

ETSI TS 133 108 V13.3.0 (2016-10)



**Universal Mobile Telecommunications System (UMTS);
LTE;
3G security;
Handover interface for Lawful Interception (LI)
(3GPP TS 33.108 version 13.3.0 Release 13)**



Reference

RTS/TSGS-0333108vd30

Keywords

LTE,SECURITY,UMTS

ETSI

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

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

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

Important noticeThe present document can be downloaded from:
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

Copyright Notification

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

The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2016.
All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Intellectual Property Rights

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

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

Foreword

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

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

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

Modal verbs terminology

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

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

Contents

Intellectual Property Rights	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	11
Introduction	11
1 Scope	12
2 References	12
3 Definitions and abbreviations.....	16
3.1 Definitions	16
3.2 Abbreviations	18
4 General	20
4.0 Introduction	20
4.1 Basic principles for the handover interface	20
4.2 Legal requirements	20
4.3 Functional requirements	20
4.4 Overview of handover interface	20
4.4.0 Introduction.....	20
4.4.1 Handover interface port 2 (HI2)	21
4.4.2 Handover interface port 3 (HI3)	22
4.5 HI2: Interface port for intercept related information	22
4.5.0 General.....	22
4.5.1 Data transmission protocols.....	23
4.5.2 Application for IRI (HI2 information).....	23
4.5.3 Types of IRI records	23
4.6 Reliability	24
5 Circuit-switch domain	24
5.0 General	24
5.1 Specific identifiers for LI	24
5.1.0 Introduction.....	24
5.1.1 Lawful Interception Identifier (LIID)	24
5.1.2 Communication Identifier (CID)	25
5.1.2.0 General	25
5.1.2.1 Network Identifier (NID).....	25
5.1.2.2 Communication Identity Number (CIN) – optional	25
5.1.3 CC link identifier (CCLID).....	26
5.1.4 Correlation of CC and IRI	26
5.1.5 Usage of Identifiers.....	26
5.2 HI2: interface port for IRI	27
5.2.1 Definition of Intercept Related Information	27
5.2.2 Structure of IRI records	27
5.2.2.0 General	27
5.2.2.1 Control Information for HI2.....	28
5.2.2.2 Basic call information	28
5.2.2.3 Information on supplementary services, related to a call in progress.....	29
5.2.2.4 Information on non-call related supplementary services.....	29
5.2.3 Delivery of IRI.....	29
5.3 HI3: interface port for Content of Communication	33
5.3.0 General.....	33
5.3.1 Delivery of Content of Communication.....	33
5.3.2 Control information for Content of Communication	35
5.3.3 Security requirements at the interface port of HI3.....	36

5.3.3.0	General	36
5.3.3.1	LI access verification	36
5.3.3.2	Access protection	36
5.3.3.3	Authentication	36
5.4	LI procedures for supplementary services	37
5.4.1	General	37
5.4.2	CC link Impact	39
5.4.3	IRI Impact, General Principle for Sending IRI records	39
5.4.4	Multi party calls – general principles, options A, B	39
5.4.4.0	General	39
5.4.4.1	CC links for active and non-active calls (option A)	39
5.4.4.2	Reuse of CC links for active calls (option B)	40
5.4.5	Subscriber Controlled Input (SCI): Activation / Deactivation / Interrogation of Services	41
5.5	Detailed procedures for supplementary services	41
5.5.1	Advice of Charge services (AOC)	41
5.5.2	Call Waiting (CW)	41
5.5.2.1	Call Waiting at target: CC links	41
5.5.2.2	Call Waiting: IRI records	41
5.5.2.2.1	Target is served user	41
5.5.2.2.2	Other party is served user	41
5.5.3	Call Hold/Retrieve	41
5.5.3.1	CC links for active and non-active calls (option A)	41
5.5.3.2	Reuse of CC links for active calls (option B)	41
5.5.3.3	IRI records	42
5.5.3.3.1	Invocation of Call Hold or Retrieve by target	42
5.5.3.3.2	Invocation of Call Hold or Retrieve by other parties	42
5.5.4	Explicit Call Transfer (ECT)	42
5.5.4.1	Explicit Call Transfer, CC link	42
5.5.4.2	Explicit Call Transfer, IRI records	42
5.5.5	Calling Line Identification Presentation (CLIP) (IRI Records)	42
5.5.5.1	Call originated by target (target is served user)	42
5.5.5.2	Call terminated at target (other party is served user)	42
5.5.6	Calling Line Identification Restriction (CLIR)	42
5.5.7	COnnected Line identification Presentation (COLP)	43
5.5.7.1	Call terminated at target (target is served user)	43
5.5.7.2	Call originated by target (other party is served user)	43
5.5.8	COnnected Line identification Restriction (COLR)	43
5.5.9	Closed User Group (CUG)	43
5.5.10	Completion of Call to Busy Subscriber (CCBS)	43
5.5.11	Multi ParTY call (MPTY)	43
5.5.11.1	General	43
5.5.11.2	IRI records	43
5.5.12	DIVersion Services (DIV)	43
5.5.12.0	General	43
5.5.12.1	Call Diversion by Target	44
5.5.12.1.1	Call Diversion by Target, CC links	44
5.5.12.1.2	Call Diversion by Target, IRI records	44
5.5.12.2	Forwarded Call Terminated at Target	44
5.5.12.3	Call from Target Forwarded	44
5.5.13	Variants of call diversion services	44
5.5.14	SUBaddressing (SUB)	45
5.5.15	User-to-User Signalling (UUS)	45
5.5.16	Incoming Call Barring (ICB)	45
5.5.17	Outgoing Call Barring (OCB)	45
5.5.18	Tones, Announcements	45
5.6	Functional architecture	45
6	Packet data domain	46
6.1	Identifiers	46
6.1.0	Introduction	46
6.1.1	Lawful interception identifier	47
6.1.2	Network identifier	47

6.1.3	Correlation number	47
6.2	Timing and quality	47
6.2.1	Timing	47
6.2.2	Quality	48
6.2.3	Void	48
6.3	Security aspects	48
6.4	Quantitative aspects.....	48
6.5	IRI for packet domain.....	48
6.5.0	Introduction.....	48
6.5.1	Events and information	52
6.5.1.0	General	52
6.5.1.1	REPORT record information	52
6.5.1.2	BEGIN record information	59
6.5.1.3	CONTINUE record information	61
6.5.1.4	END record information	63
6.6	IRI reporting for packet domain at GGSN	64
6.7	Content of communication interception for packet domain at GGSN.....	64
7	Multi-media domain	65
7.0	Introduction	65
7.1	Identifiers	66
7.1.0	General.....	66
7.1.1	Lawful Interception Identifier (LIID)	66
7.1.2	Network identifier.....	67
7.1.3	Correlation number	67
7.2	Timing and quality	68
7.2.1	Timing	68
7.2.2	Quality	68
7.2.3	Void	68
7.3	Security aspects	68
7.4	Quantitative aspects.....	68
7.5	IRI for IMS.....	69
7.5.0	Introduction.....	69
7.5.1	Events and information	71
7.6	Correlation indications of IMS IRI with GSN CC at the LEMF	73
8	3GPP WLAN Interworking	74
8.0	General	74
8.1	Identifiers	74
8.1.1	Overview	74
8.1.2	Lawful interception identifier	74
8.1.3	Network identifier.....	74
8.1.4	Correlation number	74
8.2	Timing and quality	75
8.2.1	Timing	75
8.2.2	Quality	75
8.2.3	Void	75
8.3	Security aspects	75
8.4	Quantitative aspects.....	75
8.5	IRI for I-WLAN	76
8.5.0	Introduction.....	76
8.5.1	Events and information	78
8.5.1.1	Overview	78
8.5.1.2	REPORT record information	78
8.5.1.3	BEGIN record information	83
8.5.1.4	END record information	85
8.6	CC for I-WLAN	86
9	Interception of Multimedia Broadcast/MultiCast Service (MBMS)	87
9.1	Identifiers	87
9.1.1	Overview	87
9.1.2	Lawful interception identifier	87
9.1.3	Network identifier.....	87

9.1.4	Correlation number	87
9.2	Timing and quality	88
9.2.1	Timing	88
9.2.2	Quality	88
9.2.3	Void	88
9.3	Security aspects	88
9.4	Quantitative aspects	88
9.5	IRI for MBMS	89
9.5.0	General	89
9.5.1	Events and information	91
9.5.1.1	Overview	91
9.5.1.2	REPORT record information	91
9.5.1.3	BEGIN record information	92
9.5.1.4	END record information	93
9.6	CC for MBMS	94
10	Evolved Packet System (EPS)	95
10.0	Introduction	95
10.1	Identifiers	95
10.1.0	Introduction	95
10.1.1	Lawful interception identifier	95
10.1.2	Network identifier	96
10.1.3	Correlation number	96
10.2	Timing and quality	96
10.2.1	Timing	96
10.2.2	Quality	96
10.2.3	Void	97
10.3	Security aspects	97
10.4	Quantitative aspects	97
10.5	IRI for evolved packet domain	97
10.5.0	Introduction	97
10.5.1	Events and information	102
10.5.1.0	Introduction	102
10.5.1.1	REPORT record information	102
10.5.1.2	BEGIN record information	112
10.5.1.3	CONTINUE record information	115
10.5.1.4	END record information	118
10.6	IRI reporting for evolved packet domain at PDN-GW	121
10.7	Content of communication interception for evolved packet domain at PDN-GW	121
11	3GPP IMS Conference Services	122
11.1	Identifiers	122
11.1.1	Overview	122
11.1.2	Lawful interception identifier	122
11.1.3	Network identifier	122
11.1.4	Correlation number	123
11.2	Timing and quality	123
11.2.1	Timing	123
11.2.2	Quality	123
11.2.3	Void	123
11.3	Security aspects	123
11.4	Quantitative aspects	123
11.5	IRI for IMS Conference Services	124
11.5.0	Introduction	124
11.5.1	Events and information	126
11.5.1.1	Overview	126
11.5.1.2	BEGIN record information	126
11.5.1.3	CONTINUE record information	127
11.5.1.4	END record information	130
11.5.1.5	REPORT record information	131
11.6	CC for IMS Conference Services	133
12	3GPP IMS-based VoIP Services	133

12.1	Identifiers	133
12.1.1	Overview	133
12.1.2	Lawful Interception Identifier	133
12.1.3	Network Identifier	134
12.1.4	Correlation Number	134
12.2	Timing and quality	134
12.3	Security aspects	134
12.4	Quantitative aspects	134
12.5	IRI for IMS-based VoIP	135
12.6	CC for IMS-based VoIP	135
13	Interception of Proximity Services (ProSe)	135
13.1	General	135
13.1.1	Identifiers	135
13.1.1.1	Overview	135
13.1.1.2	Lawful interception identifier	135
13.1.1.3	Network identifier	136
13.1.2	Timing and quality	136
13.1.2.1	Timing	136
13.1.2.2	Quality	136
13.1.3	Security aspects	136
13.1.4	Quantitative aspects	136
13.2	ProSe Direct Discovery	137
13.2.1	General	137
13.2.2	Events and information	138
13.2.2.1	Overview	138
13.2.2.2	REPORT record information	139
14	Invocation of Lawful Interception (LI) for Group Communications System Enablers (GCSE)	140
14.1	Background	140
14.1.1	Interception at GCS AS versus other nodes	140
14.2	GCS AS in Intercepting Operator's Network	140
14.2.1	General	140
14.2.2	Identifiers	140
14.2.2.1	Overview	140
14.2.2.2	Lawful Interception Identifier	140
14.2.2.3	Network Identifier	141
14.2.2.3	Correlation Number	141
14.2.3	Timing and quality	141
14.2.3.1	Timing	141
14.2.3.2	Quality	141
14.2.4	Security Aspects	141
14.2.4.1	General	141
14.2.5	Quantitative Aspects	142
14.2.5.1	General	142
14.2.6	IRI for GCSE based Communications	142
14.2.6.1	General	142
14.2.6.2	Events and Event Information	145
14.2.6.2.1	Overview	145
14.2.6.2.2	BEGIN record information	145
14.2.6.2.3	CONTINUE record information	147
14.2.6.2.4	END record information	149
14.2.7	CC for GCSE based Communications	150
14.2.7.1	General	150
14.3	GCS AS Outside Intercepting Operator Network	150
14.3.1	General	150
Annex A (normative): HI2 delivery mechanisms and procedures		151
A.0	Introduction	151
A.1	ROSE	151
A.1.1	Architecture	151

A.1.2	ASE_HI procedures.....	152
A.1.2.1	Sending part.....	152
A.1.2.2	Receiving part.....	153
A.1.2.3	Data link management	153
A.1.2.3.0	General	153
A.1.2.3.1	Data link establishment	153
A.1.2.3.2	Data link release.....	154
A.1.2.4	Handling of unrecognized fields and parameters.....	154
A.2	FTP.....	154
A.2.1	Introduction	154
A.2.2	Usage of the FTP.....	154
A.2.3	Profiles (informative).....	156
A.2.4	File content	157
A.2.5	Exceptional procedures.....	158
A.2.6	Other considerations	158
Annex B (normative): Structure of data at the handover interface		159
B.0	Introduction	159
B.1	Syntax definitions.....	159
B.2	3GPP object tree.....	160
B.3	Intercept related information (HI2 PS and IMS).....	160
B.3a	Interception related information (HI2 CS)	175
B.4	Contents of communication (HI3 PS)	178
B.5	HI management operation for ROSE connection.....	180
B.6	User data packet transfer (HI3 CS)	181
B.7	Intercept related information (and I-WLAN)	183
B.8	Intercept related information (MBMS)	188
B.9	Intercept related information (HI2 SAE/EPS and IMS).....	191
B.10	Contents of communication (HI3 EPS).....	205
B.11	IMS Conference Services ASN.1	207
B.11.1	Intercept related information (Conference Services).....	207
B.11.2	Contents of communication (HI3 IMS Conferencing)	210
B.12	Contents of Communication (HI3 IMS-based VoIP).....	211
B.13	Intercept related information for ProSe.....	214
B.14	GCSE Services ASN.1	216
B.14.1	Intercept related information (GCSE Services).....	216
B.14.2	Contents of communication (HI3 GCSE Group Communications)	220
Annex C (normative): UMTS and EPS HI3 interfaces.....		222
C.0	Introduction	222
C.1	UMTS LI correlation header	222
C.1.1	Introduction	222
C.1.2	Definition of ULIC header version 0.....	222
C.1.3	Definition of ULIC header version 1.....	224
C.1.4	Exceptional procedure.....	225
C.1.5	Other considerations.....	225
C.2	FTP.....	225
C.2.1	Introduction	225
C.2.2	Usage of the FTP.....	225
C.2.3	Exceptional procedures	227
C.2.4	CC contents for FTP.....	227

C.2.4.1	Fields	227
C.2.4.2	Information element syntax	229
C.2.5	Other considerations.....	231
C.2.6	Profiles (informative)	231
Annex D (informative):	LEMF requirements - handling of unrecognised fields and parameters.....	234
Annex E (informative):	Bibliography.....	235
Annex F (informative):	Correlation indications of IMS IRI with GSN CC at the LEMF	237
Annex G (informative):	United States lawful interception	238
G.1	Delivery methods preferences	238
G.2	HI2 delivery methods	238
G.2.1	TPKT/TCP/IP	238
G.2.1.1	Introduction.....	238
G.2.1.2	Normal Procedures	238
G.2.1.2.0	General.....	238
G.2.1.2.1	Usage of TCP/IP when MF initiates TCP Connections	238
G.2.1.2.2	Use of TPKT	238
G.2.1.2.3	Sending of LI messages	239
G.2.1.3	ASN.1 for HI2 Mediation Function Messages.....	239
G.2.1.4	Error Procedures	239
G.2.1.5	Security Considerations	240
G.3	HI3 delivery methods	240
G.3.1	Use of TCP/IP	240
G.3.1.1	Normal Procedures	240
G.3.1.1.0	Introduction.....	240
G.3.1.1.1	Usage of TCP/IP when MF/DF initiates TCP Connections	240
G.3.1.1.2	Use of TPKT	240
G.3.1.1.3	Sending of Content of Communication Messages	241
G.3.1.2	ASN.1 for HI3 Mediation Function Messages.....	241
G.3.1.3	Error Procedures	241
G.3.1.4	Security Considerations	241
G.4	Cross reference of terms between J-STD-025-A and 3GPP.....	242
Annex H (normative):	United States lawful interception	243
Annex I (informative):	Void	245
Annex J (normative):	Definition of the UUS1 content associated and sub-addressing to the CC link.....	246
J.0	Introduction	246
J.1	Definition of the UUS1 content associated to the CC link.....	246
J.2	Use of sub-address and calling party number to carry correlation information	247
J.2.1	Introduction	247
J.2.2	Subaddress options	247
J.2.3	Subaddress coding.....	247
J.2.3.0	General.....	247
J.2.3.1	BCD Values	247
J.2.3.2	Field order and layout	248
J.2.4	Field coding.....	251
J.2.4.0	Introduction.....	251
J.2.4.1	Direction	252
J.2.4.2	Coding of the Calling Party Number	252
J.2.5	Length of fields	252
Annex K (normative):	VoIP HI3 Interface	253

K.1	VoIP CC Protocol Data Unit	253
K.2	Definition of VoIP LI Correlation header	253
K.3	Definition of Payload	254
K.4	LEMF Considerations	254
Annex L (normative): Conference HI3 Interface.....		255
L.1	Conf CC Protocol Data Unit	255
L.2	Definition of Conference LI Correlation header	255
L.3	Definition of Payload	256
L.4	LEMF Considerations	256
Annex M (Informative): Generic LI notification (HI1 notification using HI2 method).....		257
M.1	HI.1 delivery methods preferences:.....	257
M.2	ASN.1 description of LI management notification operation (HI1 interface).....	258
Annex N (informative): Guidelines on IMS VoIP Correlation Information.....		262
N.1	Introduction	262
N.2	IMS VoIP	262
N.2.1	One Correlation Number Value.....	263
N.2.2	Multiple Correlation Number Values	263
N.2.2.1	Method 1.....	263
N.2.2.2	Method 2.....	264
N.2.2.3	Method 3.....	264
N.2.3	Complex Example – Use of one Correlation Number	264
N.2.4	Complex Example – Use of Multiple Correlation Numbers	265
N.2.4.1	Method 1.....	265
N.2.4.2	Method 2.....	266
N.2.4.3	Method 3.....	266
N.3	IMS Conferencing	266
Annex O (informative): Change history		267
History		274

Foreword

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

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

Version x.y.z

where:

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

Introduction

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

Laws of individual nations and regional institutions (e.g. European Union), and sometimes licensing and operating conditions define a need to intercept telecommunications traffic and related information in modern telecommunications systems. It has to be noted that lawful interception shall always be done in accordance with the applicable national or regional laws and technical regulations. Nothing in this specification, including the definitions, is intended to supplant national law.

This specification should be used in conjunction with TS 33.106 [18] and TS 33.107 [19] in the same release. This specification may also be used with earlier releases of 33.106 [18] and 33.107 [19], as well as for earlier releases of UMTS and GPRS.

1 Scope

This specification addresses the handover interfaces for Lawful Interception (LI) of Packet-Data Services, Circuit Switched Services, Multimedia Services within the UMTS network and Evolved Packet System (EPS). The handover interface in this context includes the delivery of Intercept Related Information (HI2) and Content of Communication (HI3) to the Law Enforcement Monitoring Facility.

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] ETSI TS 101 331: "Lawful Interception (LI); Requirements of Law Enforcement Agencies".
- [2] ETSI ES 201 158: "Telecommunications security; Lawful Interception (LI); Requirements for network functions".
- [3] ETSI ETR 330: "Security Techniques Advisory Group (STAG); A guide to legislative and regulatory environment".
- [4] 3GPP TS 29.002: "3rd Generation Partnership Project; Technical Specification Group Core Network; Mobile Application Part (MAP) specification".
- [5A] ITU-T Recommendation X.680: "Abstract Syntax Notation One (ASN.1): Specification of Basic Notation".
- [5B] ITU-T Recommendation X.681: "Abstract Syntax Notation One (ASN.1): Information Object Specification".
- [5C] ITU-T Recommendation X.681: "Abstract Syntax Notation One (ASN.1): Constraint Specification".
- [5D] ITU-T Recommendation X.681: "Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 Specifications".
- [6] ITU-T Recommendation X.690: "ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".

NOTE 1: It is recommended that for [5A], [5B], [5C], [5D] and [6] the 2002 specific versions should be used.

- [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".

NOTE 2: It is recommended that for [8] the 1994 specific versions should be used.

- [9] 3GPP TS 24.008: "3GPP Technical Specification Group Core Network; Mobile radio interface Layer 3 specification, Core network protocol; Stage 3".
- [10] - [12] Void.