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Lawful Interception (LI);
Handover Interface and
Service-Specific Details (SSD) for IP delivery;
Part 6: Service-specific details for PSTN/ISDN services

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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Lawful Interception (LI).

The present document is part 6 of a multi-part deliverable. Full details of the entire series can be found in TS 102 232-1 [2].

The ASN.1 module is also available as an electronic attachment to the original document from the ETSI site (see clause A.2 for more details).

1 Scope

The present document contains service-specific details for the handover of the lawfully intercepted PSTN/ISDN Services (including emulated services such as those defined in ES 282 002 [3]) using packet-based techniques as defined in TS 102 232-1 [2].

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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2.1 Normative references

The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 101 671: "Lawful Interception (LI); Handover interface for the lawful interception of telecommunications traffic".

NOTE: Periodically TS 101 671 is published as ES 201 671. A reference to the latest version of the TS as above reflects the latest stable content from ETSI/TC LI.

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

[3] ETSI ES 282 002: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN Emulation Sub-system (PES); Functional architecture".

[4] Recommendation ITU-T X.680: "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[5] Void.

[6] Recommendation ITU-T G.711 (1988): "Pulse code modulation (PCM) of voice frequencies".

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

[8] ETSI TS 187 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Lawful Interception; Stage 1 and Stage 2 definition".

[9] Void.

[10] IETF RFC 3551: "RTP Profile for Audio and Video Conferences with Minimal Control".

[11] Recommendation ITU-T T.38: "Procedures for real-time Group 3 facsimile communication over IP networks".

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI TR 102 053: "Telecommunications security; Lawful Interception (LI); Notes on ISDN lawfull interception functionality".

[i.2] ETSI TR 102 503: "Lawful Interception (LI); ASN.1 Object Identifiers in Lawful Interception and Retained data handling Specifications".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 102 232-1 [2] and TS 101 671 [1] apply.

3.2 Abbreviations

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

ASN.1	Abstract Syntax Notation One
CC	Content of Communication
CIN	Communications Identity Number
CR	Change Request
CSP	Communications Service Provider

NOTE: CSP covers all Access Providers, Network Operators and Service Providers.

HI2	Handover Interface 2 (for Intercept Related Information)
IP	Internet Protocol
IRI	Intercept Related Information
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
LEA	Law Enforcement Agency
LEMF	Law Enforcement Monitoring Facility
LI	Lawful Interception
MF	Mediation Function (at CSP)
NGN	Next Generation Network
OID	Object Identifier
PDU	Protocol Data Unit
PES	PSTN/ISDN Emulation Subsystem
PSTN	Public Switched Telephone Network
RTP	Real-time Transport Protocol
SDP	Session Description Protocol
TC	Technical Committee
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
UDP	User Datagram Protocol
UDPTL	Facsimile UDP Transport Layer (protocol)

4 General

4.1 Approach

The present document forms part 6 of the TS 102 232 family of standards, in that it is a service-specific component of the TS 102 232-1 [2] framework.

For ISDN interception TS 101 671 [1] defines the interception behaviour that leads to visible IRI events on the handover interface. TR 102 053 [i.1] provides detailed guidance in support of TS 101 671 [1].

The present document provides a model for handover that may be used in conjunction with the interception domain specification TS 187 005 [8]. TS 187 005 [8] also provides an overview of the document structure within the NGN LI domain.

4.2 Reference model

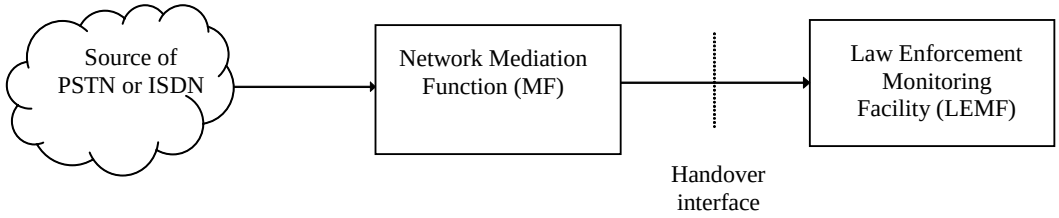

Figure 1: Reference model

5 Headers, data exchange and networks

5.1 Approach

TS 102 232-1 [2] describes a technique for data exchange and specifies the headers that shall be associated with the results of interception. The present document follows TS 102 232-1 [2] regarding headers, data exchange and networks.

5.2 Structures

IRI events from TS 101 671 [1] are sent using the structure ETSI671IRI. Supplementary information IRI (defined in clause 6.3) is sent using the structure pstnIsdnIRI and/or the structure pstnIsdnCC (see clause A.2). CC is sent using the structure pstnIsdnCC (see clauses 6.2 and A.3).

5.3 Definition of a communications session

A new Communications Identity Number (or CIN) is assigned each time a new communications session begins. See TS 101 671 [1] for the definition of communications session.

Typically, a new communications session is defined to begin (i.e. a new CIN is assigned) when each IRI-BEGIN message is sent (as listed in TS 101 671 [1]), then all further IRI and CC relating to that session has the same CIN. Typically, a REPORT record would form a communications session in its own right. If CC or an IRI record is generated for a session before the IRI-BEGIN is sent (e.g. through fault situations, or owing to unexpected latency), the CSP shall still ensure that all IRI and CC in the communication session has the same CIN.

6 Intercept Related Information (IRI) and Content of Communication (CC)

6.1 Definition of IRI events and CC events

IRI events are defined as per TS 101 671 [1]. CC is sent on all occasions that CC would be sent under TS 101 671 [1]. Further details for ISDN are provided by the state model and message sequence diagrams in TR 102 053 [i.1]; in particular see clause 6 of TR 102 053 [i.1].

6.2 CC format

The PstnIsdnCC structure shall contain the application layer traffic. Currently supported application layer protocols are RTP and UDPTL [11]. The CC shall also contain the application layer header, UDP header and IP header, except by agreement between CSP and LEA.

NOTE: CSPs and LEAs may choose to omit headers because they are unavailable at the point of interception.

The SupplementaryInfo FrameType field indicates which headers are present in a given CC stream. If all headers are present, the FrameType field may be omitted.

In the case where the RTP header is unavailable, one may be inserted by the mediation function, subject to agreement between LEA and CSP. The addition of an inserted RTP header may aid processing the audio stream at the receiver. When an artificial header is used, this shall be signalled using the artificialRtpFrame parameter of the FrameType structure.

The content (RTP or UDPTL payload) shall be a complete, unmodified copy of CC information that is part of the target communication.

The RTP header shall accurately describe the target communication.

The information contained in the IP and UDP header does not necessarily relate to any media flow as seen by the target.

IP and UDP headers shall not be inserted to the intercepted material by the mediation function if they are unavailable.

If encryption has been applied within the CSP's domain and under their control, either it shall be removed or full details of the encryption including keys shall be supplied.

Typically under PSTN/ISDN the RTP codec used is Recommendation ITU-T G.711 [6]. The codec in use shall be signalled as described in clause 6.3.

6.3 Supplementary information

6.3.1 Requirements for supplementary information

It is required that the LEA has enough information to decode and comprehend the traffic delivered over the Handover Interface. The following information is required:

- Description of the format of the CC, to allow the LEMF to understand the information within the CC.

6.3.2 Supplementary information

Supplementary information is defined to be the following set of information.

Field name	Status	ASN.1 field	Information
Media format	Mandatory	mediaFormat	This field signals the codec used, as defined in RFC 3551 [10]. The supplementary info shall contain only one media format (send another supplementary information messages if the format changes).
Media attributes	Conditional (i.e. mandatory under the conditions listed)	mediaAttributes	If any extra information (beyond the Media Format) is needed to understand the delivered CC then it shall be sent here, in the format defined in the a= field of SDP (see RFC 4566 [7]). Typically, media attributes shall be present if and only if the media format is 32 or above.
Encryption key	Conditional	encryptionKey	See clause 6.2.
Session name	Optional	sessionName	If present in the target communication (e.g. SDP 's=' field), it may be present in supplementary information as decided by national agreement.
Session information	Optional	sessionInfo	If present in the target communication (e.g. SDP 'i=' field), it may be present in the target communication, it may be present as decided by national agreement.
Copy of SDP message	Optional	copyOfSDPMessage	In addition to the above information, an SDP message may be included here.
Frame type	Optional	frameType	If one or more headers are missing from the intercepted content, this structure has to be used to signal what is being delivered
Alternate Protocol	Optional	alternateProtocol	If a complete IP, UDP or application frame is available and the payload is not RTP, this field has to be used to signal the type of application layer traffic

6.3.3 Sending supplementary information

Supplementary information shall be sent as soon as possible for a communications session, and should be sent before CC is available.

If supplementary information is not available before the CC, under no circumstances shall CC be buffered or delayed. If supplementary information is critical to interpreting the CC, then CSPs shall ensure their systems are designed to avoid any delay in sending supplementary information.

If the communications session contains traffic in more than one direction, then one set of supplementary information shall be sent for each direction present. Under some circumstances, the traffic sent in one direction will have a different set of supplementary information from traffic sent in the other direction (e.g. traffic to the target uses a different codec compared to traffic going from the target). Under these circumstances, the direction flag shall always be present and correct for all CC PDUs, and only the values "To Target" and "From Target" shall be used.

If the supplementary information changes during a session (e.g. change of codec) then a new set of supplementary information shall be sent as soon as possible (it should be sent before the change occurs). It is required that the LEMF can identify the point in the CC stream at which the change took place. If it is not clear from the CC, then the CSP should populate the field "First PDU number" within the structure "InformationAppliesTo", to state the sequence number of the first CC-PDU to which the new supplementary information applies.

Supplementary information shall be sent as IRI and/or in CC-PDUs (in this case at least in the first PDU and in the following PDUs only if there are any changes during the session).

6.3.4 Identification of CCLinks

TS 101 671 [1] identifies certain occasions when different CCLinks are established (e.g. multi-party calls).

If there are a number of different CCLinks (see TS 101 671 [1]), then one set of supplementary information shall be sent for each CC Link and the CCLinkID represent the CCLink that this information applies to. Within each CC Link, traffic in different directions shall be isolated and identified as described in clause 6.3.3.

Note that the sequence numbering of CC-PDUs is not affected by the CCLink counter (i.e. do not maintain separate sequence number counts for separate CCLinks).

Annex A (normative): ASN.1 for IRI and CC

A.1 Note on integrating ASN.1 structures

IRI information structures are defined by the ASN.1 in TS 101 671 [1]. The headers that shall be applied to all IRI are defined in TS 102 232-1 [2]. There is some overlap between these structures, in that some fields which are present in TS 101 671 [1] IRI-Parameters are then repeated in the TS 102 232 PSHeader construction. In particular, there are the following overlaps: Lawful Intercept Identifier, Communication Identifier, TimeStamp.

The present document follows TS 102 232-1 [2] for header information and requires that the TS 102 232 header shall be populated. For ease of interoperability the present document recommends that repeated fields should be populated in both the TS 102 232 and TS 101 671 [1] parts of the header.

A.2 ASN.1 definitions

The ASN.1 definitions are contained in a .txt file (PstnIsdnPDU,ver5.txt contained in archive ts_10223206v030301p0.zip) which accompanies the present document.

The ASN.1 (Recommendation ITU-T X.680 [4]) module that represents the information in the present document and meets all stated requirements is shown below. TR 102 503 [i.2] gives an overview of the relevant Object Identifiers (OID) used in ASN.1 modules of the Lawful Intercept specifications and points to the specification where the modules can be found.

```
-- ==============================
-- Description of the PstnIsdn PDU
-- ==============================

PstnIsdnPDU
{itu-t(0) identified-organization(4) etsi(0) securityDomain(2) lawfulIntercept(2) li-ps(5)
pstnIsdn(6) version5(5)}

DEFINITIONS IMPLICIT TAGS ::=
BEGIN
```

```
IMPORTS



    -- from TS 102 232-01 [2]
    PayloadDirection
        FROM LI-PS-PDU
        {itu-t(0) identified-organization(4) etsi(0) securityDomain(2) lawfulIntercept(2) li-ps(5)
genHeader(1) version18(18)};
```

```
-- ============================
-- Object Identifier Definition
-- ============================

    -- definitions are relative to
    -- {itu-t(0) identified-organization(4) etsi(0) securityDomain(2) lawfulintercept(2)}
pstnIsdnIRIObjId RELATIVE-OID   ::= {li-ps(5) pstnIsdn(6) version5(5) iRI(1)}
pstnIsdnCCObjId RELATIVE-OID    ::= {li-ps(5) pstnIsdn(6) version5(5) cC(2)}
```

```
-- ================================
-- Description of the PstnIsdn IRI
-- ================================
```

```
PstnIsdnIRI ::= SEQUENCE
{
    pstnIsdnIRIObjId        [0] RELATIVE-OID,
    pstnIsdnIRIContents     [1] PstnIsdnIRIContents
}
```

```
PstnIsdnIRIContents ::= CHOICE
{
    supplementaryInfo       [0] SupplementaryInfo,
    ...
}
```

```
SupplementaryInfo ::= SEQUENCE
{
    informationAppliesTo    [0] InformationAppliesTo,
        -- Identifies the PDUs to which this info applies
    mediaFormat             [1] INTEGER (0..127),
        -- As defined in RFC 3551 [10]
    mediaAttributes         [2] OCTET STRING OPTIONAL,
        -- Format as per RFC 4566 [7]
        -- Clause 6.3 describes when the mediaAttributes shall be present
    encryptionKey           [3] OCTET STRING OPTIONAL,
        -- Format as per RFC 4566 [7]
    sessionName             [4] OCTET STRING OPTIONAL,
        -- Format as per RFC 4566 [7]
    sessionInfo             [5] OCTET STRING OPTIONAL,
        -- Format as per RFC 4566 [7]
    copyOfSDPMessage        [6] OCTET STRING OPTIONAL,
        -- Format as per RFC 4566 [7]
    ...,
    frameType               [7] FrameType OPTIONAL,
        -- Populated if one or more protocol layers are missing from CC data
        -- May be omitted if all headers are present.
    alternateProtocol       [8] AlternateProtocol OPTIONAL
        -- Used to identify the protocol of packets sent in pstnIsdnCCContents


}
```

```
InformationAppliesTo ::= SEQUENCE
    -- Identifies the PDUs to which a piece of supplementary information applies
{
    payloadDirection        [0] PayloadDirection,
        -- The direction of the traffic to which this info applies
    cCLinkID                [1] INTEGER (0..65535) OPTIONAL,
        -- If there are multiple CCLinks, this field states CCLink to which this info applies
    firstPDUNumber          [2] INTEGER (0..4294967295) OPTIONAL,
        -- The supplementary info applies to all PDUs with this sequence number and above
    ...
}
```

```
FrameType ::= ENUMERATED
{
    ipFrame(0),
        -- All headers are present. Use AlternateProtocol to signal the contents if not RTP
    udpFrame(1),
        -- IP header is missing. Use AlternateProtocol to signal the contents if not RTP
    applicationFrame(2),
        -- UDP and IP headers are missing. Use AlternateProtocol to signal the contents if not RTP
    audioFrame(3),
        -- All headers are missing
    ...,
    artificialRtpFrame(4)
        -- UDP and IP headers are missing, artificial RTP frame has been added

}
```

```
AlternateProtocol ::= ENUMERATED
{
        uDPTL(1),
        -- pstnIsdnCCContents parameter contains UDPTL packets [11]
    ...
}
```

```
-- ==============================
-- Description of the PstnIsdn CC
-- ==============================
```

```
PstnIsdnCC ::= SEQUENCE
{
    pstnIsdnCCObjId         [0] RELATIVE-OID,
    pstnIsdnCCContents      [1] OCTET STRING,
        -- See clause 6.2 for definition of format of PstnIsdn CC
    cCLinkID                [2] INTEGER (0..65535) OPTIONAL,
        -- Shall be present if multiple CCLinks are used (see clause 6.3.4)
    ...,
    supplementaryInfo       [3] SupplementaryInfo OPTIONAL
        -- Shall be present at least in the first PDU
}
```

```
END -- end of PstnIsdnPDU
```

Annex B (informative): Change request history

Status of the present document: TS 102 232-6 Service-specific details for PSTN/ISDN services; Handover specification for IP delivery		
TC LI approval Date	**Version**	**Remarks**
September 2006	2.1.1	First publication of the TS after approval by ETSI/TC LII#13 (6-8 September 2006, Stockholm) Version 2.1.1 prepared by Mark Shepherd (HO UK) (Rapporteur)
April 2007	2.2.1	Included Change Request: TS102232-06CR001r1 (cat B) on Clarification of use of RTP/UDP/IP headers This CR was approved by TC LI#15 (23-25 April 2007; Riga) Version 2.2.1 prepared by Peter van der Arend (KPN) (Chairman TC LI) Rapporteur of this specification is Mark Shepherd (HO UK)
May 2008	2.3.1	Included Change Requests: TS102232-06CR002r1 (cat C) on Some comment and modification on the identification CCLinks defined in the clause 6.3.4 This CR was approved by TC LI#16 (2-4 October 2007; Berlin) TS102232-06CR003r1 (cat B) on SupplementaryInfo in PstnIsdnCC This CR was approved by TC LI#18 (27-29 May 2008; Chania) Version 2.3.1 prepared by Peter van der Arend (KPN) (Chairman TC LI) Rapporteur of this specification is Mark Shepherd (NTAC)
May 2012	3.1.1	Included Change Request: TS102232-06CR004r1 (cat B) on Addition of rtpframe parameter This CR was approved by TC LI#30 (14-16 May 2012, Amsterdam) The ASN.1 definitions are contained in a .txt file (PstnIsdnPDU,ver4.txt) which accompanies the present document Version 3.1.1 prepared by Peter van der Arend (Vodafone) (Chairman TC LI) Rapporteur of this specification is Mark Shepherd (NTAC)
June 2013	3.2.1	Included Change Request: TS102232-06CR005r1 (cat C) on supplementary Information Version 3.2.1 prepared by the Rapporteur
February 2014	3.3.1	Included Change Request: TS102232-06CR006r2 (cat B) on addition of UDPTL This CR was approved as TD022r2 by TCLI#35 Milan Version 3.3.1 prepared by the Rapporteur

History

Document history		
V2.1.1	December 2006	Publication
V2.2.1	May 2007	Publication
V2.3.1	August 2008	Publication
V3.1.1	June 2012	Publication
V3.2.1	July 2013	Publication
V3.3.1	March 2014	Publication