20150512-A: "Open Mobile Alliance; Mobile Location Protocol, Version 3.4".
- [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](http://www.iana.org)): Assigned Internet Protocol Numbers, "Protocol Numbers".
- [33] IETF RFC 6437: "IPv6 Flow Label Specification".
- [34] IETF RFC 791: "Internet 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
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

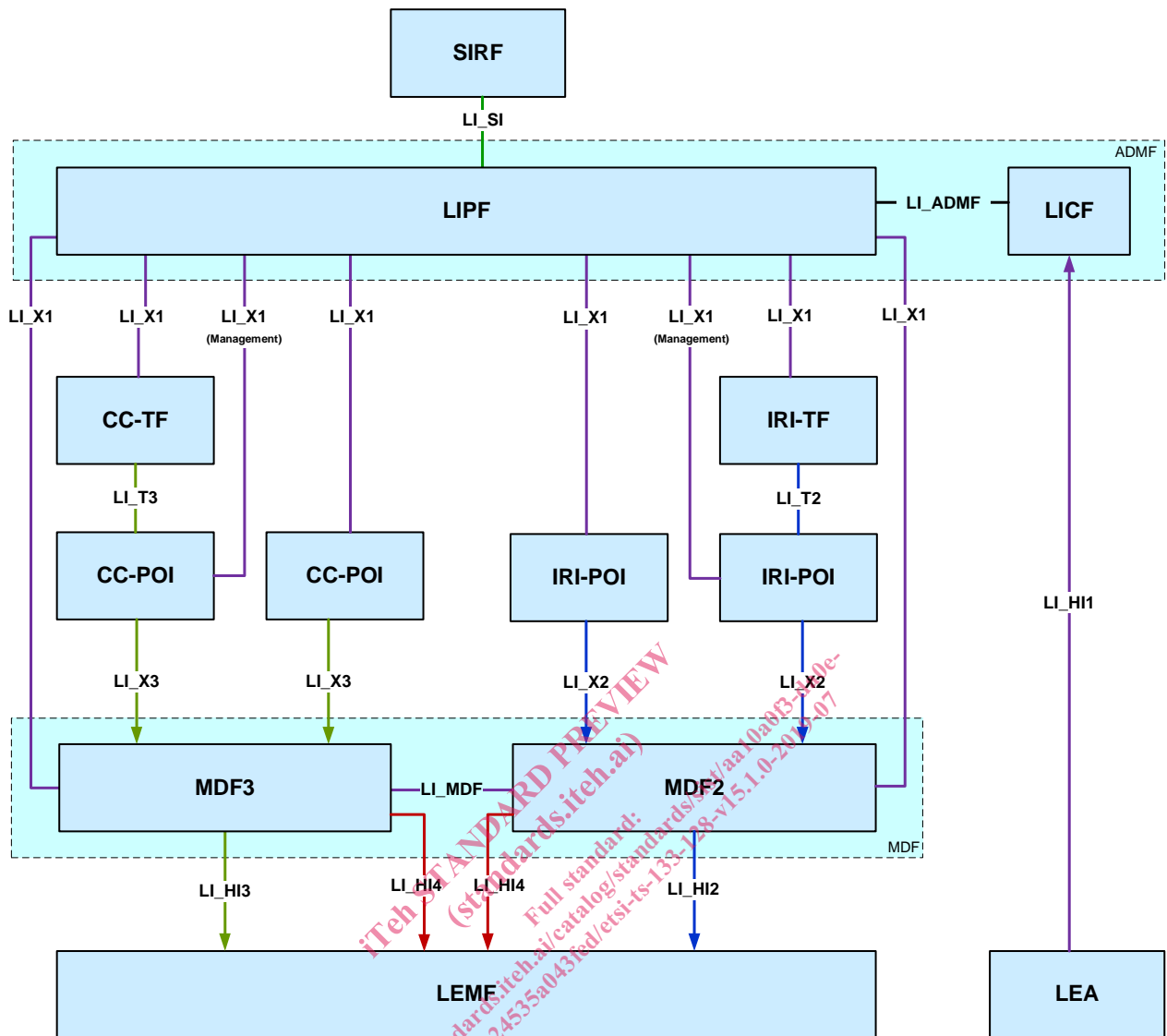
---

## 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 information from IRI-POIs to the MDF2.	ETSI TS 103 221-2 [8].	See clause 5.3.2
LI_X3	Used to pass xCC information 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 from 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

## 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

### 5.2.4.1 General

The CSP shall support the following specified options on a per intercept (per LIID) basis, to ensure strict delivery of only the interception data that an LEA is authorised to receive. These options are not exclusive, i.e., none, one, or more than one item in any given category may be turned on for any given intercept (LIID).

### 5.2.4.2 CSP service type

- Voice.
- Data.
- Messaging (e.g. SMS/MMS).
- Push-to-Talk (including MCPTT).

### 5.2.4.3 Interception type

- IRI.
- CC.

### 5.2.4.4 Location

- Report location at the beginning and end of a session.
- Report location every time the network detects a change in target location (including location update with no physical change of location).
- LALS.