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Technical Report

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

ETSI

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Foreword

This Technical Report (TR) has been produced by ETSI Special Committee Emergency Communications (EMTEL).

Introduction

Total conversation is a general multimedia conversational service. Total conversation services and terminals are deployed in the Internet in a number of countries in Europe, and adopted for example by people with disabilities who, for example, need video for sign language or real-time text for a text based conversation or as complement to a voice conversation. The present document describes how Total Conversation can be used for access to emergency services in communication modalities suitable both for the citizens and the call takers.

1 Scope

Total Conversation, as defined in ITU-T Recommendation F.703 [i.3], is a combination of three media in a conversational call: video, real-time text and audio. The present document describes conditions for using Total Conversation for emergency services and makes access of emergency services possible to people with disabilities. The present document addresses the impact on PSAP organisations and potential impact on overall emergency services organisations. It 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 organisations, the call logging and call recording at the PSAP, call-back aspects and specific call routing and location information provision aspects for these calls.

The service described here is one solution for accessible emergency services intended to fulfil requirements in the EU Universal Service Directive. Other solutions may be possible and can be added.

Due consideration is taken of related standardisation (e.g. 3GPP) and work in other bodies (e.g. EGEA).

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.

Not applicable.

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]   EENA NG1-1-2 Long Term Definition.

[i.2]   ITU-T Recommendation F.700: "Multimedia Services Framework".

[i.3]   ITU-T Recommendation F.703: "Multimedia Conversational Services".

[i.4]   ITU-T Recommendation G.114: "End-to-end latency requirements".

[i.5]   ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".

[i.6]   ITU-T Recommendation G.722: "Wide band audio codec".

[i.7]   ITU-T Recommendation H.263: "Low bit-rate video coding".

[i.8]   ITU-T Recommendation H.264: "Advanced video coding".

[i.9]   ITU-T H-series Supplement 1: "Quality of low-bitrate video for sign language and lip-reading application".

[i.10]   ITU-T Recommendation T.140: "Text Conversation".

[i.11]   ETSI TS 122 101: "Universal Mobile Telecommunications System (UMTS); LTE; Service aspects; Service principles (3GPP TS 22.101)".

[i.12]   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)".

[i.13]   ETSI TS 123 167:"Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) emergency sessions (3GPP TS 23.167)".

[i.14]   ETSI TS 126 114: "Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS); Multimedia telephony; Media handling and interaction (3GPP TS 26.114)".

[i.15]   ETSI EG 202 320: "Human Factors (HF); Duplex Universal Speech and Text (DUST) communications".

[i.16]   ETSI ES 202 975: "Human Factors (HF); Harmonized relay services".

[i.17]   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.18]   IETF RFC 3261: "Session Initiation Protocol".

[i.19]   IETF RFC 3264: "Offer/Answer model".

[i.20]   IETF RFC 3551: "RTP Profile for Audio and Video Conferences with Minimal Control".

[i.21]   IETF RFC 3711: "Secure Real Time Protocol".

[i.22]   IETF RFC 3840: "Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)".

[i.23]   IETF RFC 3841: "Caller Preferences for the Session Initiation Protocol (SIP)".

[i.24]   IETF RFC 3984: "RTP Payload for H.264 video".

[i.25]   IETF RFC 4103: "RTP Payload for text conversation".

[i.26]   IETF RFC 4566: "Session Description Protocol, SDP".

[i.27]   IETF RFC 4629: "RTP Payload for H.263 video".

[i.28]   IETF RFC 5012: "Requirements for Emergency Context Resolution with Internet Technologies".

[i.29]   IETF RFC 5194: "Framework for Real-Time Text over IP using the Session Initiation Protocol (SIP)".

[i.30]   IETF RFC 5222: "LOST: A Location to Service Translation protocol".

[i.31]   IETF RFC 5329: "Conference model".

[i.32]   IETF RFC 5646: "Tags for Identifying Languages".

[i.33]   IETF RFC 5764: "Datagram Transport Layer Security, DTLS".

[i.34]   IETF RFC 6189: "ZRTP. Media Path Key Agreement for Secure RTP".

[i.35]   IETF RFC 6442: "Location Conveyance in SIP".

[i.36]   IETF RFC 6443: "Framework for Multimedia Emergency Calling Using Internet".

[i.37]   IETF RFC 6497: "Extension T - Transformed Content".

[i.38]   IETF draft-ietf-ecrit-phonebcp: "Best Current Practice for Communications Services in support of Emergency Calling" (approved IETF draft).

[i.39] CAP 1.2 Common Alerting Protocol, OASIS.

NOTE: Available at http://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.html.

[i.40] Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services (Framework Directive).

[i.41] Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive).

[i.42] Directive 2009/136/EC amending Directive 2002/22/EC (Universal Service Directive).

[i.43] UN Convention on the Rights of Persons with Disabilities.

[i.44] EENA Transnational Emergency Calls, EENA 2012.

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

[i.45] NENA i3 Detailed Technical Specification.

[i.46] REACH112 European project 238940 in the European Commission PSP programme 2009-2012.

NOTE: Available at http://www.reach112.eu.

3 Definitions and abbreviations

3.1 Definitions

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

application service provider: organization or entity that 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.

Emergency Services IP network (ESInet): 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 NENA i3 [i.45])

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

modalities of communication: methods for human expression and perception of communication

NOTE: Examples are written, signed and spoken languages.

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

native SIP: session control environment for calls, using the RFC 3261 [i.18] Session Initiation Protocol and related protocols directly in the Internet

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

real-time text: text transmitted instantly while it is being typed or created so that the recipient can immediately read the sender's text as it is written, without waiting

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

> NOTE: A type of assisting service (definition from ES 202 975 [i.16]).

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 ITU-T Recommendation F.703 [i.3].

total conversation service provider: application service provider providing total conversation services to its users

total conversation emergency service: emergency service capable of handling total conversation emergency calls

> NOTE: This may contain additional information.

user: individual taking advantage of the total conversation service

3.2   Abbreviations

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

CAP	Common Alerting Protocol
CIF	Common Interchange Format
EC	European Commission
EENA	European Emergency Number Association
EGEA	Expert Group on Emergency Access
ESInet	Emergency Services IP Network
ESRP	Emergency Service Routing Proxy
GRUU	Globally Routable User Agent URI
GTT	Global Text Telephony
IMS	IP Multimedia Subsystem
IP	Internet Protocols
LOST	Location to Service Translation protocol
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
QCIF	Quarter CIF
RTP	Real Time Protocol
SIP	Session Initiation Protocol
SRTP	Secure Real Time Protocol
TLS	Transport Layer Security
UN	United Nations
URI	Universal Resource Identifier
ZRTP	Media Path Key Agreement for Secure RTP

4   Background

The Total Conversation service is defined in ITU-T Recommendation F.703 Multimedia Conversational Service Description [i.3]. It is used for user-to-user communication in a variation of media and modalities of communication. The present document describes background and conditions to enable Total Conversation to be used for emergency service access.

The use of Total Conversation for emergency service access is successfully trialled in the European project REACH112 during 2009-2012 [i.46], and its basic features are included in the international standards RFC 6443 [i.36] from IETF, EENA NG1-1-2 Long Term Definition [i.1] for emergency service access.

5   Total Conversation Functionality for Emergency Services

5.1   Basic functionality

The basic functionality of the Total Conversation emergency service is to provide its user with a way to make emergency calls and receive a callback from the PSAP with Total Conversation and communicate in a conversational way using combinations of video, real-time text and audio. Each media type is conveyed in real-time bidirectional manner between the participants in the call.

It should be possible for the user to make the call in a similar way as for a voice telephone call. A number or address of the emergency service is used and a calling action is initiated by the user. The emergency service is alerted, and when the call is answered, the common media supported by the terminals are connected for a bi-directional real-time conversation exchange.

The usage of the media is at the discretion of the participants. The following types of usage are possible examples. It is possible to use different media concurrently.

5.1.1   Video

The following usage of video are examples of useful cases in an emergency call:

- When video is provided, it is usually with a view of the communicating person and supporting the following usage:

  - For sign language communication with deaf persons.

  - For supporting speech with an opportunity to lip-read.

  - For the PSAP to assess the communication situation.

  - For conveying mimics, feelings, gestures and body language.

  - For providing instruction on how to handle an emergency situation.

- It should also be possible to provide video with a view of the scene of an emergency for the following usage:

  - Assessment of the emergency case.

  - Simple visual medical analysis.

For the cases of personal communication, it is essential that the user can see the display of the remote participant and, at the same time, for the remote participant to be able to see the user. This means that for an all-in-one handheld terminal design, the camera and the display need to be on the same side of the terminal.

For the cases when the user needs to show the view of the emergency situation to the remote participant, it is essential that the camera can be pointed to the item that is to be shown. However, if the user relies on seeing the display in order to communicate with the remote participant, it is preferable if the camera is free to move relative to the display, or to have an additional camera pointing in the opposite direction from the display. This means that for an all-in-one handheld terminal design, it is convenient but not essential to have an additional camera placed on the opposite side of the terminal from the display.

The quality of video should be suitable for use for sign language and lip reading. This is specified in ITU-T Series H, Supplement 1 [i.9].

A coarse summary of the information in that document is that the very minimum quality for any usability at all is 12 frames per second, QCIF resolution (176×144 pixels) and 800 ms latency. Good usability is achieved with 20 frames per second, CIF resolution (352×288 pixels) and 400 ms latency.

The trend towards high resolution video communication in the beginning of the 21st century has been working against the need for sharp reproduction of moving objects. Many video cameras built into consumer products for communication have long exposure times resulting in unusable blurry images of sign language when used in low light conditions. For successful Total Conversation emergency calls, this trend needs to be reversed so that sharp images of moving objects are produced.

It is essential that for personal communication in video, the camera takes sufficiently short exposures of the communicating users to deliver sufficiently sharp images during the movements prevailing in personal communication by sign language and lip reading in the lighting situation at the place of emergency.

The maximum exposure time can be deduced from the figure for good sign language communication according to ITU-T H-series Supplement 1 [i.8].
That figure is 20 frames per second. In order to give room for the standard picture frequency 25 per second, the exposure time per image should not be over 1 000/25 = 40 ms. This means that the camera should use an exposure time of 40 ms or shorter, at a lighting of 20 lux for the user side, corresponding to low light conditions indoors.

5.1.2   Real-time text

Real-time text is a way to exchange text rapidly between two users. This is in contrast to text messaging where the sending user builds up a complete message and requests sending of the message by a specific action, while the receiving user is waiting with no opportunity to see the composing of the message until it is completed and sent. Real-time text is provided in the emergency call for example for the following purposes:

- For short items that need to be remembered or where the exact spelling is needed during a call mainly held in video or audio. Typical examples are addresses, names and numbers.

- For the dominating part of the dialogue in a call with persons who are hard-of-hearing, speech-impaired, deaf-blind or deaf.

- For occasional words that were not understood through audio or video, because the receiving user is hard-of-hearing, deaf or deaf-blind, or the transmitting user has a speech disability. The real-time text part of the call should be provided in a way that makes it convenient to switch to real-time text occasionally when needed while relying as much as possible on the more rapid speech or sign communication.

- For communication in one direction with persons who prefer to speak, but need text communication for reception.

- For communication in one direction with persons who prefer to hear, but need text communication for transmission.

- For providing a nearly simultaneous text captioning of voice communication to support understanding of a voice call by deaf and hard-of-hearing persons.

Real-time text communication should be provided according to the quality criteria for good text conversation communication in ITU-T Recommendations F.700 [i.2] and F.703 [i.3]. Good usability is achieved with transmission within one second after entry of each character, support for the national character set in use and no more than 0,2 % characters lost because of communication errors.

5.1.3   Audio

Audio is well known from voice telephony, and is used for the following purposes in Total Conversation emergency calls:

- For bidirectional speech.

- For speech communication one way, and use of another medium the other way.

- For speech combined with video for hard-of-hearing persons in need of lip-reading.

- For speech combined with real-time text for hard-of-hearing and speech-impaired users, for occasional use of real-time text in a voice call.

- For conveying sounds from the user site.

- For conveying conversation turn-taking and acknowledgement expressions in voice during the conversation, when intonation from the talking party and short utterings from the other party are used to indicate when it is time for the other party to talk, and whether the listening party agrees, understands or not.

Wide band audio is valuable for clear audio perception because it improves the opportunity to understand speech for many persons with hearing impairments.

Other common audio codecs may be important to support in order to maximise the opportunities for interoperability in audio between a wide range of user terminals and the PSAP.

PSAPs should support both wideband and other codecs, while user terminals may support only one.

It should be possible to meet the requirements in ITU-T Recommendations F.700 [i.2] and F.703 [i.3] for audio, and ITU-T Recommendation G.114 [i.4] for audio latency.

The maximum latency for good audio experience is 400 ms.

5.2   Supplementary and Assisting Services

It should be possible for the PSAP and the Application Service Provider to invoke supplementary and Assisting Services either from the beginning or during a Total Conversation call for emergency service purposes and in call-back from the PSAP. The following services for emergency calls should be available:

- **Relay service**
  Relay services are Assisting Services that provides translation between different modalities of communication, as described in ES 202 975 [i.16]. For emergency calls made by people with communications related disabilities, it is often necessary to include a relay service in the call to ensure that the user and PSAP understand each other correctly.

  The parties in an emergency call with relay service assistance should use as many of the media defined for Total Conversation as possible. The availability of specific types of relay services is often dependent on national policy.

  Legacy relay services are typically invoked in a call in a three-step fashion. The user calls the relay service, and explains to the relay service operator where the call should be connected. Then the relay service operator connects the user to that destination and translates between the modalities used by the parties in the call. In this case, the initial call to the relay service has no indication that it is an emergency call. As a result, the user terminal cannot detect that it is an emergency call, so location information will not be provided and routing to the PSAP will not be performed correctly. This method of invocation also does not allow use of native device electronic directories for reaching the destination,. This way of invoking a relay service is not suitable for an emergency call. An alternative method is needed in order to ensure that the required characteristics of an emergency call is achieved, such as location information provision, routing to the most appropriate PSAP, priority for getting an interpreter assigned, security and other features described in this clause.

Multi-party multi-media call

It should be possible to establish and perform multi-party Total Conversation emergency calls, where all the enabled media in the call are shared between the users. However, the invocation of a multi-party emergency call may be limited to the PSAP, the Application Service provider and relay services. This is because the current versions of standards for emergency services in some common session control environments do not acknowledge requests for multi-party calls by the calling user.

A scenario when this function would be of value to request from a user is the following: A user or an interpreter agency may have established a habit to use a public three-party conference call service for getting sign language interpretation in calls between the signing deaf users and talking hearing users. This supplementary service may be seen as a method to invoke relay services in the call. In case of emergency, three-party calls cannot be established by the user because three-party calling for emergency calls is not supported as specified in RFC 6443 chapter 13, disabling of features [i.36] and in TS 122 173 [i.12], clause 8.2.13.1. The user is left without a possibility to get the call translated the usual way. The invocation may need to be handled by the PSAP instead, or done in another way where the blocking of this service is not in effect.

Another situation when a multi-party call establishment is desirable and can be done during a Total Conversation emergency service call is when the PSAP invokes some expert advice in a multi-party fashion, to see the emergency case by video and give advice by voice.

Yet another situation when a multi-party call would be essential for successful handling of an emergency call, is when the user feels unsure about some detail of importance during the emergency dialogue, and wants to extend the initially direct call to emergency service by linking in a friend or family member to support the resolution of the issues. This would best be done by extending the call to a multimedia multi-party call initiated by the user. Such functions are not possible as long as the blocking of multi-party calls in emergency service calls mentioned above is in effect. The extension of the call may instead be set up by the PSAP on request by the user, and that request may be a challenge to convey for persons with communication related disabilities.

- **Transfer, and forwarding supplementary services**
  Transfer, and forwarding supplementary services should be available for Total Conversation emergency calls operating on all media supported in the call when invoked by the PSAP or a Relay Service. However, these supplementary services are not supported for user invocation in emergency calls in some common session control environments. It is therefore important to design services for Total Conversation users so that they are not depending on their invocation of these services during emergency calls.

  This is a scenario when the restriction may cause problems for a calling user: A hard-of-hearing person makes an emergency call with a mobile Total Conversation terminal. The call is mainly text based, even if it is very useful to have video for showing the situation. But typing is slow on this small terminal, so the user wants to transfer the call to the stationary terminal at home that has a more convenient keyboard and a larger display for text. The user is used to do such transfers in everyday calls. But now, when the user tries to transfer the call, nothing happens. The call continues on the limited terminal in a time consuming, stressful way, or they need to hang up and the user call again from the better suited terminal.

5.3   Initiating the emergency call

A Total Conversation user should be provided with an opportunity to call emergency services using a call address that contains the Regional Emergency Number. In Europe this number is 112. The call results in connection and conversation through an emergency call-taker terminal capable of handling the communication with the Total Conversation user in the media supported by the user terminal. When so needed, a relay service is invoked in the call in order to facilitate the communication.

If so decided nationally, the same Total Conversation emergency service as when using the regional emergency number should be provided when a national emergency number is included in the called address.

The following three call scenarios are examples of what should be supported.

5.3.1   Call without Assisting Service

When the user and the PSAP have suitable communication modalities in common, the call can go straight between the user and the PSAP without invoking any Assisting Service. This may be the case if the user prefers text communication, or if the PSAP personnel have competence in the communication modality the user needs to use.
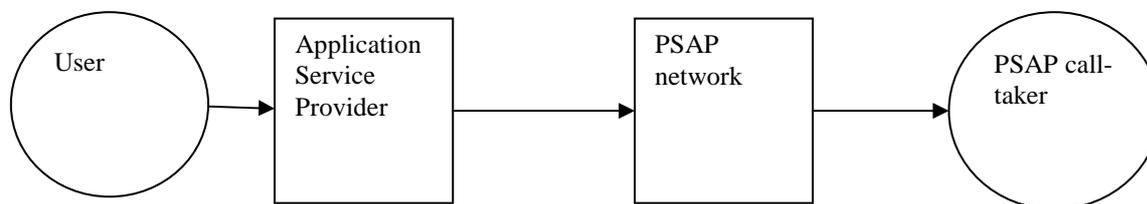
NOTE: The PSAP is able to handle the communication modalities.

Figure 1: No external assistance invocation

5.3.2   Assisting Service invoked by the Application Service Provider

When the Application Service Provider detects that an assisting service is required in the call to cover a discrepancy in media or modality capabilities between the user and the PSAP call-taker, then an Assisting Services included in the call in a three-party call fashion.
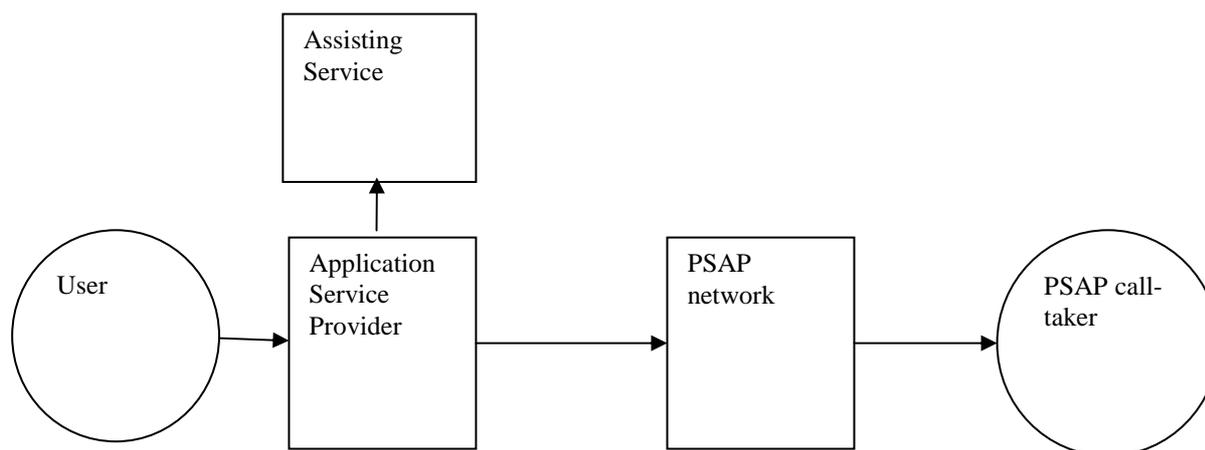
Figure 2: Assisting Service invoked by Application Service Provider

It should be possible to include relay services available to the Total Conversation user in emergency calls. Clause 5.5 about addressing provides an overview of ways to include relay services.

The relay services are best invoked as the third party in a three-party call between the user, the emergency service and the relay service.

The communication authorities and Total Conversation service providers may decide what types of relay services will be available to the users.

Foreseen possible relay services for Total Conversation users include:

- Sign relay service.

- Text relay service.

- Text-and-sign relay service.

- Captioned telephony relay service.

- Speech relay service.

- Lip-speaking relay service.

See ES 202 975 [i.16] for explanations of the types of relay services.

If a relay service is handling regular user-to-user calls as well as emergency calls, the emergency calls should be given priority in the queues for getting a relay service operator assigned. By this arrangement, efficient staff assignment can be maintained, while the delay before call handling begins can be minimized.

It should be possible to call the emergency service and the relay service simultaneously and accept the risk that the call is connected with the PSAP call-taker but there is a delay in getting a relay agent assigned. Usually, the user and the call-taker can at least exchange some text until the relay service enters the call.

When connected, the relay service should be provided with means to control the connection of the audio channel from the user, because strong sound from the user site can disturb voice communication between the relay service and the emergency service.

Also the emergency service may need to control the audio channel mixer for enabling and disabling audio from the user. This may be achieved by request from the emergency service operator to the relay service operator.

Information about the identity of the invoked relay service should be provided to the PSAP, conveyed with the call setup information. This identity should indicate 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.

5.3.3 Assisting Service invoked by the PSAP call-taker

If the PSAP call-taker detects that an Assisting Service is needed during the call, then the call taker can invoke such service through a bridge in the emergency service IP network.

This should be used as the last resort. It can cause severe risks, delays and stress for the user to have an emergency call going initially without appropriate communication facilities. Automatic means to connect required Assisting Service should be used whenever possible.
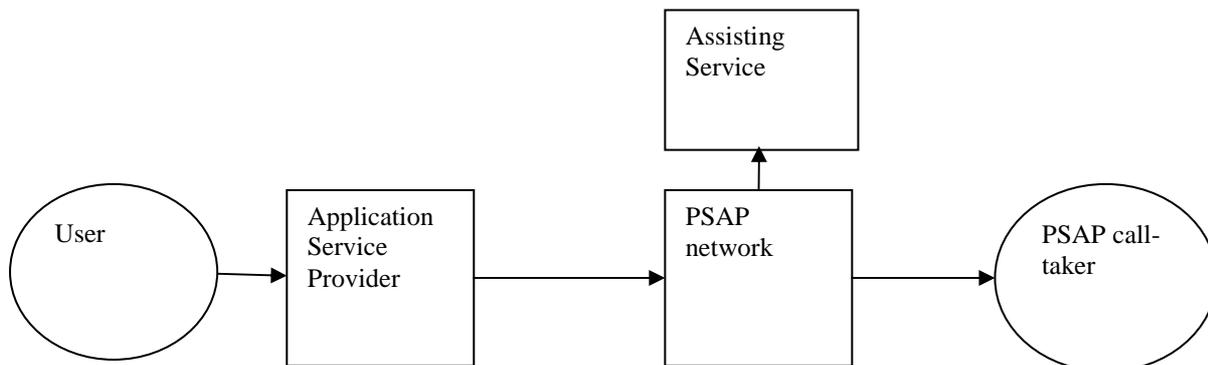
Figure 3: Assisting Service invoked by PSAP network

If the emergency call-taker realizes that a relay service would be valuable in the call, but none is already connected, the emergency call-taker should have an opportunity to invoke a relay service for Total Conversation users, in the on-going call.

The connection of the relay service should be done by establishing a three-party call between the emergency service, the relay service and the user.

When connected, the relay service should be provided with means to control the connection of the audio channel from the user, because strong sound from the user site can disturb voice communication between the relay service and the emergency service.

Also the emergency service may need to control the audio channel mixer for enabling and disabling audio from the user. This may be achieved by request from the emergency service operator to the relay service operator.

5.4 Variation in services provided and media supported

The most efficient emergency communication is achieved when the user terminal and the emergency service both support the full set of the three media in a call; Video, Real-Time Text and Audio, and also appropriate relay services is invoked. However, communication should be possible with user terminals are supporting only subsets of the full media collection.

The following subsets may be used:

- Real-time text and audio.

- Real-time text.

- Video and audio.

There may be variations in support of communication in the different media in the PSAP. The administration should set up call handling so that the calls are properly handled, but may provide the support in any combination of the following ways:

- The emergency call-taker handles real-time text conversation, but sign language communication is handled through sign relay services, while the call-taker and the user see the complete communication.

- The emergency call-taker only handles voice communication, while seeing both video and text, but rely on relay services to handle the text and video communication with the user.

- 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.

5.5 Addressing emergency services from the user terminal

The intended implementation environment for the Total Conversation service is in IP networks, where both phone numbers and alphanumeric addresses are used interchangeably.

The Total Conversation service provider should provide consistent, easily imagined ways to enter the address to call for emergency service. It should be possible to use the Emergency number (e.g. 112) as the only address or an explicit part of the address in a form that is clear to the user.

This clause is consciously formulated to give more freedom than just requiring that calling the number leads to making an emergency call.

This is intended to enable service providers to establish ways for the users to indicate both the destination number (e.g. 112) and a desired relay service to be included in the call.

Acceptable ways to address emergency services by the user on Total Conversation terminals include:

- The number (e.g. "112") used for calling directly to the emergency service capable of providing all of the Total Conversation media.

- The number (e.g. "112"), used for calling the emergency service and simultaneously invoking a relay service in cases when the Total Conversation service provider has made it possible for users to register need for a specific type of relay service during the emergency call, and the user has registered such a need.

- An address of type emergencynumber@signrelay.net for calling the emergency service and explicitly require a specific relay service. (e.g. with 112, it would be 112@signrelay.net).

- The number (e.g."112") and selecting one call option of two possible for initiating the call; one for a direct call without relay service support, another for inclusion of the favourite type of relay that the user has registered for.

Note that this clause is about the user interface side of emergency calling. The communication protocol side is specified in the technical specification related to the originating network.

5.6   Routing of emergency calls

The general principle for routing of emergency calls stated in TR 102 180 [i.17] is that the emergency call is connected to "the most appropriate PSAP".

This principle is valid also for emergency calls using Total Conversation from persons with disabilities as well as from anyone, but the meaning of the "most appropriate PSAP" may sometimes be another PSAP than the one that would have been involved if the call was a plain voice call from an inhabitant in the country of the emergency situation.

The first level of routing of the call will be to an Emergency Service IP Network that routes the calls to PSAPs according to location of the call and other pieces of information such as language preferences or media capabilities.

5.6.1   Meaning of "the most appropriate PSAP"

The "most appropriate PSAP" may in many cases in calls involving persons with disabilities and relay services mean PSAP in the home country of the user, even if the call is placed in another country, because in this way the language competence required from both the PSAP and the relay service may best match the language competence of the user, and that is a very critical requirement for successful emergency resolution.

Media capabilities matching between the user terminal and the PSAP call taker terminals may influence the assignment of the most appropriate PSAP, and the routing of the call to that PSAP.

The required agreements and procedures for cooperation between the PSAP with the appropriate language competence and the PSAP most suited to solve the practical sides of the emergency may not be in place.

Procedures for establishment of such cooperation between PSAPs are in establishment through EENA. The currently specified procedures are published in EENA Transnational Emergency Calls [i.44].

Means to arrange routing to the most appropriate PSAP should be provided.

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

The call should be routed by an action of the Total Conversation service provider to find the address of the PSAP in a standardised address conversion system, where the PSAPs have registered their address and areas of responsibility.

Called PSAPs should be prepared to cooperate with PSAPs close to the emergency site in solving the emergency situation.

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

The required modality may be different in the different communication directions. Typical examples are:

- Communication with deaf-blind users, who may feel most confident to express themselves in sign language in the video channel, but need to have real-time text in return, for example read out on an electromagnetically Braille display.

- Communication with persons with hearing impairments, who prefer to talk, but need a combination of speech and rapidly created real-time text corresponding to the speech as the response.

5.7   Location information provision in emergency calls

Location information indicating the location of the Total Conversation service user is provided in the same way as for voice emergency calls, using the same call control protocol environment.

The inclusion of relay services in the call should not interfere with provision of location information.

PSAP systems need to be capable of showing and using the location provided with the Total Conversation emergency call in the same ways as it is done with voice emergency calls.

The precision in the location information should be included.

5.8   Calling back

An address suitable for calling back to the user from the PSAP is needed with the emergency call. This address corresponds to what the directives and legacy standards call "Calling Line Identification". The Total Conversation service provider should ensure that calling back on this address results in invoking the same type of relay service as was invoked with the incoming emergency call and should result in reaching the user at the terminal used to make the original emergency call.

5.9   Connecting the call with an Emergency Control Centre and other agencies

In many cases, an emergency call results in the PSAP calling an Emergency Control Centre or another agency to do the required action on the emergency case. The call with the user is then either transferred to this new party in the call, or included in a three-party call fashion.

It is desirable for achieving most benefits of the Total Conversation emergency services that Emergency Control Centre and other agencies are equipped with Total Conversation call capabilities. However, it is allowable that such call parties have only voice capabilities.

A strategy should be defined for the PSAP for how to handle the situation when a party with limited media capabilities is connected to the call.

One option is that the PSAP stays connected to the call, and assists in any need to explain items expressed in a medium that is not accessible to all.

Another option is to make sure that a suitable relay service is invoked in the call, so that any need for mode translation can be handled by that service. In this case, the PSAP may decide to leave the call if PSAP participation is no longer needed.

For cooperation between units handling the Total Conversation emergency call, it is also essential that sufficient information about the call case is conveyed among the cooperating organizations. Specifying standards for such information exchange is a general need beyond the scope of the present document. The needs from the Total Conversation point of view on such information exchange systems is that information about at least the following should be conveyed:

- the media used in the original call;

- information on any additional service invoked;

- the address in a suitable form for calling back to the user.

5.10   Logging in the PSAP

Normally it is part of the procedure in the PSAP to log facts about the emergency calls. For Total Conversation calls, such logging should be in addition to all data normally collected with a call, also contain information on media used in the call, and the identity and address of any relay service included in the call.

5.11   Recording in the PSAP

Normally it is part of the procedure in the PSAP to record the media contents of the call for later retrieval. In case of Total Conversation service calls, such procedures should record all media used in the call, and enable later retrieval and play-back of the contents.

5.12 Language considerations

The problem of establishing the language competence needed for an efficient emergency call handling is mentioned in TR 102 180 [i.17]. This problem gets two extra dimensions in the Total Conversation case in calls with persons with disabilities.

One is that it may be less common that people with speech or hearing disabilities are able to understand or speak the language of a visited country. The other is that in case of need to invoke a relay service, the existing relay services have limited language capabilities, and can usually only handle the language of the home country of the user, with some few additions.

This is especially true for sign languages, where the interpreters in the sign relay services commonly only have competence for communication in one national sign language.

This fact makes it common that emergency calls via Total Conversation services with disabled users need to be routed to a PSAP in the home country of the user, and in case of invoking a relay service, invoke a relay service in the home country. The PSAP in the home country of the user need then contact a PSAP close to the emergency and convey the conversation.

It may be possible to arrange technical means to resolve the best combination of PSAP and relay service for the languages involved in each emergency call. The aspect of Total Conversation and relay service competence should be brought into any effort to resolve the overall problem of language handling in European Emergency calls.

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

5.13 Security

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

However, during migration to a situation when all terminals and originating networks have implemented the emergency service standards, it needs also to be possible to conduct calls without these security measures for terminals and service providers that have not yet implemented such measures.

Measures for protection against call control spam and Denial of Service attacks should be taken by the emergency centres.

5.14 Testing

A method should be supported by the PSAP for brief automated testing of the communication path. Such testing should not cause overwhelming load on the PSAP and network components.

6. Total Conversation Environments

This clause specifies Total Conversation access to emergency services for two existing standardised IP network session control environments: native SIP and IP Multimedia Subsystem (IMS).

Any other emerging session control environment for Total Conversation may be added for a region, provided that a specification is agreed for the items in the following clauses, and a decision made on whether the protocol will be converted by the Application Service Provider to an already supported protocol, or the Emergency Service IP Networks (ESInets) and PSAPs in the region be updated to support the new protocol.

6.1 Internet access using native Session Initiation Protocol (SIP)

One implementation environment for Total Conversation is based on Internet communication using the RFC 3261 [i.18] (without IMS). Total Conversation can be viewed as an extension of the most common system for voice over IP (VoIP). This environment is called "native SIP" here.

The specifics for Total Conversation in native SIP is specified in RFC 5194 [i.29], and also in EG 202 320 [i.15]. 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 support a Total Conversation service.

The requirements for emergency services in this environment are described in RFC 5012 [i.28].

The specific mechanisms for emergency call handling in native SIP are specified in RFC 6443 [i.36] and in EENA NG1-1-2 Long Term Definition [i.1].

According to RFC 6443 [i.36], either the user terminal or a SIP proxy retrieves an address to send the call to from a LOST server according to the LOST protocol, specified in RFC 5222 [i.30]. The calls are routed to a PSAP according to principles depending on the location of the caller and the capability required by the user terminal and the PSAP in a policy based routing action, so that they are routed to the most appropriate PSAP to handle the emergency situation. The policy based routing can take both location, media and language requirements in consideration and route the call to a PSAP terminal with suitable capabilities and responsibility.

PSAPs implementing Total Conversation access need to be able to handle emergency calls using these routing and interface protocols.

Total conversation access to emergency services using native SIP is further specified in clause 7.

6.2 IP Multimedia Subsystem (IMS) access

One implementation environment for Total Conversation is based on the IP Multimedia Subsystem(IMS) specified by 3GPP.

Total Conversation is a service that lies within the scope to be provided by the IMS Multimedia Telephony service described in TS 122 173 [i.12], by including all three media described in TS 126 114 [i.14].

These specifications have essentially the same call control protocol and media considerations as native SIP described in clause 6.1.

In 3GPP Release 11, the specifications were updated to allow emergency calls to support other media in addition to voice, which includes video, real-time text, text messaging etc, effectively supporting the basic requirements for Total Conversation calls.

The emergency calls initiated from users in IMS, are expected to be routed to an ESInet, according to the principles in the clause on Internet access above.

Total Conversation access using IMS is further specified in clause 8.

6.3 Access through other IP based protocols

Total Conversation can be implemented with protocols other than what is specified in the clauses above. Service providers using such protocols for their users could then convert the calls to use either of the SIP-based protocols described in clauses 6.1 and 6.2 for communication with emergency services, or add standardised protocols to the emergency service interface.

6.4 Access through legacy (Circuit switched) networks

A legacy form of Real-time text exists in some countries, called Text Telephony, enabling limited interworking with Real-time text. In some cases, circuit switched voice may also be supported with Text Telephony, however it may not be possible to have concurrent voice and text sessions.

It is possible to arrange for emergency service access for Text Telephony into the IP based emergency service access interfaces for Total Conversation by means of gateways with suitable capabilities, between PSTN and IP networks.

If such access is arranged, the functional limitations of the PSTN text telephony protocols should be taken into consideration. Many of these legacy protocols can only handle one transmission direction for text at a time, and voice communication is only possible while text is not transmitted. The gateways should cater for adaptation to these limitations, because it is not feasible to expect that the emergency call-takers will be able to keep such limitations in mind when communicating in the emergency cases.

7   Total conversation access using native SIP

This clause specifies factors of Total Conversation access to emergency services that are access network and session control protocol specific, and valid for use of native SIP as the session control protocol environment.

7.1   Protocols for the basic functionality

The protocols and procedures used in the interface between the access network and the Emergency Service IP network (ESInet) are specified in RFC 6443 [i.36].

A description more from the user terminal side is found in IETF "Best Current Practice for Communications Services in support of Emergency Calling" (approved IETF draft) [i.38].

7.1.1   Video

Two way video support in calls is needed by the PSAP and the ESInet.

Both the following codecs should be supported by PSAPs in order to maximise the opportunities for a successful video connection. At least one of them would be supported by the user terminals:

- ITU-T Recommendation H.264 coding [i.8], transported as specified in RFC 3984 [i.24].

- ITU-T Recommendation H.263 coding [i.7], transported as specified in RFC 4629 [i.27].

7.1.2   Real-time text

Two-way simultaneous real-time text needs to be supported by PSAPs and Total Conversation terminals. One standard exists for this medium.

ITU-T Recommendation T.140 [i.10] is the specification to be supported for coding and presentation, and the text is transported as specified in RFC 4103 [i.25].

7.1.3   Audio

Bidirectional audio needs to be supported by PSAPs and should be supported by user terminals.

Both the following codecs should be supported by PSAPs, and at least one of them should be supported by terminals. The wide band codec should be preferred when needed for improved perception by users with hearing-impairments:

- ITU-T Recommendation G.722 [i.6] wide band coding, transported as specified in RFC 3551 [i.20].

- ITU-T Recommendation G.711 [i.5] audio coding, transported as specified in RFC 3551 [i.20].

7.2   Supplementary and additional services

7.2.1   Relay service invocation

The Application Service Provider is best positioned to provide a possibility to invoke a relay service in the call, when a user profile or user request indicates that a relay service is desired. The procedures for relay service invocation should allow a call setup to be provided to both the emergency service and the relay service simultaneously. In this way the time lost waiting for a response from the relay service and the PSAP is minimized.

This implies that for calls possibly requiring relay service invocation, the terminal needs to include a SIP proxy in the route that can make the decision to invoke the relay service.

The procedures for invoking relay services should use SIP in a simple straightforward manner. It is recommended to let the call be handled by a three-party bridge, automatically calling the right PSAP and the right relay service and do the suitable media mixing.

7.2.2   Multi-party multimedia call

The PSAP needs to have access to a Total Conversation conference bridge, independent of the Application Service Provider three-party bridge, capable of extending the participants in the call on request from the PSAP. The primary method is to let the call with the user be established with the bridge and other call legs created as needed without modifying the original call.

This bridge should support RFC 5239 [i.31] Conference model, but would also need to be able to let conference-unaware terminals participate.

7.2.3   Non-blocking of forward and transfer supplementary services

The supplementary services for forward and transfer are important for the performance of Total Conversation emergency calls.

Because of the possible need to invoke relay services by procedures based on these supplementary services, clause 9 requesting to block user initiation of such services expressed in RFC 6443 [i.36] can be overcome in Total Conversation services by having actions initiated by the PSAP and/or the Application Service Provider. Blocking these services may cause a risk for Total Conversation access to emergency services. User terminals may rely on methods to request such actions from the Application Service Provider.

7.3   Initiating the emergency call

The procedures for placing an emergency call specified in RFC 6443 [i.36] are suitable to be followed by user terminals, access networks and PSAPs. Different options exist, with the preferred option that the user terminal recognizes the emergency call string and then makes the steps required regarding the SIP URI and the Route according to RFC 6443 [i.36]. In the case that the Application service provider SIP proxy is to get a possibility to decide to invoke a relay service, a route parameter pointing at the Application Service Provider proxy should to be inserted before the emergency service address.

7.3.1   User initiated invocation of relay services in emergency calls

It should be possible for users to request relay services to be invoked in a call on a per call basis.

The primary way to do this is to issue a SIP session establishment request with both the emergency dial string and the SIP URI of the relay service in a conference URI list. The Application service provider should do the invocation based on such request.

The call should be conveyed to the PSAP with an indication in the supplemental data header, indicating what service was invoked.

7.3.2 Application service provider initiated invocation of relay services in emergency calls

The Application Service Provider should implement procedures for invoking relay services in emergency calls. These procedures should be possible to invoke by a general agreement between the user and the Application Service Provider about how to handle the user's emergency calls. This information may be stored in a user profile by the Application Service Provider.

The call should be conveyed to the PSAP with an indication in the supplemental data header, indicating what service was invoked.

7.3.3 Emergency service initiated invocation of relay services in emergency calls

The PSAP should have a possibility to invoke external support services such as remote sign language interpreting. This should be done by setting up a three-party call by the PSAP bridge.

7.4 Variation in services provided and media supported

All combinations of the three media of Total Conversation should be allowed in emergency calls. The PSAP should support the full set of media in Total Conversation. The principles of RFC 4566 [i.26] and RFC 3264 [i.19] should be applied for deciding on media and codecs to include in calls.

7.5 Addressing and routing

The user terminal should insert the SIP URI urn:service:sos or any other specified URI in this range. If the user terminal does not do so, a SIP proxy of the Application Service Provider should do this insertion.

The terminal should include the Application Service Provider SIP Proxy in a route parameter.

According to RFC 6443 [i.36], either the user terminal or a SIP proxy retrieves an address to send the call to from a LOST server according to the LOST protocol, specified in RFC 5222 [i.30]. The calls are routed to a PSAP according to principles depending on the location of the caller and the capability required by the user terminal and the PSAP in a policy based routing action described in EENA NG1-1-2 Long Term Definition [i.1], so that they are routed to the most appropriate PSAP to handle the emergency situation.

7.6 Location information provision in emergency calls

The specification of RFC 6443 [i.36] should be followed for handling location information provision in emergency Total Conversation calls. The location information should be conveyed in the SIP protocol according to RFC 6442 [i.35].

7.7 Calling back

The calling user terminal should provide a globally routable GRUU address, to be used by the PSAP in the case of need to call-back. Refer to RFC 6443 [i.36] for further information.

7.8 Connecting the call with an Emergency Control Centre and other agencies

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

A standard for information exchange about emergency cases is also needed. CAP [i.39] extended for individual emergency case information may be a candidate. Specifically for Total Conversation application in native SIP is a need to provide information on the call-back SIP address in GRUU form, information on media, codecs and eventual assisting services involved in the call. Optionally, languages used in the call may be registered in such information exchange protocol. It is however outside the scope of the present document to specify the information exchange standard.

7.9   Logging at the PSAP

The Total Conversation calls should be logged as any other call, including information on GRUU, media used, and any relay service involved.

7.10   Recording at the PSAP

All media should be recorded and be made available for analysis and storage.

7.11   Language considerations

It is possible for a native SIP user terminal to specify language competence and language preference for the user, by means of language tags in the SIP headers specified in RFC 3840 [i.22] and RFC 3841 [i.23]. Capability and preference to handle text in the call can also be expressed by the "text" media feature tag.

The language competence and preferences of the PSAP terminal operators and the media capabilities of the PSAP terminals can also be declared in the same way.

The preferences can be expressed as "required", when no call should be established without a match of the tag from the caller and the called party, or an "accepted" level, when a match is not required.

The Emergency Service Routing Proxy (ESRP) defined in RFC 6443 [i.36] can do selection of PSAP terminal to receive the call, with matching competence, preference and capability.

For the case that no match is found, the translation needed can be checked by translation services declaring their translation competence with language tags according to RFC 6497 [i.37], and a translation service invoked.

The available language tags are specified in RFC 5646 [i.32]. There it can be seen that many language tags for sign languages and for languages in general are specified. It is thus not possible to distinguish between capabilities to type and read the written form of a language from speaking and hearing a language. This lack of specification possibility can be compensated by a requirement to specify "text" media capability on the "required" level for users who have very strong preference for using text in the call, and a specification of media capability "text" as "accepted" for PSAP operators who are prepared to conduct the emergency handling in text.

Efficient use of this system for routing calls to terminals with suitable capabilities and PSAP operators with suitable language competence requires consequent configuring of the corresponding parameters in terminal profiles and user profiles on the user side, as well as on the PSAP side. Successful deployment of this structure can lead to good fulfilment of the requirements to handle emergency calls from travelling people well. However, borrowing a phone from another person, without changing the language preference settings can result in emergency calls being routed to a PSAP terminal and a PSAP operator with less favourable media and language match.

These features and functions for media and language matching are therefore only described here as a possibility. Enforcing detailing and use of it requires further action on policy level.

7.12   Security

The emergency call should follow the security section of RFC 6443 [i.36]. This implies that TLS should be used for securing the session control protocol with the user terminal and external assisting services if possible, and SRTP should be used as specified in RFC 3711 [i.21] for media encryption. For key management, PSAPs and external services should support both DTLS-SRTP according to RFC 5764 [i.33] and ZRTP according to RFC 6189 [i.34]. User terminals may use either of these methods for security. Calls without security measures should be accepted.

7.13   Testing

The PSAP should have equipment for handling the test calls mentioned in RFC 6443 [i.36].

User Terminals should initiate test calls according to the schedule and mechanism specified in RFC 6443 [i.36]. All Total Conversation media supported by the terminal should be tested.

8   Total Conversation access using IMS

This clause specifies how Total Conversation emergency calls are handled when the user terminal is located in an IP Multimedia Subsystem (IMS) environment.

The functionality and procedures in the PSAP, ESInet and external services are not influenced by this access network.

8.1   Protocols for the basic functionality

Total Conversation calls are handled in the IMS network using the IMS Multimedia Telephony service as specified in TS 122 173 [i.12], enabling calls to contain video, real-time text and audio media. The media aspects specified in TS 126 114 [i.14] should be followed.

The functionality available in emergency services is briefly specified in TS 122 101 [i.11]. The functionality called "GTT" in that specification contains the IP based real-time text component in Total Conversation calls.

Note that some of the functionality needed for Total Conversation access is made conditional on the availability of regulation or national policy in [i.11].

The protocols and procedures used in the interface between the access network and the ESInet should be as specified in RFC 6443 [i.36].

The way that the emergency calls are handled within the IMS network should follow TS 123 167 [i.13].

8.1.1   Video

Video should be included in Total Conversation emergency sessions as specified in the video related clauses of TS 126 114 [i.14].

8.1.2   Real-time text

Real-time text should be included in Total Conversation emergency sessions, and use RFC 4103 [i.25] as specified in the text related clauses of TS 126 114 [i.14].

The sampling interval should be 300 ms, and redundancy should be used in the transmission following the recommendations in RFC 4103 [i.25].

8.1.3   Audio

Audio should be included in Total Conversation emergency sessions, as specified in the audio related clauses of TS 126 114 [i.14].

8.2   Supplementary and additional services

It should be possible to invoke supplementary and additional services when making a Total Conversation call for emergency service purposes and when making a PSAP call-back. The following services of importance for emergency calls should be made available.

8.2.1   Relay service

It should be possible to invoke relay services in an IMS Total Conversation Emergency service.

The call should be connected to the PSAP through a multi-party bridge, automatically calling the right PSAP and the right relay service and do the suitable media mixing.

8.2.2   Multi-party calls

It should be possible to have multi-party calls set up in the IMS network in emergency sessions as initiated by the Application Service Provider or the PSAP. This could be one way to support Total Conversation when users need to involve additional services. The IMS CONF service, described in TS 122 173 [i.12] may be used for this purpose when initiated by the PSAP or Application Service Provider. There may be occasions when the blocking of these services for users cause inconvenience that can be circumvented by manual action from the PSAP.

8.2.3   Non-blocking of forward and transfer supplementary services

The supplementary services forward and transfer available in IMS Multimedia Telephony sessions, described in TS 122 173 [i.12] should be possible to use in emergency sessions for PSAPs and Application Service Providers. There may be occasions when the blocking of these services for users cause inconvenience. but the situations influenced by that restriction can be circumvented by manual action from the PSAP, or automatic actions by the application service provider.

8.3   Initiating the emergency call

The procedures described in TS 123 167 [i.13] for calling emergency services with Total Conversation should be applied. The procedure varies depending on if the user terminal is in the home network or a visited network.

8.3.1   User initiated invocation of relay services in emergency calls

A user should be able to indicate emergency service and need for a specific relay service in the same type of call operation as they make in their everyday calls.

The terminal should be able to recognize that an emergency call is made. Location and routing and relay service invocation actions should be applied by the Application Service Provider.

The call should be conveyed to the PSAP with an indication in the supplemental data header, indicating what service was invoked.

8.3.2   Emergency service initiated invocation of relay services in emergency calls

The emergency service may detect a need to invoke relay services during processing of the emergency call.

Invocation should for this case be done by including the relay service in the call through the multi-party bridge of the PSAP.

If a call arrives with supplemental data pointing at a relay service to be invoked, that service should be invoked in a three-party fashion by the PSAP.

8.4   Variation in services provided and media supported

The media included in the emergency call may be added or removed according to the description in TS 126 114 [i.14].

8.5   Addressing

The procedures described in TS 123 167 [i.13] for how the emergency number is detected and replaced by a PSAP address should be applied.

8.6   Routing of emergency calls

The procedures described in TS 123 167 [i.13] for how the emergency number is detected and replaced by a PSAP address and used for routing the emergency call should be applied.

8.7   Location information provision in emergency calls

The procedures described in TS 123 167 [i.13] for location information retrieval and provision should be applied.

8.8   Calling back

The procedures described in TS 123 167 [i.13] for providing an address suitable for calling back, and for making the call-back should be applied.

8.9   Security

The procedures described in TS 123 167 [i.13] for security in Multimedia Telephony emergency sessions should be applied.

Annex A:
Background

A.1   Background

A long series of efforts to harmonize and improve conversational communication services and access to emergency services in Europe for people with disabilities as well as all, have resulted in enhanced requirements in the European Electronic Communications Framework Directives. The Total Conversation concept meets the identified communication needs in everyday communication as well as in emergency situations.

The main difference from voice telephony is that Total Conversation supports more media. It supports communication in video, real-time text and audio in a consistent standardized way. That combination provides good opportunities for a wide range of users to find the modalities of communication they need for each situation.

Interoperability, meaning that users of different communication systems are able to communicate with each other, was the key to the success of the voice telephone system. The goal of the Total Conversation concept is to extend this interoperability approach to calls with the three media. The way to achieve this is by applying technical standards for the communication interfaces.

The Total Conversation concept is briefly defined in ITU-T Recommendation F.703 [i.3]. It can be implemented in a multitude of technical environments, and standards exist for the implementation of Total Conversation in a number of Multimedia Protocol environments. Since it is the consistent inclusion of the real-time text medium that is the characteristic feature of Total Conversation as compared to Video Telephony, it is often in descriptions of Real-Time Text that the Total Conversation service details are described. A number of standardized ways to implement Total Conversation are described in EG 202 320 [i.15]. However, it is with the deployment of IP based multimedia services that Total Conversation has got its main implementation environment and has become a service of benefit to a number of users. One well defined environment for Total Conversation is in the IP Multimedia Subset Multimedia Telephony services, defined in TS 122 173 [i.12] and technically specified in TS 126 114 [i.14].

Thus, when defining Emergency Service access for Total Conversation users, it is the IP based implementations that are considered.

Since many of the Total Conversation users are persons with disabilities, using other modalities of communication than speech, it is of importance for proper handling of calls to arrange for translation between such communication forms and speech. Typical modalities used are Sign Language and Real-Time Text conversations. It is worth to note that any combination of modalities during a call may be used. For such translations, relay services are used, as defined in ES 202 975 [i.16].

Multimedia calls can carry information of great value during emergency assessment. The consistent inclusion of Total Conversation access to emergency services is therefore not only of interest for people with disabilities, but of general importance to all.

Work with standardisation of Total Conversation access to emergency services has been performed in IETF, resulting in draft-ietf-ecrit-phonebcp "Best Current Practice for Communications Services in support of Emergency Calling" [i.38], covering the main interface aspects.

3GPP has also specified the use of the IMS environment for non-voice emergency services in TS 122 101 [i.11] and in TS 123 167 [i.13].

A.1.1   Relations to European Directives

The Universal service Directive 2002/22/EC [i.41] requires that all end users of publicly available telephone services have the possibility to call the emergency services by using the single European emergency call number "112".

In the preamble (13) to the amendment directive 2009/136/EC [i.42] amending the Universal Service Directive, it is stated that: "Publicly available telephone services also include means of communication specifically intended for disabled end-users using text relay or Total Conversation services."

This amendment directive also says in article 36.4: "Member States shall ensure that access for disabled end-users to emergency services is equivalent to that enjoyed by other end-users. Measures taken to ensure that disabled end-users are able to access emergency services whilst travelling in other Member States shall be based to the greatest extent possible on European standards or specifications published in accordance with the provisions of Article 17 of Directive 2002/21/EC [i.40] (Framework Directive), and they shall not prevent Member States from adopting additional requirements in order to pursue the objectives set out in this Article."

Article 36.4 clearly requires that disabled end-users have the means to access emergency services in a manner equivalent to that enjoyed by other end-users. Total Conversation provides combinations of video, real-time text and voice for persons with disabilities that can assist in fulfilling these requirements. Preamble 13 states that such services shall be provided to people with disabilities who needs them.

NOTE: Reference to Directive 2002/21/EC (Framework Directive) is found in [i.40].

A.1.2   Relation to UN Convention on rights of persons with disabilities

The UN Convention on rights of persons with disabilities [i.43] settles important principles for the rights of persons with disabilities. Many of its articles have valid statements supporting the need for emergency services accessible by Total Conversation. The convention is ratified by a large number of states, and can therefore be recognized as a common legal base for providing emergency services accessible to people with disabilities.

One clear example is Article 9:

"Article 9
Accessibility
1. To enable persons with disabilities to live independently and participate
fully in all aspects of life, States Parties shall take appropriate measures to
ensure to persons with disabilities access, on an equal basis with others, to the
physical environment, to transportation, to information and communications,
including information and communications technologies and systems, and to
other facilities and services open or provided to the public, both in urban and
in rural areas. These measures, which shall include the identification and
elimination of obstacles and barriers to accessibility, shall apply to, inter alia:

(a) Buildings, roads, transportation and other indoor and outdoor
facilities, including schools, housing, medical facilities and workplaces;

(b) Information, communications and other services, including
electronic services and emergency services."

Also Article 11 is valid in this context.

"Article 11
Situations of risk and humanitarian emergencies
States Parties shall take, in accordance with their obligations under
international law, including international humanitarian law and international
human rights law, all necessary measures to ensure the protection and safety of
persons with disabilities in situations of risk, including situations of armed
conflict, humanitarian emergencies and the occurrence of natural disasters."

The terms communication and language are defined in the definitions:

"Definitions,
"Communication" includes languages, display of text, Braille, tactile
communication, large print, accessible multimedia as well as written, audio,
plain-language, human-reader and augmentative and alternative modes, means
and formats of communication, including accessible information and
communication technology;

"Language" includes spoken and signed languages and other forms of non spoken languages".

History

Document history		
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