



Emergency Communications (EMTEL); Interoperability testing of core elements for network independent access to emergency services

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Reference

DTS/EMTEL-00038

Keywords

chat, emergency services, location

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 - APE 7112B
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Foreword

This Technical Specification (TS) has been produced by ETSI Special Committee Emergency Communications (EMTEL).

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).

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Executive summary

The present document specifies the Interoperability Test Descriptions (TD) for core elements involved in network-independent access to emergency services. It provides a standardized methodology to verify end-to-end interoperability between various emergency service network functions, including the Emergency Services IP network (ESInet), Public Safety Answering Points (PSAPs), and originating networks like VoIP and IMS. The test descriptions focus on validating key functionalities such as location delivery (By-Value and By-Reference), Advanced Mobile Location (AML), multimedia session management (audio, video, real-time text), and emergency call routing.

Introduction

Ensuring that emergency communications components from different vendors can interoperate is critical for the reliable delivery of life-saving services. While conformance testing validates individual components, interoperability testing ensures that the entire chain from the caller's device through the core network to the PSAP functions correctly in a multi-vendor environment. The present document defines the necessary test supporting functional elements, configurations and data sets required to perform lab-based interoperability testing. By following these standardized test descriptions, operators and vendors can validate the deployment of Next Generation emergency services independently of the access network.

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1 Scope

The present document defines the Interoperability Test Descriptions (TD) for core elements providing network-independent access to emergency services. These test descriptions are intended to:

- Verify end-to-end interoperability between originating services (VoIP, IMS, PSTN/PABX) and Next Generation core services such as the Border Control Function (BCF), Emergency Service Routing Proxy (ESRP), and Emergency Call Routing Function (ECRF).
- Cover procedures for location acquisition and transport, including Location-By-Value and By-Reference, as well as Advanced Mobile Location (AML) via HTTPS and SMS.
- Validate multimedia capabilities, ensuring successful transmission and reception of audio, video, Real-Time Text (RTT), and total conversation across different network configurations.
- Test routing and policy functions, including the use of the LoST protocol for mapping locations to service URNs and handling SIP headers for emergency call management.
- Provide a basis for standardized lab testing by specifying the baseline configurations, reference points, and interfaces (such as SIP, HTTP, HELD, and RTP) required for a complete test environment.

The tests described in the present document are focused on functional interoperability and do not include performance or security testing protocols.

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.

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

- [1] [ETSI TS 103 479](#): "Emergency Communications (EMTEL); Core elements for network independent access to emergency services".
- [2] [ETSI TS 123 167](#): "Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) emergency sessions; (3GPP TS 23.167)".
- [3] [ETSI TS 123 333](#): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Multimedia Resource Function Controller (MRFC) - Multimedia Resource Function Processor (MRFP) Mp interface: Procedures descriptions; (3GPP TS 23.333)".
- [4] [ETSI TS 103 625](#): "Emergency Communications (EMTEL); Transporting Handset Location to PSAPs for Emergency Communications - Advanced Mobile Location".
- [5] [ETSI TS 103 698](#): "Emergency Communications (EMTEL); Lightweight Messaging Protocol for Emergency Service Accessibility (LMPE)".
- [6] [IETF RFC 7946](#): "The GeoJSON Format", (August 2016).
- [7] [ETSI TS 103 683](#): "Mobile Standards Group (MSG); Testing; Next Generation eCall High Level Application Protocol (HLAP) Interoperability Testing".

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.

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Not applicable.

3 Definition of terms, symbols and abbreviations

3.1 Terms

Void.

3.2 Symbols

Void.

3.3 Abbreviations

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

AML	Advanced Mobile Location
APP	Application
BCF	Border Control Function
CA	Certification Authority
CAP	Common Alerting Protocol
CPE	Call Processing Equipment
CSCF	Call Session Control Function
DID	Decentralised Identifier
DLT	Distributed Ledger Technology
DNS	Domain Name System
DUT	Device under Test
ECRF	Emergency Call Routing Function
ECSCF	Emergency Call Session Control Function
ESInet	Emergency Services IP network
ESRP	Emergency Service Routing Proxy
ETSI	European Telecommunications Standards Institute
EUT	Equipment Under Test
FG	Forest Guide
GNSS	Global Navigation Satellite System
GW	Gateway
HELD	HTTP Enabled Location Delivery
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
IETF	Internet Engineering Task Force
IBCF	Interconnection Border Control Function
ID	Identity
IFS	Interoperable Function Statement
IF	Interface
IM	Instant Messaging

IMS	IP Multimedia Subsystem
IP	Internet Protocol
IVS	In-Vehicle System
LbR	Location by Reference
LbV	Location by Value
LCS	Location Services (3GPP)
LIF	Location Interwork Function
LIS	Location Information Server
LMPE	Lightweight Messaging Protocol for Emergency Service Accessibility
LNG	Legacy Network Gateway
LRF	Location Retrieval Function
LO	Location Object
LOST	Location to Service Translation
LS	Location Server
MRFP	Multimedia Resource Function Processor
MSD	Minimum Set of Data
NAPTR	Name Authority Pointer
NG	Next Generation
NIF	Next Generation Specific Interwork Function
PABX	Private Automatic Branch Exchange
PCSCF	Proxy Call Session Control Function
PIDF	Presence Information Data Format
PIDF-LO	Presence Information Data Format - Location Object
PIF	Protocol Interworking Function
PSTN	Public Switched Telephone Network
PRF	Policy Routing Function
PSAP	Public Safety Answering Point
RTCP	Real-time Transport Control Protocol
RTP	Real-time Transport Protocol
RTT	Real-Time Text
SCSCF	Serving Call Session Control Function
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SIPS	Session Initiation Protocol Secure
SMS	Short Message Service
SMSC	Short Message Service Centre
SUT	System Under Test
TC	Total Conversation
TCP	Transmission Control Protocol
TD	Test Description
TLS	Transport Layer Security
TR	(ETSI) Technical Report
TS	(ETSI) Technical Specification
UA	User Agent
UC	Unified Communication
UDP	User Datagram Protocol
UE	User Equipment
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
URN	Uniform Resource Name
UTF	Unicode Transformation Format
VoIP	Voice over IP WGS World Geodetic System
XML	eXtensible Markup Language

4 Conventions

4.1 Test Description Pro forma

A Test Description (TD) is a detailed description of the process that needs to be followed to test one or more inter operable functionalities between two or more vendor implementations. A TD should include as a minimum the following elements: The following different types are defined.

Interoperability Test Description			
Identifier	a unique test description identifier should follow a well-defined naming convention, e.g.: TD_XX_00		
Test Objective	a concise summary of the test, which should reflect its purpose and allow readers to easily distinguish this test from any other test in the document		
Configuration	list of all the required equipment for running this test, possibly also including a (reference to) an illustration of a test architecture or test configuration		
References	list of references to the base specification clause(s), use case(s), requirement(s), etc. which are either used in the test or define the functionality being tested		
Applicability	list of features and capabilities in the IFS which are required to be supported by the SUT in order to execute this test (e.g. if this list contains an optional feature to be supported, then the test is optional)		
Pre-test conditions	list of test specific pre-conditions that need to be met by the SUT including information about equipment configuration, i.e. precise description of the initial state of the SUT prior to start executing the test sequence		
Test Sequence	Step	Type	Description
	1	<type>	step description
	2		
	3		
Notes	optional list of explanatory notes		

- A **stimulus** corresponds to an event that triggers an EUT to proceed with a specific protocol action, like sending a message for instance.
- A **check** step consists of verifying that the EUT behaves according to the expected behaviour (for instance the EUT behaviour shows that it receives the expected message).
- A **configure** corresponds to an action to modify the EUT configuration.
- A **verify** step consists of verifying that the tested scenario provides expected results (for instance an emergency call is received at the correct PSAP and media is transmitted).

Each check step consists of the receipt of protocol messages on reference points, with valid content. The check should be performed using a trace created by a monitor tool.

4.2 Interoperable Functions Statement

The "Interoperable Functions Statement" (IFS) identifies the standardised functions of a DUT. These functions can be mandatory, optional or conditional (depending on other functions), and depend on the role played by the DUT. The IFS can also be used as a pro forma by a vendor to identify the functions that its DUT will support when interoperating with corresponding functions from other vendors.

5 Configurations and Interfaces

5.1 ESInet

5.1.1 General

The clauses below describe the baseline ESInet configuration required to execute tests as defined in the present document. The given architecture describes the minimum setup necessary to test a complete end-to-end path including relevant core services. Necessary extensions to consider different hierarchical levels in the test scenarios are out of scope.

5.1.2 Architecture

Core services connecting to an ESInet are introduced in ETSI TS 103 479 [1] and listed as follows:

- Border Control Function (BCF);
- Emergency Call Routing Function (ECRF);
- Call bridging function (BRIDGE);
- Public Safety Answering Point (PSAP);
- Emergency Services Routing Proxy (ESRP); and
- Location Information Service (LIS).

Figure 1 illustrates the base testing environment including various originating services that interconnect to core services via a BCF. Optionally, LIS and ESRP can be used to address missing functionality in the originating network such as location and service URN support. Detailed description of originating services can be found in the following clauses.

NOTE: The use of LIS and ESRP in the origination network does not suggest a specific architecture, rather it helps to support either different test combinations based on location, or to use standard VoIP devices for test purposes.

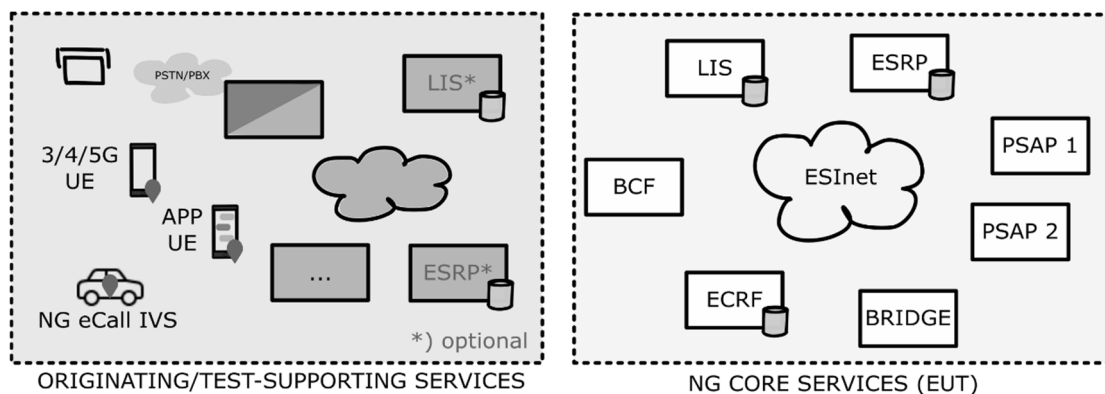


Figure 1: ESInet configuration

5.1.3 Interfaces

Mandatory interface reference points as shown in Figure 2 are introduced in ETSI TS 103 479 [1] and define media and signalling capabilities of core services connected to an ESInet.

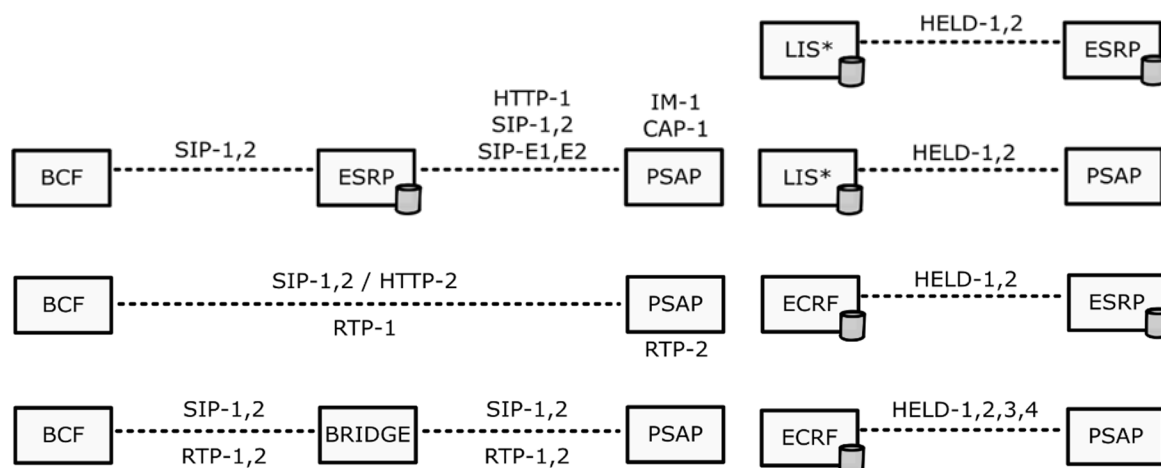


Figure 2: Reference points

Interface identifiers, as listed below, are used in the test description to list required interfaces for the respective test.

SIP-1, SIP-2:

Interface between BCF, ESRP and PSAP elements that defines SIP transport and signalling capabilities.

SIP-E1, SIP-E2:

Interface between ESRP and PSAP elements that defines domain specific SIP event notification capabilities.

HTTP-1:

Interface between ESRP and PSAP elements that defines domain specific web service capabilities.

HTTP-2:

Interface between BCF and PSAP elements that defines domain specific web service capabilities.

LOST-1, LOST-2:

Interface between ESRP, PSAP and ECRF elements that defines LoST signalling capabilities.

LOST-3, LOST-4:

Interface between PSAP and ECRF elements that defines LoST signalling capabilities.

HELD-1, HELD-2:

Interface between ESRP or PSAP and LIS elements that defines location dereference and HELD signalling capabilities.

RTP-1, RTP-2:

Interface between BCF and PSAP elements that defines media transport capabilities and media types for audio, video and real-time text.

IM-1:

PSAP call handling capabilities to support instant messaging.

CAP-1:

PSAP call handling capabilities to support the common alerting protocol.

5.2 VoIP

5.2.1 General

The clauses below describe the baseline VoIP configuration required to execute tests as defined in the present document. The given architecture describes the minimum setup necessary to test a complete end-to-end path including relevant core services with emergency calls originating from a VoIP service provider infrastructure including fixed or mobile devices and call origination (PSTN). Necessary extensions to consider different hierarchical levels in the test scenarios are out of scope.

5.2.2 Architecture

Core services connecting to an ESInet are introduced in ETSI TS 103 479 [1] and listed as follows:

- Border Control Function (BCF);
- Emergency Call Routing Function (ECRF);
- Call bridging function (BRIDGE);
- Public Safety Answering Point (PSAP);
- Emergency Services Routing Proxy (ESRP); and
- Location Information Service (LIS).

Originating services comprising the VoIP configuration are:

- VoIP service provider infrastructure (SIP and GW in Figure 3)
- Call originating devices (UE, APP, IP in Figure 3)

Figure 3 illustrates the VoIP testing environment including originating services that interconnect to core services via a BCF. Optionally, LIS and ESRP can be used to address missing functionality in the originating network such as location or service URN support. ESInet peering is either local (lab) or remote with appropriate security mechanisms. Further information regarding NG eCall tests can be found in ETSI TS 103 683 [7].

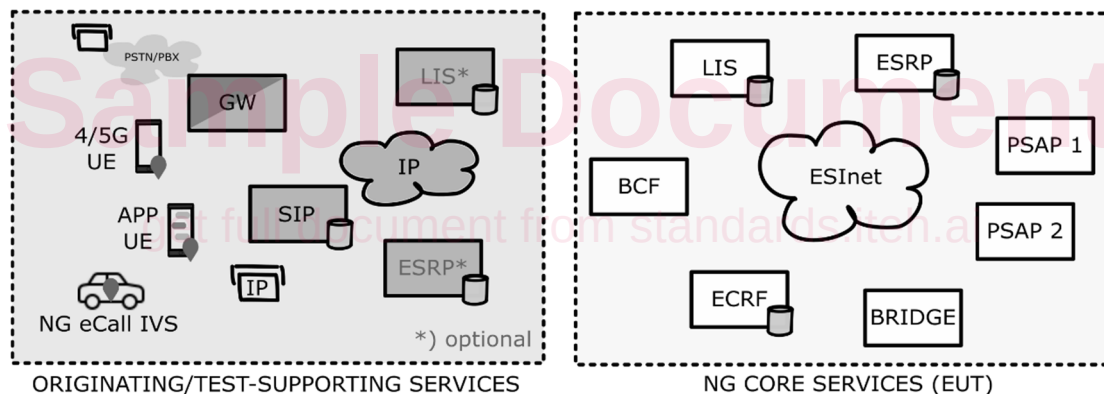


Figure 3: VoIP configuration

5.2.3 Interfaces

Mandatory interface reference points as shown in Figure 4 are introduced in ETSI TS 103 479 [1] and define media and signalling capabilities of the VoIP services connected to an ESInet.

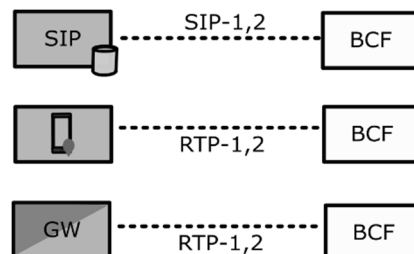


Figure 4: Reference points

Interface identifiers, as listed below, are used in the test description to list required interfaces for the respective test.

SIP-1, SIP-2:

Interface between BCF, ESRP and PSAP elements that defines SIP transport and signalling capabilities.