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Technical Specification

Emergency Communications (EMTEL);
Total Conversation Access to Emergency Services

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Foreword

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

Introduction

Total Conversation is a general multimedia conversational service. Internet-based Total Conversation services and terminals are deployed in a number of countries in Europe, and adopted for example by some persons with disabilities who need video for sign language communication or Real-Time Text for a text based conversation instead of or as complement to a voice conversation. The present document specifies how Total Conversation can be used for access to emergency services employing communication modalities suitable both for the Total Conversation Terminal user and PSAP call-taker.

The present document is based on TR 103 170 [i.6].

1 Scope

Total Conversation, as defined in Recommendation ITU-T F.703 [2], is a combination of three media in a conversational call: video, Real-Time Text and audio. The present document defines conditions for using Total Conversation for emergency services with more media than in the regular voice call providing opportunities to more rapid, reliable and confidence-creating resolution of the emergency service cases compared to plain voice emergency calls, and especially for enabling access of emergency services or making them more usable for those persons who may have little or no use of voice telephony because of disabilities related to hearing, speech or other human communication functions.

The present document addresses the organization of Public Safety Answering Points (PSAP) and the potential impact on overall organizations of emergency services for handling Total Conversation calls. The present document also addresses functional requirements regarding the interface to the PSAP, the connection to external supporting services, the transferring and sharing of the call between call handling organizations, the call logging and call recording at the PSAP, the PSAP call back aspects and specific call routing and location information provision aspects for these Total Conversation calls. The present document refers to existing standards relevant for Total Conversation user terminals and serving networks to facilitate a Total Conversation emergency call. The present document does not imply any requirements on user terminals in general to be Total Conversation terminals.

The service specified here is one solution for accessible emergency services intended to fulfil requirements in the EU Universal Service Directive [i.1] and [i.2]. The present document does not preclude that other solutions may be possible and can be specified and implemented.

Due consideration is taken of related standardization (e.g. 3GPP^{TM} and IETF) and work in other bodies (e.g. the Expert Group on Emergency Access (EGEA) and the European Emergency Number Association (EENA)).

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.

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

2.1 Normative references

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

[1] Recommendation ITU-T F.700: "Framework Recommendation for multimedia services".

[2] Recommendation ITU-T F.703: "Multimedia conversational services".

[3] Recommendation ITU-T G.114: "One-way transmission time".

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

[5] Recommendation ITU-T G.722: "7 kHz audio-coding within 64 kbit/s".

[6] Recommendation ITU-T H.263: "Video coding for low bit rate communication".

[7] Recommendation ITU-T H.264: "Advanced video coding for generic audiovisual services".

[8] ITU-T H-series Supplement 1: "Application profile - Sign language and lip-reading real-time conversation using low bit rate video communication".

[9] Recommendation ITU-T T.140: "Protocol for multimedia application text conversation".

[10]   ETSI TS 122 101: "Universal Mobile Telecommunications System (UMTS); Service aspects; Service principles (3GPP TS 22.101)".

[11]   ETSI TS 122 173: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Core Network Subsystem (IMS) Multimedia Telephony Service and supplementary services; Stage 1 (3GPP TS 22.173)".

[12]   ETSI TS 123 167:"Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) emergency sessions (3GPP TS 23.167)".

[13]   ETSI TS 126 114:"Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS); Multimedia telephony; Media handling and interaction (3GPP TS 26.114)".

[14]   ETSI TS 124 279: "Universal Mobile Telecommunications System (UMTS); LTE; Combining Circuit Switched (CS) and IP Multimedia Subsystem (IMS) services; Stage 3 (3GPP TS 24.279)".

[15]   ETSI ES 202 975: "Human Factors (HF); Harmonized relay services".

[16]   IETF RFC 3261: "SIP: Session Initiation Protocol".

[17]   IETF RFC 3264: "An Offer/Answer Model with Session Description Protocol (SDP)".

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

[19]   IETF RFC 3711: "The Secure Real-time Transport Protocol (SRTP)".

[20]   IETF RFC 6184: "RTP Payload Format for H.264 Video".

[21]   IETF RFC 4103: "RTP Payload for Text Conversation".

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

[23]   IETF RFC 4629: "RTP Payload Format for ITU-T Rec. H.263 Video".

[24]   IETF RFC 5239: "A Framework for Centralized Conferencing".

[25]   IETF RFC 5627: "Obtaining and Using Globally Routable User Agent URIs (GRUUs) in the Session Initiation Protocol (SIP)".

[26]   IETF RFC 5764: "Datagram Transport Layer Security (DTLS) Extension to Establish Keys for the Secure Real-time Transport Protocol (SRTP)".

[27]   IETF RFC 6189: "ZRTP. Media Path Key Agreement for Unicast Secure RTP".

[28]   IETF RFC 6263: "Application Mechanism for Keeping Alive the NAT Mappings Associated with RTP / RTP Control Protocol (RTCP) Flows".

[29]   IETF RFC 6442: "Location Conveyance for the Session Initiation Protocol".

[30]   IETF RFC 6443: "Framework for Emergency Calling Using Internet Multimedia".

NOTE: This is an informational IETF document collecting references to many standard track normative IETF documents of importance for Next Generation Emergency Services and therefore considered relevant as normative reference.

[31]   IETF RFC 6881: "Best Current Practice for Communications Services in Support of Emergency Calling (BCP 181)".

NOTE: This is an IETF Best Current Practice document collecting references to many standard track normative IETF documents of importance for Next Generation Emergency Services.

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]   Directive 2002/22/EC of the European Parliament and the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive).

[i.2]   Directive 2009/136/EC of the European Parliament and the Council of 25 November 2009 amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws.

[i.3]   "EENA NG1-1-2 Long Term Definition", EENA 2012.

NOTE   http://www.eena.org/ressource/static/files/2013-03-15-eena_ltd_v1-1_final.pdf.

[i.4]   ETSI EG 202 320: "Human Factors (HF); Duplex Universal Speech and Text (DUST) communications".

[i.5]   ETSI TR 102 180: "Emergency Communications (EMTEL); Basis of requirements for communication of individuals with authorities/organizations in case of distress (emergency call handling)".

[i.6]   ETSI TR 103 170: "Emergency Communications (EMTEL); Total Conversation Access to Emergency Services".

[i.7]   IETF RFC 5012: "Requirements for Emergency Context Resolution with Internet Technologies".

[i.8]   IETF RFC 5194: "Framework for Real-Time Text over IP Using the Session Initiation Protocol (SIP)".

[i.9]   draft-ietf-ecrit-additional-data: "Additional Data related to an Emergency Call".

NOTE: http://tools.ietf.org/html/draft-ietf-ecrit-additional-data (work in progress).

3   Definitions and abbreviations

3.1   Definitions

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

address: identifier of the destination of a call containing only numbers, or a wider range of characters depending on the rules established by the application service provider

application service provider: organization or entity that, via a serving network, provides application-layer services, which may include voice, video and text communication

assisting services: services invoked during a call, assisting the user or the call-taker with specific tasks in the call

NOTE: Such tasks can for example be language translations, relay service or expert advice.

basic SIP: session control environment for calls, using the RFC 3261 [16] and related protocols in the IP networks

NOTE: The above refers to an environment outside the scope of IMS.

Emergency Services IP network (ESInet): Internet Protocol (IP) based communications network dedicated for public safety use

> NOTE: An ESInet delivers emergency requests and corresponding data to emergency services providers and facilitates communication between emergency service providers and other supporting entities. An ESInet is typically deployed to support a set of PSAPs and other public safety agencies on a geographic basis. A given PSAP, or other appropriate entity, may connect to one or more ESInets. ESInets may be interconnected to facilitate emergency event handling and other related interactions (from EENA NG112 LTD [i.3]).

emergency service system: ESiNet and PSAPs together, including technology for both emergency call handling and additional functions such as emergency call distribution, emergency call recording, logging, and connection to emergency service queue

home environment: environment responsible for overall provision and control of the Personal Service Environment of its subscribers

IP Multimedia Subsystem (IMS): standardized Next Generation Networking (NGN) architecture for telecom operators that want to provide mobile and fixed multimedia services

modalities: methods for human expression and perception of communication

> NOTE: Examples are written, signed and spoken languages, pictures, gestures, etc.

multi-party call: real-time communication session with more than two participants where media sent from participants are distributed for presentation among the participants in the call

personal service environment: environment containing personalized information defining how subscribed services are provided and presented towards the user

> NOTE: Each subscriber of the Home Environment has her own Personal Service Environment. The Personal Service Environment is defined in terms of one or more User Profiles.

Public Safety Answering Point (PSAP): physical location where emergency calls are received under the responsibility of a public authority

Real-Time Text (RTT): form of text conversation in point to point situations or in multipoint conferencing where the text being entered is displayed in such a way that the communication is perceived by the user as being continuous

> NOTE: This feature is often called RTT.

relay service: telecommunications service that enables users of different modes of communication e.g. text, sign, speech, to interact by providing conversion between the modes of communication, normally by a human operator

> NOTE: A type of assisting service. (definition from ES 202 975 [15]).

serving network: entity that provides the user with access to the services of the Home Environment

total conversation: audiovisual conversation service providing bidirectional symmetric real-time transfer of motion video, Real-Time Text and voice between users in two or more locations

> NOTE: Definition from Recommendation ITU-T F.703 [2].

total conversation terminal: user terminal capable of being used for Total Conversation

user: individual taking advantage of the Total Conversation service

3.2   Abbreviations

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

3GPP	Third Generation Partnership Project
BOM	Byte Order Mark
CRLF	Carriage Return, Line Feed
CS	Circuit Switched

EC	European Commission
EENA	European Emergency Number Association
EGEA	Expert Group on Emergency Access
EMTEL	Emergency Communications
ESInet	Emergency Services IP network
GRUU	Globally Routable User Agent URI
GTT	Global Text Telephony
IMS MES	IMS Multimedia Emergency Session
IMS	IP Multimedia Subsystem
IP	Internet Protocol
LoST	Location to Service Translation protocol
LTD	Long Term Definition
MES	Multimedia Emergency Session
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
RCS	Rich Communications Suite
RTP	Real Time Protocol
RTT	Real-Time Text
SIP	Session Initiation Protocol
SOS	Start Of String
SRTP	Secure Real Time Protocol
ST	String Terminator
TLS	Transport Layer Security
UCS	Universal Character Set
URI	Uniform Resource Indicator
URN	Uniform Resource Name
UTF	UCS Transformation Format
ZRTP	Media Path Key Agreement for Secure RTP

4 Background

The Total Conversation service is defined in Recommendation ITU-T F.703 [2]. It is used for user-to-user communication in a variation of media and modes of communication. The present document applies to Total Conversation when used for emergency service access.

Background information can be found in TR 103 170 [i.6].

5 Total Conversation Functionality for Emergency Services

5.1 Basic functionality

The emergency service capable of handling Total Conversation emergency calls shall provide its users with a way to make and receive emergency calls with Total Conversation and communicate simultaneously in a conversational way using available combinations of video, Real-Time Text and audio. The call is made in a similar way as for a voice emergency call.

An emergency number or address is used by the Total Conversation user when calling emergency services and a calling action shall be initiated.

When the emergency Total Conversation call is answered, the common media supported by the terminal and the PSAP for Total Conversation shall be used to initiate a Total Conversation Call.

If an emergency service system has both Total Conversation call-taker workstations and workstations supporting fewer media than the Total Conversation workstations, then Total Conversation emergency calls shall be handled by the Total Conversation workstations whenever possible.

If an emergency call with Total Conversation media requested cannot be handled by a Total Conversation workstation in the PSAP, then the PSAP shall be allowed to handle the call in a workstation with support of fewer media. In the case that not all 3 media is used by the PSAP, or the user requires to use a modality not supported by the PSAP, relay services may be invoked to handle the missing media or modalities if needed.

The present document assumes the conceptual service architecture shown in figure 1.
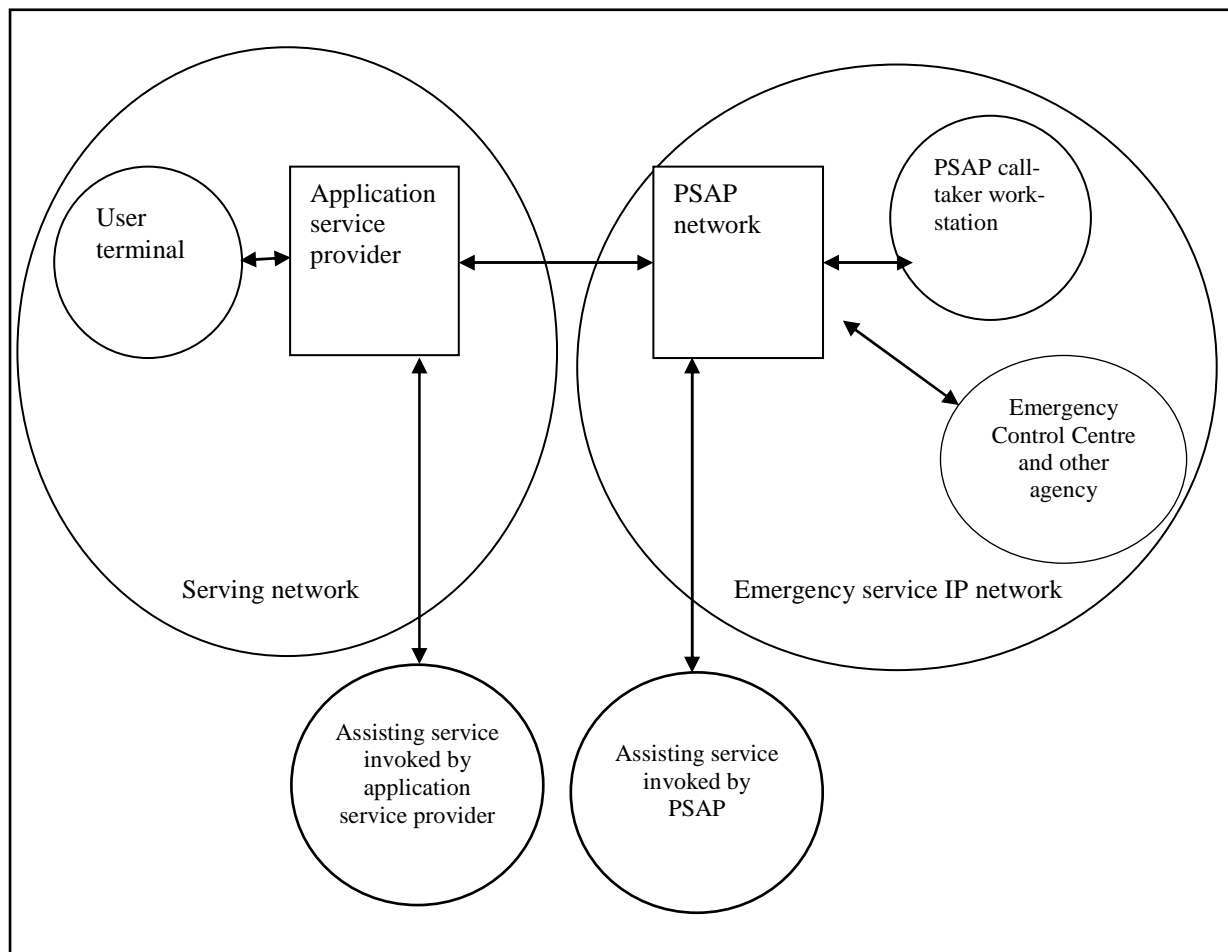
Figure 1: Conceptual service architecture for Total Conversation access to emergency services

5.2 Total Conversation Environments

There are currently two main standardized IP network session control environments. They are: basic SIP and IP Multimedia Subsystem IMS.

Selection of environment for terminal implementation is influenced by conditions out of the scope of the present document. A terminal needs to support only the same environment for Total Conversation emergency calls as it supports for Total Conversation non-emergency calls.

An overview of Total Conversation access to emergency services for the two session control environments are provided in clauses 5.2.1 and 5.2.2.

Support for Total Conversation access to emergency services may be added for any other emerging session control environment for Total Conversation. The terms for such additions are described in clause 5.2.3.

A brief description of legacy PSTN access with relation to a subset of Total Conversation is included in clause 5.2.4.

5.2.1   Access using basic Session Initiation Protocol (SIP)

Total Conversation can be based on Internet communication using the session control protocol SIP as specified in
RFC 3261 [16] but not necessarily in accordance with the IMS framework specified in 3GPP. In this case Total
Conversation can be viewed as an extension of a system for voice over IP (VoIP) based on SIP. This is called "basic
SIP" in the present document.

> NOTE 1: A particular characteristic of this environment is that the Internet is an unmanaged network that is
> untrusted, inherently insecure and does not guarantee any quality of service (i.e. is "best effort").

The specifics for Total Conversation in this environment are specified in RFC 5194 [i.8], and also in EG 202 320 [i.4].
These two specifications concentrate on describing the conditions for the Real-Time Text medium, while they specify
that video and audio may also be enabled in the call to compose the Total Conversation service.

The requirements for emergency services in this environment are described in RFC 5012 [i.7].

The specific mechanisms for emergency call handling in this environment are specified in RFC 6443 [30] and
RFC 6881 [31].

PSAPs implementing Total Conversation access shall be able to handle emergency calls using the interface protocols
specified in RFC 6881 [31].

The protocols and procedures used in the interface between the serving network and the Emergency Service Network
shall be as specified in RFC 6881 [31].

> NOTE 2: More information on suitable procedures and protocols for this environment is found in EENA
> NG112 LTD [i.3].

5.2.2   IP Multimedia Subsystem (IMS) access

Total Conversation can be based on the IP Multimedia Subsystem IMS as specified by 3GPP.

> NOTE 1: A particular characteristic of this deployment scenario is that the IMS architecture is an operator managed
> network that can be trusted, and provides security and quality of service.

Total Conversation in IMS shall be provided by the IMS Multimedia Telephony service described in TS 122 173 [11],
by including all three media described in TS 126 114 [13].

The IMS MES as specified in TS 122 101 [10] shall be used for Total Conversation emergency calls.

> NOTE 2: Some functionalities for IMS based access to Emergency Services for Total Conversation related to user
> preference based invocation of assisting services are not supported until Release 12 of the 3GPP
> specifications.

These specifications are essentially based upon the same call control protocol and media considerations as those used
for the basic SIP case described in clause 5.2.1 but with some IMS specific protocol extensions and some IMS specific
mechanisms for emergency handling.

The emergency calls initiated from Total Conversation users in the IMS system, are expected to be routed to emergency
services using basic SIP according to the principles in clause 5.2.1.

The functionality and procedures in the PSAP, Emergency Service Network and external services are not influenced by
this serving network. They are, in the present document, assumed to be based on basic SIP.

The opportunity to make emergency calls with the media included in Total Conversation was first specified in 3GPP
Release 11 of IMS in the multimedia emergency session concept. Thus the IMS access is valid only for IMS networks
implementing 3GPP Release 11 or higher.

The functionality available in emergency services is specified in TS 122 101 [10]. The functionality entitled "Global
Text Telephony (GTT)" in that description contains the IP based Real-Time Text component in Total Conversation
calls. GTT shall be combined with audio and video and be implemented together as the three media in IMS Multimedia
Telephony to provide the intended IMS based Total Conversation access to emergency services.

Some of the functionality needed for Total Conversation access in TS 122 101 [10] is made conditional on the
availability of regulation or national policy. The requirements expressed in article 26.4 in the European Universal

Service Directive [i.1] and in recitals 12 and 13 of the amending directive [i.2] should be regarded as indicating a requirement for availability of such functionality for Europe.

The protocols procedures and codecs used in the interface between the serving network and the Emergency Service Network should be as specified in RFC 6881 [31]. The serving network shall bridge any differences between what is used in IMS and this interface to the emergency service capable of handling Total Conversation emergency calls.

The way that the emergency calls are processed within the IMS network shall follow TS 123 167 [12].

The use of IMS for the case of voice call in CS mode combined in a data/video session using Rich Communications Suite (RCS), is specified in TS 124 279 [14].

5.2.3   Access through other IP based protocols

Total Conversation can be implemented with other protocols than those specified in clauses 5.2.1 and 5.2.2. If an authority decided that a service using such protocol shall provide access to emergency service with capability to handle Total Conversation, then the default method shall be to use the same interface as for the basic SIP based protocols described in the present document. The application service provider using such protocols shall establish the procedures and technology for the conversion.

Only if the protocol used between the Total Conversation user terminal and the application service provider is introduced as a supported standard protocol among ESiNets and PSAPs in the region where it is provided, then that protocol may be used as the emergency access protocol. The introduction of the new protocol for emergency access may be done through a revised version of the present document.

5.2.4   Access through legacy (circuit switched) networks

A legacy form of Real-Time Text exists in some countries, called text telephony, enabling limited communication with Real-Time Text in the PSTN, sometimes alternating with voice.

In countries where legacy text telephones prevail, the authorities may arrange for emergency service access for text telephony into the IP based emergency service access interfaces for Total Conversation by means of gateways between PSTN and IP networks with suitable capabilities.

The gateways shall cater for adaptation to possible limitations in media simultaneity of the PSTN Text Telephones.

Legacy call handling as specified in EG 202 320 [i.4] and RFC 5194 [i.8] should be applied.

5.3   Total Conversation Media

5.3.1   Video

A capability to use two way video communications in emergency calls shall be provided by PSAP call-taker workstations and emergency service systems supporting Total Conversation emergency calls. Calls without video shall also be supported.

A view of the other communicating person(s) is provided to each participant in the call.

　　NOTE: In sign language communication all users need to see the head and hands of all participants in the call.

The PSAP call-taker workstations used for Total Conversation shall be capable of transmitting a view of the call-taker including the face and the hands. This view is suitable both in general and for cases when the call-taker is using sign language.

Video communication for conversational use with Total Conversation should be provided with characteristics and quality suitable for use of sign language and lip reading when used for emergency calls. This is specified in ITU-T Series H, Supplement 1 [8].

5.3.1.1 Basic SIP support

Both the following codecs shall be supported by PSAPs and ESInet in the interface between serving networks and the ESInet. At least one of them shall be supported and used in this interface by the combination of serving networks and Total Conversation user terminals when used for emergency calls.

Recommendation ITU-T H.264 [7] coding, using the transport specification in RFC 6184 [20].

Recommendation ITU-T H.263 [6] coding, using the transport specification in RFC 4629 [23].

5.3.1.2 IMS support

Video included in Total Conversation emergency sessions in IMS shall follow the specification in the video-related clauses of TS 126 114 [13] regarding the Total Conversation user terminal and the serving network.

5.3.2 Real-Time Text

A capability to use Real-Time Text in emergency calls shall be provided by PSAP call-taker workstations and emergency service systems supporting Total Conversation. Calls without Real-Time Text shall also be supported.

A capability to use Real-Time Text in the emergency call interoperable with the emergency service system shall be provided by the serving network in interaction with the Total Conversation user terminals.

Real-Time Text communication should be provided in the Total Conversation emergency call according to the quality criteria for good text conversation communication. Such criteria are described in Recommendations ITU-T F.700 [1] and F.703 [2].

5.3.2.1 Basic SIP support

Recommendation ITU-T T.140 [9] and RFC 4103 [21] for coding, presentation and transport of Real-Time Text shall be supported by Total Conversation PSAPs and ESInet as specified in RFC 6881 [31]. These specifications for Real-Time Text shall also be supported by the serving network in the interface between serving networks and the ESInet for Total Conversation emergency calls with Total Conversation user terminals.

   NOTE: Two errata are available in IETF for RFC 4103 [21].

The need for keep-alive communication should be considered as described in RFC 6263 [28]. Regular transmission of the UTF-8 BOM character is an alternative keep-alive method. BOM characters shall not be interpreted as user-generated text.

On reception, any character codes that cannot be presented shall be ignored. This may be because of graphical rendering limitations or for special signalling character codes such as SOS-ST strings specified in Recommendation ITU-T T.140 [9].

When deleting, each backspace character shall delete exactly one Unicode character, regardless of the byte-length of that character in UTF-8. The only exception to this is that CRLF combinations sent by non-compliant systems, instead of the proper Unicode line-separator character, shall be treated as a single character when deleting.

5.3.2.2 IMS support

Real-Time Text included in Total Conversation emergency sessions in IMS shall support the specification in the text-related clauses of TS 126 114 [13] regarding the Total Conversation user terminal and the serving network.

5.3.3 Audio

A capability to use two ways audio in Total Conversation emergency calls shall be provided by PSAP call-taker workstations and emergency service systems. Calls without audio shall also be supported

A capability to use two ways audio in the Total Conversation emergency call interoperable with the emergency service system shall be provided by the serving network in interaction with the Total Conversation user terminals.

The emergency service system handling Total Conversation calls shall support both wide band and narrow band audio codecs. This is valid for all components of the emergency service system, including the EsiNet, the PSAP workstation, call distribution and call recording equipment.

The Total Conversation user terminals shall support at least one of wide band or narrow band codec.

Preference should be given to the wide band codec commonly available for the voice communication.

Audio shall be provided meeting the requirements in Recommendations ITU-T F.700 [1] and F.703 [2] for conversational audio, and Recommendation ITU-T G.114 [3] for audio latency.

5.3.3.1   Basic SIP support

The following audio codecs shall be supported by PSAPs. At least one of them shall be supported in the interface between serving networks and the ESInet by the combination of serving network and Total Conversation terminal. The wide band codec should be preferred for improved perception by users with hearing-impairments.

Recommendation ITU-T G.722 [5] wide band coding, using the transport specification in RFC 3551 [18].

Recommendation ITU-T G.711 [4] audio coding, using the transport specification in RFC 3551 [18].

PSAPs and the combination of serving network and Total Conversation user terminals may support other audio codecs as well.

5.3.3.2   IMS support

Audio included in Total Conversation emergency sessions in IMS shall support the specification in the audio-related clauses of TS 126 114 [13] regarding the Total Conversation user terminal and the serving network.

The wide band codec should be preferred for improved perception by users with hearing-impairments.

5.4   Supplementary and assisting services

5.4.1   General

If a supplementary or assisting service is supported in a non-emergency Total Conversation call, that service shall be made available for emergency calls using Total Conversation. Some of those services are described below.

5.4.2   Assisting service

Means to include assisting services in the Total Conversation emergency call shall be provided. Assisting services may for example provide language interpretation or expert advice.

5.4.2.1   Relay service

There shall be means to invoke available relay services of the types described in ES 202 975 [15] in emergency calls in order to facilitate communication by interpretation between different modalities. The relay services shall be invoked as a party in a multi-party call between the user, the PSAP and the relay service.

The authorities responsible for electronic communication accessible to persons with disabilities, the authorities responsible for emergency service provision and Application Service Providers may decide what types of relay services will be available to the users.

If a relay service is handling regular user-to-user calls as well as emergency calls, the Total Conversation emergency calls shall be given priority in the queues for getting a relay service operator assigned to the call.

The call establishment procedure shall enable call setup requests to go to both the emergency service and the relay service in parallel.

NOTE: Because loud noise from the user site can disturb voice communication between the relay service and the emergency service, some means of temporarily reducing such external noise may help increase communication between the user and the PSAP operator. Further details related to this topic may be considered in an implementation guide.

Information about the identity of the invoked relay service shall be provided to the PSAP, conveyed together with other available call setup and emergency case information. The identity shall be in a form that can be resolved to a unique working place and operator of the relay service. The intention of this information is both for logging, and for the ability to call back to the user with the same type of relay service invoked as in the original call.

5.4.2.1.1   Basic SIP support

Invocation of relay services shall be done when a user profile or other user indications indicate that this is desired.

A SIP proxy capable of making such decisions and invocations shall be included in the route of the calls possibly requiring relay service invocation.

It is recommended that the invocation of the relay service should be handled through connection of a multi-party bridge. The communication between the user and the bridge, between the PSAP and the bridge and between the relay service and the bridge should be mixed in the multi-party bridge.

When an assisting service is invoked, information about the invoked service should be included in the call signalling when a standard for that purpose is available. Work is in progress [i.9].

5.4.2.1.2   IMS support

Means shall be provided by the serving network provider to invoke relay services in an IMS Total Conversation Emergency service at the interface between the serving network and the ESInet.

5.4.3   Multi-party multi-media call

Means to establish and perform multi-party Total Conversation emergency calls shall be provided by the serving network, in which all the enabled media in the call are shared between the call participants.

5.4.3.1   Basic SIP support

The PSAP or ESInet shall be equipped with a Total Conversation conference bridge.

The bridge shall be capable of adding and deleting participants in the call on request from the PSAP.

The bridge shall support RFC 5239 [24], but shall be able to let devices participate without full support for the RFC 5239 [24] conferencing procedures.

5.4.4   Transfer and Forward supplementary services

Transfer and forward supplementary services shall be available for Total Conversation emergency calls for invocation from the PSAP and the application service provider.

Supplementary services operating on media shall apply to all media supported in the call when applicable.

5.4.4.1   Basic SIP support

The supplementary services for Transfer and Forwarding shall be supported by the PSAP.

5.5   Initiating the emergency call

A Total Conversation user terminal intended to support emergency calls shall be able to make an emergency call in accordance with regional regulatory requirements.

5.5.1   Basic SIP support

The procedures for placing an emergency call specified in RFC 6881 [31] shall be followed by Total Conversation user terminals, serving networks, ESInets and PSAPs.

The preferred option shall be that the user terminal recognizes the initiation of an emergency call and then performs the steps required regarding the SIP headers and the routing according to RFC 6881 [31].

A route parameter pointing at the application service provider proxy shall be inserted before the PSAP address in the route set to assure that a proxy capable of invoking relay services is included in the call path.

5.5.2   IMS support

The procedures described in TS 123 167 [12] for calling emergency services with Total Conversation shall be applied.

5.6   Call scenarios

The following Total Conversation emergency call scenarios shall be supported.

5.6.1   Call without assisting service

In cases when the user and the PSAP call-taker have suitable common communication modalities, the call can be made without invoking any assisting service. The decision to do so may be made by comparing capabilities and preferences or by pre-arranged agreements between application service providers and PSAPs.
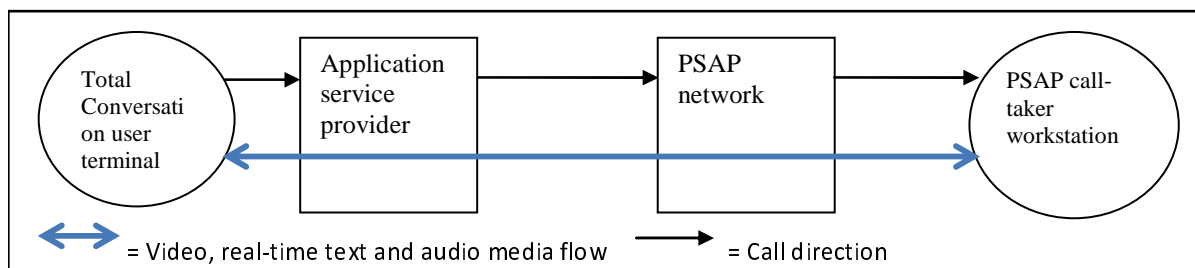

Figure 2: Total Conversation emergency call with no external assistance invocation

5.6.2   Assisting service need indicated by the user

Users of Total Conversation user terminals are provided with means to request specific assisting services to be invoked in the emergency calls on a per call basis.

This request shall be satisfied either by the application service provider or the PSAP as described in the scenarios below in clauses 5.6.3 and 5.6.4.

Location provision and routing actions shall be applied. The call shall be routed towards the PSAP, with an indication what service to invoke or what modality support is required.

5.6.3   Assisting service invoked by the application service provider

If the application service provider finds during call setup that an assisting service is desired or needed in the Total Conversation emergency call to cover a discrepancy in media or modality capabilities between the Total Conversation user and the PSAP, the application service provider shall perform procedures for connecting a suitable available assisting service to the call.

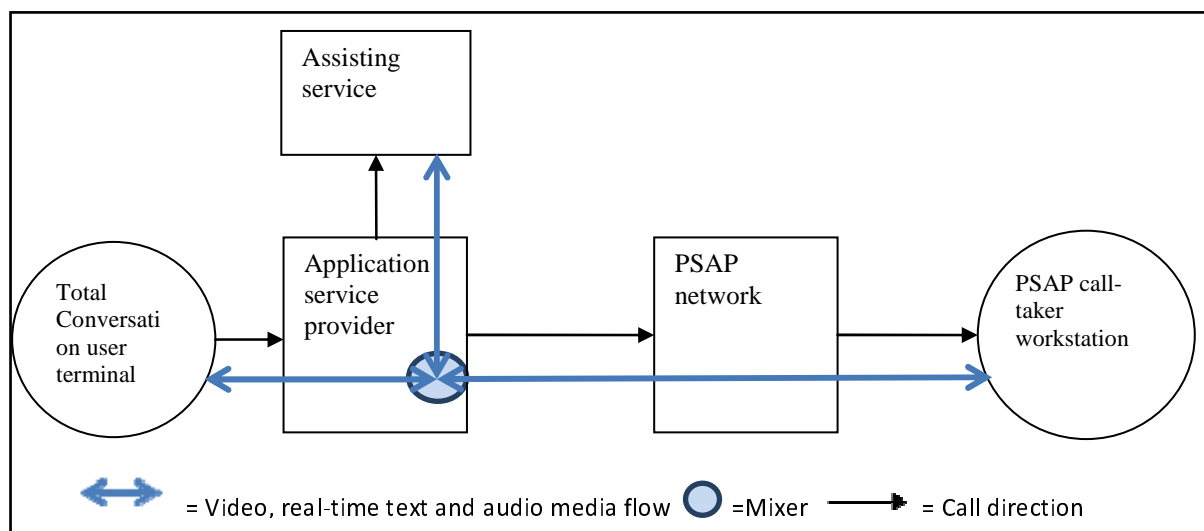Such invocation should be done as a multi-party call.

Figure 3: Assisting service invoked by application service provider

5.6.3.1   Basic SIP support

The invocation shall be made as a result of a service subscription functionality provided to the user by the application service provider about how to handle the user's emergency calls or on an indication per call as described in clause 5.6.2.

When the application service provider has included an assisting service in the call, information about this assisting service shall be included in the call setup information.

    NOTE: When specifications are available.

5.6.3.2   IMS support

This is work in progress in 3GPP. There are currently no completed specifications.

5.6.4   Assisting service invoked by the PSAP call-taker

The PSAP call-taker shall be provided with means to invoke an assisting service during the call. Such invocation should be done as a multi-party call. The use of this type of invocation shall be restricted to cases when it is in accordance with PSAP policy. Automatic means should be used whenever possible.
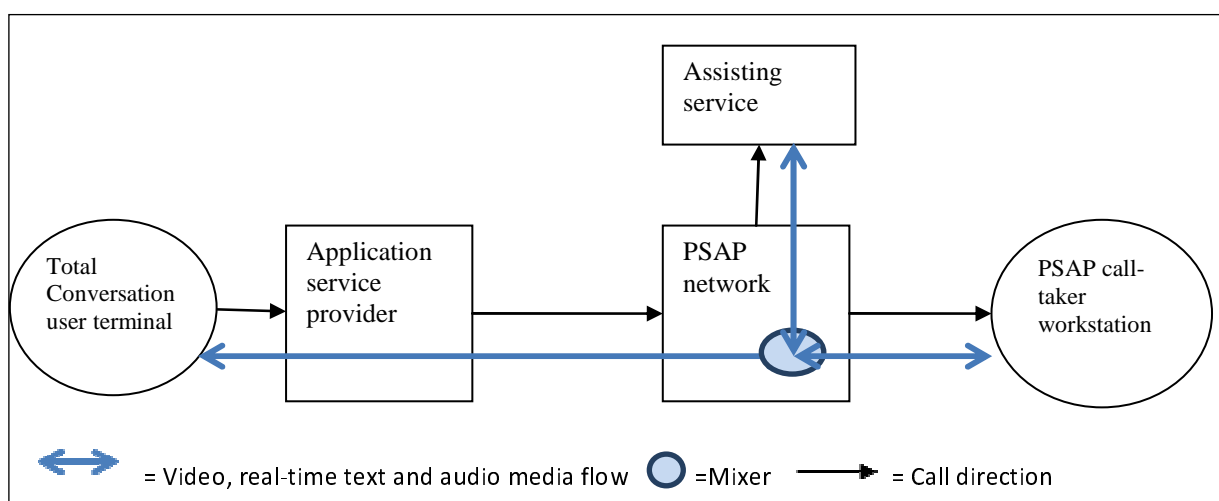

Figure 4: Assisting service invoked by PSAP network

In the call establishment procedure, the possible inclusion of an assisting service should be supported by information on desired and possible modalities of the users, as well as information about already invoked assisting services.

NOTE: The above paragraph cannot be realized until the necessary protocol standards are completed.

5.7   Variation in services provided and media supported

Full Total Conversation support with three media shall be implemented in the PSAP call-taker workstations used for Total Conversation access. User terminals may support subsets of the full media collection when used for emergency calls. Calls shall be accepted by the PSAP call-taker workstation with the full set of media and any subset of media offered or supported by the user terminal.

The normal modes of operation for a Total Conversation enabled PSAP call-taker workstation can vary according to needs in actual situations and established working procedures, for example including the following variants for sign language related emergency calls.

NOTE 1: These are only examples, and reality will imply many more variants.

- Sign language communication is handled between the user and the sign relay service. The sign relay service translates between sign language and voice, so that voice is used between the PSAP and the sign relay service, The PSAP call-taker handles any Real-Time Text conversation. while the PSAP call-taker sees the complete sign language communication as shown in table 1.

Table 1: Example of modality use with user handling sign language and PSAP handling voice and text

Participant	Main modality for expressing information	Main modality for receiving information	Alternate modality for expressing information	Alternate modality for receiving information
User	Sign language	Sign language	Text	Text
PSAP	Voice	Voice	Text	Text
Relay service	Sign language Voice	Sign Language Voice		Text

- The PSAP call-taker only handles voice communication actively for language communication. The communication relies on the relay service to handle sign language and text communication with the user and translating to and from speech. Text and video is also visible to and can be used by the PSAP call-taker and the call-taker can be seen by the user, as shown in table 2.

Table 2: Example of modality use with sign language user and PSAP handling only voice

Participant	Main modality for expressing information	Main modality for receiving information	Alternate modality for expressing information	Alternate modality for receiving information
User	Sign language	Sign language	Text	Text
PSAP	Voice	Voice	Video	Video, text
Relay service	Sign language Voice	Sign Language Voice	Text	Text

- The emergency service has special call-takers, competent in sign and text communication, so no external relay service is used for calls in sign language and in text, as shown in table 3.

Table 3: Example of modality use with sign language user and PSAP handling sign language

Participant	Main modality for expressing information	Main modality for receiving information	Alternate modality for expressing information	Alternate modality for receiving information
User	Sign language	Sign language	Text	Text
PSAP	Sign language	Sign language	Text	Text

NOTE 2: In all cases, the modalities not shown can be used occasionally depending on the situation.

The PSAP call-taker may, as an exception, work in voice only and use assisting services for interpretation of other modalities in the call. This may for example happen in cases of high load if only some of the PSAP workstations are equipped with Total Conversation functionality, while other workstations have support for voice only or another subset of the media of Total Conversation.

5.7.1   Basic SIP support

The principles of RFC 4566 [22] Session Description Protocol and RFC 3264 [17] shall be applied for deciding on media and codecs to include in calls.

It shall be possible to add and delete media in the call by request from either party in the call.

5.7.2   IMS support

The media included in the emergency call may be varied according to the description TS 126 114 [13].

5.8   Addressing emergency services from the user terminal

A consistent address shall be provided for Total Conversation access to Emergency services. Using just the Emergency number (e.g. 112) in the Total Conversation user terminal as the only address shall result in an emergency call. If the user is provided with other methods for entering a destination address and other conditions for the call, e.g. the need to include a relay service, then that form shall also be possible to use with the emergency number as the destination address.

5.8.1   Basic SIP support

The Total Conversation user terminal should insert the service URN urn:service:sos or one of its sub-service URNs. in the Request-URI of the SIP request.

If the Total Conversation user terminal did not insert the service URN as the URI, a SIP proxy of the application service provider shall do this insertion.

5.8.2   IMS support

The procedures described in TS 123 167 [12] for how the emergency services are addressed shall be applied.

5.9   Routing of emergency calls

The general principle for routing of emergency calls is that the emergency call shall be connected to the appropriate PSAP. See TR 102 180 [i.5].

This principle shall also be followed for emergency calls using Total Conversation, taking into account that the appropriate PSAP may be assigned specific interpretation for Total Conversation calls from two aspects:

- One possible implementation is that the call is routed to a PSAP or PSAP workstation with media capabilities corresponding to those offered in the call.

- Another possible implementation is that the call is routed to a PSAP or PSAP workstation operated by staff with specific competence in handling calls with persons with disabilities.

For cases when the language issues do not call for any special routing, the Total Conversation emergency call shall be routed to the appropriate PSAP based on the location of the user and the availability of a PSAP supporting Total Conversation.

Called PSAPs should be prepared to cooperate with PSAPs close to the emergency site in solving the emergency situation. This can be done by having preparation and working procedures for calling these PSAPs and including them in a conference call, and invoking any needed language translation services in the call.

If the modality preferences and capabilities of the user and the PSAP indicate need for relay service support, the same type of relay service that is normally invoked in the calls for a user shall also be invoked in emergency calls.

5.9.1   Basic SIP support

The Total Conversation user terminal shall include the application service provider SIP Proxy in a route parameter.

Either the Total Conversation user terminal or the SIP proxy shall make the LoST lookup described in RFC 6881 [31] to retrieve the PSAP SIP address to insert in the route set.

The routing procedures based on location specified in RFC 6881 [31] shall be applied.

Media capabilities and AdditionalData may influence routing.

5.9.2   IMS support

The procedures described in TS 123 167 [12] for how emergency calls are routed to a PSAP shall be applied.

5.10   Location information provision in emergency calls.

Location information indicating the location of the Total Conversation user shall be provided to the PSAP according to regulatory requirements. The inclusion of relay services in the call shall not modify the location information of the Total Conversation user in the call.

5.10.1   Basic SIP support

The best common practices noted in RFC 6881 [31] shall be followed for handling location information provision in emergency Total Conversation calls.

The preferred option should be that the Total Conversation user terminal acquires the location, and conveys the location information in a way specified in RFC 6442 [29].

5.10.2   IMS support

The procedures described in TS 123 167 [12] for location information retrieval and provision shall be applied.

5.11   PSAP call back

The system shall support a call-back from a PSAP to the same Total Conversion terminal that initiated an emergency call, and should ensure that the same media and same type of relay service as was invoked with the incoming emergency call is invoked by the call-back. The invocation of the relay service shall be made with the same priority for getting the relay operator as in situations when the Total Conversation user initiates the emergency call.

5.11.1   Basic SIP support

In order to support the ability for PSAP callback the SIP Registrar in the application service provider network shall support the mechanism defined in RFC 5627 [25] for a Total Conversation user terminal to obtain a Globally Routable User Agent URI (GRUU).

The calling Total Conversation user terminal shall provide a GRUU address in emergency session requests sent to the PSAP, to be used by the PSAP if it is necessary to call back according to procedures specified in RFC 6881 [31].

NOTE: It is for further study how a Total Conversation user terminal can prevent PSAP impersonation call-backs.

5.11.2   IMS support

The procedures described in TS 123 167 [12] for providing an address suitable for calling back, and for making the call back shall be applied.

> NOTE: There are scenarios when an address suitable for calling back cannot be provided, as well as other scenarios where the call-back may fail.

5.12   Connecting the call with an emergency control centre and other agencies

A PSAP may involve an emergency control centre or another agency to do the required action on the emergency case.

Means shall be provided to transfer the Total Conversation emergency call to another agency, maintaining all media in the Total Conversation call that are supported by the workstation receiving the call after the transfer.

It shall also be possible for the PSAP call-taker originally responding to the emergency call, to stay in the call, with all common media mixed in a multi-party fashion.

Means shall also be provided for the original PSAP to include a suitable available relay service in the call to cover any modality differences between the user and the agency that is about to be brought into the call.

The procedures for connecting the call with the emergency control centre shall be based on using the PSAP bridge and connecting as many media as are supported by the parties in the call. It is beneficial if emergency control centres have full Total Conversation capability.

5.13   Logging in the PSAP

Logging of facts about the Total Conversation emergency calls shall be done. Such logging shall contain information on call back address, media used in the call, and the identity and address of any relay service included in the call.

5.14   Recording in the PSAP

Recording procedures for Total Conversation emergency calls shall record all media used in the call, and enable later retrieval and play-back of the contents of all media. Video shall be recorded without quality degradation.

5.15   Language considerations

Considerations for establishing the language competence needed for efficient emergency call handling is described in TR 102 180 [i.5].

Technical means to arrange for the best combination of PSAP and assisting service for the languages involved in each emergency call should be arranged.

Until such technical systems are in place, the procedures described in clause 5.9 (on routing of emergency calls) apply.

For cases when language mismatches are detected, even with appropriate relay services invoked in the call, the PSAP shall be provided with means to add language translating services to the call by adding call legs to the PSAP bridge. Such call additions should be made with as many media as the assisting service supports.

5.16   Co-operation between emergency handling organizations

In order to be able to involve other organizations in handling the call, the PSAP and such other organizations shall implement interoperable protocols for session control and media handling using basic SIP specified in the present document.

Specifically for Total Conversation applications in basic SIP, there is a need to provide information to emergency handling organizations about the call back SIP address in GRUU form, and information on media, codecs and assisting services involved in the call. Optionally, languages used in the call may be registered in such information exchange.

Other aspects of information exchange are out of scope of the present document.

5.17   Security

Emergency centres shall have means to conduct emergency calls with protection for privacy and against manipulation of call control, media and location information, using commonly used and standardized technologies.

It shall also be possible to conduct calls without these security measures for terminal and service providers that have not yet implemented such measures.

The security and privacy requirements also include any relay service invoked in the calls, where both technical means and contractual obligations are required to fulfil the requirements.

Measures for protection against call control spam misusing the emergency call control system as well as protection against Denial of Service attacks shall be taken by the emergency centres.

5.17.1   Basic SIP support

The emergency call shall follow the security section of RFC 6881 [31]. TLS should be used for securing the session control protocol with the Total Conversation user terminal and external assisting services if possible, and SRTP should be used as specified in RFC 3711 [19] for media encryption. Calls with Total Conversation user terminals unable to apply security measures shall be accepted.

For key management, PSAPs and external services should support both DTLS-SRTP according to RFC 5764 [26] and ZRTP according to RFC 6189 [27]. Total Conversation user terminals may use either of these methods for security.

5.17.2   IMS support

The procedures described in TS 123 167 [12] for security in Multimedia Telephony emergency sessions shall be applied.

5.18   Testing

A method shall be supported by the PSAP for brief automated testing of the communication path of all media supported by Total Conversation. Such testing shall not cause excessive load on the PSAP and network components.

Authorities should establish test procedures verifying the Total Conversation capabilities of the PSAPs by this procedure.

Test calls shall be identified as test calls as specified in RFC 6881 [31] and shall be routed to a non-emergency URN. The ESInet shall divert the test calls to be answered by test response equipment using all media offered in the incoming test call.

Total Conversation user terminals should initiate test calls according to the schedule and mechanism specified in RFC 6881 [31].

Annex A (informative):
Bibliography

- "EENA Transnational Emergency Calls", EENA 2012.

NOTE: http://www.eena.org/ressource/static/files/3-5-4-1_v1-0.pdf

History

Document history		
V1.1.1	November 2013	Publication