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A. Introduction

This contribution contains the current version of 3GPP TS 33.108 without revision marks.

B. Discussion

This version of 3GPP TS 33.108 (v0.7.3) has been created from version v0.7.2 and incorporates the editorial changes received. This is the clean version for submission to SA3 for approval.

C. Recommendations

Send to SA3 for approval..

3GPP TS 33.108 V0.7.3 (2002-02)

Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Security;
Handover Interface for Lawful Intercept
(Release 5)**



The present document has been developed within the 3rd Generation Partnership Project (3GPP™) and may be further elaborated for the purposes of 3GPP.

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Keywords

Security, Lawful Interception, Architecture

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Contents

1		
2	Foreword.....	5
3	Introduction	5
4	1 Scope.....	6
5	2 References.....	7
6	3 Definitions, symbols and abbreviations	8
7	3.1 Definitions.....	8
8	3.2 Abbreviations.....	10
9	4 General.....	12
10	4.1 Basic principles for the handover interface.....	12
11	4.2 Legal requirements.....	12
12	4.3 Functional requirements.....	12
13	4.4 Overview of handover interface.....	12
14	4.4.1 Handover interface port 2 (HI2).....	13
15	4.4.2 Handover interface port 3 (HI3).....	14
16	4.5 HI2: Interface port for intercept related information.....	14
17	4.5.1 Data transmission protocols.....	14
18	4.5.2 Application for IRI (HI2 information)	14
19	4.5.3 Types of IRI records	15
20	5 Circuit-switch domain.....	16
21	6 Packet data domain	17
22	6.1 Identifiers.....	17
23	6.1.1 Lawful interception identifier	17
24	6.1.2 Network identifier.....	17
25	6.1.3 Correlation number	17
26	6.2 Performance, reliability, and quality.....	18
27	6.2.1 Timing.....	18
28	6.2.2 Quality	18
29	6.2.3 Reliability	18
30	6.3 Security aspects.....	18
31	6.4 Quantitative aspects	18
32	6.5 IRI for packet domain	18
33	6.5.1 Events and information.....	21
34	6.5.1.1 REPORT record information	21
35	6.5.1.2 BEGIN record information	25
36	6.5.1.3 CONTINUE record information.....	27
37	6.5.1.4 END record information	28
38	7 Multi-media domain.....	29
39	Annex A (normative): HI2 Delivery mechanisms and procedures.....	30
40	A.1 ROSE.....	30
41	A.1.1 Architecture	30
42	A.1.2 ASE_HI procedures	30
43	A.1.2.1 Sending part.....	30
44	A.1.2.2 Receiving part.....	31
45	A.1.2.3 Data link management	31
46	A.1.2.3.1 Data link establishment	31
47	A.1.2.3.2 Data link release	32
48	A.1.2.4 Handling of unrecognized fields and parameters.....	32
49	A.2 FTP.....	33
50	A.2.1 Introduction.....	33
51	A.2.2 Usage of the FTP	33
52	A.2.3 Profiles (informative).....	34

1	A.2.4	File content	35
2	A.2.5	Exceptional procedures	35
3	A.2.6	Other considerations	36
4	Annex B (normative): Structure of data at the handover interface		37
5	B.1	Syntax definitions	37
6	B.2	Object tree	38
7	B.3	Intercept related information (HI2)	39
8	B.4	HI3 CC definition	45
9	Annex C (normative): UMTS HI3 Interface		46
10	C.1	UMTS LI correlation header version 0	46
11	C.1.1	Introduction	46
12	C.1.2	Definition of ULIC header version 0	46
13	C.1.3	Definition of ULIC header version 1	47
14	C.1.4	Exceptional procedure	48
15	C.1.5	Other considerations	48
16	C.2	FTP	49
17	C.2.1	Introduction	49
18	C.2.2	Usage of the FTP	49
19	C.2.3	Exceptional procedures	50
20	C.2.4	CC contents for FTP	51
21	C.2.4.1	Fields	51
22	C.2.4.2	Information element syntax	53
23	C.2.5	Other considerations	55
24	Annex D (informative): LEMF requirements - handling of unrecognised fields and parameters		56
25	Annex E (informative): Bibliography		57
26	Annex F (informative): Profiles for FTP		59
27	Annex G (informative): United States lawful interception		60
28	G.1	Delivery methods preferences	60
29	G.2	HI2 delivery methods	60
30	G.2.1	TPKT/TCP/IP	60
31	G.2.1.1	Introduction	60
32	G.2.1.2	Normal Procedures	60
33	G.2.1.2.1	Usage of TCP/IP when MF initiates TCP Connections	60
34	G.2.1.2.2	Use of TPKT	60
35	G.2.1.2.3	Sending of LI messages	61
36	G.2.1.3	ASN.1 for HI2 Mediation Function Messages	61
37	G.2.1.4	Error Procedures	61
38	G.2.1.5	Security Considerations	61
39	G.3	HI3 delivery methods	62
40	G.3.1	Use of TCP/IP	62
41	G.3.1.1	Normal Procedures	62
42	G.3.1.1.1	Usage of TCP/IP when MF initiates TCP Connections	62
43	G.3.1.1.2	Use of TPKT	62
44	G.3.1.1.3	Sending of Content of Communication Messages	62
45	G.3.1.2	ASN.1 for HI3 Mediation Function Messages	63
46	G.3.1.3	Error Procedures	63
47	G.3.1.4	Security Considerations	63
48	Annex H (informative): Change history		64
49			
50			

1 Foreword

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

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

6 Version x.y.z

7 where:

8 x the first digit:

9 1 presented to TSG for information;

10 2 presented to TSG for approval;

11 3 or greater indicates TSG approved document under change control.

12 y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections,
13 updates, etc.

14 z the third digit is incremented when editorial only changes have been incorporated in the document.

15 Introduction

16 This Technical Specification has been produced by the 3GPP TSG SA to allow for the standardization in the area of
17 lawful interception of telecommunications. This document addresses the handover interfaces for lawful interception of
18 Packet-Data Services, Circuit Switched Services, and Multimedia Services within the Universal Mobile
19 Telecommunication System (UMTS). The specification defines the handover interfaces for delivery of lawful
20 interception Intercept Related Information (IRI) and Content of Communication (CC) to the Law Enforcement
21 Monitoring Facility.

22 Laws of individual nations and regional institutions (e.g. European Union), and sometimes licensing and operating
23 conditions define a need to intercept telecommunications traffic and related information in modern telecommunications
24 systems. It has to be noted that lawful interception shall always be done in accordance with the applicable national or
25 regional laws and technical regulations.

26 This specification should be used in conjunction with 3GPP TS 33.106 and 33.107 in the same release. This
27 specification may also be used with earlier releases of 33.106 and 33.107, as well as for earlier releases of UMTS and
28 GPRS.

1

2 1 Scope

3 This specification addresses the handover interfaces for lawful interception of Packet-Data Services, Circuit Switched
4 Services, and Multimedia Services within the UMTS network. The handover interface in this context includes the
5 delivery of Intercept Related Information (HI2) and Content of Communication (HI3) to the Law Enforcement
6 Monitoring Facility.

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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] TR 101 331: Telecommunications security; Lawful Interception (LI); requirements of Law Enforcement Agencies
- [2] ES 201 158: "Telecommunications security; Lawful Interception (LI); Requirements for network functions".
- [3] ETR 330: "Security Techniques Advisory Group (STAG); A guide to legislative and regulatory environment".
- [4] GSM 09.02: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".
- [5] ITU-T Recommendation X.680: "Specification of Abstract Syntax Notation One (ASN.1)".
- [6] ITU-T Recommendation X.690: "Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1)".
- [7] ITU-T Recommendation X.880: "Information technology - Remote Operations: Concepts, model and notation".
- [8] ITU-T Recommendation X.882: "Information technology - Remote Operations: OSI realizations - Remote Operations Service Element (ROSE) protocol specification".
- [9] EN 300 940, GSM 04.08: " Digital cellular communications system (Phase 2+) ; Mobile radio interface layer 3 specification ".
- [10] TS 101 509 "Digital cellular telecommunications system (Phase 2+); Lawful interception; Stage 2 (GSM 03.33)
- [11] GSM 03.03: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".
- [12] GSM 09.60 (EN 301 347): "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); GPRS tunnelling protocol (GTP) across Gn and Gp Interface
- [13] STD 9 "File Transfer Protocol (FTP)", October 1985
- [14] GSM 12.15 "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication Management; Charging & Billing; GSM call and event data for the Packet Switched (PS) domain) "
- [15] STD0005 "Internet Protocol"
- [16] STD0007 "Transmission Control Protocol"
- [17] 3GPP TS 29.060 GPRS Tunnelling Protocol
- [18] 3GPP TS 33.106 Lawful Interception Requirements
- [19] 3GPP TS 33.107 Lawful Interception Architecture and Functions
- [20] 3GPP TS 23.107 – QoS Concepts and Architecture
- [21] 3GPP TS 24.008: "3GPP Technical Specification Group Core Network; Mobile radio interface layer 3 specification ".

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2 3 Definitions, symbols and abbreviations

3 3.1 Definitions

4 For the purposes of the present document, the following terms and definitions apply.

5 **access provider:** access provider provides a user of some network with access from the user's terminal to that network.

6 NOTE 1: This definition applies specifically for the present document. In a particular case, the access provider and
7 network operator may be a common commercial entity.

8 **(to) buffer:** temporary storing of information in case the necessary telecommunication connection to transport
9 information to the LEMF is temporarily unavailable.

10 **communication:** Information transfer according to agreed conventions.

11 **content of communication:** information exchanged between two or more users of a telecommunications service,
12 excluding intercept related information. This includes information which may, as part of some telecommunications
13 service, be stored by one user for subsequent retrieval by another.

14 **handover interface:** physical and logical interface across which the interception measures are requested from network
15 operator / access provider / service provider, and the results of interception are delivered from a network operator /
16 access provider / service provider to a law enforcement monitoring facility.

17 **identity:** technical label which may represent the origin or destination of any telecommunications traffic, as a rule
18 clearly identified by a physical telecommunications identity number (such as a telephone number) or the logical or
19 virtual telecommunications identity number (such as a personal number) which the subscriber can assign to a physical
20 access on a case-by-case basis.

21 **interception:** action (based on the law), performed by an network operator / access provider / service provider, of
22 making available certain information and providing that information to a law enforcement monitoring facility.

23 NOTE 2: In the present document the term interception is not used to describe the action of observing communications by a
24 law enforcement agency.

25 **interception configuration information:** information related to the configuration of interception.

26 **interception interface:** physical and logical locations within the network operator's / access provider's / service
27 provider's telecommunications facilities where access to the content of communication and intercept related information
28 is provided. The interception interface is not necessarily a single, fixed point.

29 **interception measure:** technical measure which facilitates the interception of telecommunications traffic pursuant to
30 the relevant national laws and regulations.

31 **intercept related information:** collection of information or data associated with telecommunication services involving
32 the target identity, specifically communication associated information or data (e.g. unsuccessful communication
33 attempts), service associated information or data (e.g. service profile management by subscriber) and location
34 information.

35 **interception subject:** person or persons, specified in a lawful authorization, whose telecommunications are to be
36 intercepted.

37 **internal intercepting function:** point within a network or network element at which the content of communication and
38 the intercept related information are made available.

39 **internal network interface:** network's internal interface between the Internal Intercepting Function and a mediation
40 device.

41 **invocation and operation:** describes the action and conditions under which the service is brought into operation; in the
42 case of a lawful interception this may only be on a particular communication. It should be noted that when lawful

1 interception is activated, it shall be invoked on all communications (Invocation takes place either subsequent to or
2 simultaneously with activation.). Operation is the procedure which occurs once a service has been invoked.

3 NOTE 3: The definition is based on [8], but has been adapted for the special application of lawful interception, instead of
4 supplementary services.

5 **law enforcement agency:** organization authorized by a lawful authorization based on a national law to request
6 interception measures and to receive the results of telecommunications interceptions.

7 **law enforcement monitoring facility:** law enforcement facility designated as the transmission destination for the
8 results of interception relating to a particular interception subject.

9 **lawful authorization:** permission granted to a LEA under certain conditions to intercept specified telecommunications
10 and requiring co-operation from a network operator / access provider / service provider. Typically this refers to a
11 warrant or order issued by a lawfully authorized body.

12 **lawful interception:** see interception.

13 **lawful interception identifier:** identifier for a particular interception.

14 **location information:** information relating to the geographic, physical or logical location of an identity relating to an
15 interception subject.

16 **mediation device:** equipment, which realizes the mediation function.

17 **mediation function:** mechanism which passes information between a network operator, an access provider or service
18 provider and a handover interface, and information between the internal network interface and the handover interface.

19 **network element:** component of the network structure, such as a local exchange, higher order switch or service control
20 processor.

21 **network element identifier:** uniquely identifies the relevant network element carrying out the lawful interception.

22 **network identifier:** internationally unique identifier that includes a unique identification of the network operator,
23 access provider, or service provider and, optionally, the network element identifier.

24 **network operator:** operator of a public telecommunications infrastructure which permits the conveyance of signals
25 between defined network termination points by wire, by microwave, by optical means or by other electromagnetic
26 means.

27 **quality of service:** quality specification of a telecommunications channel, system, virtual channel, computer-
28 telecommunications session, etc. Quality of service may be measured, for example, in terms of signal-to-noise ratio, bit
29 error rate, message throughput rate or call blocking probability.

30 **reliability:** probability that a system or service will perform in a satisfactory manner for a given period of time when
31 used under specific operating conditions.

32 **result of interception:** information relating to a target service, including the content of communication and intercept
33 related information, which is passed by a network operator, an access provider or a service provider to a law
34 enforcement agency. Intercept related information shall be provided whether or not call activity is taking place.

35 **service information:** information used by the telecommunications infrastructure in the establishment and operation of a
36 network related service or services. The information may be established by a network operator, an access provider, a
37 service provider or a network user.

38 **service provider:** natural or legal person providing one or more public telecommunications services whose provision
39 consists wholly or partly in the transmission and routing of signals on a telecommunications network. A service
40 provider needs not necessarily run his own network.

41 **SMS:** Short Message Service gives the ability to send character messages to phones. SMS messages can be MO
42 (mobile originate) or MT(mobile terminate).

43 **target identity:** technical identity (e.g. the interception's subject directory number), which uniquely identifies a target
44 of interception. One target may have one or several target identities.

1 **target service:** telecommunications service associated with an interception subject and usually specified in a lawful
2 authorization for interception.

3 NOTE 4: There may be more than one target service associated with a single interception subject.

4 **telecommunications:** any transfer of signs, signals, writing images, sounds, data or intelligence of any nature
5 transmitted in whole or in part by a wire, radio, electromagnetic, photoelectronic or photo-optical system.

6 3.2 Abbreviations

7 For the purposes of the present document, the following abbreviations apply:

8	AP	Access Provider
9	ASN.1	Abstract Syntax Notation, Version 1
10	ASE	Application Service Element
11	BER	Basic Encoding Rules
12	CC	Content of Communication
13	DF	Delivery Function
14	FTP	File Transfer Protocol
15	GGSN	Gateway GPRS Support Node
16	GLIC	GPRS LI Correlation
17	GPRS	General Packet Radio Service
18	GSM	Global System for Mobile communications
19	GSN	GPRS Support Node (SGSN or GGSN)
20	GTP	GPRS Tunnelling Protocol
21	HI	Handover Interface
22	HI1	Handover Interface Port 1 (for Administrative Information)
23	HI2	Handover Interface Port 2 (for Intercept Related Information)
24	HI3	Handover Interface Port 3 (for Content of Communication)
25	HLC	High Layer Compatibility
26	IA	Interception Area
27	IA5	International Alphabet No. 5
28	IAP	Interception Access Point
29	ICI	Interception Configuration Information
30	IE	Information Element
31	IIF	Internal Interception Function
32	IMEI	International Mobile station Equipment Identity
33	IMSI	International Mobile Subscriber Identity
34	INI	Internal network interface
35	IP	Internet Protocol
36	IPS	Internet Protocol Stack
37	IRI	Intercept Related Information
38	LEA	Law Enforcement Agency
39	LEMF	Law Enforcement Monitoring Facility
40	LI	Lawful Interception
41	LIID	Lawful Interception Identifier
42	LLC	Lower layer compatibility
43	LSB	Least significant bit
44	MAP	Mobile Application Part
45	MF	Mediation Function
46	MS	Mobile Station
47	MSB	Most significant bit
48	MSISDN	Mobile Subscriber ISDN Number
49	MSN	Multiple Subscriber Number
50	NEID	Network Element Identifier
51	NID	Network Identifier
52	NWO	Network Operator
53	OA&M	Operation, Administration & Maintenance
54	PDP	Packet Data Protocol
55	PLMN	Public land mobile network
56	PSTN	Public Switched Telephone Network

1	ROSE	Remote Operation Service Element
2	R _x	Receive direction
3	SGSN	Serving GPRS Support Node
4	SMAF	Service Management Agent Function
5	SMF	Service Management Function
6	SMS	Short Message Service
7	SvP	Service Provider
8	TCP	Transmission Control Protocol
9	TI	Target identity
10	TP	Terminal Portability
11	T-PDU	tunneled PDU
12	T _x	Transmit direction
13	UI	User Interaction
14	UMTS	Universal Mobile Telecommunication System
15	VPN	Virtual Private Network
16		
17		

1

2 4 General

3 The present document focuses on the handover interface related to the provision of information related to LI between a
4 network operator, access provider and/or service provider and a Law Enforcement Agency (LEA).

5 4.1 Basic principles for the handover interface

6 The network requirements mentioned in the present document are derived, in part, from the requirements defined in
7 ES 201 158 [2].

8 Lawful interception requires functions to be provided in some, or all of, the switching or routing nodes of a
9 telecommunications network.

10 The specification of the handover interface is subdivided into three parts each optimised to the different purposes and
11 types of information being exchanged.

12 The interface is extensible.

13 4.2 Legal requirements

14 It shall be possible to select elements from the handover interface specification to conform with:

- 15 - national requirements;
- 16 - national law;
- 17 - any law applicable to a specific LEA.

18 As a consequence, the present document shall define, in addition to mandatory requirements, which are always
19 applicable, supplementary options, in order to take into account the various influences listed above. See also [1] and [3].

20 4.3 Functional requirements

21 A lawful authorization shall describe the kind of information (Intercept Related Information (IRI) only, or IRI with
22 Content of Communication (CC)) that is required by this LEA, the interception subject, the start and stop time of LI,
23 and the addresses of the LEAs for delivery of CC and/or IRI and further information.

24 A single interception subject may be the subject of interception by different LEAs. It shall be possible strictly to
25 separate these interception measures.

26 If two targets are communicating with each other, each target is dealt with separately.

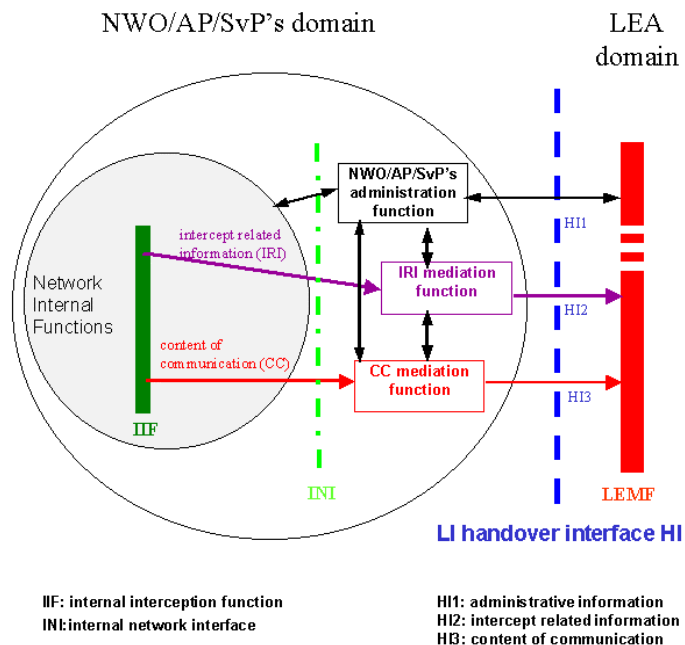
27 4.4 Overview of handover interface

28 The generic handover interface adopts a three port structure such that administrative information (HI1), intercept related
29 information (HI2), and the content of communication (HI3) are logically separated.

30 Figure 2 shows a block diagram with the relevant entities for Lawful Interception.

31 The outer circle represents the NWO/AP/SvP's domain with respect to lawful interception. It contains the network
32 internal functions, the internal network interface (INI), the administration function and the mediation functions for IRI
33 and CC. The inner circle contains the internal functions of the network (e.g. switching, routing, handling of the
34 communication process). Within the network internal function the results of interception (i.e., IRI and CC) are
35 generated in the Internal Interception Function (IIF).

1 The IIF provides the Content of Communication (CC) and the Intercept Related Information (IRI), respectively, at the
 2 Internal Network Interface (INI). For both kinds of information, mediation functions may be used, which provide the
 3 final representation of the standardized handover interfaces at the NWO/AP/SvP's domain boundary.



4
 5 **Figure 4.1: Functional block diagram showing handover interface HI**

6 NOTE 1: Figure 2 shows only a reference configuration, with a logical representation of the entities involved in lawful
 7 interception and does not mandate separate physical entities.

8 NOTE 2: The mediation functions may be transparent.

9 **4.4.1 Handover interface port 2 (HI2)**

10 The handover interface port 2 shall transport the IRI from the NWO/AP/SvP's IIF to the LEMF.

11 The delivery shall be performed via data communication methods which are suitable for the network infrastructure and
 12 for the kind and volume of data to be transmitted.

13 The delivery can in principle be made via different types of lower communication layers, which should be standard or
 14 widely used data communication protocols.

15 The individual IRI parameters shall be coded using ASN.1 and the basic encoding rules (BER). The format of the
 16 parameter's information content shall be based on existing telecommunication standards, where possible.

17 The individual IRI parameters have to be sent to the LEMF at least once (if available).

18 The IRI records shall contain information available from normal network or service operating procedures. In addition
 19 the IRI records shall include information for identification and control purposes as specifically required by the HI2 port.

20 The IIF is not required to make any attempt to request explicitly extra information which has not already been supplied
 21 by a signalling system.

1 4.4.2 Handover interface port 3 (HI3)

2 The port HI3 shall transport the content of the communication (CC) of the intercepted telecommunication service to the
3 LEMF. The content of communication shall be presented as a transparent en-clair copy of the information flow during
4 an established, frequently bi-directional, communication of the interception subject.

5 As the appropriate form of HI3 depends upon the service being intercepted, HI3 is described in relevant annexes

6 The HI2 and HI3 are logically different interfaces, even though in some installations the HI2 and HI3 packet streams
7 might also be delivered via a common transmission path from a MF to a LEMF. It is possible to correlate HI2 and HI3
8 packet streams by having common (referencing) data fields embedded in the IRI and the CC packet streams.

9 4.5 HI2: Interface port for intercept related information

10 The HI2 interface port shall be used to transport all intercept-related information (IRI), i.e. the information or data
11 associated with the communication services of the target identity apparent to the network. It includes signalling
12 information used to establish the telecommunication service and to control its progress, time stamps, and, if available,
13 further information such as location information. Only information which is part of standard network signalling
14 procedures shall be used within communication related IRI.

15 Sending of the intercept-related information (IRI) to the LEMF shall in general take place as soon as possible, after the
16 relevant information is available.

17 In exceptional cases (e.g. data link failure), the intercept related information may be buffered for later transmission for a
18 specified period of time.

19 Within this section only definitions are made which apply in general for all network technologies. Additional
20 technology specific HI2 definitions are specified in related Annexes.

21 4.5.1 Data transmission protocols

22 The protocol used by the "LI application" for the encoding and the sending of data between the MF and the LEMF is
23 based on already standardized data transmission protocols like ROSE or FTP.

24 The specified data communication methods provide a general means of data communication between the LEA and the
25 NWO/AP/SvP's mediation function. They are used for the delivery of:

- 26 - HI2 type of information (IRI records);
- 27 - Certain types of content of communication (e.g., SMS).

28 The present document specifies the use of the two possible methods for delivery: ROSE or FTP on the application layer
29 and the BER on the presentation layer. The lower layers for data communication may be chosen in agreement with the
30 NWO/AP/SvP and the LEA.

31 The delivery to the LEMF should use the internet protocol stack.

32 4.5.2 Application for IRI (HI2 information)

33 The handover interface port 2 shall transport the intercept related information (IRI) from the NWO/AP/SvP's MF to the
34 LEMF.

35 The individual IRI parameters shall be coded using ASN.1 and the basic encoding rules (BER). Where possible, the
36 format of the information content shall be taken over from existing telecommunication standards, which are used for
37 these parameters with the network already (e.g., IP). Within the ASN.1 coding for IRI, such standard parameters are
38 typically defined as octet strings.

1 4.5.3 Types of IRI records

2 Intercept related information shall be conveyed to the LEMF in messages, or IRI data records, respectively. Four types
3 of IRI records are defined:

- | | | |
|----|------------------------|--|
| 4 | 1) IRI-BEGIN record | at the first event of a communication attempt, |
| 5 | | opening the IRI transaction |
| 6 | 2) IRI-END record | at the end of a communication attempt, |
| 7 | | closing the IRI transaction |
| 8 | 3) IRI-CONTINUE record | at any time during a communication attempt |
| 9 | | within the IRI transaction |
| 10 | 4) IRI-REPORT record | used in general for non-communication related events |

11 For information related to an existing communication case, the record types 1 to 3 shall be used. They form an IRI
12 transaction for each communication case or communication attempt, which corresponds directly to the communication
13 phase (set-up, active or release).

14 For packet oriented data services, the first event of a communication attempt shall be the PDP context activation or a
15 similar event and an IRI-BEGIN record shall be issued. The end of the communication attempt shall be the PDP context
16 deactivation or a similar event and an IRI-END record shall be issued. While a PDP context is active, IRI-CONTINUE
17 records shall be used for CC relevant IRI data records, IRI-REPORT records otherwise.

18 Record type 4 is used for non-communication related subscriber action, like subscriber controlled input (SCI) for
19 service activation. For simple cases, it can also be applicable for reporting unsuccessful communication attempts.

20 The record type is an explicit part of the record. The 4 record types are defined independently of target communication
21 events. The actual indication of one or several communication events, which caused the generation of an IRI record, is
22 part of further parameters within the record's, information content. Consequently, the record types of the IRI
23 transactions are not related to specific messages of the signaling protocols of a communication case, and are therefore
24 independent of future enhancements of the intercepted services, of network specific features, etc. Any transport level
25 information (i.e. higher-level services) on the target communication-state or other target communication related
26 information is contained within the information content of the IRI records.

27 For packet oriented data services, if LI is being activated during an already established PDP context or similar, an IRI-
28 BEGIN record will mark the start of the interception. If LI is being deactivated during an established PDP context or
29 similar, no IRI-END record will be transmitted. The end of interception can be communicated to the LEA by other
30 means (e.g., HI1).

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2 **5** Circuit-switch domain

3 For further study.

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2 6 Packet data domain

3 6.1 Identifiers

4 Specific identifiers are necessary to identify a target for interception uniquely and to correlate between the data, which
5 is conveyed over the different handover interfaces (HI2 and HI3). The identifiers are defined in the subsections below.

6 For the delivery of CC and IRI the SGSN or GGSN provide correlation numbers and target identities to the HI2 and
7 HI3. The correlation number is unique per PDP context and is used to correlate CC with IRI and the different IRI's of
8 one PDP context

9 6.1.1 Lawful interception identifier

10 For each target identity related to an interception measure, the authorized NWO/AP/SvP operator shall assign a special
11 Lawful Interception Identifier (LIID), which has been agreed between the LEA and the NWO/AP/SvP.

12 Using an indirect identification, pointing to a target identity makes it easier to keep the knowledge about a specific
13 interception target limited within the authorized NWO/AP/SvP operators and the handling agents at the LEA.

14 The LIID is a component of the CC delivery procedure and of the IRI records. It shall be used within any information
15 exchanged at the handover interfaces HI2 and HI3 for identification and correlation purposes.

16 The LIID format shall consist of alphanumeric characters. It might for example, among other information, contain a
17 lawful authorization reference number, and the date, when the lawful authorization was issued.

18 The authorized NWO/AP/SvP shall either enter a unique LIID for each target identity of the interception subject or a
19 single LIID for multiple target identities all pertaining to the same interception subject.

20 If more than one LEA intercepts the same target identity, there shall be unique LIIDs assigned relating to each LEA.

21 6.1.2 Network identifier

22 The network identifier (NID) is a mandatory parameter; it should be internationally unique. It consists of the following
23 two identifiers.

24 1) NWO/AP/SvP- identifier (mandatory):

25 Unique identification of network operator, access provider or service provider.

26 2) Network element identifier NEID (optional):

27 The purpose of the network element identifier is to uniquely identify the relevant network element carrying out
28 the LI operations, such as LI activation, IRI record sending, etc.

29 A network element identifier may be an IP address or other identifier. For GSM and UMTS systems deployed in
30 the U.S., the network element identifier is required.

31 6.1.3 Correlation number

32 The Correlation Number is unique per PDP context and used for the following purposes:

- 33 • correlate CC with IRI,
- 34 • correlate different IRI records within one PDP context.

35 As an example, in the UMTS system, the Correlation Number may be the combination of GGSN address and charging
36 ID.

1 6.2 Performance, reliability, and quality

2 6.2.1 Timing

3 As a general principle, within a telecommunication system, intercept related information (IRI), if buffered, should be
4 buffered for as short a time as possible.

5 NOTE: If the transmission of intercept related information fails, it may be buffered or lost.

6 6.2.2 Quality

7 The quality of service associated with the result of interception should be (at least) equal to the quality of service of the
8 original content of communication. This may be derived from the QoS class used for the original intercepted session
9 [7].

10 6.2.3 Reliability

11 The reliability associated with the result of interception should be (at least) equal to the reliability of the original content
12 of communication. This may be derived from the QoS class used for the original intercepted session [7].

13 6.3 Security aspects

14 Security is defined by national requirements.

15 6.4 Quantitative aspects

16 The number of target interceptions supported is a national requirement.

17 6.5 IRI for packet domain

18 Intercept related information will in principle be available in the following phases of a data transmission:

- 19 1. At connection attempt when the target identity becomes active, at which time packet transmission may or may
20 not occur (set up of a data context, target may be the originating or terminating party).
- 21 2. At the end of a connection, when the target identity becomes inactive (removal of a data context).
- 22 3. At certain times when relevant information are available.

23 In addition, information on non-transmission related actions of a target constitute IRI and is sent via HI2, e.g.
24 information on subscriber controlled input.

25 The intercept related information (IRI) may be subdivided into the following categories:

- 26 1. Control information for HI2 (e.g. correlation information).
- 27 2. Basic data context information, for standard data transmission between two parties.

28 The events defined in ref [11] are used to generate records for the delivery via HI2.

29 There are eight different event types received at DF2 level. According to each event, a Record is sent to the LEMF if
30 this is required. The following table gives the mapping between event type received at DF2 level and record type sent to
31 the LEMF.

1 **Table 1: Mapping between UMTS Data Events and HI2 records type**

Event	IRI Record Type
GPRS attach	REPORT
GPRS detach	REPORT
PDP context activation (successful)	BEGIN
PDP context modification	CONTINUE
PDP context activation (unsuccessful)	REPORT
Start of intercept with PDP context active	BEGIN
PDP context deactivation	END
Location update	REPORT
SMS	REPORT

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A set of information is used to generate the records. The records used transmit the information from mediation function to LEMF. This set of information can be extended in the GSN or DF2 MF, if this is necessary in a specific country. The following table gives the mapping between information received per event and information sent in records.

Table 2: Mapping between Events information and IRI information

parameter	description	HI2 ASN.1 parameter
observed MSISDN	Target Identifier with the MSISDN of the target subscriber (monitored subscriber).	partyInformation (party-identity)
observed IMSI	Target Identifier with the IMSI of the target subscriber (monitored subscriber).	partyInformation (party-identity)
observed IMEI	Target Identifier with the IMEI of the target subscriber (monitored subscriber)	partyInformation (party-identity)
observed PDP address	PDP address used by the target..	partyInformation (services-data-information)
event type	Description which type of event is delivered: PDP Context Activation, PDP Context Deactivation,GPRS Attach, etc.	gPRSevent
event date	Date of the event generation in the xGSN	timeStamp
event time	Time of the event generation in the xGSN	
access point name	The APN of the access point	partyInformation (services-data-information)
PDP type	This field describes the PDP type as defined in TS GSM 09.60, TS GSM 04.08, TS GSM 09.02	partyInformation (services-data-information)
initiator	This field indicates whether the PDP context activation, deactivation, or modification is MS directed or network initiated.	initiator
correlation number	Unique number for each PDP context delivered to the LEMF, to help the LEA, to have a correlation between each PDP Context and the IRI.	gPRSCorrelationNumber
lawful interception identifier	Unique number for each lawful authorization.	lawfulInterceptionIdentifier
location information	This field provides the service area identity, RAI and/or location area identity that is present at the SGSN at the time of event record production.	locationOfTheTarget
SMS	The SMS content with header which is sent with the SMS-service	sMS
failed context activation reason	This field gives information about the reason for a failed context activation of the target subscriber.	gPRSOperationErrorCode
failed attach reason	This field gives information about the reason for a failed attach attempt of the target subscriber.	gPRSOperationErrorCode
service center address	This field identifies the address of the relevant server within the calling (if server is originating) or called (if server is terminating) party address parameters for SMS-MO or SMS-MT.	serviceCenterAddress
QOS	This field indicates the Quality of Service associated with the PDP Context procedure.	qOS
context deactivation reason	This field gives information about the reason for context deactivation of the target subscriber.	gPRSOperationErrorCode
network identifier	Operator ID plus SGSN or GGSN address.	networkIdentifier
iP assignment	Observed PDP address is statically or dynamically assigned.	iP-assignment
SMS originating address	Identifies the originator of the SMS message.	DataNodeAddress
SMS terminating address	Identifies the intended recipient of the SMS message.	DataNodeAddress

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NOTE: LIID parameter must be present in each record sent to the LEMF.

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2 6.5.1 Events and information

3 This clause describes the information sent from the Delivery Function (DF) to the Law Enforcement Monitoring
4 Facility (LEMF) to support Lawfully Authorized Electronic Surveillance (LAES). The information is described as
5 records and information carried by a record. This focus is on describing the information being transferred to the
6 LEMF.

7 The IRI events and data are encoded into records as defined in the Table 1 Mapping between GPRS Events and HI2
8 records type and Annex B.3 Intercept related information (HI2) [1]. IRI is described in terms of a 'causing event' and
9 information associated with that event. Within each IRI Record there is a set of events and associated information
10 elements to support the particular service.

11 The communication events described in Table 1: Mapping between GPRS Events and HI2 record type and Table 2:
12 Mapping between Events information and IRI information convey the basic information for reporting the disposition
13 of a communication. This clause describes those events and supporting information.

14 Each record described in this clause consists of a set of parameters. Each parameter is either:

15 mandatory (M) - required for the record,

16 conditional (C) - required in situations where a condition is met (the condition is given in the Description), or

17 optional (O) - provided at the discretion of the implementation.

18 The information to be carried by each parameter is identified. Both optional and conditional parameters are considered
19 to be OPTIONAL syntactically in ASN.1 Stage 3 descriptions. The Stage 2 inclusion takes precedence over Stage 3
20 syntax.

21 6.5.1.1 REPORT record information

22 The REPORT record is used to report non-communication related subscriber actions (events) and for reporting
23 unsuccessful packet-mode communication attempts.

24 The REPORT record shall be triggered when:

- 25 • the intercept subject's mobile station performs a GPRS attach procedure (successful or unsuccessful);
- 26 • the intercept subject's mobile station performs a GPRS detach procedure;
- 27 • the intercept subject's mobile station is unsuccessful at performing a PDP context activation procedure;
- 28 • the intercept subject's mobile station performs a cell, routing area, or combined cell and routing area update;
- 29 • the intercept subject's mobile station sends an SMS-Mobile Originated (MO) communication. Dependent on
30 national requirements, the triggering event shall occur either when the 3G SGSN receives the SMS from the
31 target MS or, when the 3G SGSN receives notification that the SMS-Centre successfully received the SMS.

32 For GSM and UMTS systems deployed in the U.S., a REPORT record shall be triggered when the 3G SGSN
33 receives an SMS-MO communication from the intercept subject's mobile station.

- 34 • the intercept subject's mobile station receives a SMS Mobile-Terminated (MT) communication. Dependent
35 on national requirements, the triggering event shall occur either when the 3G SGSN receives the SMS from
36 the SMS-Centre or, when the 3G SGSN receives notification that the target MS successfully received the
37 SMS.

1 For GSM and UMTS systems deployed in the U.S., a REPORT record shall be triggered when the 3G
 2 SGSN receives an SMS-MT communication from the SMS-Centre destined for the intercept subject's
 3 mobile station.

4 **Table 6-1: GPRS Attach REPORT Record**

Parameter	MOC	Description/Conditions
observed MSISDN	C	Provide at least one and others when available.
observed IMSI		
observed IMEI		
event type	C	Provide GPRS Attach event type.
event date	M	Provide the date and time the event is detected.
event time		
network identifier	M	Shall be provided.
lawful intercept identifier	M	Shall be provided.
location information	C	Provide, when authorized, to identify location information for the intercept subject's MS.
failed attach reason	C	Provide information about the reason for failed attach attempts of the target subscriber.

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6 **Table 6-2: GPRS Detach REPORT Record**

Parameter	MOC	Description/Conditions
observed MSISDN	C	Provide at least one and others when available.
observed IMSI		
observed IMEI		
event type	C	Provide GPRS Detach event type.
event date	M	Provide the date and time the event is detected.
event time		
network identifier	M	Shall be provided.
lawful intercept identifier	M	Shall be provided.
location information	C	Provide, when authorized, to identify location information for the intercept subject's MS.

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Table 6-3: PDP Context Activation (unsuccessful) REPORT Record

Parameter	MOC	Description/Conditions
observed MSISDN	C	Provide at least one and others when available.
observed IMSI		
observed IMEI		
observed PDP address	C	Provide to identify either the: <ul style="list-style-type: none"> - static address requested by the intercept subject's MS in association with a subject-initiated PDP context activation request for unsuccessful PDP context activation requests; or - address offered by the network in association with a network-initiated PDP context activation request when the intercept subject's MS rejects the network-initiated PDP context activation.
iP assignment	C	Provide to indicate observed PDP address is statically or dynamically assigned.
event type	C	Provide PDP Context Activation event type.
event date	M	Provide the date and time the event is detected.
event time		
access point name	C	Provide to identify either the: <ul style="list-style-type: none"> - packet data network to which the intercept subject requested to be connected when the intercept subject's mobile station is unsuccessful at performing a PDP context activation procedure (MS to Network); or - access point of the packet data network that requested to be connected to the MS when the intercept subject's mobile station rejects a network-initiated PDP context activation (Network to MS).
PDP type	C	Provide to describe the PDP type of the observed PDP address. The PDP Type defines the end user protocol to be used between the external packet data network and the MS.
initiator	C	Provide to indicate whether the PDP context activation is network-initiated, intercept-subject-initiated, or not available.
network identifier	M	Shall be provided.
lawful intercept identifier	M	Shall be provided.
location information	C	Provide, when authorized, to identify location information for the intercept subject's MS.
failed context activation reason	C	Provide information about the reason for failed context activation attempts of the target subscriber.
QOS	C	Provide to identify the QOS parameters.

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2**Table 6-4: Location Information Update (with No PDP Context Active) REPORT Record**

Parameter	MOC	Description/Conditions
observed MSISDN	C	Provide at least one and others when available.
observed IMSI		
observed IMEI		
event type	C	Provide Location Information Update event type.
event date	M	Provide the date and time the event is detected.
event time		
network identifier	M	Shall be provided.
lawful intercept identifier	M	Shall be provided.
location information	C	Provide, when authorized, to identify location information for the intercept subject's MS.

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4**Table 6-5: SMS-MO and SMS-MT Communication REPORT Record**

Parameter	MOC	Description/Conditions
observed MSISDN	C	Provide at least one and others when available.
observed IMSI		
observed IMEI		
event type	C	Provide SMS event type.
event date	M	Provide the date and time the event is detected.
event time		
network identifier	M	Shall be provided.
lawful intercept identifier	M	Shall be provided.
SMS originating address	O	Provide to identify the originating and destination address of the SMS message.
SMS destination address		
location information	C	Provide, when authorized, to identify location information for the intercept subject's MS.
SMS	C	Provide to deliver SMS content, including header which is sent with the SMS-service.
service center address	C	Provide to identify the address of the relevant SMS-C server. If SMS content is provided, this parameter is optional.

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1 6.5.1.2 BEGIN record information

2 The BEGIN record is used to convey the first event of packet-data communication interception.

3 The BEGIN record shall be triggered when:

- 4 • successful PDP context activation;
- 5 • the interception of a subject's communications is started and at least one PDP context is active. If more than
- 6 one PDP context is active, a BEGIN record shall be generated for each PDP context that is active.

7 **Table 6-6: PDP Context Activation (successful) BEGIN Record**

Parameter	MOC	Description/Conditions
observed MSISDN	C	Provide at least one and others when available.
observed IMSI		
observed IMEI		
observed PDP address	C	Provide to identify one of the following: <ul style="list-style-type: none"> - static address requested by the intercept subject's MS, and allocated by the Network for a successful PDP context activation; - address allocated dynamically by the network to the intercept subject MS in association with a PDP context activation (i.e., address is sent by the Network in an Activate PDP Context Accept) for a successful PDP context activation procedure when the PDP Context activation request does not contain a static PDP address; or - address offered by the network in association with a network-initiated PDP context activation request when the intercept subject's MS accepts the network-initiated PDP context activation request.
iP assignment	C	Provide to indicate observed PDP address is statically or dynamically assigned.
event type	C	Provide PDP Context Activation event type.
event date	M	Provide the date and time the event is detected.
event time		
access point name	C	Provide to identify the: <ul style="list-style-type: none"> - packet data network to which the intercept subject requested to be connected when the intercept subject's MS is successful at performing a PDP context activation procedure (MS to Network). - access point of the packet data network that requested to be connected to the MS when the intercept subject's MS accepts a network-initiated PDP context activation (Network to MS).
PDP type	C	Provide to describe the PDP type of the observed PDP address. The PDP Type defines the end user protocol to be used between the external packet data network and the MS.
initiator	C	Provide to indicate whether the PDP context activation is network-initiated, intercept-subject-initiated, or not available.
network identifier	M	Shall be provided.
correlation number	C	Provide to uniquely identify the PDP context delivered to the LEMF and to correlate IRI records with CC.
lawful intercept identifier	M	Shall be provided.
location information	C	Provide, when authorized, to identify location information for the intercept subject's MS.
QOS	C	Provide to identify the QOS parameters.

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Table 6-7: Start Of Interception (with PDP Context Active) BEGIN Record

Parameter	MOC	Description/Conditions
observed MSISDN	C	Provide at least one and others when available.
observed IMSI		
observed IMEI		
observed PDP address	C	Provide to identify the: - static address requested by the intercept subject's MS, and allocated by the Network for a successful PDP context activation. - address allocated dynamically by the network to the intercept subject MS in association with a PDP context activation (i.e., address is sent by the Network in an Activate PDP Context Accept) for a successful PDP context activation procedure when the PDP Context activation request does not contain a static PDP address. - address offered by the network in association with a network-initiated PDP context activation request when the intercept subject's MS accepts the network-initiated PDP context activation request.
event type	C	Provide Start Of Interception With PDP Context Active event type.
event date	M	Provide the date and time the event is detected.
event time		
access point name	C	Provide to identify the: - packet data network to which the intercept subject requested to be connected when the intercept subject's MS is successful at performing a PDP context activation procedure (MS to Network). - access point of the packet data network that requested to be connected to the MS when the intercept subject's MS accepts a network-initiated PDP context activation (Network to MS).
PDP type	C	Provide to describe the PDP type of the observed PDP address. The PDP Type defines the end user protocol to be used between the external packet data network and the MS.
initiator	C	Provide to indicate whether the PDP context activation is network-initiated, intercept-subject-initiated, or not available.
network identifier	M	Shall be provided.
correlation number	C	Provide to uniquely identify the PDP context delivered to the LEMF and to correlate IRI records with CC.
lawful intercept identifier	M	Shall be provided.
location information	C	Provide, when authorized, to identify location information for the intercept subject's MS.
QOS	C	Provide to identify the QOS parameters.

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2 **6.5.1.3 CONTINUE record information**

3 The CONTINUE record is used to convey events during an active packet-data communication PDP Context.

4 The CONTINUE record shall be triggered when:

- 5
- An active PDP context is modified;

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Table 6-8: PDP Context Modification CONTINUE Record

Parameter	MOC	Description/Conditions
observed MSISDN	C	Provide at least one and others when available.
observed IMSI		
observed IMEI		
observed PDP address	C	<p>The observed address after modification</p> <p>Provide to identify the:</p> <ul style="list-style-type: none"> - static address requested by the intercept subject's MS, and allocated by the Network for a successful PDP context activation. - address allocated dynamically by the network to the intercept subject MS in association with a PDP context activation (i.e., address is sent by the Network in an Activate PDP Context Accept) for a successful PDP context activation procedure when the PDP Context activation request does not contain a static PDP address. - address offered by the network in association with a network-initiated PDP context activation request when the intercept subject's MS accepts the network-initiated PDP context activation request.
event type	C	Provide the PDP Context Modification event type.
event date	M	Provide the date and time the event is detected.
event time		
access point name	C	<p>Provide to identify the:</p> <ul style="list-style-type: none"> - packet data network to which the intercept subject requested to be connected when the intercept subject's MS is successful at performing a PDP context activation procedure (MS to Network). - access point of the packet data network that requested to be connected to the MS when the intercept subject's MS accepts a network-initiated PDP context activation (Network to MS).
PDP type	C	Provide to describe the PDP type of the observed PDP address. The PDP Type defines the end user protocol to be used between the external packet data network and the MS.
initiator	C	Provide to indicate whether the PDP context activation is network-initiated, intercept-subject-initiated, or not available.
network identifier	M	Shall be provided.
correlation number	C	Provide to uniquely identify the PDP context delivered to the LEMF used to correlate IRI records with CC.
lawful intercept identifier	M	Shall be provided.
location information	C	Provide, when authorized, to identify location information for the intercept subject's MS.
QOS	C	Provide to identify the QOS parameters.

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2 **6.5.1.4 END record information**

3 The END record is used to convey the last event of packet-data communication interception.

4 The END record shall be triggered when:

- 5
- PDP context deactivation.

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Table 6-9: PDP Context Deactivation END Record

Parameter	MOC	Description/Conditions
observed MSISDN	C	Provide at least one and others when available.
observed IMSI		
observed IMEI		
observed PDP address	C	Provide to identify the PDP address assigned to the intercept subject, if available.
event type	C	Provide PDP Context Deactivation event type.
event date	M	Provide the date and time the event is detected.
event time		
access point name	C	Provide to identify the packet data network to which the intercept subject is connected.
PDP type	C	Provide to describe the PDP type of the observed PDP address. The PDP Type defines the end user protocol to be used between the external packet data network and the MS.
initiator	C	Provide to indicate whether the PDP context deactivation is network-initiated, intercept-subject-initiated, or not available.
network identifier	M	Shall be provided.
correlation number	C	Provide to uniquely identify the PDP context delivered to the LEM and to correlate IRI records with CC.
lawful intercept identifier	M	Shall be provided.
location information	C	Provide, when authorized, to identify location information for the intercept subject's MS.
context deactivation reason	C	Provide to indicate reason for deactivation.

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2 **7 Multi-media domain**

3 For further study.

4

Annex A (normative): HI2 Delivery mechanisms and procedures

There are two possible methods for delivery of IRI to the LEMF standardized in this document:

- a) ROSE
- b) FTP

A.1 ROSE

A.1.1 Architecture

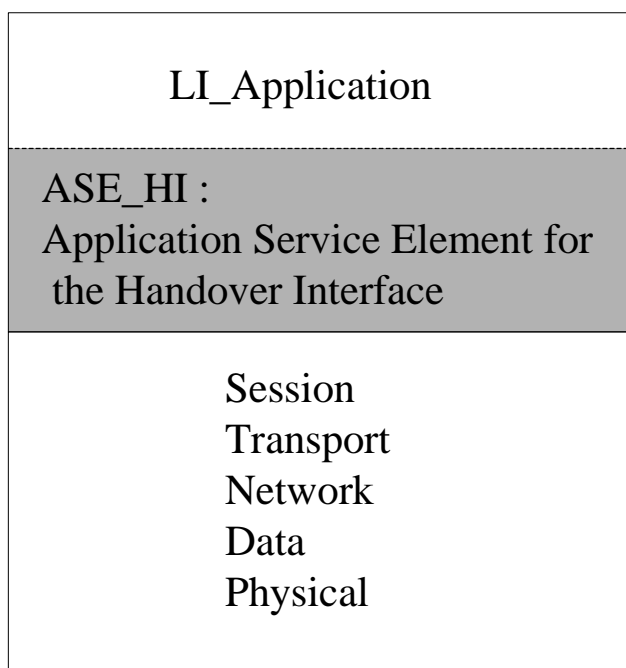


Figure A.1: Architecture

The ASE_HI manages the data link, the coding/decoding of the ROSE operations and the sending/receiving of the ROSE operations.

A.1.2 ASE_HI procedures

A.1.2.1 Sending part

To request the sending of data to a peer entity, the LI_Application provides the ASE_HI, the address of the peer entity, the nature of the data and the data.

On receiving a request of the LI_Application:

- If the data link toward the peer entity address is active, the ASE_HI, from the nature of the data provided, encapsulates this data in the relevant RO-Invoke operation.
- If the data link toward the peer entity address isn't active, the ASE_HI establishes this data link (see annex A.1.2.3). Then, depending on the nature of the data provided, the ASE_HI encapsulates this data in the relevant RO-Invoke operation.

1 Depending on the natures of the data provided by the LI_Application, the ASE_HI encapsulates this data within the
2 relevant ROSE operation:

- 3 - IRI: in this case the data provided by the application are encoded within the class 2 RO-Invoke operation
4 *Sending-of-IRI*.
- 5 - SMS: in this case the data provided by the application are encoded within the class 2 RO-Invoke operation
6 *Sending-of-IRI*.

7 Depending on the class of the operation, the ASE-HI may have to wait for an answer. In this case a timer, depending on
8 the operation, is started on the sending of the operation and stopped on the receipt of an answer (RO_Result, RO_Error,
9 RO_Reject).

10 On timeout of the timer, the ASE_HI indicates to the LI_Application that no answer has been received. It is under the
11 LI_Application responsibility to send again the data or to inform the administrator of the problem.

12 On receipt of an answer component (after verification that the component isn't erroneous), the ASE_HI stop the relevant
13 timer and acts depending on the type of component:

- 14 - On receipt of a RO_Result, the ASE_HI provide the relevant LI_Application an indication that the data has been
15 received by the peer LI-application and the possible parameters contained in the RO_Result.
- 16 - On receipt of a RO_Error, the ASE_HI provide the relevant LI_Application an indication that the data hasn't
17 been received by the peer LI-application and the possible "Error cause". The error causes are defined for each
18 operation in the relevant ASN1 script. It is under the LI_Application responsibility to generate or not an alarm
19 message toward an operator or administrator.
- 20 - On receipt of a RO_Reject_U/P, the ASE_HI provide the relevant LI_Application an indication that the data
21 hasn't been received by the peer LI-application and the "Problem cause". The "problem causes" are defined
22 in [7] to [8]. It is under the LI_Application responsibility to send again the data or to inform the
23 operator/administrator of the error.

24 On receipt of an erroneous component, the ASE_HI acts as described in ITU-T Recommendations [7] to [8].

25 **A.1.2.2 Receiving part**

26 On receipt of a ROSE operation from the lower layers:

- 27 - When receiving operations from the peer entity, the ASE_HI verifies the syntax of the component and transmits
28 the parameters to the LI-Application. If no error/problem is detected, in accordance with the [7] to [8] standard
29 result (only Class2 operation are defined), the ASE_HI sends back a RO_Result which coding is determined by
30 the relevant operation ASN1 script. The different operations which can be received are:
- 31 - RO-Invoke operation "Sending-of-IRI" (HI2 interface);
- 32 - RO-Invoke operation "No-Circuit-Call-Related-Services" (HI3 interface);

33 In case of error, the ASE_HI acts depending on the reason of the error or problem:

- 34 - In accordance with the rules defined by [7] to [8], an RO_Error is sent in the case of an unsuccessful operation at
35 the application level. The Error cause provided is one among those defined by the ASN1 script of the relevant
36 operation.
- 37 - In accordance with the rules defined in [7] to [8], an RO_Reject_U/P is sent in the case of an erroneous
38 component. On receipt of an erroneous component, the ASE_HI acts as described in [7] to [8].

39 **A.1.2.3 Data link management**

40 This function is used to establish or release a data link between two peer LI_Applications entities (MF and LEMF).

41 Depending on a per destination address configuration data, the data link establishment may be required either by the
42 LEMF LI_Application or by the MF LI_Application.

43 **A.1.2.3.1 Data link establishment**

44 To request the establishment of a data link toward a peer entity, the LI_Application provides, among others, the
45 destination address of the peer entity (implicitly, this address defined the protocol layers immediately under the

1 ASE_HI: TCP/IP, X25, ...). On receipt of this request, the ASE_HI request the establishment of the data link with
2 respect of the rules of the under layers protocol.

3 As soon as the data link is established, the requesting LI_Application initiates an authentication procedure:

- 4 - the origin LI_Application requests the ASE_HI to send the class 2 RO-Invoke operation
5 "Sending_of_Password" which includes the "origin password" provided by the LI_Application;
- 6 - the peer LI-Application, on receipt of the "origin password" and after acceptance, requests to its ASE_HI to send
7 back a RO-Result. In addition, this destination application requests the ASE_HI to send the class 2 RO-Invoke
8 operation "Sending-of-Password" which includes the "destination password" provided by the LI_Application;
- 9 - the origin LI-Application, on receipt of the "destination password" and after acceptance, requests to its ASE_HI
10 to send back a RO-Result. This application is allowed to send data;
- 11 - after receipt of the RO_Result, this application is allowed to send data.

12 In case of erroneous password, the data link is immediately released and an "password error indication" is sent toward
13 the operator.

14 Optionally a *Data link test* procedure may be used to verify periodically the data link:

- 15 - When no data have been exchanged during a network dependent period of time toward an address, (may vary
16 from 1 to 30 minutes) the LI_Application requests the ASE_HI to send the class 2 RO-Invoke operation
17 *Data-Link-Test*.
- 18 - The peer LI-Application, on receipt of this operation , requests to it's ASE_HI to send back a RO-Result.
- 19 - On receipt of the Result the test is considered valid by the LI_Application.
- 20 - If no Result is received or if a Reject/Error message is received, the LI_Application requests the ASE_HI to
21 release the data link and send an error message toward the operator.

22 **A.1.2.3.2 Data link release**

- 23 - The End of the connection toward the peer LI_Application is under the responsibility of the LI_Application.
24 E.g., the End of the connection may be requested in the following cases:
 - 25 - When all the data (IRI, ...) has been sent. To prevent unnecessary release, the datalink may be released only
26 when no LI_Application data have been exchanged during a network dependent period of time.
 - 27 - The data link is established when a call is intercepted and released when the intercepted call is released (and
28 all the relevant data have been sent).
 - 29 - For security purposes.
 - 30 - For changing of password or address of the LEMF/IIF.
- 31 - To end the connection an LI_Application requests the ASE_HI to send the class 2 RO-Invoke operation "End-
32 Of-Connection".
- 33 - The peer LI-Application, on receipt of this operation , requests to it's ASE_HI to send back a RO_Result.
- 34 - On receipt of the Result the LI_Application requests the ASE_HI to release the data link.
- 35 - If no Result is received after a network dependent period of time, or if a Reject/Error message is received, the
36 LI_Application requests the ASE_HI to release the data link and to send an error message toward the
37 operator/administrator.

38 **A.1.2.4 Handling of unrecognized fields and parameters**

39 See annex D.

40

1 A.2 FTP

2 A.2.1 Introduction

3 At HI2 interface FTP is used over internet protocol stack for the delivery of the IRI. The FTP is defined in ref [13]. The
4 IP is defined in ref [15]. The TCP is defined in ref [16].

5 FTP supports reliable delivery of data. The data may be temporarily buffered in the mediation function (MF) in case of
6 link failure. FTP is independent of the payload data it carries.

7 A.2.2 Usage of the FTP

8 The MF acts as the FTP client and the LEMF acts as the FTP server . The client pushes the data to the server.

9 The receiving node LEMF stores the received data as files. The MF may buffer files.

10 Several records may be gathered into bigger packages prior to sending, to increase bandwidth efficiency.

11 The following configurable intercept data collection (= transfer package closing / file change) threshold parameters
12 should be supported:

- 13 - frequency of transfer, based on send timeout, e.g. X ms
- 14 - frequency of transfer, based on volume trigger, e.g. X octets

15 Every file shall contain only complete IRI records. The single IRI record shall not be divided into several files.

16 There are two possible ways as to how the interception data may be sent from the MF to the LEMF. One way is to
17 produce files that contain interception data only for one observed target (ref: "File naming method A)"). The other way
18 is to multiplex all the intercepted data that MF receives to the same sequence of general purpose interception files sent
19 by the MF (ref: "File naming method B)").

20 **File naming:**

21 The names for the files transferred to a LEA are formed according to one of the 2 available formats, depending on the
22 delivery file strategy chosen (e.g. due to national convention or operator preference).

23 Either each file contains data of only one observed target (as in method A) or several targets' data is put to files
24 common to all observed target traffic through MF (as in method B).

25 The maximum set of allowed characters in interception file names are "a"... "z", "A"... "Z", "-", "_", ".", and decimals
26 "0"... "9".

27 **File naming method A):**

28 <LIID>_<seq>.<ext>

29 **LIID** = See clause 7.1.

30 **seq** = integer ranging between [0..2⁶⁴-1], in ASCII form (not exceeding 20 ASCII digits), identifying the
31 sequence number for file transfer from this node per a specific target.

32 **ext** = ASCII integer ranging between ["1".."7".] (in hex: 31H...37H), identifying the file type. The possible file
33 type coding for IRI is shown in table A.1.
34
35

Table A.1: Possible file types

File types that the LEA may get	Intercepted data types
"1" (in binary: 0011 0001)	IRI

36
37 This alternative A is used when each target's IRI is gathered per observed target to dedicated delivery files. This method
38 provides the result of interception in a very refined form to the LEAs, but requires somewhat more resources in the MF
39 than alternative B. With this method, the data sorting and interpretation tasks of the LEMF are considerably easier to
40 facilitate in near real time than in alternative B.

41 **File naming method B):**

42 The other choice is to use monolithic fixed format file names (with no trailing file type part in the file name):

1 <filenamestring> (e.g. ABXY00041014084400001)

2 where:

3 ABXY = Source node identifier part, used for all files by the mobile network operator "AB" from this MF node
4 named "XY".

5 00 = year 2000

6 04 = month April

7 10 = day 10

8 14 = hour

9 08 = minutes

10 44 = seconds

11 0000 = extension

12 1 = file type. The type "1" is reserved for IRI data files. (Codings "2" = CC(MO), "4" = CC(MT), "6" =
13 CC(MO&MT) are reserved for HI3).

14

15 This alternative B is used when several targets' intercepted data is gathered to common delivery files. This method does
16 not provide the result of interception in as refined form to the LEAs as the alternative A, but it is faster in performance
17 for the MF point of view. With this method, the MF does not need to keep many files open like in alternative A.

18 A.2.3 Profiles (informative)

19 As there are several ways (usage profiles) how data transfer can be arranged by using the FTP, this chapter contains
20 practical considerations how the communications can be set up. Guidance is given for client-server arrangements,
21 session establishments, time outs, the handling of the files (in RAM or disk). Example batch file is described for the
22 case that the sending FTP client uses files. If instead (logical) files are sent directly from the client's RAM memory,
23 then the procedure can be in principle similar though no script file would then be needed.

24 At the LEMF side, FTP server process is run, and at MF, FTP client. No FTP server (which could be accessed from
25 outside the operator network) shall run in the MF. The FTP client can be implemented in many ways, and here the FTP
26 usage is presented with an example only. The FTP client can be implemented by a batch file or a file sender program
27 that uses FTP via an API. The login needs to occur only once per e.g. <destaddr> & <leouser> -pair. Once the login is
28 done, the files can then be transferred just by repeating 'mput' command and checking the transfer status (e.g. from the
29 API routine return value). To prevent inactivity timer triggering, a dummy command (e.g. 'pwd') can be sent every T
30 seconds (T should be less than L, the actual idle time limit). If the number of FTP connections is wanted to be as
31 minimised as possible, the FTP file transfer method "B" is to be preferred to the method A (though the method A helps
32 more the LEMF by pre-sorting the data sent).

33 *Simple example of a batch file extract:*

34 FTP commands usage scenario for transferring a list of files:

35 To prevent FTP cmd line buffer overflow the best way is to use wildcarded file names, and let the FTP implementation
36 do the file name expansion (instead of shell). The number of files for one mput is not limited this way:

```
37 ftp <flags> <destaddr>
38 user <leouser> <leapasswd>
39 cd <destpath>
40 lcd <srcpath>
41 bin
42 mput <files>
43 nlist <lastfile> <checkfile>
44 close
45 EOF
```

47 This set of commands opens an FTP connection to a LEA site, logs in with a given account (auto-login is disabled),
48 transfers a list of files in binary mode, and checks the transfer status in a simplified way.

49 Brief descriptions for the FTP commands used in the example:

50 user <user-name> <password>	Identify the client to the remote FTP server.
51 cd <remote-directory>	Change the working directory on the remote machine to remote-directory.
52 lcd <directory>	Change the working directory on the local machine.
53 bin	Set the file transfer type to support binary image transfer

1	<code>mput <local-files></code>	Expand wild cards in the list of local files given as arguments and do a put
2		for each file in the resulting list. Store each local file on the remote
3		machine.
4	<code>nlist <remote-directory> <local-file></code>	Print a list of the files in a directory on the remote machine. Send the
5		output to local-file.
6	<code>close</code>	Terminate the FTP session with the remote server, and return to the
7		command interpreter. Any defined macros are erased.

8 The parameters are as follows:

9	<flags>	contains the FTP command options, e.g. "-i -n -V -p" which equals to 'interactive prompting off', 'auto-
10		login disabled', 'verbose mode disabled', and 'passive mode enabled'. (These are dependent on the used
11		ftp- version.)
12	<destaddr>	contains the IP address or DNS address of the destination (LEA).
13	<leouser>	contains the receiving (LEA) username.
14	<leapasswd>	contains the receiving (LEA) user's password.
15	<destpath>	contains the destination path.
16	<srcpath>	contains the source path.
17	<files>	wildcarded file specification (matching the files to be transferred)
18	<lastfile>	the name of the last file to be transferred
19	<checkfile>	is a (local) file to be checked upon transfer completion; if it exists then the transfer is considered
20		successful.

21 The FTP application should to do the following things if the checkfile is not found:

- 22 - keep the failed files.
- 23 - raise 'file transfer failure' error condition (i.e. send alarm to the corresponding LEA).
- 24 - the data can be buffered for a time that the buffer size allows. If that would finally be exhausted, DF would start
- 25 dropping the corresponding target's data until the transfer failure is fixed.
- 26 - the transmission of the failed files is retried until the transfer eventually succeeds. Then the DF would again start
- 27 collecting the data.
- 28 - upon successful file transfer the sent files are deleted from the DF.

29 The FTP server at LEMF shall not allow anonymous login of an FTP client.

30 A.2.4 File content

31 The file content is in method A relating to only one intercepted target.

32 In the file transfer method B, the file content may relate to any intercepted targets whose intercept records are sent to

33 the particular LEMF address.

34 Individual IRI records shall not be fragmented into separate files at the FTP layer.

35 A.2.5 Exceptional procedures

36 Overflow at the receiving end (LEMF) is avoided due to the nature of the protocol.

37 In case the transit network or receiving end system (LEMF) is down for a reasonably short time period, the local

38 buffering at the MF will be sufficient as a delivery reliability backup procedure.

39 In case the transit network or receiving end system (LEMF) is down for a very long period, the local buffering at the

40 MF may have to be terminated. Then the following intercepted data coming from the intercepting nodes to the MF

41 would be discarded, until the transit network or LEMF is up and running again.

1 A.2.6 Other considerations

2 The FTP protocol mode parameters used:

3 Transmission Mode: stream
 4 Format: non-print
 5 Structure: file-structure
 6 Type: binary

7
 8 The FTP client (=user -FTP process at the MF) uses e.g. the default standard FTP ports 20 (for data connection) and 21
 9 (for control connection), 'passive' mode is supported. The data transfer process listens the data port for a connection
 10 from a server-FTP process.

11 For the file transfer from the MF to the LEMF(s) e.g. the following data transfer parameters are provided for the FTP
 12 client (at the MF):

- 13 - transfer destination (IP) address, e.g. "194.89.205.4"
- 14 - transfer destination username, e.g. "LEA1"
- 15 - transfer destination directory path, e.g. "/usr/local/LEA1/1234-8291"
- 16 - transfer destination password
- 17 - interception file type, "1" (this is needed only if the file naming method A is used)

18 LEMF may use various kind directory structures for the reception of interception files. It is strongly recommended that
 19 at the LEMF machine the structure and access and modification rights of the storage directories are adjusted to prevent
 20 unwanted directory operations by a FTP client.

21 Timing considerations for the HI2 FTP transmission

22 The MF and LEMF sides control the timers to ensure reliable, near-real time data transfer. The transmission related
 23 timers are defined within the lower layers of the used protocol and are out of scope of this document.

24 The following timers may be used within the LI application:

25 **Table A.2: Timing considerations**

Name	Controlled by	Units	Description
T1 inactivity timer	LEMF	Seconds	Triggered by no activity within the FTP session (no new files). The FTP session is torn down when the T1 expires. To send another file the new connection will be established. The timer avoids the FTP session overflow at the LEMF side.
T2 send file trigger	MF	Milliseconds	Forces the file to be transmitted to the LEMF (even if the size limit has not been reached yet in case of volume trigger active). If the timer is set to 0 the only trigger to send the file is the file size parameter (Ref. C.2.2).

26

27

Annex B (normative): Structure of data at the handover interface

This annex specifies the coding details at the handover interface HI for all data, which may be sent from the NWO/AP/SvP's equipment to the LEMF, across HI.

At the HI2 and HI3 handover interface ports, the following data may be present:

- interface port HI2: Intercept related information (IRI);
- interface port HI3: records containing content of communication (CC).

The detailed coding specification for these types of information is contained in this annex, including sufficient details for a consistent implementation in the NWO/AP/SvP's equipment and the LEMF.

It must be noticed some data are ROSE specific and have no meaning when FTP is used. Those specificities are described at the beginning of each sub-annex.

B.1 Syntax definitions

The transferred information and messages are encoded to be binary compatible with [5] (Abstract Syntax Notation One (ASN.1)) and [6] (Basic Encoding Rules (BER)).

These recommendations use precise definitions of the words *type*, *class*, *value*, and *parameter*. Those definitions are paraphrased below for clarity.

A *type*, in the context of the abstract syntax or transfer syntax, is a set of all possible values. For example, an INTEGER is a type for all negative and positive integers.

A *class*, in the context of the abstract syntax or transfer syntax, is a one of four possible domains for uniquely defining a type. The classes defined by ASN.1 and BER are: UNIVERSAL, APPLICATION, CONTEXT, and PRIVATE.

The UNIVERSAL class is reserved for international standards such as [5] and [6]. Most parameter type identifiers in the HI ROSE operations are encoded as CONTEXT specific class. Users of the protocol may extend the syntax with PRIVATE class parameters without conflict with the present document, but risk conflict with other users' extensions. APPLICATION class parameters are reserved for future extensions.

A *value* is a particular instance of a type. For example, five (5) is a possible value of the type INTEGER.

A *parameter* in the present document is a particular instance of the transfer syntax to transport a value consisting of a tag to identify the parameter type, a length to specify the number of octets in the value, and the value.

In the BER a *tag* (a particular type and class identifier) may either be a primitive or a constructor. A *primitive* is a pre-defined type (of class UNIVERSAL) and a *constructor* consists of other types (primitives or other constructors). A constructor type may either be IMPLICIT or EXPLICIT. An IMPLICIT type is encoded with the constructor identifier alone. Both ends of a communication must understand the underlying structure of the IMPLICIT types. EXPLICIT types are encoded with the identifiers of all the contained types. For example, an IMPLICIT Number of type INTEGER would be tagged only with the *Number* tag, where an EXPLICIT number of type INTEGER would have the *INTEGER* tag within the *Number* tag. The present document uses IMPLICIT tagging for more compact message encoding.

For the coding of the value part of each parameter the general rule is to use a widely use a standardized format when it exists (ISUP, DSS1, MAP, ...).

As a large part of the information exchanged between the user's may be transmitted within ISUP/DSS1 signalling, the using of the coding defined for this signalling guarantee the integrity of the information provided to the LEMF and the evolution of the interface. For example if new values are used within existing ISUP parameters, this new values shall be transmitted transparently toward the LEMF.

1 **B.2 Object tree**

2 For Further Study

3

4

1

2 **B.3 Intercept related information (HI2)**3 Declaration of ROSE operation sending-of-IRI is ROSE delivery mechanism specific. When using FTP delivery
4 mechanism, data IRI-content must be considered.5 **ASN1 description of IRI (HI2 interface)**6 HI2Operations { (*For Future Study: Module ID to be defined*)}

7

8 DEFINITIONS IMPLICIT TAGS ::=

9

10 BEGIN

11

12

IMPORTS

13

OPERATION,

14

ERROR

15

FROM Remote-Operations-Information-Objects

16

{joint-iso-itu-t(2) remote-operations(4) informationObjects(5) version1(0)}

17

18

LawfulInterceptionIdentifier,

19

TimeStamp

20

FROM HI2Operations

21

{ccitt(0) identified-organization(4) etsi(0) securityDomain(2)

22

lawfulIntercept(2) hi2(1) version2(2)}; -- ES 201 671 Edition 2

23

24

25

26 **sending-of-IRI** OPERATION ::=

27

{

28

ARGUMENT IRIContent

29

ERRORS { OperationErrors }

30

CODE global:({ *For Future Study: to be defined as a 3GPP-LI Object-ID*})

31

}

32

-- Class 2 operation . The timer shall be set to a value between 3 s and 240 s.

33

-- The timer.default value is 60s.

34

-- NOTE: The same note as for HI management operation applies.

35

36 **IRIContent** ::= CHOICE

37

{

38

iRI-Begin-record [1] IRI-Parameters, -- include at least one optional parameter

39

iRI-End-record [2] IRI-Parameters,

40

iRI-Continue-record [3] IRI-Parameters, -- include at least one optional parameter

41

iRI-Report-record [4] IRI-Parameters -- include at least one optional parameter

42

}

43

44 unknown-version ERROR ::= { CODE local:0}

45

45 missing-parameter ERROR ::= { CODE local:1}

46

46 unknown-parameter-value ERROR ::= { CODE local:2}

47

47 unknown-parameter ERROR ::= { CODE local:3}

48

49 **OperationErrors** ERROR ::=

50

{

51

unknown-version |

52

missing-parameter |

53

unknown-parameter-value |

54

unknown-parameter

55

}

56

-- This values may be sent by the LEMF, when an operation or a parameter is misunderstood.

57

```

1  IRI-Parameters ::= SEQUENCE
2  {
3      iRVersion          [23] ENUMERATED
4      {
5          version2(2),
6          ...
7      } OPTIONAL,
8      -- if not present, it means version 1 is handled
9      lawfulInterceptionIdentifier [1] LawfulInterceptionIdentifier,
10     -- This identifier is associated to the target.
11     timeStamp          [3] TimeStamp,
12     -- date and time of the event triggering the report.)
13     initiator          [4] ENUMERATED
14     {
15         not-Available    (0),
16         originating-Target (1),
17         -- in case of GPRS, this indicates that the PDP context activation
18         -- or deactivation is MS requested
19         terminating-Target (2),
20         -- in case of GPRS, this indicates that the PDP context activation or
21         -- deactivation is network initiated
22     ...
23     } OPTIONAL,
24
25     locationOfTheTarget [8] Location OPTIONAL,
26     -- location of the target subscriber
27     partyInformation    [9] SET SIZE (1..10) OF PartyInformation OPTIONAL,
28     -- This parameter provides the concerned party (Originating, Terminating or
29     -- forwarded party), the identiy(ies) of the party and all the information provided
30     -- by the party.
31
32     serviceCenterAddress [13] PartyInformation OPTIONAL,
33     -- e.g. in case of SMS message this parameter provides the address of the relevant
34     -- server within the calling (if server is originating) or called (if server is
35     -- terminating) party address parameters
36     sms                 [14] SMS-report OPTIONAL,
37     -- this parameter provides the SMS content and associated information
38
39     national-Parameters [16] National-Parameters OPTIONAL,
40     gPRSCorrelationNumber [18] GPRSCorrelationNumber OPTIONAL,
41     gPRSevent           [20] GPRSEvent OPTIONAL,
42     -- This information is used to provide particular action of the target
43     -- such as attach/detach
44     sgSnAddress         [21] DataNodeAddress OPTIONAL,
45     gPRSOperationErrorCode [22] GPRSOperationErrorCode OPTIONAL,
46     ggsnAddress        [24] DataNodeAddress OPTIONAL,
47     qos                 [25] Qos OPTIONAL,
48     networkIdentifier   [26] Network-Identifier OPTIONAL,
49     smsOriginatingAddress [27] DataNodeAddress OPTIONAL,
50     smsTerminatingAddress [28] DataNodeAddress OPTIONAL,
51     ...
52 }

```

```

53
54 -- PARAMETERS FORMATS
55

```

```

56 Network-Identifier ::= SEQUENCE
57 {
58     operator-Identifier [0] OCTET STRING (SIZE (1 .. 5)),
59     -- it's a notification of the NWO/AP/SvP in ASCII- characters
60     -- the parameter is mandatory.
61     network-Element-Identifier [1] Network-Element-Identifier OPTIONAL,
62     ...
63 }

```

```

64
65 Network-Element-Identifier ::= CHOICE
66 {
67     iP-Format          [3] OCTET STRING (SIZE (1 .. 25)),
68     -- IP address
69     dNS-Format         [4] OCTET STRING (SIZE (1 .. 25)),
70     -- DNS address
71     iP-Address        [5] DataNodeAddress
72 }
73
74
75

```

```

1 PartyInformation ::= SEQUENCE
2 {
3   party-Qualifier [0] ENUMERATED
4   {
5     gPRS-Target(3),
6     ...
7   },
8   partyIdentity [1] SEQUENCE
9   {
10    imei [1] OCTET STRING (SIZE (8)) OPTIONAL,
11    -- See MAP format [4]
12
13    imsi [3] OCTET STRING (SIZE (3..8)) OPTIONAL,
14    -- See MAP format [4] International Mobile
15    -- Station Identity E.212 number beginning with Mobile Country Code
16
17    msISDN [6] OCTET STRING (SIZE (1..9)) OPTIONAL,
18    -- MSISDN of the target, encoded in the same format as the AddressString
19    -- parameters defined in MAP format document ref [4], § 14.7.8
20
21    e164-Format [7] OCTET STRING (SIZE (1 .. 25)) OPTIONAL,
22    -- E164 address of the node in international format. Coded in the same format as
23    -- the calling party number parameter of the ISUP (parameter part:[5])
24    ...
25  },
26
27  services-Data-Information [4] Services-Data-Information OPTIONAL,
28  -- This parameter is used to transmit all the information concerning the
29  -- complementary information associated to the basic data call
30  ...
31 }
32
33 Location ::= SEQUENCE
34 {
35   globalCellID [2] OCTET STRING (SIZE (5..7)) OPTIONAL,
36   --see MAP format (see [4])
37   rAI [4] OCTET STRING (SIZE (6)) OPTIONAL,
38   -- the Routing Area Identifier is coded in accordance with the § 10.5.5.15 of
39   -- document ref [9] without the Routing Area Identification IEI (only the
40   -- last 6 octets are used)
41   gsmLocation [5] GSMLocation OPTIONAL,
42   umtsLocation [6] UMTSLocation OPTIONAL,
43   sAI [7] OCTET STRING (SIZE (7)) OPTIONAL,
44   -- format: PLMN-ID 3 octets (no. 1 - 3)
45   -- LAC 2 octets (no. 4 - 5)
46   -- SAC 2 octets (no. 6 - 7)
47   -- (according to 3GPP TS 25.413)
48   ...
49 }
50

```

```

1  GSMLocation ::= CHOICE
2  {
3    geoCoordinates [1] SEQUENCE
4    {
5      latitude [1] PrintableString (SIZE(7..10)),
6      -- format : XDDMMSS.SS
7      longitude [2] PrintableString (SIZE(8..11))
8      -- format : XDDMMSS.SS
9    },
10   -- format : XDDMMSS.SS
11   -- X : N(orth), S(outh), E(ast), W(est)
12   -- DD or DDD : degrees (numeric characters)
13   -- MM : minutes (numeric characters)
14   -- SS.SS : seconds, the second part (.SS) is optional
15   -- Example :
16   -- latitude short form N502312
17   -- longitude long form E1122312.18
18
19   utmCoordinates [2] SEQUENCE
20   {
21     utm-East [1] PrintableString (SIZE(10)),
22     utm-North [2] PrintableString (SIZE(7))
23     -- example utm-East 32U0439955
24     -- utm-North 5540736
25   },
26
27   utmRefCoordinates [3] PrintableString (SIZE(13)),
28   -- example 32UPU91294045
29
30   wGS84Coordinates [4] OCTET STRING (SIZE(7..10))
31   -- format is as defined in GSM 03.32; polygon type of shape is not allowed.
32 }
33
34 UMTSLocation ::= CHOICE {
35   point [1] GA-Point,
36   pointWithUnCertainty [2] GA-PointWithUnCertainty,
37   polygon [3] GA-Polygon
38 }
39
40 GeographicalCoordinates ::= SEQUENCE {
41   latitudeSign ENUMERATED { north, south },
42   latitude INTEGER (0..8388607),
43   longitude INTEGER (-8388608..8388607),
44   ...
45 }
46
47 GA-Point ::= SEQUENCE {
48   geographicalCoordinates GeographicalCoordinates,
49   ...
50 }
51
52 GA-PointWithUnCertainty ::= SEQUENCE {
53   geographicalCoordinates GeographicalCoordinates,
54   uncertaintyCode INTEGER (0..127)
55 }
56
57 maxNrOfPoints INTEGER ::= 15
58
59 GA-Polygon ::= SEQUENCE (SIZE (1..maxNrOfPoints)) OF
60 SEQUENCE {
61   geographicalCoordinates GeographicalCoordinates,
62   ...
63 }
64

```

```

1 SMS-report ::= SEQUENCE
2 {
3   SMS-Contents [3] SEQUENCE
4   {
5     sms-initiator [1] ENUMERATED -- party which sent the SMS
6     {
7       target (0),
8       server (1),
9       undefined-party (2),
10      ...
11    },
12    transfer-status [2] ENUMERATED
13    {
14      succeed-transfer (0), -- the transfer of the SMS message succeeds
15      not-succeed-transfer(1),
16      undefined (2),
17      ...
18    } OPTIONAL,
19    other-message [3] ENUMERATED -- in case of terminating call, indicates if the
20    -- server will send other SMS
21    {
22      yes (0),
23      no (1),
24      undefined (2),
25      ...
26    } OPTIONAL,
27    content [4] OCTET STRING (SIZE (1 .. 270)) OPTIONAL,
28    -- Encoded in the format defined for the SMS mobile
29    ...
30  }
31 }
32
33 National-Parameters ::= SET SIZE (1..40) OF OCTET STRING (SIZE (1..256))
34 -- Content defined by national law
35
36 GPRSCorrelationNumber ::= OCTET STRING (SIZE(8..20))
37
38 GPRSEvent ::= ENUMERATED
39 {
40   pDPContextActivation (1),
41   startOfInterceptionWithPDPContextActive (2),
42   pDPContextDeactivation (4),
43   gPRSAttach (5),
44   gPRSDetach (6),
45   locationInfoUpdate (10),
46   SMS (11),
47   pDPContextModification (13),
48   ...
49 }
50 -- see ref [10]
51
52 Services-Data-Information ::= SEQUENCE
53 {
54   gPRS-parameters [1] GPRS-parameters OPTIONAL,
55   ...
56 }
57
58 GPRS-parameters ::= SEQUENCE
59 {
60   pDP-address-allocated-to-the-target [1] DataNodeAddress OPTIONAL,
61   aPN [2] OCTET STRING (SIZE(1..100)) OPTIONAL,
62   pDP-type [3] OCTET STRING (SIZE(2)) OPTIONAL,
63   ...
64 }
65
66 GPRSOperationErrorCode ::= OCTET STRING (SIZE(2))
67 -- refer to standard [9] for values(GMM cause or SM cause parameter).
68

```

```
1  DataNodeAddress ::= CHOICE
2  {
3    ipAddress [1] IPAddress,
4    x25Address [2] X25Address,
5    e164-Format [3] OCTET STRING (SIZE (1 .. 25))
6    -- E164 address of the node in international format. Coded in the same format as
7    -- the calling party number parameter of the ISUP (parameter part:[5])
8  }
9
10 IPAddress ::= SEQUENCE
11 {
12   iP-type [1] ENUMERATED
13   {
14     iPV4(0),
15     iPV6(1),
16     ...
17   },
18   iP-value [2] IP-value,
19   iP-assignment [3] ENUMERATED
20   {
21     static (1),
22     -- The static coding shall be used to report a static address
23     -- requested by a MS or offered by the network in association
24     -- with a PDP context activation procedure.
25     dynamic (2),
26     -- The dynamic coding shall be used to report a dynamically allocated
27     -- address by the network in association with a PDP context activation.
28     notAvailable (3)
29     -- The notAvailable coding shall be used to report IP addresses
30     -- not associated with a MS (i.e., network element IP address).
31     -- In addition, this coding shall also be used when the ip assignment
32     -- method associated with the MS is not known, not available,
33     -- or not retained at the intercepting 3G GSN.
34   },
35   ...
36 }
37
38 IP-value ::= CHOICE
39 {
40   iPBinaryAddress [1] OCTET STRING (SIZE(4..16)),
41   iPTextAddress [2] IA5String (SIZE(7..45))
42 }
43
44 X25Address ::= OCTET STRING (SIZE(1..25))
45
46 Qos ::= CHOICE
47 {
48   qosIu [1] OCTET STRING (SIZE(3..11)),
49   -- The qosIu parameter shall be coded in accordance with the § 10.5.6.5 of
50   -- document ref [9] or ref [21] without the Quality of service IEI and Length of
51   -- quality of service IE (only the last 3, or 11 octets are used. That is, first two
52   -- octets carrying 'Quality of service IEI' and 'Length of quality of service IE'
53   -- shall be excluded).
54   qosGn [2] OCTET STRING (SIZE(3..254))
55   -- qosGn parameter shall be coded in accordance with § 7.7.34 of document ref [17]
56 }
57
58
59 END -- OF HI2Operations
60
```

B.4 HI3 CC definition

```
1
2 HI3-PS { (For Future Study: module ID to be defined)}
3
4 DEFINITIONS IMPLICIT TAGS ::=
5
6 BEGIN
7
8 IMPORTS
9     LawfulInterceptionIdentifier,
10    GPRSCorrelationNumber,
11    TimeStamp,
12 FROM HI2Operations
13    { (For Future Study: module ID to be defined)}; -- from HI2Operations 3GPP UMTS-PS module
14
```

```
15 CC-PDU [1] CC-PDU
16
17 CC-PDU ::= SEQUENCE
18 {
19     uLIC-header [1] ULIC-header,
20     payload [2] OCTET STRING
21 }
22
23 ULIC-header ::= SEQUENCE
24 {
25     version [1] Version,
26     liID [2] LawfulInterceptionIdentifier OPTIONAL,
27     correlation-Number [3] GPRSCorrelationNumber,
28     timeStamp [4] TimeStamp OPTIONAL,
29     sequence-number [5] INTEGER (0..65535),
30     t-PDU-direction [6] TPDU-direction,
31     ...
32 }
```

```
34 Version ::= ENUMERATED
35 {
36     version1(1),
37     ...
38 }
39
40 TPDU-direction ::= ENUMERATED
41 {
42     from-target (1),
43     to-target (2),
44     unknown (3)
45 }
```

```
46 END
47
```

48

1 **Annex C (normative):**
 2 **UMTS HI3 Interface**

3 There are two possible methods for delivery of content of communication to the LEMF standardized in this document:

- 4 - UMTS LI Correlation Header (ULIC) and UDP/TCP
- 5 - FTP

6 Two versions of ULIC are defined: version 0 and version 1.

7 ULICv1 shall be supported by the network and, optionally, ULICv0 may be supported by the network. When both are
 8 supported, ULICv1 is the default value.

9 **C.1 UMTS LI correlation header version 0**

10 **C.1.1 Introduction**

11 The header and the payload of the communication between the intercepted subscriber and the other party (later called:
 12 Information Element) is duplicated. A new header (later called: ULIC-Header) is added before it is sent to LEMF.

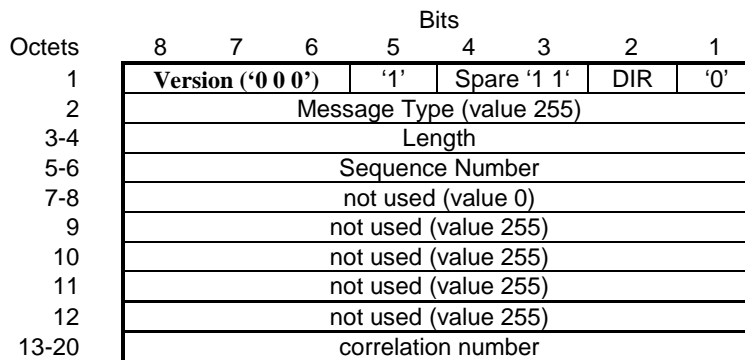
13 Data packets with the ULIC header shall be sent to the LEA via UDP/IP or TCP/IP.

14 **C.1.2 Definition of ULIC header version 0**

15 ULIC header contains the following attributes:

- 16 - Correlation Number
- 17 - Message Type (a value of 255 is used for HI3-PDU's).
- 18 - Direction
- 19 - Sequence Number
- 20 - Length

21 T-PDU contains the intercepted information.



22 **Figure C.1: Outline of ULIC header**

- 23
- 24
- 25 - For interception tunneling the ULIC header shall be used as follows:
- 26 - Version shall be set to 0 to indicate the first version of ULIC header.

- 1 - DIR indicates the direction of the T-PDU:
- 2 "1" indicating uplink (from observed mobile user) and
- 3 "0" indicating downlink (to observed mobile user).
- 4 - Message Type shall be set to 255 (the unique value that is used for T-PDU within GTP [12]).
- 5 - Length shall be the length, in octets, of the signaling message excluding the ULIC header. Bit 8 of octet 3 is the
- 6 most significant bit and bit 1 of octet 4 is the least significant bit of the length field.
- 7 - Sequence Number is an increasing sequence number for tunneled T-PDUs. Bit 8 of octet 5 is the most significant
- 8 bit and bit 1 of octet 6 is the least significant bit of the sequence number field.
- 9 - Correlation Number consists of two parts: GGSN-ID identifies the GGSN which creates the Charging-ID
- 10 Charging-ID is defined in [12] and assigned uniquely to each PDP context activation on that GGSN (4 octets).
- 11 The correlation number consist of 8 octets and guarantees a unique identification of the tunnel to the LEA over a
- 12 long time. The requirements for this identification are similar to that defined for charging in [12], chapter 5.4.
- 13 Therefore it is proposed to use the Charging-ID, defined in [12] , chapter 5.4 as part of correlation number. The
- 14 Charging-ID is signaled to the new SGSN in case of SGSN-change so the tunnel identifier could be used
- 15 "seamlessly" for the HI3 interface.

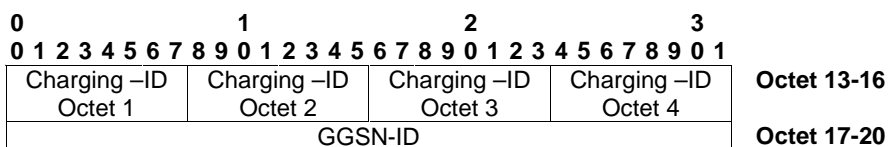


Figure C.2: Outline of correlation number

The ULIC header is followed by a subsequent payload information element. Only one information element is allowed in a single signaling message.

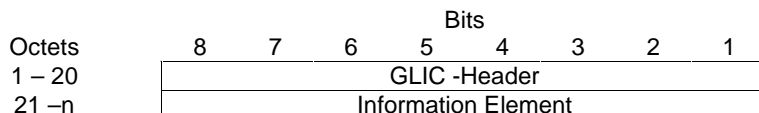


Figure C.3: ULIC header followed by the subsequent payload Information Element

The information element contains the header and the payload of the communication between the intercepted subscriber and the other party.

C.1.3 Definition of ULIC header version 1

ULIC-header version 1 is defined in ASN.1 (ref [5]) (see annex B.4) and is encoded according to BER (ref [6]). It contains the following attributes:

- 31 • ULIC header version (version)
- 32 set to version1
- 33 • lawful interception identifier (LIID, optional)
- 34 sending of lawful interception identifier is application dependant; it is done according to national requirements
- 35 • correlation number (correlation-Number)
- 36
- 37 • As defined in clause 6.1.3

- 1 • time stamp (timeStamp, optional),
2 sending of time stamp is application dependant; it is done according to national requirements
- 3 • sequence number (sequence-number)
- 4
- 5 • Sequence Number is an increasing sequence number for tunneled T-PDUs. Handling of sequence number is
6 application dependent; it is done according to national requirements (e.g. unique sequence number per PDP-
7 context).
- 8 • TPDU direction (t-PDU-direction)
9 indicates the direction of the T-PDU (from the target or to the target).
- 10 The ULIC header is followed by a subsequent payload information element. Only one information element is allowed in
11 a single signalling message (see annex B.4).

12 C.1.4 Exceptional procedure

13 With ULIC over UDP: the delivering node doesn't take care about any problems at LEMF.

14 With ULIC over TCP: TCP tries to establish a connection to LEMF and resending (buffering in the sending node) of
15 packets is also supported by TCP.

16 In both cases it might happen that content of communication gets lost (in case the LEMF or the transit network between
17 MF and LEMF is down for a long time).

18 C.1.5 Other considerations

19 The use of IPsec for this interface is recommended.

20 The required functions in LEMF are:

- 21 - Collecting and storing of the incoming packets inline with the sequence numbers.
22 - Correlating of CC to IRI with the use of the correlation number in the GLIC header.

23

1

2 C.2 FTP

3 C.2.1 Introduction

4 At HI3 interface FTP is used over the internet protocol stack for the delivery of the result of interception. FTP is defined
5 in ref [13]. The IP is defined in ref [15]. The TCP is defined in ref [16].

6 FTP supports reliable delivery of data. The data may be temporarily buffered in the sending node (MF) in case of link
7 failure. FTP is independent of the payload data it carries.

8 C.2.2 Usage of the FTP

9 In the packet data LI the MF acts as the FTP client and the receiving node (LEMF) acts as the FTP server . The client
10 pushes the data to the server.

11 The receiving node LEMF stores the received data as files. The sending entity (MF) may buffer files.

12 Several smaller intercepted data units may be gathered to bigger packages prior to sending, to increase bandwidth
13 efficiency.

14 The following configurable intercept data collection (= transfer package closing / file change) threshold parameters
15 should be supported:

- 16 - frequency of transfer, based on send timeout, e.g. X ms
- 17 - frequency of transfer, based on volume trigger, e.g. X octets

18 There are two possible ways how the interception data may be sent from the MF to the LEMF. One way is to produce
19 files that contain interception data only for one observed target (ref: "File naming method A)"). The other way is to
20 multiplex all the intercepted data that MF receives to the same sequence of general purpose interception files sent by the
21 MF (ref: "File naming method B")).

22 The HI2 and HI3 are logically different interfaces, even though in some installations the HI2 and HI3 packet streams
23 might also be delivered via a common transmission path from a MF to a LEMF. It is possible to correlate HI2 and HI3
24 packet streams by having common (referencing) data fields embedded in the IRI and the CC packet streams.

25 **File naming:**

26 The names for the files transferred to a LEA are formed according to one of the 2 available formats, depending on the
27 delivery file strategy chosen (e.g. due to national convention or operator preference).

28 Either each file contains data of only one observed target (as in method A) or several targets' data is put to files
29 common to all observed target traffic through a particular MF node (as in method B).

30 The maximum set of allowed characters in interception file names are "a"... "z", "A"... "Z", "-", "_", ".", and decimals
31 "0"... "9".

32 **File naming method A):**

33 <LIID>_<seq>.<ext>

34 **LIID** = See clause 7.1.

35 **Seq** = integer ranging between [0..2⁶⁴-1], in ASCII form (not exceeding 20 ASCII digits), identifying the sequence
36 number for file transfer from this node per a specific target.

37 **Ext** = ASCII integer ranging between ["1".."7".] (in hex: 31H...37H), identifying the file type. The possible file type
38 codings for intercepted data are shown in table C.1. But for the HI3 interface, only the types "2", "4", and "6" are
39 possible.

Table C.1: Possible file types

File types that the LEA may get	Intercepted data types
"2" (in binary: 0011 0010)	CC(MO)
"4" (in binary: 0011 0100)	CC(MT)
"6" (in binary: 0011 0110)	CC(MO&MT)

(The least significant bit that is '1' in file type 1, is reserved for indicating IRI data.) The bit 2 of the **ext** tells whether the Mobile Originated (MO) Content of Communication (CC) is included to the intercepted data.

The bit 2 of the **ext** tells whether the Mobile Originated (MO) Content of Communication (CC) is included to the intercepted data.

The bit 3 of the **ext** tells whether the Mobile Terminated (MT) Content of Communication (CC) is included to the intercepted data.

Thus, for Mobile Originated Content of Communication data, the file type is "2", for MT CC data "4" and for MO&MT CC data "6".

This alternative A is used when each target's intercepted data is gathered per observed target to dedicated delivery files. This method provides the result of interception in a very refined form to the LEAs, but requires somewhat more resources in the sending node than alternative B. With this method, the data sorting and interpretation tasks of the LEMF are considerably easier to facilitate in near real time than in alternative B.

File naming method B):

The other choice is to use monolithic fixed format file names (with no trailing file type part in the file name):

<filenamestring> (e.g. ABXY00041014084400006)

where:

ABXY = Source node identifier part, used for all files by the mobile network operator "AB" from this MF node named "XY".

00 = year 2000

04 = month April

10 = day 10

14 = hour

08 = minutes

44 = seconds

0000 = extension.

6 = file type. Coding: "2" = CC(MO), "4" = CC(MT), "6" = CC(MO&MT). (The type "1" is reserved for IRI data files).

This alternative B is used when several targets' intercepted data is gathered to common delivery files. This method does not provide the result of interception in as refined form to the LEAs as the alternative A, but it is faster in performance for the MF point of view. With this method, the MF does not need to keep many files open like in alternative A.

C.2.3 Exceptional procedures

Overflow at the receiving end (LEMF) is avoided due to the nature of the protocol.

In case the transit network or receiving end system (LEMF) is down for a reasonably short time period, the local buffering at the MF will be sufficient as a delivery reliability backup procedure.

In case the transit network or receiving end system (LEMF) is down for a very long period, the local buffering at the MF may have to be terminated. Then the following intercepted data coming from the intercepting nodes towards the MF would be discarded, until the transit network or LEMF is up and running again.

1 C.2.4 CC contents for FTP

2 C.2.4.1 Fields

3 The logical contents of the CC-header is described here.

4 **CC-header** = (Version, HeaderLength, PayloadLength, PayloadType, PayloadTimeStamp, PayloadDirection,
5 CCSeqNumber, CorrelationNumber, LIID, PrivateExtension)

6 The Information Element CorrelationNumber forms the means to correlate the IRI and CC of the communication
7 session intercepted.

8 The first column indicates whether the Information Element referred is Mandatory, Conditional or Optional.

9 The second column is the Type in decimal.

10 The third column is the length of the Value in octets.

11 (Notation used in table C.2: M = Mandatory, O = Optional, C= Conditional.)

12 **Table C.2: Information elements in the first version of the CC header**

Mode	Type	Length	Value
M	130	2	Version = the version number of the format version to be used. This field has a decimal value, this enables version changes to the format version. The values are allocated according to national conventions.
O	131	2	HeaderLength = Length of the CC-header up to the start of the payload in octets. (This field is optional since it is useful only in such cases that these information elements would be transferred without a dynamic length encapsulation that contains all the length information anyway. This field could be needed in case of e.g. adapting to a local encapsulation convention.)
O	132	2	PayloadLength = Length of the payload following the CC-header in octets. (This field is optional since it is useful only in such cases that these information elements would be transferred without a dynamic length encapsulation that contains all the length information anyway. This field could be needed in case of e.g. adapting to a local encapsulation convention.)
M	133	1	PayloadType = Type of the payload, indicating the type of the CC. Type of the payload. This field has a decimal value. The possible PDP Type values can be found in the standards (e.g.3GPP TS 29.060 [17]). The value 255 is reserved for future PDP Types and means: "Other".
O	134	4	PayloadTimeStamp = Payload timestamp according to intercepting node. (Precision: 1 second, timezone: UTC). Format: Seconds since 1970-01-01 as in e.g. Unix (length: 4 octets).
C	137	1	PayloadDirection = Direction of the payload data. This field has a decimal value 0 if the payload data is going towards the target (ie. downstream), or 1 if the payload data is being sent from the target (ie. upstream). If this information is transferred otherwise, e.g. in the protocol header, this field is not required as mandatory. If the direction information is not available otherwise, it is mandatory to include it here in the CC header.
O	141	4	CCSeqNumber = Identifies the sequence number of each CC packet during interception of the target. This field has a 32-bit value.
M	144	8 or 20	CorrelationNumber . Identifies an intercepted session of the observed target. This can be implemented by using e.g. the Charging Id (4 octets, see [14]) with the (4-octet/16-octet) Ipv4/Ipv6 address of the PDP context maintaining GGSN node attached after the first 4 octets.
			<Possible future parameters are to be allocated between 145 and 250.>
O	254	1-25	LIID = Field indicating the LIID as defined in this document. This field has a character string value, e.g. "ABCD123456".
O	255	1-N	PrivateExtension = An optional field. The optional Private Extension contains vendor or LEA or operator specific information. It is described in the document 3GPP TS 29.060 [17].

13

1

Table C.3: Information elements in the second version of the CC header

Mode	Type	Length	Value
M	130	2	Version = the version number of the format version to be used. This field has a decimal value, this enables version changes to the format version. The values are allocated according to national conventions.
O	131	2	HeaderLength = Length of the CC-header up to the start of the payload in octets. (This field is optional since it is useful only in such cases that these information elements would be transferred without a dynamic length encapsulation that contains all the length information anyway. This field could be needed in case of e.g. adapting to a local encapsulation convention.)
O	132	2	PayloadLength = Length of the payload following the CC-header in octets. (This field is optional since it is useful only in such cases that these information elements would be transferred without a dynamic length encapsulation that contains all the length information anyway. This field could be needed in case of e.g. adapting to a local encapsulation convention.)
M	133	1	PayloadType = Type of the payload, indicating the type of the CC. Type of the payload. This field has a decimal value. The possible PDP Type values can be found in the standards (e.g.3GPP TS 29.060 [17]). The value 255 is reserved for future PDP Types and means: "Other".
O	134	4	PayloadTimeStamp = Payload timestamp according to intercepting node. (Precision: 1 second, timezone: UTC). Format: Seconds since 1970-01-01 as in e.g. Unix (length: 4 octets).
C	137	1	PayloadDirection = Direction of the payload data. This field has a decimal value 0 if the payload data is going towards the target (ie. downstream), or 1 if the payload data is being sent from the target (ie. upstream). If this information is transferred otherwise, e.g. in the protocol header, this field is not required as mandatory. If the direction information is not available otherwise, it is mandatory to include it here in the CC header.
O	141	4	CCSeqNumber = Identifies the sequence number of each CC packet during interception of the target. This field has a 32-bit value.
M	144	8 or 20	CorrelationNumber . Identifies an intercepted session of the observed target. This can be implemented by using e.g. the Charging Id (4 octets, see [14]) with the (4-octet/16-octet) Ipv4/Ipv6 address of the PDP context maintaining GGSN node attached after the first 4 octets. <Possible future parameters are to be allocated between 145 and 250.>
M	251	2	MainElementID = Identifier for the TLV element that encompasses one or more HeaderElement-PayloadElement pairs for intercepted packets.
M	252	2	HeaderElementID = Identifier for the TLV element that encompasses the CC-header of a PayloadElement.
M	253	2	PayloadElementID = Identifier for the TLV element that encompasses one intercepted Payload packet.
O	254	1-25	LIID = Field indicating the LIID as defined in this document. This field has a character string value, e.g. "ABCD123456".
O	255	1-N	PrivateExtension = An optional field. The optional Private Extension contains vendor or LEA or operator specific information. It is described in the document 3GPP TS 29.060 [17].

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C.2.4.2 Information element syntax

The dynamic TypeLengthValue (TLV) format is used for its ease of implementation and good encoding and decoding performance. Subfield sizes: Type = 2 octets, Length = 2 octets and Value = 0...N octets. From Length the T and L subfields are excluded. The Type is different for every different field standardized.

The octets in the Type and Length subfields are ordered in the little-endian order, (i.e. least significant octet first). Any multi-octet Value subfield is also to be interpreted as being little-endian ordered (word/double word/long word) when it has a (hexadecimal 2/4/8-octet) numeric value, instead of being specified to have an ASCII character string value. This means that the least significant octet/word/double word is then sent before the more significant octet/word/double word.

TLV encoding:

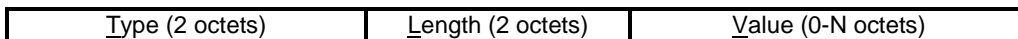
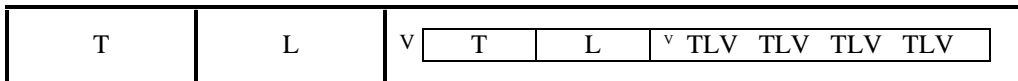


Figure C.4: Information elements in the CC header

TLV encoding can always be applied in a nested fashion for structured values.

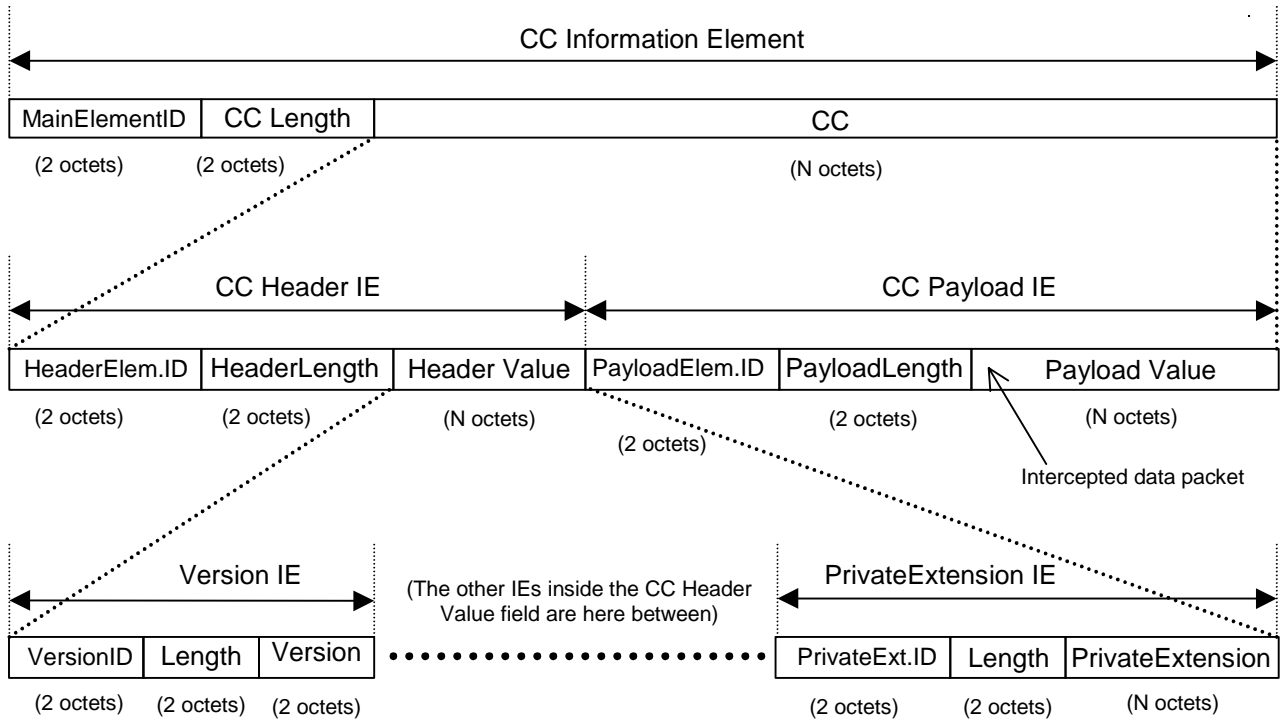


(The small "v" refers to the start of a Value field that has inside it a nested structure.)

Figure C.5: Information elements in the CC header

1

2 In figure C.6, the TLV structure for UMTS HI3 transfer is presented for the case that there is just one intercepted packet
 3 inside the CC message. (There can be more CC Header IEs and CC Payload IEs in the CC, if there are more intercepted
 4 packets in the same CC message.)



5

Figure C.6: IE structure of a CC message that contains one intercepted packet

6

7

8 The first octet of the first TLV element will start right after the last octet of the header of the protocol that is being used
 9 to carry the CC information.

10 The first TLV element (i.e. the main TLV IE) comprises the whole dynamic length CC information, i.e. the dynamic
 11 length CC header and the dynamic length CC payload.

12 Inside the main TLV IE there are at least 2 TLV elements: the Header of the payload and the Payload itself. The Header
 13 contains all the ancillary IEs related to the intercepted CC packet. The Payload contains the actual intercepted packet.

14 There may be more than one intercepted packet in one UMTS HI3 delivery protocol message. If the Value of the main
 15 TLV IE is longer than the 2 (first) TLV Information Elements inside it, then it is an indication that there are more than
 16 one intercepted packets inside the main TLV IE (i.e. 4 or more TLV IEs in total). The number of TLV IEs in the main
 17 TLV IE is always even, since for every intercepted packet there is one TLV IE for header and one TLV IE for payload.

18

1

2 **C.2.5 Other considerations**

3 The FTP protocol mode parameters used:

4 Transmission Mode: stream
5 Format: non-print
6 Structure: file-structure
7 Type: binary

8 The FTP service command to define the file system function at the server side: STORE mode for data transmission.

9 The FTP client (=user -FTP process at the MF) uses e.g. the default standard FTP ports 20 (for data connection) and
10 21 (for control connection), 'passive' mode is supported. The data transfer process listens the data port for a connection
11 from a server-FTP process.

12 For the file transfer from the MF to the LEMF(s) e.g. the following data transfer parameters are provided for the FTP
13 client (at the MF):

- 14 - transfer destination (IP) address, e.g. "194.89.205.4";
- 15 - transfer destination username, e.g. "LEA1";
- 16 - transfer destination directory path, e.g. "/usr/local/LEA1/1234-8291";
- 17 - transfer destination password;
- 18 - interception file type, e.g. "2" (this is needed only if the file naming method A is used).

19 LEMF may use various kind directory structures for the reception of interception files. It is strongly recommended that
20 at the LEMF machine the structure and access and modification rights of the storage directories are adjusted to prevent
21 unwanted directory operations by a FTP client.

22 The use of IPSec services for this interface is recommended.

23 **Timing considerations for the FTP transmission**

24 The MF and LEMF sides control the timers to ensure reliable, near-real time data transfer. The transmission related
25 timers are defined within the lower layers of the used protocol and are out of scope of this document.

26 The following timers may be used within the LI application:

27

Table C.4: Timing considerations

Name	Controlled by	Units	Description
T1 inactivity timer	LEMF	Seconds	Triggered by no activity within the FTP session (no new files). The FTP session is torn down when the T1 expires. To send another file the new connection will be established. The timer avoids the FTP session overflow at the LEMF side.
T2 send file trigger	MF	Milliseconds	Forces the file to be transmitted to the LEMF (even if the size limit has not been reached yet in case of volume trigger active). If the timer is set to 0 the only trigger to send the file is the file size parameter (Ref. C.2.2).

28

29

Annex D (informative): LEMF requirements - handling of unrecognised fields and parameters

During decoding of a record at the LEA, the following exceptional situations may occur:

- 1) Unrecognized parameter: The parameter layout can be recognized, but its name is not recognized:
The parameter shall be ignored, the processing of the record proceeds.
- 2) The parameter content or value is not recognized or not allowed:
The parameter shall be ignored, the processing of the record proceeds.
- 3) The record cannot be decoded (e.g. it seems to be corrupted):
The whole record shall be rejected when using ROSE delivery mechanism or ignored.

NOTE: In cases 2 and 3, the LEMF may wish to raise an alarm to the NWO/AP/SvP administration centre. For case 1, no special error or alarm procedures need be started at the LEA, because the reason may be the introduction of a new version of the specification in the network, not be an error as such security aspects.

1

2 Annex E (informative):

3 Bibliography

4 The following material, though not specifically referenced in the body of the present document (or not publicly
5 available), gives supporting information.

- 6 1. ITU-T Recommendation X.25: "Interface between Data Terminal Equipment (DTE) and Data Circuit-
7 terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data
8 networks by dedicated circuit".
- 9 2. EN 300 356-1 to 20: "Integrated Services Digital Network (ISDN); Signaling System No.7; ISDN User Part
10 (ISUP) version 3 for the international interface; Parts 1 to 20".
- 11 3. EN 300 403-1 (V1.2): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No.
12 one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol
13 specification [ITU-T Recommendation Q.931 (1993), modified]".
- 14 4. EN 300 061-1: "Integrated Services Digital Network (ISDN); Subaddressing (SUB) supplementary service;
15 Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- 16 5. EN 300 097-1 including Amendment 1: "Integrated Services Digital Network (ISDN); Connected Line
17 Identification Presentation (COLP) supplementary service; Digital Subscriber Signalling System No. one
18 (DSS1) protocol; Part 1: Protocol specification".
- 19 6. EN 300 098-1: "Integrated Services Digital Network (ISDN); Connected Line Identification Restriction
20 (COLR) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1:
21 Protocol specification".
- 22 7. EN 300 130-1: "Integrated Services Digital Network (ISDN); Malicious Call Identification (MCID)
23 supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol
24 specification".
- 25 8. EN 300 138-1 including Amendment 1: "Integrated Services Digital Network (ISDN); Closed User Group
26 (CUG) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol
27 specification".
- 28 9. EN 300 185-1: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary
29 service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- 30 10. ETS 300 188-1: "Integrated Services Digital Network (ISDN); Three-Party (3PTY) supplementary service;
31 Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- 32 11. EN 300 207-1 (V1.2): "Integrated Services Digital Network (ISDN); Diversion supplementary services;
33 Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- 34 12. EN 300 286-1: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary
35 service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- 36 13. EN 300 369-1 (V1.2): "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT)
37 supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol
38 specification".
- 39 14. EN 300 196-1 (V1.2): "Integrated Services Digital Network (ISDN); Generic functional protocol for the
40 support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1:
41 Protocol specification".
- 42 15. ITU-T Recommendation Q.850: "Usage of cause and location in the Digital Subscriber Signalling System No.
43 1 and the Signalling System No. 7 ISDN User Part".
- 44 16. ITU-T Recommendation X.881: "Information technology - Remote Operations: OSI realizations - Remote
45 Operations Service Element (ROSE) service definition".

- 1 17. ITU-T Recommendation X.882: "Information technology - Remote Operations: OSI realizations - Remote
2 Operations Service Element (ROSE) protocol specification".
- 3 18. EN 300 122-1: "Integrated Services Digital Network (ISDN); Generic keypad protocol for the support of
4 supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol
5 specification".
- 6 19. ETS 300 392-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General network
7 design".
- 8 20. EN 301 344, GSM 03.60: "Digital cellular telecommunications system (Phase 2+); GPRS Service description
9 stage 2".
- 10 21. RFC2228 "FTP Security Extensions", October 1997
- 11 22. ITU-T recommendation Q.763 Signalling System No.7 - ISDN User Part formats and codes
- 12 23. TR 101 876 "Telecommunications security; Lawful Interception (LI); Description of GPRS HI3"
- 13 24. ETSI ES 201 671 Edition 2, Telecommunications security; Lawful Intercept (LI); Handover interface for the
14 lawful interception of telecommunications traffic.
- 15 25. TIA/EIA J-STD-025 Lawfully Authorized Electronic Surveillance, September 2000.

16

1 Annex F (informative):
2 Profiles for FTP

3 For further study.

4

1 Annex G (informative):

2 United States lawful interception

3 G.1 Delivery methods preferences

4 Law enforcement agencies want reliable delivery of intercepted communications to the LEMF:

- 5 • U.S. Law enforcement prefers that the capability to deliver IRI to the LEMF be provided over the HI2
6 directly over TCP (at the transport layer) and the Internet Protocol (IP) (at the network layer).
- 7 • U.S. Law enforcement prefers that the capability to deliver content of communication to the LEMF be
8 provided using the GPRS LI Correlation Header over TCP/IP method for delivery.

9 G.2 HI2 delivery methods

10 G.2.1 TPKT/TCP/IP

11 G.2.1.1 Introduction

12 The protocol used by the "LI application" for the encoding of IRI data and the sending of IRI data between the MF and
13 the LEMF is based on already standardized data transmission protocols. At the HI2 interface, the "LI application"
14 protocol is used directly over the Transmission Control Protocol (TCP), which uses the Internet Protocol (IP) for the
15 delivery of the IRI. IP is defined in ref [15]. TCP is defined in ref [16].

16 TCP/IP supports reliable delivery of data. TCP is independent of the payload data it carries.

17 G.2.1.2 Normal Procedures

18 Either the MF or LEMF may initiate the TCP connection. The case when the MF initiates the TCP connection is
19 detailed in A.3.2.1.

20 G.2.1.2.1 Usage of TCP/IP when MF initiates TCP Connections

21 The MF shall initiate TCP connections to the LEMF for LI purposes. Once a TCP connection is established,
22 the MF shall send the LI application messages defined in Section A.3.3. The MF shall not receive TCP data.

23 The "LI application" messages may be sent over a single TCP connection per LEMF. A TCP/IP connection
24 shall be capable of transporting "LI application" messages for multiple surveillance cases to a single LEA.
25 The MF initiates the establishment of TCP connections to the LEMF equipment designated by the LEA.
26 Optionally, the MF may use more than one TCP connection per LEMF for the purpose of delivering "LI
27 application" messages to minimize the effects of congestion or facility failures. For example, if more than
28 one TCP connection was used "LI application" messages may be uniformly distributed across the
29 connections. If delays are detected on one TCP connection, the MF could begin to transmit more messages
30 on the other TCP connections. The number of TCP connections supported to the LEMF shall be less than or
31 equal to the provisioned maximum number of such connections.

32 G.2.1.2.2 Use of TPKT

33 The individual IRI parameters are coded using ASN.1 and the basic encoding rules (BER). The individual IRI
34 parameters are conveyed to the LEMF in "LI application" messages or IRI data records.

35 TCP is a stream-based protocol and has no inherent message delineation capability.

36 Since the upper-layer protocols are not self-describing, ISO Transport Service on top of TCP (ITOT), also
37 referred to as TPKT, as defined in RFC 1006 and later updated by RFC 2126 is used to encapsulate the "LI
38 application" messages before handing them off to TCP.

1 Therefore, TPKT shall be required and used in the transport stack of the IRI delivery interface (i.e., “LI
2 application” messages/TPKT/TCP/IP). Protocol class 0 defined in RFC 2126 shall be supported.

3 **G.2.1.2.3 Sending of LI messages**

4 After the TCP connection has been established, the MF shall send the “LI application” messages defined in
5 Section A.3.3 to the LEMF, when applicable events have been detected and such messages are formulated.

6 The basic “LI application” message is called LawfullIntercept message. When sending IRI, a LawfullIntercept
7 message shall be used and the IRI shall be encoded within the IRIContent parameter. Multiple IRIContent
8 parameters may be included within a single LawfullIntercept message. When sending the optional keep-Alive
9 indication, the LawfullIntercept shall be coded with the keep-Alive parameter.

10 In all cases, LawfullIntercept messages are only sent from the MF to the LEMF. All transfer of packets other
11 than those operationally required to maintain the connection must be from the MF to the LEMF only. At no
12 time may the LEMF equipment send unsolicited packets from the LEMF equipment to the MF.

13 If supported, a LawfullIntercept message including a keep-Alive parameter shall be sent when no
14 LawfullIntercept message has been sent for a configurable amount of time in minutes (e.g., 5 minutes),
15 indicating to the LEMF that the LI connection is still up. The keep-alive-time parameter shall be settable in
16 increments of 1 minute, from 1 minute up to a maximum of 5 minutes, with a default value of 5 minutes.

17 The “LI application” messages shall be encapsulated using TPKT, as defined in Section A.3.2.2, before
18 sending them from the MF to the LEMF using TCP/IP.

19 **G.2.1.3 ASN.1 for HI2 Mediation Function Messages**

20 DEFINITIONS IMPLICIT TAGS ::=

21

```
22 LawfullIntercept ::= CHOICE  
23 {  
24     keep-Alive          [0] NULL,  
25     envelopedIRIContent [1] EnvelopedIRIContent,  
26     ...  
27 }  
28 EnvelopedIRIContent ::= SEQUENCE OF IRIContent  
29
```

30 **G.2.1.4 Error Procedures**

31 Upon detection of the “User Timeout” condition, as defined in STD0007 [16], if the surveillance is still active,
32 the MF shall take action to re-establish the TCP connection with the LEMF. Due to this condition, any
33 information that TCP was not able to deliver is lost unless it is buffered.

34 Therefore, the MF should be able to buffer any information that is to be delivered to the LEMF during a
35 period of User Timeout detection until the re-establishment of the TCP connection. If the MF is not able to
36 establish the TCP connection, the MF may discard the buffered information. If the connection is re-
37 established, the MF shall hand off (transmit) the information stored in its buffer to TCP before sending any
38 new information.

39 **G.2.1.5 Security Considerations**

40 Security considerations shall be taken into account in designing the interface between the MF and the LEMF.
41 At a minimum, the MF shall use a source IP address known to the LEMF. To protect against address
42 spoofing and other security concerns, it is recommended that the MF and the LEMF utilize IPSec.

43

1

2 G.3 HI3 delivery methods

3 G.3.1 Use of TCP/IP

4 At the HI3 interface, the user data packets with the GLIC header shall be sent to the LEMF over Transmission Control
5 Protocol (TCP), which uses the Internet Protocol (IP).

6 TCP/IP supports reliable delivery of data. TCP is independent of the payload data it carries.

7 G.3.1.1 Normal Procedures

8 Either the MF or LEMF may initiate the TCP connection. The case when the MF initiates the TCP connection is
9 detailed in G.3.1.1.1.

10 G.3.1.1.1 Usage of TCP/IP when MF initiates TCP Connections

11 The MF shall initiate TCP connections to the LEMF for the purpose of delivering CC. Once a TCP connection is
12 established, the MF will send CC messages to the LEMF via TCP.

13 CC messages shall be sent over TCP connections established specifically to deliver CC. A minimum of one TCP
14 connection shall be established per intercept subject per LEMF to deliver CC associated only with the intercept subject.
15 The MF initiates the establishment of TCP connections to the LEMF equipment designated by the LEA. Optionally,
16 the MF may use more than one TCP connection per intercept subject per LEMF for the purpose of delivering CC
17 associated with the intercept subject to minimize the effects of congestion or facility failures. For example, if more than
18 one TCP connection is used, CC messages may be uniformly distributed across the connections. If delays are detected
19 on one TCP connection, the MF could begin to transmit more messages on the other TCP connections. The number of
20 TCP connections supported to the LEMF per intercept subject shall be less than or equal to the provisioned maximum
21 number of such connections.

22 After the TCP connection establishment procedure, the MF shall send the connectionStatus message including the
23 lawfulInterceptionIdentifier parameter to the LEMF. The delivery of the lawful interception identifier to the LEMF after
24 the TCP connection establishment procedure will assist the LEMF in correlating the TCP connection, established for
25 delivering content of communication, with a particular surveillance and the intercept subject.

26 G.3.1.1.2 Use of TPKT

27 TCP is a stream-based protocol and has no inherent message delineation capability.

28 Since the upper-layer protocols are not self-describing, ITOT, also referred to as TPKT, as defined in RFC 1006 and
29 later updated by RFC 2126 is used to encapsulate the CC and connectionStatus messages before handing them off to
30 TCP.

31 Therefore, TPKT shall be required and used in the transport stack of the CC delivery interface (e.g., CC
32 messages/TPKT/TCP/IP). Protocol class 0 defined in RFC 2126 shall be supported.

33 G.3.1.1.3 Sending of Content of Communication Messages

34 After the TCP connection has been established and the connectionStatus message has been sent, the MF shall send the
35 CC messages (including the GLIC header) defined in Section C.1 using TPKT to the LEMF.

36 In all cases, CC messages are only sent from the MF to the LEMF. All transfer of packets other than those operationally
37 required to maintain the connection must be from the MF to the LEMF only. At no time may the LEMF equipment
38 send unsolicited packets from the LEMF equipment to the MF.

39 If supported, a connectionStatus message including the keep-Alive parameter shall be sent from the MF to the LEMF
40 when no CC message has been sent for a configurable amount of time in minutes (e.g., 5 minutes), indicating to the
41 LEMF that the TCP connection is still up. If a keep-alive capability is supported, a keep-Alive parameter shall be
42 settable in increments of 1 minute, from 1 minute up to a maximum of 5 minutes, with a default value of 5 minutes.

1 The CC messages and the connectionStatus message shall be encapsulated using TPKT, as defined in Section G.3.1.1.2,
2 before sending them from the MF to the LEMF using TCP/IP.

3 **G.3.1.2 ASN.1 for HI3 Mediation Function Messages**

4 DEFINITIONS IMPLICIT TAGS ::=

```
5  
6 ConnectionStatus ::= CHOICE  
7 {  
8     keep-Alive [0] Null,  
9     lawfulInterceptionIdentifier [1] LawfulInterceptionIdentifier,  
10     ...  
11 }  
12
```

13 **G.3.1.3 Error Procedures**

14 Upon detection of the “User Timeout” condition, as defined in STD0007 [16], if the surveillance is still active and user
15 data packets with the GLIC header are available for delivery to the LEMF, the MF shall take action to re-establish the
16 TCP connection with the LEMF. Due to this condition, any information that TCP was not able to deliver is lost unless
17 it is buffered.

18 Therefore, the MF should be able to buffer any information that is to be delivered to the LEMF during a period of User
19 Timeout detection until the re-establishment of the TCP connection. If the MF is not able to establish the TCP
20 connection, the MF may discard the buffered information. If the connection is re-established, the MF shall hand off
21 (transmit) the information stored in its buffer to TCP before sending any new information.

22 **G.3.1.4 Security Considerations**

23 Security considerations shall be taken into account in designing the interface between the MF and the LEMF. At a
24 minimum, the MF shall use a source IP address known to the LEMF. To protect against address spoofing and other
25 security concerns, it is recommended that the MF and the LEMF utilize IPsec.

26

1 Annex H (informative):
2 Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
June 2001					Initial draft		V0.0.0
June 2001					Revised draft – review via correspondence (e-mail discussion)	V0.0.0	V0.0.1
June 2001					Revised draft with structural revision marks removed – circulated for review via correspondence (e-mail discussion).	V0.0.1	V0.0.1a
August 2001					Editorial Revisions by a) SA3-LI editor, and b) 3GPP standard formatting by MCC	V0.0.1a	V0.0.2
Sept. 2001					Revisions from August 2001 meeting in Saarbrucken. Circulated for review of revisions.	V0.0.2	V0.0.3
October 2001					Incorporated v0.0.3 revisions and restructured document.	V0.0.3	V0.1.0
Dec. 2001					Incorporates approved changes from Aspen meeting.	V0.1.0	V0.2.0
Dec. 2001					Same as v 0.2.0 without revision marks.	V0.2.0	V0.2.1
Jan. 2002					Incorporates approved changes from Dusseldorf workshop.	V0.2.0	V0.3.0
Jan. 2002					Same as v 0.3.0 with revisions applied.	V0.3.0	V0.3.1
Jan. 2002					Incorporates approved changes from Amsterdam meeting. As of 1/31 Thursday morning.	V0.3.1	V0.4.0
Jan. 2002					Incorporates changes to Annex C, ASN.1 for GLIC, and ASN.1 Workshop results on Thursday afternoon 1/31.	V0.4.0	V0.5.0
Jan. 2002					Clean version of v0.5.0 for SA3 approval.	V0.5.0	V0.5.1
Feb. 2002					Incorporates requested changes received via e-mail between Thursday 1/31 and Friday 2/08. All ASN.1 comments were to be received by 2/10.	V0.5.1	V0.6.0
Feb. 2002					Incorporates changes discussed via e-mail between 2/08 and Friday 2/15.	V0.6.0	V0.7.0
Feb. 2002					Clean copy for submission to SA3 for approval. Distributed 2/18/02.	V0.7.0	V0.7.1
Feb. 2002					Incorporates minor editorial received 2/18-2/21.	V0.7.1	V0.7.2
Feb. 2002					Clean version. Accept editorials received 2/18-2/21.	V0.7.2	V0.7.3

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