



TECHNICAL REPORT

**Lawful Interception (LI);  
Cloud/Virtual Services for Lawful Interception (LI)  
and Retained Data (RD)**

---

Reference

DTR/LI-00084

---

Keywords

cloud, lawful interception, virtual services,  
security, retained data

**ETSI**

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

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

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

---

**Important notice**

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

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the 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  
<http://portal.etsi.org/tb/status/status.asp>

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.

# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Modal verbs terminology.....	6
1 Scope .....	7
2 References .....	7
2.1 Normative references .....	7
2.2 Informative references.....	7
3 Definitions and abbreviations.....	8
3.1 Definitions .....	8
3.2 Abbreviations .....	12
4 Cloud Services Overview .....	16
4.1 Introduction .....	16
4.2 Perspectives on Cloud services .....	16
4.2.1 Introduction.....	16
4.2.2 General characteristics of Cloud services .....	17
4.2.3 Service models for Cloud services.....	17
4.2.4 Deployment models for Cloud services.....	17
4.3 Cloud reference architectures and infrastructures .....	18
4.4 Resource management.....	21
4.5 Enabling Mobile Cloud .....	22
5 Network Virtual Services Overview .....	24
5.1 Introduction .....	24
5.2 NFV relationship to Cloud Services.....	25
5.3 NFV standardization.....	25
6 Lawful Interception .....	26
6.1 Introduction .....	26
6.2 LEA.....	26
6.2.1 Identify and communicate with the responsible service providers .....	26
6.2.2 Facilitate access and delivery across different jurisdictions .....	26
6.2.3 Existing telecommunications services implemented using Cloud/virtual capabilities.....	26
6.3 CSP / C(L)SP Provider Obligations .....	27
6.3.1 Overview .....	27
6.3.2 Use of trusted third parties (TTP).....	27
6.4 LI implementation scenarios .....	28
6.5 Implementation Challenges .....	28
6.5.1 Introduction.....	28
6.5.2 Encryption Challenge .....	29
6.5.3 Multiple copies of intercepted traffic.....	29
6.5.4 Integration of Partial Communication Segments .....	29
6.5.5 Nomadicity .....	29
6.5.6 Location .....	29
6.5.7 Target Identification .....	30
6.5.8 Correlation .....	31
6.5.9 Network Virtualization .....	31
6.6 Mobile Networks.....	31
6.6.1 Introduction.....	31
6.6.2 Non-MNO transited Cloud Applications/Services.....	31
6.6.3 Cloud Applications/Services integral to MNO .....	31
6.6.4 Cloud Applications/Services Transit MNO via Proxies .....	32
6.6.5 Cloud Applications/Services Transit MNO via Policies.....	34
6.7 Mobile Networks.....	34
6.7.1 General.....	34
6.7.2 Mobile Cloud.....	34
6.7.3 General.....	34

6.7.4	Proxy.....	35
6.7.5	ANDSF.....	35
7	Traditional LI models and methods applied to the Cloud environment.....	36
7.1	Introduction.....	36
7.2	Traditional LI models.....	36
7.3	Adaptation to the Cloud environment.....	36
7.4	Handover Interfaces for new Cloud services.....	37
7.5	Handover interfaces for virtualized network elements.....	37
7.6	Hybrid Services.....	37
7.6.1	Introduction.....	37
7.6.2	Volte.....	37
7.6.3	Peer to Peer Services.....	37
7.7	Cloud Lawful Interception Function (CLIF).....	38
8	Security of LI in a Cloud or Network Virtualized environment.....	38
8.1	Lawful Interception security.....	38
8.2	Cloud services security.....	39
8.3	Security Considerations in a Virtualized Network Environment.....	39
9	LI - Cloud gaps and challenges.....	39
9.1	Generic Cloud LI interface specification gap.....	39
9.2	Specific Cloud LI specification gaps.....	40
9.2.1	General.....	40
9.2.2	Scenario 2: Cloud Services that transit the network facilities via Proxy.....	40
9.2.3	Scenario 3: Cloud Services that transit the network facilities via Policies.....	40
9.2.4	Target Identity expressions for Cloud LI.....	41
9.2.5	Application Identity expressions for Cloud LI.....	41
9.2.6	Virtual Observable (VO) expressions for Cloud LI.....	41
9.2.7	CLIF Specifications.....	41
10	LI - Network Virtualization gaps and challenges.....	42
11	Conclusions and Recommendations.....	42
<b>Annex A:</b>	<b>Several Use cases.....</b>	<b>43</b>
A.1	Telepresence use case 1: TSP offers Telepresence and all participants are subscribers of the TSP.....	43
A.2	Telepresence use case 2: Telepresence is offered by a Third Party provider. Participants are subscribers of the same or different TSP(s).....	44
A.3	Virtual Machine Image (VMI) Basic Use Case.....	46
A.4	In Memory File System or Database.....	47
A.5	Distributed Application Communicating through IPC.....	47
A.6	Mobile Portal or Dashboard using both Operator Provided and Enterprise Applications.....	48
A.7	Enterprise Cloud based or Dashboard using both Operator Provided and Enterprise Applications.....	50
A.8	Use of VDI supporting Offline Operations.....	51
A.9	Delayed Communication by Transferring a Cloud based Virtual Machine Image (VMI).....	52
A.10	Consumer based Files Sharing.....	54
A.11	Consumer based File Sharing 1.....	56
A.12	Consumer based File Sharing 2.....	59
A.13	Consumer based File Sharing 3.....	63
A.14	Consumer based File Sharing 4.....	67
A.15	Consumer based File Sharing 5.....	70
A.16	Consumer based File Sharing 6.....	75

A.17 Consumer based File Sharing 7.....	80
A.18 Consumer based File Sharing 8.....	84
A.19 Access Network Discovery and Selection Function (ANDSF) Use Case.....	90
<b>Annex B: Cloud Virtualization Fora.....</b>	<b>93</b>
History .....	103

---

## 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 Report (TR) has been produced by ETSI Technical Committee Lawful Interception (LI).

The present document does not in any matter establish or imply legal obligations to meet specified LI capability obligations for Cloud/virtual service providers.

---

## 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.

---

# 1 Scope

The present document provides an overview of Cloud/virtual services and studies. This includes Lawful Interception (LI) and Retained Data (RD) aspects of these services in the converged Cloud/virtual service environment, the challenges and obstacles of complying with those obligations, what implementations can be achieved under existing ETSI LI standards and what new work may be required to achieve needed Lawful Interception capabilities.

Cloud Services, in whichever forms they take (Infrastructure, Software, Platform or combinations of these), are often trans-border in nature and the information required to maintain LI and RD capability or sufficient coverage for LI/RD support may vary in different countries or within platforms of different security assurance levels. The present document aims to ensure capabilities can be maintained while allowing business to utilize the advantages and innovations of Cloud Services and was undertaken cooperatively with relevant Cloud security technical bodies.

---

## 2 References

### 2.1 Normative 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 referenced 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>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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

Not applicable.

### 2.2 Informative 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 referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

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 TS 101 331: "Lawful Interception (LI); Requirements of Law Enforcement Agencies".

[i.2] ETSI TS 101 671: "Lawful Interception (LI); Handover interface for the lawful interception of telecommunications traffic".

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

[i.3] 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".

[i.4] ETSI TS 102 232-2: "Lawful Interception (LI); Handover Interface and Service-Specific Details (SSD) for IP delivery; Part 2: Service-specific details for messaging services".

[i.5] ETSI TS 102 232-3: "Lawful Interception (LI); Handover Interface and Service-Specific Details (SSD) for IP delivery; Part 3: Service-specific details for internet access services".