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Emergency Communications (EMTEL);
Core elements for network independent access to emergency services

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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

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Executive summary

The core elements for network independent access to emergency services provide facilities that support centralized mapping and routing functions for current and future emergency communications and operational requirements. The baseline is a network with the functional elements that comprise security measures and the routing capabilities being necessary to forward a call received at any concentration point based on the caller's location to the responsible emergency call centre. In addition, other functional elements and necessary protocols and procedures enabling interoperable and secure implementations are specified to allow multimedia communications as they evolve.

Introduction

At present, an emergency services infrastructure is based on straightforward technical building blocks and a few legal/regulatory aspects. Technical elements, typically part of an incumbent telephone service provider, ensure that emergency calls are routed to the most appropriate PSAP. Such routing is based on static information at the local telephone exchange that provides a mapping between the location of a calling line and the PSAP, or for a mobile call, between the location of the mobile network cell coverage and the PSAP. The mapping information itself is most often managed by the national regulator, and typically, mapping information is represented by dialling code/area code/cell identifier and a table that maps those codes to PSAPs, which are identified by unlisted and often un-dialable numbers.

However, the existing, legacy emergency services infrastructure is not designed in a way that enables interaction with enhanced services, or that current and future communications and operational requirements will be met. Simply put, the emergency services infrastructure has not kept up with technology, thus, is not able to provide the level of service that citizens expect. Hence, new technologies with a new architecture are introduced as core elements for network independent access to emergency services. These elements enable citizens/individuals to contact emergency services in different ways, using the same types of technology as those they use to communicate every day. It also makes possible that PSAPs receive more and better information about emergencies of all magnitudes and improves interoperability between emergency services.

1 Scope

The purpose of the present document is to describe the architecture, the core elements and corresponding technical interfaces for network independent access to emergency services. Elements are: Border Control Function (BCF), Emergency Service Routing Proxy (ESRP), Emergency Call Routing Function (ECRF), Public Safety Answering Point (PSAP), the Location Information Server (LIS), and the Call Transfer Bridge (BRIDGE).

The described architecture is currently named Next Generation 112 architecture.

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 https://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.

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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.

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3 Definition of terms, symbols and abbreviations

3.1 Terms

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

emergency call: any type of emergency communications and associated media initiated by an individual and received by a Public Safety Answering Point (PSAP)

emergency service: service which provides urgent assistance in situations where there is a direct risk to life, general public safety, public/private property or the environment (e.g. police, fire, ambulance, coastguard)

NOTE: A PSAP may be an independent organisation or an integrated part of the emergency services.

Public Safety Answering Point (PSAP): physical location where an emergency call from an individual is first answered and from where a request for assistance may be made to the emergency services

3.2 Symbols

Void.

3.3 Abbreviations

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

AML	Advanced Mobile Location
AMR	Adaptive Multi-Rate
ANP	Access Network Provider
ASP	Application Service Provider
BCF	Border Control Function
CA	Certification Authority
CAP	Common Alerting Protocol
CERT	Computer Emergency Response Team
CPE	Call Processing Equipment
CR	Carriage Return
CTI	(ETSI) Center for Testing and Interoperability
DHE	Ephemeral Diffie-Hellman key exchange
ECRF	Emergency Call Routing Function
ECRIT	Emergency Context Resolution with Internet Technologies (IETF WG)
ECSP	Emergency Call Service Provider
EPSG	European Petroleum Survey Group
ES	ETSI Standard
ESInet	Emergency Services IP network
ESRF	Emergency Service Routing Function
ESRP	Emergency Service Routing Proxy
ETSI	European Telecommunications Standards Institute
EVRC	Enhanced Variable Rate Wideband Codec
EVRC-B	Enhanced Variable Rate Wideband Codec -B
GCM	Galois/Counter Mode
GIS	Geographic Information System
HELD	HTTP Enabled Location Delivery
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
IF	InterFace
IM	Instant Messaging
IMS	IP Multimedia Core Network Subsystem
IP	Internet Protocol
IT	Information Technology
ITU-T	International Telecommunications Union - Telecommunications
JSON	JavaScript Object Notation
LF	Line Feed
LIS	Location Information Server
LO	Location Object
LOST	LOcation to Service Translation
LS	Location Server
MPEG	Moving Picture Experts Group
MSD	Minimum Set of Data

MSRP	Message Session Relay Protocol
NE	Neighbouring Entity
NW	Narrowband-Wideband
PIDF	Presence Information Data Format
PIDF-LO	Presence Information Data Format - Location Object
PNNS	Protocol Naming and Numbering Service
PRF	Policy Routing Function
PSAP	Public Safety Answering Point
PSP	PSAP Service Provider
PSTN	Public Switched Telephone Network
RFC	Request For Comment
RSA	Rivest–Shamir–Adleman
RTCP	Real-time Transport Control Protocol
RTP	Real-time Transport Protocol
RTSP	Real-time Streaming Protocol
SBC	Session Border Controller
SDES	SDP Security Descriptions
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SIPS	Session Initiation Protocol Secure
SMS	Short Message Service
SMSC	Short Message Service Center
SRS	Spatial Reference System
SRTCP	Secure Real-time Transport Control Protocol
SRTP	Secure Real-time Transport Protocol
TCP	Transmission Control Protocol
TLS	Transport Layer Security
TR	(ETSI) Technical Report
TS	(ETSI) Technical Specification
UA	User Agent
UAC	User Agent Client
UAS	User Agent Server
UDP	User Datagram Protocol
UE	User Equipment
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
URN	Uniform Resource Name
UTF	Unicode Transformation Format
VSP	Voice Service Provider
WB	Wideband
WGS	World Geodetic System
XML	eXtensible Markup Language

4 General

4.1 Overview

Per ETSI ES 203 178 [1], emergency calls originating in an ANP infrastructure are forwarded via a VSP to an ECSP where the appropriate PSAP or, in general terms, the Point-of-Interconnect to a PSP infrastructure is determined. In general, emergency calls are routed by the ESRF to the ESRP via a BCF utilizing interface ***ih***. Depending on national PSAP models the ESRP may then forward directly to the appropriate PSAP utilizing interface ***ij*** or use PSP internal facilities to determine the correct PSAP (e.g. in the case of nationally interconnected PSAPs).

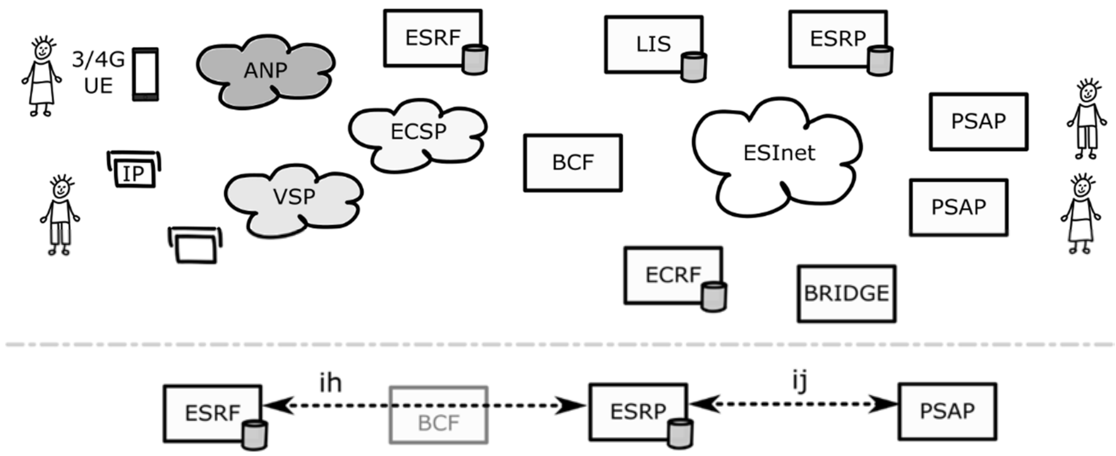

Figure 1: High level functional architecture

ETSI ES 203 283 [2] specifies interfaces ***ih*** and ***ij*** for basic emergency call routing services. The present document aims to extend these interfaces and to specify additional ones to cover PSP specific facilities considering security, location and policy-based routing. Standardization of ANP, VSP or ECSP specific entities are not covered in the present document.

The following architecture introduces functional elements that comprise an IP only PSP environment. Such elements provide security measures (BCF), location information (LIS), emergency call routing (ESRP), mapping PSAP boundaries to SIP URIs (ECRF), bridging (BRIDGE) and call processing equipment (PSAP).

4.2 Architecture

The definition of core elements for network independent access to emergency services is based on the core concept of the NG112 architecture as introduced in [i.1], the Emergency Services IP Network (ESInet). The ESInet is an emergency services network of networks that utilizes IP technology. ESInets are private, managed, and routed IP networks. An ESInet can serve a set of PSAPs, a region, a state, or a set of states. ESInets may be interconnected and shall be built upon common functions and interfaces making ESInets interoperable. The present document defines such functional elements with their external interfaces.

The NG112 architecture fits with the overall concept of different service provider roles as defined in ETSI ES 203 178 [1]. The present document addresses the specific needs of the PSAP Service Provider (PSP) domain and the inter-operator interfaces to other domains. These specific functions of the PSP domain extend the existing definition of the PSP domain (ETSI ES 203 178 [1]), e.g. for the deployment of more complex policies for destination selection.

The functional architecture introduced in ETSI ES 203 178 [1] identifies four service provider roles and a routing function as represented in Figure 2 to the left:

- Access Network Provider (ANP).
- Voice Service Provider (VSP).
- Emergency Call Service Provider (ECSP).
- PSAP Service Provider (PSP).
- Emergency Service Routing Function (ESRF).

The ANP, ECSP and PSP are in the same regulatory domain. The VSP can be inside or outside this domain. The present document extends this architecture with elements located within or accessed from a PSP infrastructure as shown in Figure 2:

- Border Control Function (BCF);
- Emergency Call Routing Function (ECRF);
- Call Bridging function (BRIDGE);