



Emergency Communications (EMTEL),

Total Conversation for emergency communications; implementation guidelines

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ETSI

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

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

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Foreword

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

Modal verbs terminology

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Introduction

The present document contains recommendations and guidelines on the implementation of Total Conversation for emergency service access and provision. Total Conversation enables conversation in real-time text, video and audio. Subsets are also considered including the combination of real-time text and audio that forms the text telephony service.

Total Conversation services and terminals are deployed in some European countries, and have been adopted 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 use of Total Conversation for Emergency Communications would enable and/or improve access to emergency services by people with disabilities. However the few deployments of Total Conversation for Emergency Communications that exist, are implemented in different ways in different countries, and are not implemented according to the latest development of ETSI, IETF and 3GPP standards for Emergency Communications. This non-harmonised deployment means that there are no interoperable solutions for emergency service access across the EU countries, which is contrary to EU policy.

The present document is intended to assist ETSI SC EMTEL to coordinate with other standards bodies and relevant stakeholders so that the recommendations of TS 101 470 [i.2] and TR 103 170 [i.3] can be implemented. It can also be used to assess if Total Conversation requirements are fulfilled by other necessary standards, and that there are no contradictions.

Draft

1 Scope

The present document:

- Assesses the support of Total Conversation for emergency communications by existing specifications, in particular those from 3GPP and IETF.
- Identifies any changes that might be required to those specifications to support Total Conversation for emergency communications.
- Provides guidance for developers and PSAPs planning to implement Total Conversation for emergency communications, and for users of the Total Conversation service.

The present document covers emergency calls with the full media set of Total Conversation as well as subsets of the media, except voice calls in which no assisting service is needed.

Although the focus of the present document is Total Conversation for emergency communications, no Total Conversation user can be expected to use Total Conversation only for contacting emergency services. Therefore some aspects of use of Total Conversation for non-emergency communications are also covered where applicable.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] EENA NG1-1-2 Long Term Definition.
- [i.2] ETSI TS 101 470: "Total conversation access to emergency services".
- [i.3] ETSI TR 103 170: "Total conversation access to emergency services".

- [i.4] 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.5] ETSI ES 202 975: "Human Factors (HF); Harmonized relay services".
- [i.6] 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.7] ETSI TS 126 114: "Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS); Multimedia telephony; Media handling and interaction (3GPP TS 27.114)".
- [i.8] ETSI TS 123 167: "Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) emergency sessions (3GPP TS 23.167)".
- [i.9] ETSI TS 122 101: "Universal Mobile Telecommunications System (UMTS); LTE; Service aspects; Service principles (3GPP TS 22.101)".
- [i.10] ETSI EG 202 320: "Human Factors (HF); Duplex Universal Speech and Text (DUST) communications".
- [i.11] ETSI TS 122 228: "Universal Mobile Telecommunications System (UMTS); LTE; Service requirements for the Internet Protocol (IP) multimedia core network subsystem (IMS) (3GPP TS 22.228)".
- [i.12] IETF RFC 5194: "Framework for Real-Time Text over IP using the Session Initiation Protocol (SIP)".
- [i.13] IETF RFC 6881: "Best Current Practice for Communications Services in Support of Emergency Calling (BCP 181)".
- [i.14] IETF RFC 4596: "Guidelines for Usage of the Session Initiation Protocol (SIP) Caller Preferences Extension".
- [i.15] IETF RFC 3841: "Caller Preferences for the Session Initiation Protocol (SIP)".
- [i.16] IETF RFC 6443: "Framework for Emergency Calling Using Internet Multimedia".
- [i.17] IETF RFC 4190: "Framework for Supporting Emergency Telecommunications Service (ETS) in IP Telephony".
- [i.18] IETF RFC 3261: "Session Initiation Protocol".
- [i.19] ITU-T Recommendation F.742: "Service description and requirements for videotelephony services over IP networks".
- [i.20] ITU-T Recommendation F.703: "Multimedia Conversational Services".
- [i.21] ITU-T Recommendation V.18 "Operational and interworking requirements for DCEs operating in the text telephone mode".
- [i.22] NENA i3 Detailed Technical Specification.
- [i.23] ETSI TS 122 071: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Services (LCS); Service description (3GPP TS 22.071)".

- [i.24] ETSI TS 123.271: “Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Functional stage 2 description of Location Services (LCS) (3GPP TS 23.271)”.
- [i.25] ETSI TS 124 229: “Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) (3GPP TS 24.229)”.
- [i.26] IETF RFC 4353: “A Framework for Conferencing with the Session Initiation Protocol (SIP)”
- [i.27] 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.28] ETSI TS 133 106: “Universal Mobile Telecommunications System (UMTS); LTE; 3G security; Lawful interception requirements”.
- [i.29] ETSI ES 201 158 (V1.2.1): "Telecommunications security; Lawful Interception (LI); Requirements for network functions".
- [i.30] ETSI TS 123 237: “Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) Service Continuity; Stage 2 (3GPP TS 23.237)”.
- [i.31] IETF RFC 5631: "Session Initiation Protocol (SIP) Session Mobility".
- [i.32] IETF RFC 5589: “Session Initiation Protocol (SIP) Call Control - Transfer”.
- [i.33] IETF RFC 4579: “Session Initiation Protocol (SIP) Call Control - Conferencing for User Agents”.
- [i.34] IETF RFC 3515: “The Session Initiation Protocol (SIP) Refer Method”.
- [i.35] IETF RFC 3725: “Best Current Practices for Third Party Call Control (3pcc) in the Session Initiation Protocol (SIP)”.
- [i.36] IETF RFC 5646: "Tags for Identifying Languages".
- [i.37] ETSI TS 122 226: “Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Global text telephony (GTT); Stage 1 (3GPP TS 22.226)”.
- [i.38] ETSI TS 123 226: “Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Global text telephony (GTT); Stage 2 (3GPP TS 23.226)”.
- [i.39] ETSI TS 129 332: “Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Media Gateway Control Function (MGCF) - IM Media Gateway; Mn interface”.
- [i.40] Errata 1203 to IETF RFC 4103: “http://www.rfc-editor.org/errata_search.php?rfc=4103”.
- [i.41] IETF Draft: “Additional Data Related to an Emergency Call - draft-ietf-ecrit-additional-data-37.txt”.
- [i.42] IETF RFC 4556: “SDP: Session Description Protocol”.
- [i.43] IETF Draft: “draft-gellens-slim-negotiating-human-language-02”.

- [i.44] IETF RFC 3264: “An Offer/Answer Model with the Session Description Protocol (SDP)”.
- [i.45] IETF RFC 6157: “IPv6 Transition in the Session Initiation Protocol (SIP)”.
- [i.46] IETF RFC 7090: “Public Safety Answering Point (PSAP) Callback”.
- [i.47] IETF RFC 6189: “ZRTP: Media Path Key Agreement for Secure RTP”.
- [i.48] GSMA IR.92: “IMS Profile for Voice and SMS”.
- [i.49] GSMA IR.94: “IMS Profile for Conversational Video Service”.
- [i.50] IETF RFC 3840: “Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)”.
- [i.51] ETSI TR 121 905: “Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS);LTE; Vocabulary for 3GPP Specifications (3GPP TR 21.905)”.
- [i.52] EENA 3.5.4.1: “Transnational Emergency Calls version 1.0”.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

Many of the definitions have been copied from TS 101 470 [i.2]. If there are any discrepancies between the definitions that follow and those in TS 101 470 [i.2], then the definitions that follow apply to the present document.

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 Total Conversation user or the call-taker with specific tasks in the call

NOTE 1: Such tasks can for example be language translations, relay service or expert advice.

call-taker: an agent at the PSAP that accepts calls and may dispatch emergency help

NOTE 2: Sometimes the functions of call taking and dispatching are handled by different groups of people, but these divisions of labour are not generally visible to the caller and thus do not concern us here (definition is copied from RFC 5012 [i.37])

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

NOTE 3: 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.1]).

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

IETF SIP: session control environment for calls, using the RFC 3261 [i.18] and related protocols in the IP networks

NOTE 4: The above refers to an environment outside the scope of IMS.

NOTE 5: In TS 101 470 [i.2], the term "basic SIP" is used.

IP Multimedia Subsystem (IMS): a standardised architectural framework for delivering Internet Protocol (IP) multimedia services, as described in ETSI TS 122 228 [i.11]

modalities: methods for human expression and perception of communication

NOTE 6: 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

NG112: next generation 112 emergency services provided via the Emergency Services IP network (ESInet)

non-Total Conversation emergency session: a voice-only emergency session

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

NOTE 7: 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 8: This feature is often called RTT.

relay node: a functional entity providing a conference bridge to multiple parties, including and not limited to the Total Conversation user and the relay service, engaged in a Total Conversation session.

NOTE 9: in the context of Total Conversation emergency session, the PSAP is also considered as a party using the relay Node.

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 10: A type of assisting service (definition from ES 202 975 [i.5]).

servicing 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 11: Definition from Recommendation ITU-T F.703 [i.20].

Total Conversation emergency service: emergency service capable of handling Total Conversation emergency sessions

Total Conversation service provider: application service provider providing Total Conversation services to its Total Conversation users

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

Total Conversation user: individual taking advantage of the Total Conversation service

UICC: a physically secure device, an IC card (or 'smart card'), that can be inserted and removed from the terminal. It may contain one or more applications. One of the applications may be a USIM.

NOTE 12: Definition from TR 121 905 [i.51].

User Profile: the set of information necessary to provide a user with a consistent, personalised service environment, irrespective of the user's location or the terminal used (within the limitations of the terminal and the serving network)

3.2 Abbreviations

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

3GPP	3 rd Generation Partnership Project
CAP	Common Alerting Protocol
CIF	Common Interchange Format
CS	Circuit Switched
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
GSMA	GSM Association
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
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SRTP	Secure Real Time Protocol
TC	Total Conversation
TLS	Transport Layer Security
UN	United Nations
URI	Universal Resource Identifier
WebRTC	Web real-time communications

4 Background

Total Conversation is a conversational service providing real-time communication in video, real-time text and audio. For the purpose of the current document, also subsets of these media are included in the concept.

Descriptions of general usefulness of Total Conversation is found in the use cases of ITU-T F.742 [i.19].

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

The use of Total Conversation in emergency service sessions is described in TR 103 170 [i.3], and specified in TS 101 470 [i.2].

The main motivation for use of Total Conversation for emergency calls rests in the utility provided by the three media supported, which brings particular benefits for persons having disabilities. Some examples are given in the following table:

Table 4.1 Examples of supported media in Total Conversation

Media	Description
Video	<ul style="list-style-type: none"> -useful for visual assessment of conditions at site of emergency -can carry sign language between call-taker or interpreter and hard-of-hearing or deaf user -can improve intelligibility of/to caller in noisy environment -view of call-taker can convey calming impression to Total Conversation user in distress
Real Time Text	<ul style="list-style-type: none"> -useful for short items that need to be remembered or for rapid provision of exact spelling for e.g. addresses -can provide part or all of dialogue to/from hard-of-hearing or deaf user -useful for clarification of key words from Total Conversation user calling from noisy environment
Audio	<ul style="list-style-type: none"> -spoken dialogue between Total Conversation user and call-taker -spoken interpreted dialogue between call-taker and interpreter -audio information from the emergency site - for assessment -partial spoken dialogue when used in combination with real-time text or sign language.

5 Existing requirements, recommendations, and assumptions

5.1 General

Specific requirements and recommendations for Total Conversation access to emergency services can be found in TS 101 470 [i.2] and TR 103 170 [i.3] respectively. The following clause provides a brief overview over those requirements and recommendations. They form the basis for analysis of the state of standards and specifications supporting these requirements and recommendations. For more details of the requirements see clause 5 of TS 101 470 [i.2].

In addition, requirements for support of Multimedia Emergency Sessions and for IMS Multimedia Telephony which fulfil the service requirement for Total Conversation be found in clause 10 of TS 122 101 [i.9], in clause 4 of TS 122 173 [i.6], and in TS 126 114.

Editor's note: It is FFS how to capture the 3GPP requirements in the TR, e.g. by explicit reference or by directly copying the requirements.

5.2 Summary of existing requirements

The emergency service capable of handling Total Conversation emergency calls will provide its Total Conversation users with a way to make and receive emergency calls using combinations of video, Real-Time Text and audio. The requirements applicable to voice-only emergency calls also apply to Total Conversation emergency calls.

The following Total Conversation specific requirements have also been identified:

- **Call initiation.** A Total Conversation user terminal intended to support emergency calls should recognize an emergency call and perform the specific steps required for establishing the call with the desired media.
- **Call addressing.** A consistent address should be assigned for Total Conversation Emergency session. Using just the Emergency number (e.g. 112) in the Total Conversation user terminal as the only address should result in an emergency call. If the Total Conversation 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 should also be possible to use with the emergency number (according to the destination address).
- **PSAP assignment.** Total Conversation Emergency sessions should follow the principle of TR 102 180 [i.4] that the session should be connected to the most appropriate PSAP, bearing in mind that the PSAP may be assigned based on the location, media, and language capabilities of the call-taker.
- **Media Support.** Full Total Conversation support with three media should be implemented in the PSAP call-taker workstations used for Total Conversation access. Total Conversation user terminals may make emergency sessions using the full media set or a subset thereof.
- **Assisting services.** The inclusion of assisting services such as those providing language interpretation should be supported. These may include relay services that translate between modalities of human communication. Mechanisms should be provided for the Total Conversation user and the PSAP to be able to invoke such services at the time of session establishment, or to add them during the session.
- **Caller identity preservation.** For caller identity, the principle of ES 202 975 [i.5] should be followed, i.e. the inclusion of a relay service in the call should not modify the caller identity information for the Total Conversation user. Rather the caller identity should be forwarded transparently by the relay service to PSAP.
- **Location information preservation.** The inclusion of a relay service in the session should not modify the location information for the Total Conversation user. Rather, the user location information should be forwarded transparently by the relay services to the PSAP.
- **Call-back.** In the case of call-back, the PSAP should ensure that the same media, and if applicable the same type of relay service, are used for the call-back as in the original session.
- **Involvement of other entities.** A PSAP may involve a separate emergency control centre or a third party to take the required action on the emergency case. Means should be provided to transfer the Total Conversation emergency session to such an entity, maintaining all the media supported by the entity to which the session is transferred.
- **Call logging.** Means should be provided to log information about Total Conversation emergency sessions including media used, identity and address of any assisting services included, etc. This requirement is further elaborated in EENA NG112 LTD [i.1].
- **Call recording.** Means should be provided at the PSAP to record all media used in a session without degradation, for later retrieval and play-back.
- **Security.** Security and privacy requirements also include any relay service invoked during the session. In particular, data protection and privacy requirements should be respected. Both technical means and contractual obligations are needed to fulfil the requirements.

5.3 Study and Analysis Assumptions

5.3.1 General

The following clauses provide the assumptions taken into consideration while providing the gap analysis and the findings in this document.

5.3.2 Assumptions of the Total Conversation for Emergency Communication

The following assumptions are taken into consideration:

- Total Conversation for emergency communication is also referred to as “Total Conversation for Emergency services” in the present TR;
- Total Conversation as a concept by itself exists already in standards. It is not further studied in this TR unless impacts on Total Conversation as a concept are identified as necessary to support its use for emergency communications;
- Basic requirements and implementations for Total Conversation used as a basis for Total Conversation for emergency services are not repeated in this TR.

5.3.3 Assumptions of the PSAP and Relay node networks

The following assumptions are taken into consideration:

- This document considers deployments to be based on NG112 PSAPs. An NG112 PSAP is connected to a SIP based network, called the ESI-net, see EENA NG 112 LTD [i.1]. This means no IMS based PSAPs are considered in the present report;

Editor’s Note: Migration scenarios with a mix of countries implementing NG112 and other countries being still on PSTN based emergency services will be considered in this document, at least to the degree that it is clear how emergency calls from Total Conversation users can be treated in different mixed environments, if the STF489 time budget allows. This will be added as a separate Annex that describes the migration scenario.

- A non NG112 PSAP is connected to CS based network: A gateway is needed to perform interworking between the SIP signalling of the IP based access network and the CS based signalling of the non NG112 PSAP network, as well as media interworking which might reduce the quality of service. Video is not expected to be supported in the non NG112 PSAP which will also reduce the quality of experience;
- Relay nodes are connected to SIP based networks.

NOTE: The legacy PSAP, supporting PSTN, and how it connects to a multimedia relay service node is not dealt with in detail in the present document.

5.3.4 Assumptions of the Total Conversation user access network

The following assumptions are taken into consideration:

- The Total Conversation user terminal supports multimedia (see ITU-T F.703 [i.20]) and is connected to an IP based access network (example IETF SIP or IMS).

NOTE: The Total Conversation user terminal that is connected to an access network interfacing with a CS based PSAP network through an interworking unit is likely to experience service limitations, e.g. Video is not likely to be supported. This type of access is covered in TS 101 470 [i.2], clause 5.2.4.

5.3.5 Assumptions on the routing of Total Conversation for emergency communication calls

The following assumptions are taken into consideration:

- Total conversation emergency sessions are routed to the most appropriate PSAP, i.e. one that is in the jurisdiction of the incident. This is also valid for users roaming outside their home countries; and
- Routing within the ESInet and all additional services provided by the ESInet, such as providing Location information, are not studied in this document, because the present document looks mainly at access networks and service provider networks, and at the interface to ESInets.

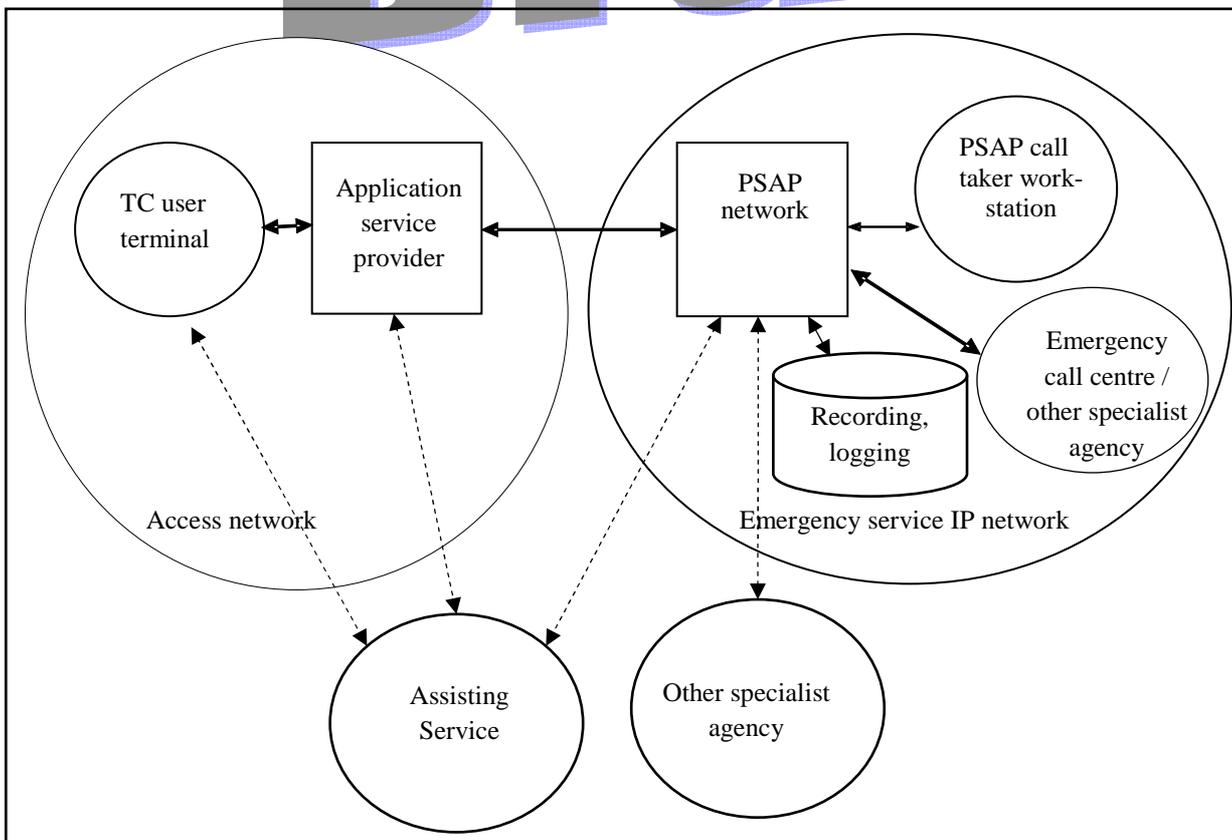
NOTE: The ESInet and the services it provides is based on SIP and IETF recommendations and EENA specifications.

6. Architecture principles

6.1 General

The requirements and recommendations for Total Conversation for Emergency Communications span over a wide range of entities between which the technical systems for emergency service session handling need to interoperate according to the technical and operational standards and specifications.

6.2 Architecture functional entities



The architecture functional entities are shown in Figure 1.

Figure 1: Architecture functional entities

The architecture comprises the following elements:

1. The Total Conversation user terminal:

The Total Conversation terminal that the Total Conversation user uses to contact the emergency service centre (PSAP).

NOTE 1: This is usually also the terminal that is used for everyday calling for conversational services between Total Conversation users.

2. Access network:

The network handling the Total Conversation call between the Total Conversation user, the application service provider and the emergency service network.

NOTE 2: This is also the network handling the everyday calling for conversational services by the Total Conversation user.

3. Emergency service IP network:

An IP based network connecting a group of emergency service PSAP networks together in a network for conveying emergency service calls and enabling collaboration between PSAPs and other functional units in emergency services. This type of network is called ESInet.

4. PSAP:

The point within the emergency service network initially answering and handling an emergency service call. The PSAP collects information and decides on the next step in handling of the call. That can involve linking in external expert services, translation services and first responders for the call, or transferring the call to another party.

5. PSAP network:

The network connecting a number of PSAPs in the same location or administration area together.

6. Emergency service recording and logging unit:

The functional unit within an emergency service network that handles recording of emergency service calls and retrievals of the calls.

7. Assisting service.

Assisting services including translation services, relay services and relay node which can be invoked when needed during a Total Conversation emergency session. These may be invoked by the Total Conversation user terminal, by the Application Service Provider in the access network, in the ESInet or by the PSAP.

8. Other specialist agency.

Other specialist agencies may be emergency specific (e.g. hostage negotiation) and reside in the ESInet or provide specialist advice not necessarily specific to emergency situations (e.g. chemical spillage) and therefore reside outside of the ESInet.

6.3 Call scenarios

6.3.1 General

At the top level, clause 5.6 of TS 101 470 [i.2] considers two main call scenarios as follows:

1. TC calls with no assisting service invoked; and
2. TC calls with assisting service(s) invoked.

Where assisting services are included they can be invoked manually or automatically at the time of Total Conversation emergency session establishment by either the Total Conversation user, the Total Conversation application service provider, or by the PSAP. If the need for an assisting service arises whilst the Total Conversation emergency session is ongoing, then the assisting service could potentially be invoked by the PSAP, by the Total Conversation application service provider, or by the Total Conversation user depending on the availability of a suitable/optimum implementation.

NOTE: The assisting service could also be invoked by the Total Conversation user once the call is established, but this is not permitted according to RFC 6881 [i.13] and TS 122 173 [i.6] because of the disruption it would cause to the ongoing emergency session.

The following clauses describe aspects of Total Conversation sessions using the architecture of clause 6.2, which might require special handling over and above those for VoIP emergency sessions.

Possible routing scenarios of Total Conversation emergency sessions toward the PSAP are also considered in the following clauses.

6.3.2 Baseline session (without any assisting service)

The baseline session is a Total Conversation session comprising the media audio, video, and Real Time Text, or a subset thereof, which is established between the Total Conversation user and the most appropriate PSAP. The Total Conversation user should be able to request to add or subtract media from the session once it is in progress.

It is assumed that routing towards the PSAP is based on the Total Conversation user's location, that all PSAPs in the emergency services network are capable of supporting the full media set associated with Total Conversation, and that no assisting services are needed.

Supporting functionality specific to Total Conversation for Emergency Communications: None.

6.3.3 Routing based on media capability of PSAP

In the case where not all PSAPs in the emergency services network support the full Total Conversation media set, it is desirable to route Total Conversation sessions towards PSAPs that support Total Conversation. In this case, it will be necessary to be able to differentiate between a Total Conversation emergency session and a non-Total Conversation emergency session.

Supporting functionality specific to Total Conversation for Emergency Communications: Total Conversation emergency session identification.

6.3.4 Routing based on language / modality

If the Total Conversation user is not in his/her home network, and/or prefers to communicate with the PSAP in a language / modality other than the default language / modality of the country, then the Total Conversation user should be able to indicate his/her preferred language or modality at the time of session establishment. The session should be routed to the most appropriate PSAP based on that preference.

This could include the case where the Total Conversation user prefers to send information using one modality (e.g. speech), and receive information using another (e.g. real-time text, or sign-language). In this case, the Total Conversation user should be able to indicate the preferred method of communication for each direction of the session, so that the call-taker can be selected appropriately or an appropriate assisting service be invoked.

Routing of a Total Conversation session could potentially be directly to a PSAP supporting the Total Conversation user's preferred language / modality, or by inclusion of an assisting relay service.

Supporting functionality specific to Total Conversation for Emergency Communications: Language / modality indication for each direction of communication

6.3.5 Routing via an assisting service

The Total Conversation user could include an assisting service manually, e.g. by adding the assisting service address to the session routing path at the time of the session initiation, or automatically through pre-configuration of the Total Conversation terminal (e.g. including the necessary relay service in the routing path for all sessions). In this case, the assisting service should be indicated in the signalling from the Total Conversation user's terminal.

The assisting service could also be included by the application service provider on behalf of the Total Conversation user at the time the session is established. In this case, the application service provider will need to know in advance the address of the assisting service to be included. This information might be configured for each user and stored as part of the User Profile for Total Conversation users. The assisting service may originate the emergency session on the Total Conversation user's behalf.

In the case where the emergency call is routed to the PSAP via an assisting service, the Total Conversation user identity and location information should be relayed transparently to the PSAP together with any additional data included by the Total Conversation user terminal.

Supporting functionality specific to Total Conversation for Emergency Communications: Assisting service invocation, location information preservation, Total Conversation user identity preservation.

6.3.6 Conferencing with third party including assisting relay services

The Total Conversation user should be able to invoke an assisting service adding it to a multi-party conference at the time of the session initiation, either manually or automatically through pre-configuration of the Total Conversation terminal (e.g. invoking the necessary relay service for all sessions).

The assisting service could also be invoked by the application service provider establishing a multi-party conference on behalf of the Total Conversation user at the time the session is established. In this case, the application service provider will need to know in advance the nature of the assisting service to be invoked. This information may be configured for each user and stored as part of the User Profile for Total Conversation users.

The PSAP should be able to enlist the help of a specialist third party agency or assisting relay service in order to resolve the emergency either from the start of an emergency session or during the ongoing session (e.g. specialist service providing specific incident related expertise, or a relay service for language / modality reasons). In this case, the PSAP should be able to establish a conference session including the third party, sharing either all or a subset of the available media, depending on the third party media support capability and the preferences of the PSAP, as well as the regulatory requirements pertaining to the PSAP and the third party.

In the case where an assisting service is already included in the session, it should if still needed, remain in the conference session after it has been established.

Supporting functionality specific to Total Conversation for Emergency Communications: Interworking of media, preservation of existing assisting service.

6.3.7 Transfer of session from PSAP

During the course of a Total Conversation emergency session, the PSAP may wish to transfer the responsibility for resolving the emergency to a third party (e.g. another PSAP or external agency). For a Total Conversation emergency session all established media should be transferred. If the third party does not support all established media, then a subset of the established media may be transferred, with an appropriate notification sent to the Total Conversation user and any other participants in the call.

In the case where an assisting service is already included in the session, it should if still needed, remain in the session after the session has been transferred. The PSAP should be able to add an assisting service to the session as part of the transfer procedure.

Supporting functionality specific to Total Conversation for Emergency Communications: Interworking of media, preservation of existing assisting service, assisting service invocation.

6.3.8 Transfer of session to more appropriate Total Conversation user terminal

A Total Conversation user may establish an emergency session using a terminal that does not support, or does not adequately support, all media (e.g. audio only, or terminal with small / low resolution video screen). Later in the call the Total Conversation user may be in a position to access a more capable terminal. In that case, it could be useful to transfer certain media (e.g. video) or the whole session to a more media capable terminal in order to better communicate with the PSAP (if necessary adding media in the process). The reason could for example be to show the scene of the emergency via video media, or to add the possibility for the Total Conversation user to lip-read the call-taker, or to get access to a more convenient keyboard for typing real-time text during the call. In the case where an assisting service is already included in the session, it should if still needed, remain in the session after the transfer.

NOTE: This is no different in principle from a non-emergency TC session, excepting the additional problems that might exist for an IMS terminal when it is IMS emergency registered only (see TS 123 176 [i.8]).

Supporting functionality specific to Total Conversation for Emergency Communications: Interworking of media, preservation of existing assisting service.

6.3.9 Call-back

The PSAP should be able to call-back to the Total Conversation user. In this case, the session should by default: be established using the same media as used for the initial emergency session; include any assisting services previously present in the session; and be routed to the terminal used by the Total Conversation user at the time of session establishment.

The PSAP should also be able to add media to the established call-back with the Total Conversation user with variations from the default set of media.

If the Total Conversation user has access to more than one terminal, she/he may inform the PSAP of the identity of the other SIP registered terminal in order to direct the PSAP to call-back towards that terminal rather than that from which the Total Conversation emergency session was initially established. In that case, the PSAP should be able to establish the call-back with additional media depending on the Total Conversation user's indicated preferences and the terminal capability.

PSAP call-back is considered as a normal call and can only be differentiated from other non-emergency SIP calls through the "SIP PSAP Callback Indicator" as described in RFC 7090 [i.46]. This indicator is used accordingly in the SIP based PSAP call-back. In the IMS core, the "SIP PSAP Callback Indicator" may be removed by IMS nodes or by the Total Conversation user terminal as no trust domain for the indicator exists in the network (see ETSI TS 124 229 [i.25]).

As call-back is a normal call, the user needs to register to the service provider to receive the service/call. Therefore in IMS case normal IMS registration is needed to receive call-back as described in ETSI TS 124 229 [i.25].

It would be useful for user agents and proxies to deactivate any features that interfere with success of call-back for a predefined period of time (example 30 minutes), e.g. as described in RFC 6881 [i.13] and RFC 6443 [i.16] except for actions with the goal to invoke relay services without interruption of the session with the user.

Supporting functionality specific to Total Conversation for Emergency Communications: Total Conversation identity preservation, interworking of media, preservation of existing assisting service.

6.4 Implementation technologies

6.4.1 General

Total Conversation implementation relies on the use of multimedia session control and media protocols, therefore the implementation of multimedia protocols is needed in all parts of the emergency service session chain.

The technologies most often used or discussed for conversational communication and for emergency service implementation are briefly presented here. They are further analysed in the later clauses of the present document.

6.4.2 IETF SIP

IETF SIP is used for Total Conversation user terminals, for SIP communication services, for NG112 emergency service access and for NG112 PSAPs.

6.4.3 IMS

IMS is specified and used for terminals and network entities. It is specified for both mobile, fixed and WiFi network access.

6.4.4 Web based technologies

Web based technologies are emerging as suitable for emergency service access by addition of standardized real-time communication features in web browsers.

WebRTC is one such technology for web based real-time communication. Work in standardization and implementation is going on in W3C, IETF and 3GPP for this technology. If eventually supported by the main web browser and operating systems manufacturers, this technology could enable additional application specific ways to communicate.

WebRTC as an access and terminal technology can be made interoperable with IETF SIP or IMS through gateways and non-standardized interoperability solutions for Total Conversation exist.

WebRTC use in IMS environment is specified in TS 122 228 [i.11], but WebRTC use for emergency sessions is not currently specified. It is therefore not further considered in the present report.

NOTE: This could be seen as an omission which could be further explored by SC EMTEL, since it is not yet mature enough to be fully specified in relation to the present report.

6.4.5 PSTN

In PSTN, only voice and text telephony is feasible, thus allowing for a service with some similarities to a limited subset of Total Conversation.

Text telephony in PSTN is in decline but remains in a few countries, and access to emergency services is still possible.

For general use in PSTN, text telephony makes use of various sub-modes of ITU-T Recommendation V.18. [i.21]. The access to PSTN based emergency services is described the same standard.

EENA NG 112 LTD [i.1] describes the conversion between PSTN text telephony and SIP based emergency service networks and PSAPs.

One situation to cater for is when a Total Conversation user calls emergency services and the most appropriate emergency service is PSTN-based. If the Total Conversation user in that situation is depending on video, e.g. for sign language use, then a mechanism is needed to provide sign language access via an assisting service in IMS or IETF SIP, that conveys the call between the Total Conversation signing user and the talking PSAP call-taker. TS 101 470 [i.2] discusses such situations.

6.5 Supported functions in Total Conversation for Emergency Communications

6.5.1 General

This clause describes the functions in more detail than in the call scenarios above, and refers to some of the documents in which they are specified. It also clarifies the functional aspects that are unique for Total Conversation as opposed to speech only emergency sessions.

Total Conversation for emergency communications can for the most part be implemented using existing standardised means specified by IETF and 3GPP respectively for emergency calls and for multimedia calls - see RFC 6881 [i.13], RFC 6443 [i.16], RFC 4190 [i.17], and TS 122 173 [i.6], TS 126 114 [i.7], TS 123 167 [i.8], TS 122 101 [i.9].

Some specific functions needed to support Total Conversation for emergency communications are identified in clause 6.3. The underlying architectural aspects that facilitate these functions are further discussed the clauses that follow. The options for implementation of the functions to support Total Conversation for emergency communications are discussed under clause 7.2 of the present document.

6.5.2 Naming and addressing

6.5.2.1 Identification of the Total Conversation emergency session

Total Conversation emergency session request should be differentiated from other emergency session requests. This could be achieved through either explicit or implicit indication of the Total Conversation nature of the emergency session.

The Total Conversation emergency session indication can be used by the application service provider and ESinet for identifying the Total Conversation emergency session and for routing it to the most appropriate PSAP. The Total Conversation emergency session indication can also help the receiving PSAP to differentiate the emergency session as a Total Conversation emergency session. The appropriate PSAP needs to be capable of receiving and handling the Total Conversation emergency session, i.e. to support the language and modality of communication required by the user or be able to request assistance from relay service, other PSAP or third party.

The Total Conversation emergency service indication should be included in the signalling by the Total Conversation user terminal or by the application service provider. The application service provider (IMS, SIP core) should if necessary be able to differentiate and route the Total Conversation emergency session based on this indication towards the most appropriate PSAP that supports Total Conversation. Total Conversation by definition involves conversational real-time, text, audio and video. The SIP signalling for a Total Conversation session therefore has to contain information (in the SDP) about the codecs required to support those media. Given the presence of such an implicit indication in SIP signalling for a Total Conversation session, there appears no necessity to include an additional explicit indication in the signalling.

6.5.2.2 Caller / Originator Identity

The Total Conversation user terminal should provide its identity to PSAP to facilitate PSAP Call-Back as described in RFC 7090 [i.46], RFC 6881 [i.13] and ETSI TS 124 229 [i.25]. The caller identity is needed to allow the PSAP to call-back to the Total Conversation user terminal. The network operator (IMS or IETF SIP) should provide the caller identity (Directory Number/ SIP URI) to the PSAP in a similar way as for non-Total Conversation emergency sessions. The caller identity for a Total Conversation session should be presented to the PSAP in the same way as for non-Total Conversation emergency session.

NOTE 1: Tel-URI will be provided for the case where the PSAP is CS/PSTN based.

The relay-service should provide its identity to the PSAP to allow the PSAP to include the relay-service in case of call-back.

NOTE 2: The relay-service needs to provide its address/identity to the PSAP for a number of reasons, as described in the present TR, as well as to enable call-back. In case of call-back it may not be possible to engage the same relay communications agent or interpreter, however the same relay-service should be contacted.

6.5.2.3 Relay Service identification

Editor's note: this is FFS a contribution will be made to v0.2.0.

6.5.3 Language considerations

6.5.3.1 Identification of preferred language / modality.

The preferred communication language of the Total Conversation user should be identifiable for the emergency session to be established.

The language / modality indication can be used by the network operator/service provider for identifying the languages / modalities by which the Total Conversation user is able to communicate. It can be used in the network for routing sessions to PSAPs operators with whom the Total Conversation user will be able to converse. It could also be used in combination with other session attributes by the application service provider or the PSAP to identify when it may be necessary to invoke an assisting service to facilitate communication between the Total Conversation user and the caller. E.g. when the SDP offers video media, and the TC user indicates a preference for sign-language, but the PSAP cannot support video.

Total conversation users may also have different modality preferences for receiving and sending information. E.g. a hard of hearing user may prefer to receive information using sign-language, but to send information using speech. For this reason, the Total Conversation user should also be able to indicate modality preference for each direction of communication.

TS 122 228 clause 7.5.2 [i.11] currently specifies that user equipment should be able to negotiate the user's desired languages and modalities, and that the service provider 'shall' be able to pass this information between end points. There are currently no requirements in TS 122 228 [i.11] for the service provider to be able to route calls based on language / modality indications.

RFC 4596 [i.14] provides guidelines for usage of the SIP caller preferences extension specified in RFC 3841 [i.15] and RFC 3840 [i.50]. This includes the ability to indicate the languages / modalities supported by the caller, the caller's proficiency in those languages / modalities, and how this information can be used to route within a network to called parties supporting those languages / modalities.

NOTE 2: There is currently no solution specified to allow users to express language/modality preference for sending/receiving information. IETF SLIM has been looking at this issue in draft-gellens-slim-negotiating-human-language [i.43]. However, the work is not completed at the time of writing the present report and there are no requirements for this in current 3GPP or IETF specifications.

Editor's note: These are gaps for which remedial actions are needed that should be documented in clause 9 of a later version of the TR.

6.5.4 Location information

Location information is needed in the ESI-net to be able to route the Total Conversation emergency session to the most appropriate PSAP. It is also needed at the PSAP and by the emergency services first responder to know the location of the caller in order to provide assistance in the most efficient manner. The application service provider should provide the location information to the ESI-net in the same way as for non-Total Conversation emergency sessions. The location information for a Total conversation session should be presented to the PSAP in the same way as for any other emergency session.

The requirements and mechanisms for obtaining and providing location information for emergency sessions in IP based systems are specified by IETF and 3GPP respectively in: RFC 4596 [i.14], NENA i3 DTS [i.22], and in TS 122 101 [i.9], TS 122 071 [i.23], TS 123 167 [i.8], TS 123 271 [i.24], and TS 124 229 [i.25].

6.5.5 Assisting services

The invocation of assisting services can help Total Conversation users in different ways. It can help by providing instant translation between spoken languages (e.g. English to French) as well as support for persons with disabilities wishing to contact emergency services (e.g. deaf / hard-of-hearing using other or complementary modalities than speech).

Assisting services can be implemented in different ways in different countries. In some countries, a dedicated PSAP may be assigned for Total Conversation users requiring spoken language translation or sign-language interpretation. However, in many countries a separate assisting service may need to be included in the session in order to enable full communication with the emergency services. The requirements for support of assisting services as described in ES 202 975 [i.5] are specified in TS 101 470 [i.2].

The goal of including an assisting service is that the Total Conversation user should be efficiently served in a language and modality that is convenient and manageable, and that a PSAP with authority to act on the emergency situation (i.e. one that is in the same country as the Total Conversation user) is able to handle the call in a supported language and modality. The need for assisting services could be indicated in a number of ways such as:

- in the signalling from the user equipment;
- in the Total Conversation user profile; or
- explicitly by the Total Conversation user to the call-taker once the session has been established.

That indication, may be acted upon in the access network, the ESN, or at the PSAP. The invocation of an assisting service may occur at the time of session establishment and/or once the emergency session has been established.

Assisting services for Total Conversation users can be invoked in different ways in different networks for non-emergency sessions, e.g. by the Application Service provider. However, for IMS roaming users and IMS emergency registered users the Application Service provider might not be included in the session routing and would therefore be unable to invoke the assisting service. There is therefore a need for consistent implementation across different networks to ensure successful inclusion of assisting services in those cases.

Any emergency sessions that are routed via an assisting service (e.g. in the home network) and therefore potentially not identified as emergency sessions by the network, would be subject to network charges that could be billable to the Total Conversation user. This is contrary to the EU Universal Service Directive [i.27] requirement that all citizens should be able to call emergency services free of charge. Lawful Interception would also need to be supported for such calls (see TS 133 106 [i.28] and ES 201 158 [i.29]).

IMS:

- In IMS, a user terminal detecting an emergency session when it is not IMS registered in its home network or is IMS registered but roaming outside of its home network, has to initiate IMS emergency registration as per clause 7.2 of TS 123 167 [i.8]. This means that emergency session establishment is handled differently to non-emergency session establishment, and a consequence, the usual method used for indicating the need for an assisting services for non-emergency sessions might not be supported.

IETF SIP:

- In IETF SIP, Total Conversation users connecting outside of their home network will always be SIP registered in the home network. This is regardless of whether an emergency session is to be established or not. In that case, there could be a problem if both the Application Service Provider in the home network, and the PSAP in the visited country try to invoke the assisting services for the session, based on a signalled indication from the Total Conversation user.

NOTE: In this case, it is likely that there will also be a more fundamental problem with identification of the most appropriate PSAP by the home network (the PSAP being in the visited country). This problem is related to addressing and routing so is not considered further here.

The obstacles to identifying and invoking assisting services are related to how to assess what modality(s) and language(s) the Total Conversation user and the PSAP are able to support, and how to invoke an appropriate assisting service in an interoperable way.

Given the potential compatibility problems outlined above, it is highly desirable to ensure that there are common solutions across all networks for indicating/identifying the need for, and invoking, assisting services when it comes to Total Conversation for emergency communications. Further discussions of solutions and recommendations are described under clause 7.2 of the present document.

Editor's Note: Migration paths need also to be considered so that service can start even if recommended solutions are not implemented in all networks.

Regardless of how the need for assisting services is indicated/identified, or by whom and when the assisting services are included in the session, they will for the most part be invoked as one participant in a multi-party conference between the Total Conversation user, the PSAP, and the assisting service. When applying functions for multi-party sessions, the specific requirements for caller location and identity information provision in the emergency service session case have to be respected.

The requirements for the IMS conference service are specified in TS 122 173 [i.6]. The IETF SIP conference framework is specified in RFC 4353 [i.26].

6.5.6 Security and Privacy

Security requirements are described in TS 101 470 v1.1.1 [i.2]. The interface between the Total Conversation terminal and the relay node is covered by IMS and IETF SIP specifications. The interface between the PSAP and the relay node is covered by the ESInet solution. Security functionality for emergency calling is specified in TS 123 167 [i.8] for IMS, and described in RFC 6443 [i.16]

Media encryption and key management as per TS 101 470 [i.2] are described for IETF SIP including the security methods recommended by EENA and IETF. However TS 101 470 [i.2] also refers to the use of ZRTP [i.47] based key exchange that is not mentioned by EENA and IETF specifications. Therefore ZRTP implementation is not a requirement for the implementing Total Conversation for emergency communications in the current emergency service environment.

Requirements for privacy and data protection of user information such as location, identity, etc. are subject to local regulations. They are applicable for the different entities that receive these data such as the access network, service provider, assisting service, PSAP, and others.

Authentication and trust of the PSAP towards the used assisting service is essential. If the solution requires the PSAP to invoke pre agreed/trusted assisting services into its multi-party conference then no further authentications are needed. Otherwise if the relay service is provided or invoked by the user or network service provider, then a mechanism should be defined to authenticate the assisting service. This requires some work to identify how key exchange is achieved and how to protect the functional entities, e.g. PSAP, ESInet from security and Denial of Service attacks.

NOTE: Key exchange and the protection against DoS attacks are not within the scope of the present document.

Editor's note: include the recommendation above in the conclusion and recommendations of the TR.

6.5.7 Transfer of session to other Total Conversation user terminal

Clause 6.3.8 of the present document discusses the potential need to transfer specific media from an ongoing session or the entire Total Conversation session, to a more appropriate Total Conversation terminal, e.g. one that has a higher

resolution screen. Requirements for the transfer of media between user terminals is specified for IMS in TS 122 228 [i.11] with procedures specified in TS 123 237 [i.30]. For IETF, SIP Session Mobility is described in RFC 5631 [i.31]. Requirements for Explicit Communication Transfer are described in TS 122 173 [i.6] for IMS and for IETF SIP Best Current Practice for Call Control – Transfer is specified in RFC 5589 [i.32].

If an attempted session transfer fails, then the Total Conversation user may be disconnected until such time that a call-back from the PSAP is successfully established. This would cause a delay in service. If the attempted transfer of media to another terminal fails, this might not result in the session being disconnected, but the attempt would cause distraction for the Total Conversation user and the call-taker, and could interrupt the service resulting in a delayed response. In addition, the transference of media between an emergency registered terminal in IMS and a SIP registered terminal might not be straightforward and would require further standardisation in order to work. TS 123 237 [i.30] therefore specifies that the terminal ‘shall’ not invoke Inter UE Transfer (see TS 123 237 [i.30]) during an emergency call, and TS 122 173 [i.6] specifies that Explicit Communication Transfer by any entity other than a PSAP is prohibited during an emergency call. RFC 6443 [i.18] and RFC 6881 [i.13] specify that the terminal should disable all features that will interrupt an ongoing emergency call. Although the scenario presented in clause 6.3.9 could potentially occur, it should be seen as an exception and something that could potentially be worked around, e.g. by the PSAP operator agreeing with the Total Conversation user to establish an outgoing call to the other terminal, or by inviting the other terminal to an ongoing conference.

NOTE: This would assume that the other terminal was addressable by the PSAP, discussion of which is beyond the scope of the present document.

As a conclusion, given the changes that would be needed to existing standards to support session or media transfer, the exceptional nature of the scenario presented, and the potential for a work around solution, the present document does not further consider transference of an ongoing session between Total Conversation user terminals.

6.5.8 Testing

The requirements for automatic functional testing of Total Conversation emergency communications from Total Conversation user terminals in production are described in TS 101 470 v1.1.1 [i.2]. The URN used in this case should start with “test”, for example “urn:service:test.sos” is defined specifically for testing as described in RFC6881 [i.13]. The PSAP used for test purposes should be able to test the media combinations that are required for Total Conversation, see RFC6881 [i.13]. Also including a relay service in the Total Conversation emergency test session should be taken into consideration so that this leg of the call is made part of the test call.

As the Test for Total Conversation for emergency communications uses the same ESInet as the regular emergency calls, it is recommended to consider the number of terminals performing the test at any moment in time in order to prevent congestion.

Editor’s note: There is a need to check if PSAPs are aware of this, and if it can be recommended.

7. Key Issues for implementing Total Conversation for Emergency services

7.1 General

The key implementation issues for Total Conversation for Emergency Communications are described in this clause. For each key issue one or several solutions with analysis and then a conclusion is provided. The analysis is the key factor to identify if changes are needed in 3GPP and/or IETF specifications.

In all cases different solutions are evaluated while maintaining the need to meet existing requirements for non-Total Conversation emergency sessions, e.g. location of Total Conversation user, call-back, etc.

7.2 Identification and invocation of assisting relay service

7.2.1 General

If the Total Conversation user has communication needs that may require an assisting relay service to be included in the emergency session, this can be indicated in different ways (see clause 7.2.3). The indication can be used by functional entities at different locations within the network to trigger the invocation of a multi-party conference that includes the assisting service as one of the participants if needed and as outlined in clause 6.5.5.

The need for a specific assisting relay service could be explicitly indicated in the Total Conversation user's subscription profile or in signalling from the Total Conversation user's terminal. Alternatively, it could be inferred by entities in the network based on the Total Conversation user's indicated language / modality preferences and the known capabilities of operators and/or equipment at the receiving PSAP in the case of emergency invocation.

The two main issues that need to be considered with respect to assisting services for emergency communications are therefore:

1. Where and by which entity in the networks should the multi-party conference be invoked.
2. How to indicate/identify the need for the assisting service;

7.2.2 Issue #1: Invoking the conference for inclusion of an assisting service

7.2.2.1 General

A multi-party conference could be invoked for inclusion of an assisting service by the following entities:

1. The Total Conversation user terminal;
2. The access network by the Application Service Provider (which could provide the assisting service itself);
3. The ESInet, e.g. the Public Service Access Point (PSAP).

NOTE: There are many different ways in which a conference can be invoked and it is not considered practical to describe and analyse all of those in the clauses that follow. However, sufficient examples are given to allow identification of the advantages and disadvantages associated with having the conference invoked by each of the three entities above.

7.2.2.2 Solution #1: Conference invocation by the Total Conversation terminal

7.2.2.2.1 Description and analysis

This describes the case where the conference is hosted by a multi-party conference bridge external to the Total Conversation terminal.

A three way conference session is invoked and controlled by the Total Conversation terminal, e.g. by using the following steps:

1. The Total Conversation user terminal requests creation of a conference focus (host) using SIP ad hoc methods as per RFC 4579 [i.33];
2. The Total Conversation user terminal then sends a REFER request as per RFC 3515 [i.34] to the assisting service referring it to a conference URI;
3. The Total Conversation user terminal then uses 3rd Party Call Control (3PCC) as per RFC 3725 [i.35] to connect the media from the PSAP to the conference focus.

There are other ways in which PSAP may be connected to the multi-party conference bridge, e.g. by sending a REFER request. One advantage of using 3PCC however, is that the INVITE message from the Total Conversation user terminal appears no different than a normal INVITE for a Total Conversation emergency session.

This method assumes that the address of the assisting service to be invoked is configured in the Total Conversation terminal. The address may be obtained by the Total Conversation user subscribing to the assisting service, or configured by the application service provider, e.g. via service provisioning or an application downloaded to the terminal.

7.2.2.2.2 Evaluation

Advantages:

- There is no need for the Total Conversation terminal to include an explicit indication in signalling of the Total Conversation user's communication needs. Hence, there should be no impact to existing standards on the user to network signalling.
- The PSAP will receive the necessary location and caller identity information in the INVITE directly from the Total Conversation user terminal, as within the existing solutions for emergency services.
- The Total Conversation user usually has the best knowledge about which assisting service is needed in a session.
- It is possible to include an assisting service for the purposes of translation between a Total Conversation user requiring sign-language or text support and a voice only PSAP located in the CS domain.

Disadvantages:

- Not all terminals making emergency calls will be conference aware or support SIP conferencing call control conventions as per RFC 4579 [i.33].
- Not all terminals making emergency calls support the SIP REFER mechanism.
- IMS in TS 122 173 [i.6] currently prohibits that any entity other than the PSAP can invoke the CONF service for an emergency session. For IETF SIP RFC 6443 [i.16] recommends and RFC 6881 [i.13] mandates that three-way-calling be disabled in terminals.
- The Total Conversation user terminal would need to have specific application functionality to make the invocation of assisting relay services convenient for the user.
- An IMS emergency registered Total Conversation user will not be able to establish a conference between the PSAP and the assisting service, because the registered contact field can only be used for emergency sessions, and because media associated with the emergency sessions have to be handled independently from media associated with any other sessions as per TS 124 229 [i.25].
- The PSAP would not be aware of the of the contact information for the assisting service for the purposes of including that service again in the event of a call-back to the Total Conversation user. This means that the Total Conversation user terminal would have to establish the multi-party conference again at the time of the call-back.
- The PSAP will not be aware of the multi-party conference so the conference party details will not be included in session logging and recording.
- If this is not the only implemented method, there may be a risk for invocation of an assisting service even when there is no need for it, e.g. when the PSAP has capability for the communication modality of the Total Conversation user.

Conclusion:

This solution is not recommended for IMS, because of the modifications that would be needed to the 3GPP standard in order to allow the Total Conversation terminal to invoke a conference for the emergency session.

This solution could be acceptable for IETF SIP if a variant were selected that made the connection with the assisting service simultaneously with the connection to the PSAP, because this would seem unlikely to interrupt the session (IETF specifications RFC 6443 [i.16] and RFC 6881 [i.13] only discourage such operations in the event that they will interrupt an ongoing emergency session). In this case all Total Conversation user terminals would need to implement RFC 4579 [i.33] and SIP REFER mechanisms accordingly.

7.2.2.3 Solution #2: Conference invocation initiated in the Access Network

7.2.2.3.1 Description and analysis

This describes the case where the conference is hosted by a multi-party conference bridge in the Application Service Provider/access network.

A three way conference session is invoked and controlled by the Application Service Provider, e.g. as follows:

1. The Total Conversation user initiates a Total Conversation emergency session by sending an INVITE indicating an emergency session.
2. The need for an assisting service to be included in the session is identified by the Application Service Provider e.g. through the User Profile indicating need of the assisting service for all calls to voice-only terminals, i.e. those that do not support video and text, and for all calls with emergency services.
3. An Application Server invokes a multi-party conference by dialling into a dedicated conference URI as per RFC 4579 [i.33];
4. The Application Server refers the Total Conversation user and the needed assisting service to the conference as per RFC 3515 [i.34];

The Application Server initiates an emergency session on behalf of the Total Conversation user, passing the caller identity and location information transparently to the PSAP, and using 3rd Party Call Control to connect the media from the PSAP to the conference, as per RFC 3725 [i.35].

This method assumes that the Application Service Provider knows the address of the assisting service to be invoked and that it is configured in the Total Conversation user profile. This may be because it is the Application Service Provider offers the assisting service to the Total Conversation user as part of his/her subscription.

Other mechanisms than those above are available to the Application Service Provider for connecting the Total Conversation user, assisting service, and PSAP to the conference.

7.2.2.3.2 Evaluation

Advantages:

- If the need for and the address of the assisting service were stored as part of the user profile, there would be no need for the Total Conversation user terminal to include any indication in signalling of the need for a conference including an assisting service to be invoked by 3rd party in either the Access Network or the ESIInet. Hence there would be no impact on existing terminal to network signalling.
- The PSAP can receive the necessary location and caller identity information in the INVITE from the Total Conversation user terminal if relayed transparently by the Application Server initiating the emergency session.
- The Application Service may be set up to invoke the same suitable assisting service as is done in everyday calls with the Total Conversation user. This implies a good opportunity for a successful emergency session.

- It is possible to include an assisting service for the purposes of translation between Total Conversation user requiring sign-language support and a voice only PSAP located in the CS domain.

Disadvantages:

- IMS in TS 122 173 [i.6] currently prohibits that any entity other than the PSAP can invoke the CONF service for an emergency session. For IETF SIP RFC 6443 [i.16] recommends and RFC 6881 [i.13] mandates that three-way-calling be disabled in the network during emergency sessions.
- Total Conversation users' sessions from IMS Emergency registered subscribers whether roaming or in their home networks are not routed via the home Application Service Provider. As such, the User Profile is not accessed, in which case no conference can be invoked (see TS 123 167 [i.8]);
- If the need for a specific assisting relay service were not stored as part of the user profile, there would be a need for the Total Conversation user terminal to include an explicit indication for the specific relay service in signalling.
- The PSAP will not be aware of the contact information for the assisting service for the purposes of including that service again in the event of a call-back to the Total Conversation user. However, the service could potentially be invoked automatically by the Application Service Provider on behalf of the Total Conversation user as part of the terminating call procedures.
- The PSAP will not be aware of the multi-party conference so the details might not be included in session logging and will only be included in the session recording if the PSAP supports all media of the user and the assisting service together.

NOTE: If Additional Data is implemented (see Additional Data Related to an Emergency Call [i.41]) then information about the assisting service will be available to the PSAP.

- Not all Total Conversation user terminals support the SIP REFER mechanism.

Conclusion:

This solution is not recommended for IMS, because of the changes that would be needed to the 3GPP standard in order to allow the Application Service provider to invoke a conference for the emergency session.

This solution could be acceptable for IETF SIP if a variant were selected that made the connection with the assisting service simultaneously with the connection to the PSAP, because this would seem unlikely to interrupt the session (IETF specifications RFC 6443 [i.16] and RFC 6881 [i.13] only discourage such operations in the event that they will interrupt an ongoing emergency session).

7.2.2.4 Solution #3: Conference invocation in the ESNnet

7.2.2.4.1 Description and analysis

This describes the case where the conference is hosted by the PSAP that controls the multi-party conference bridge.

A three way conference session is invoked and controlled by the PSAP, e.g. as follows:

1. The TC user terminal sends an INVITE to the PSAP for an emergency session
2. The need for an assisting service is identified by the PSAP. e.g. by checking the Total Conversation user's indicated language / modality preferences and recognising that those are not supported by the PSAP;3. The PSAP invokes a multi-party conference by dialling into a dedicated PSAP conference URI as per RFC 4579 [i.33];
4. The PSAP refers the assisting service to the conference as per RFC 3515 [i.34];

5. The PSAP responds to the Total Conversation user terminal using 3PCC as per RFC 3725 [i.35], with an SDP offer directing the TC user media towards the multi-party conference bridge.

7.2.2.4.2 Evaluation

Advantages:

- The PSAP will in any case have to support conference functionality in order to be able to conference in and transfer to other agencies and first responder assisting services for cases where the need is discovered by the call-taker during the emergency session;
- The PSAP will have contact information for the assisting relay service so that it can be included again in the event of a call-back to the Total Conversation user;
- The PSAP will be fully aware of and in control of the emergency conference. This would facilitate re-establishment of the conference in the case of call-back.
- The Total Conversation user terminal need not be conference aware, nor support SIP REFER mechanism.

Disadvantages:

- This will not work during the migration phase in the event of a Total Conversation session being routed to a PSAP in the CS domain, e.g. PSTN, where an assisting service e.g. could be used to provide sign-language translation via video to Total Conversation user and audio only to the PSAP. In this case media gateways are used and fall-back to text service is recommended.

NOTE: Since the assumption in this document is that the PSAP and relay service are connected to IP based network ESIInet, then this disadvantage should not appear in full deployments of member states to the Total Conversation for emergency communications.

Conclusion:

This appears to be a good solution for IMS and IETF SIP for use in the home country of the user, because it places no special requirement on the Total Conversation user terminal, and would have limited impact on existing standards.

NOTE: In case of a scenario which could transpire for roaming users during migration to NG112, if the need for an assisting service could be identified at the gateway between the access network and the CS network, then it may be possible to invoke the conference at that point. The details of this solution are out of scope for the present document.

7.2.3 Issue #2: Indicating/identifying the communication needs of the Total Conversation user

7.2.3.1 General

It would be possible in some circumstances for the relay service to be invoked in the same way for emergency session as it is for a non-emergency session. This could have benefits for the Total Conversation user, e.g. being able to use a relay service provider that has been tried and is trusted due to its everyday use by the Total Conversation user. However, guidance received from stakeholders has indicated a preference for a single common solution controlled by the PSAP which would work for all Total Conversation users regardless of their registration or roaming status. Also the analysis undertaken in clause 7.2.2 indicates that this would appear less controversial from the point of view of the impact to existing standards. The present clause therefore focusses on the way in which the communication needs of the Total Conversation user, and if necessary the URI of the required relay service can be indicated to the PSAP. A description of a solution that allows relay services to be added by different parties in the emergency session depending on the registration and roaming status of the Total Conversation user is provided in Annex A.

NOTE: If the PSAP can answer every call directly into a conference, then the steps below involving PSAP invocation of the conference would not be necessary.

7.2.3.2 Solution #1: Preferred Language / Modality indicated by Total Conversation terminal in Accept-Contact header

7.2.3.2.1 Description and analysis

The indication of the Total Conversation user's communication needs are signalled by the Total Conversation terminal using the user preference mechanism extension described in RFC 3840 [i.50] and RFC 3841[i.5]. They use the language / modality tags defined in the IANA language sub-tag registry described in RFC 5646 [i.36], and the media tags of RFC 3840[i.50]. Examples of use can be found in RFC 4596 [i.14].

The method builds upon the premise that called parties have registered their language/modality/media capabilities by listing their associated tags when registering to the SIP service. The caller expresses his/her needs and preferences with similar tags in the Accept-Contact field. The addressed service provider matches the preferred capabilities against those indicated as available, and routes the call to the best match. Extra resources can be invoked to improve the match. The resulting capabilities in the session are expressed in the Contact field of the response so that a negotiation is completed.

RFC 6443 [i.16] clause 9.2 and EENA NG112 LTD [i.1] clause 4.3.1.5 briefly describe that it is possible to route emergency calls in the ESIInet based on headers in the Invite.

1. The Total Conversation user terminal is configured by the Total Conversation user, or by the Application Service provider to include an indication of the needed language / modality in an Accept-contact header in the INVITE message;
2. When the INVITE arrives at the ESIInet the Accept-contact header is cross checked with the registered capabilities of the PSAPs;
3. If one or more of the PSAPs is able to support the needed language / modality combination, then the call is routed to the most appropriate of those PSAP for handling the call.
4. If the indicated language / modality requirement of the Total Conversation user cannot be accommodated by any of the PSAP operators, then a conference is invoked by the most appropriate PSAP as per clause 7.2.2.3 and the assisting service is added to the session.
5. The supported modalities and languages in the session are presented in the response by SIP media and language tags according to RFC 3840 [i.50].

7.2.3.2.2 Evaluation

Advantages:

- The method for inclusion of a user's language / modality preferences in SIP messages is already specified in RFC 4596 [i.14] for the languages / modalities covered in RFC 5646 [i.36], as is the ability to route locally based on those preferences. No further standardisation work would therefore be needed in IETF to cover a requirement for a specific spoken/written or signed language. However, there is no commonly agreed way to differentiate between spoken and written language.
- The ability to negotiate a user's desired language and modality, and the ability to pass this information between end points are requirements of IMS. Only limited changes to 3GPP profile might be needed to guarantee this functionality for IMS.

Disadvantages:

- This method is limited to indicating the Total Conversation user's need for a specific language / modality combination, i.e. spoken/written, or signed. It cannot currently be used to indicate e.g. the communication needs

for someone requiring translation due to a severe speech impediment who might usually use a speech-to-speech relay service. It would also appear not possible to use this method to indicate a need for rapid captioning of speech. These two requirements seem to require a service need indication rather than a modality need indication. Such indications are as yet to be defined.

- This method would, with the currently specified language and media tags, not be able to clearly discriminate between spoken and written language. Further, it would not allow for the preferred directionality of communication to be indicated. E.g. a user wishing to use speech for outward communication but preferring text for incoming communication.
- This method would not work if the Total Conversation user were to attempt an emergency call using a Total Conversation terminal other than their own which had therefore not been configured with the Total Conversation user's communication preference settings.

Conclusion:

This method of indication is not recommended because it lacks flexibility in language/modality negotiation due to its not being possible, using currently available standards, to discriminate between written and spoken language preferences, and because it could not, with currently available standards, be used to indicate the needed direction (send or receive) for different modalities. Solutions for directional and media level indication to be used in SDP are under development by IETF in draft-gellens-slim-negotiating-human-language [i.43] (see also clause 7.2.3.3 below). .

7.2.3.3 Solution #2: Preferred Language / Modality indicated by Total Conversation terminal in SDP language attribute

7.2.3.3.1 Description and analysis

The indication of the Total Conversation user's communication needs are signalled by the Total Conversation terminal using the language attribute of the SDP (RFC 4566 [i.42]), and the languages / modalities defined in the IANA language sub-tag registry described in RFC 5646 [i.36].

IETF SLIM is currently working to specify a human interactive language tag to indicate which language should be used for each direction of an interactive media stream. See draft-gellens-slim-negotiating-human-language [i.43].

1. The Total Conversation user terminal is configured by the Total Conversation user, or by the Application Service provider to include an indication of the needed language / modality in a language attribute in the SDP offer included with the INVITE message;
2. When the SDP offer arrives at the ESInet the language attribute is cross checked with the registered capabilities of the PSAPs. This function is specified in RFC 6443 [i.16] clause 9.2 and in EENA NG112 LTD [i.1] clause 4.3.1.5;
3. If one or more of the PSAPs is able to support the needed language / modality combination, then the call is routed to the most appropriate of those PSAPs for handling the call.

NOTE 2: Use of an SDP language attribute could also allow for negotiation of the language to be used via the SDP offer-answer mechanism. See RFC 3264 [i.44] updated by RFC 6157 [i.45].

4. If the indicated language / modality requirement of the Total Conversation user cannot be accommodated by any of the PSAP operators, then a conference is invoked by the PSAP as per clause 7.2.2.3 and the assisting service is added to the session.

7.2.3.3.2 Evaluation

Advantages:

- The method for inclusion of a user's language / modality preferences in the SDP body of a SIP message is already specified in RFC 4566 [i.42] for the languages / modalities covered in RFC 5646 [i.36]. In addition, RFC 6443 [i.16] and EENA N112 LTD [i.1] state that Emergency Service Routing Proxies (ESRP) are expected to be able to provide routing based on media, languages and other fields in SIP and SDP.
- Whilst some further standardisation work is needed in IETF to allow the preferred language / modality to be indicated for each media direction rather than for the entire media session, this work is already underway in IETF SLIM. Therefore no further standardisation work than that would be needed in IETF.
- The ability to negotiate a user's desired language and modality, and the ability to pass this information between end points are existing requirements of IMS, as is the inclusion of SDP in SIP messages. Therefore, potentially no changes to 3GPP profile would be needed to add this functionality to IMS.

Disadvantages:

- This method is limited to indicating the Total Conversation user's need for a specific language / modality combination, i.e. spoken, written or signed. It cannot currently be used to indicate e.g. the communication needs for someone requiring translation due to a severe speech impediment who might usually use a speech-to-speech relay service. It would also appear not possible to use this method to indicate a need for rapid captioning of speech. These two requirements seem to require a service need indication rather than a modality need indication. Such indications are as yet to be defined.

NOTE: The ongoing SLIM work [i.43] covers the most common cases, and the aim is to continue the standardisation to cover more complicated use cases.

- This method would not work if the Total Conversation user were to attempt an emergency call using a Total Conversation terminal other than their own which had therefore not been configured for the communications needs of the calling user.

Conclusion:

This method of indication is recommended for the case when the Total Conversation user has language / modality needs that can be indicated using this mechanism.

7.2.3.4 Solution #3: Preferred Language / Modality tag added by Application Service Provider

7.2.3.4.1 Description and analysis

This method is similar to that for solution #1 except that the Total Conversation user's communication needs are added by the Application Service provider to the signalling.

NOTE: This method will only work if the Total Conversation user has asked their Application Service Provider to set the preferences in a personal profile.

1. The Total Conversation user sends an INVITE to establish the emergency session.
2. The communication needs of the Total Conversation user are stored in the User Profile with the Application Service provider. Service logic in the network at the routing proxy, triggers an Application Server which adds the needed language / modality indication to the Accept-Contact header or to the SDP body of the INVITE and forwards the message on towards the PSAP.
3. The session signalling continues as per steps 2-4 of clause 7.2.3.2 / 7.2.3.3.

7.2.3.4.2 Evaluation

Advantages:

- The advantages for solution #1 in clause 7.2.3.2.2 or solution #2 in 7.2.3.2.2 apply respectively depending on whether the language / modality indication is added to the Accept-Contact header or to the SDP.
- The TC user can easily switch Total Conversation user terminal without losing the language/modality settings.

Disadvantages:

- Total Conversation user's sessions from IMS Emergency registered or roaming subscribers (see TS 123 167 [i.8]) are not routed via their home Application Service provider, so it cannot be guaranteed that in all emergency sessions will have the language / modality preferences added.
- This method would in all practical cases not work if the Total Conversation were to attempt an emergency call in IMS using a Total Conversation terminal other than their own.

NOTE: This could potentially work if the UICC hosting the subscription for the Total Conversation user were transferred into that terminal, but that would seem very unlikely to happen in an emergency situation.

- Depending on how the language / modality indication is added, the disadvantages of solution #1 in clause 7.2.3.2.2 or solution #2 in 7.2.3.3.2 also apply respectively.

Conclusion:

This method of indication is not recommended due to the fact that it cannot be guaranteed to include the language / modality information for all emergency sessions.

7.2.3.5 Solution #4: Use of Additional Data to indicate communication needs and / or a specific relay service

Chapter 9 of the EENA Long Term Development specification [i.1] talks speculatively about the potential use of "additional data" by the user terminal to send information about a specific relay service to the PSAP for inclusion in the ensuing emergency conference. Since [i.1] was finalised, work has progressed on this work in the IETF ECRIT group. The latest draft version of the specification can be found in IETF draft-ietf-ecrit-additional-data [i.41].

Looking at the IETF Additional Data draft [i.41] however, it does not appear that any of the defined data structures readily lend themselves to inclusion of information relating to a relay service (unless included by a relay service itself if present in the routing of the session).

Firstly, the draft specification does not include any structures for data associated with a caller, only for data associated with a call. Caller related data perhaps related to communication needs and/or a specific relay service may be the subject of future specification, but that will not happen within the timeframe of STF489.

Secondly, there does not appear to be an appropriate parameter in the vCard structure describing subscriber information other than "lang" for including information about communication needs of the user in subscriber information for the call. Whilst this could be used to provide an indication of the user's preferred language for the session and could potentially be used at the PSAP for invoking an appropriate relay service, as confidential user data it is subject to more stringent privacy requirements and so cannot be used for routing or negotiation during session establishment.

Finally, there appears to be no means to include a URI associated with a relay service, or indeed any indication that such a URI would be associated with a relay service that needed to be included in the call.

However, given the solutions described in the present document, it appears likely that the majority of cases where a relay service needs to be included could be handled without having to use Additional Data for identification of the service. As such its use for providing information about a communication need and/or relay service to be included, could be considered purely as a fall-back mechanism of last resort. In that case, it would be possible for the Total Conversation user terminal to include in the "Comment" block of the Additional Data [i.41], an indication of the needed relay service, and its URI to be used in the event that the PSAP cannot identify one based on the language / modality indication provided elsewhere in the signalling.

The “Comment” block is not intended to be machine readable so could not be used for automatic inclusion of the relay service by a PSAP local implementation, however it would be available to the PSAP operator at the time the session was established so could be used to manually add the necessary relay service before the call-taker starts communication with the Total Conversation user. The “Comment” block could also potentially be used to indicate communication needs that are not covered by existing language / modality tags, as well as the URI of the relay service.

7.2.4 Issue #3: Emergency session handling at the assisting relay service.

7.2.4.1 General

It is likely that the assisting relay services used to enhance communication for Total Conversation for emergency sessions will in many cases be the same ones as those used for non-emergency sessions. In that case, there are a number of reasons why it is necessary for the relay service to be able to differentiate between emergency sessions and non-emergency sessions.

One reason is that it is desirable to treat incoming emergency sessions to the assisting relay service with higher priority than non-emergency sessions. Another reason is that the interpreters and call assistants working in the relay service need to know and accept that they will be handling emergency calls, because of the extra stress it can cause. It is desirable, and in some jurisdictions it may also be required, that interpreters have been specially trained to handle emergency calls in the relay service.

The assisting relay service could be invoked for an emergency session by different entities in the network. In the case where the assisting service is able to be invoked by the Total Conversation user terminal or by the Application Service Provider including the URI of the needed assisting service in the signalling of the emergency session, then the assisting relay service could act on the “urn:service:sos” indication included in the INVITE towards the PSAP. However, in the case where the assisting relay service is being invoked by the PSAP itself, or by a relay node setting up the multi-party call, the incoming INVITE will appear as “normal” (non-emergency) session establishment, and no such indication will by default be available. It is therefore necessary to include a specific indication.

The following clauses consider different solutions for how to indicate the emergency nature of the incoming session to the assisting relay service.

7.2.4.2 Solution #1: Use of “SIP PSAP callback indicator”

7.2.4.2.1 Description

In this case, the PSAP would include the “SIP PSAP callback indicator” as specified in RFC 7090 [i.46]. This indication was specified in order to be used in the event of the PSAP having to call back to the SIP registered user, so that the session would be recognised in a user’s terminal as relating to a previously established emergency session.

7.2.4.2.2 Evaluation

Whilst the “SIP PSAP callback indicator” could potentially be used for the purposes of indicating an incoming emergency session from a PSAP to the assisting relay service, such use is not in line with the original intention of the indicator and would not necessarily result in priority handling of the INVITE by the network. Also the SIP PSAP callback indicator is not considered “trusted” according to the IMS standard (e.g. it is to be ignored by IMS registered User Equipment). As such, it might be completely ignored or even removed by intermediate network entities. (See clause 6.3.10).

Conclusion:

This solution is not recommended because it could not provide a reliable indication to the assisting relay service of the nature of the emergency nature of the incoming session.

7.2.4.3 Solution #2: Use of assisting relay service emergency specific URI

7.2.4.3.1 Description

In this case, an emergency call specific URI is used by the invoking entity to address the assisting relay service in order to enable priority handling and other emergency service specific actions.

7.2.4.3.2 Evaluation

An emergency specific URI used to address the assisting relay service should not be subject to any lack of trust by the system or network entities, so would appear reliably at the assisting relay service allowing priority treatment of the incoming emergency session and preparedness of the personnel involved.

The use of such a URI is currently not specified for assisting relay services, though it is assumed to exist according to the specifications in EENA NG112 LTD [i.1] and in TS 101 470 [i.2]. Methods for making the URIs of suitable relay services known to the functional entities that will invoke them need to be established. Such methods are discussed elsewhere in the present document.

Conclusion:

This solution is not recommended. It has benefits but complications. It can provide a reliable indication of the emergency nature of an incoming session. But separate entry addresses need to be agreed and communicated to the parties doing the invocation.

7.2.4.4 Solution #3: Trusted relay services recognising PSAP specific originating URIs

7.2.4.4.1 Description

A database of PSAP URIs is made available to dedicated and therefore trusted relay services. If the URI of the originating party of an incoming session to the relay service is recognised as the URIs of a PSAP, then it will be identified as an emergency session and handled appropriately by the assisting relay service.

7.2.4.4.2 Evaluation

Use of a dedicated SIP Contact URI by the PSAP for outgoing emergency sessions should provide a secure and reliable way to indicate the emergency nature of the incoming session to a relay service, thus enabling the session to be handled accordingly.

Editor's note: It is FFS whether any functionality entity in path of session between PSAP and relay service would have cause to alter or destroy the Contact URI.

However, the identification of PSAP URI would need to be collected in a database that would also have to be kept up-to-date. Ownership of this data-base would need to be identified and agreed.

Conclusion:

This is a possible solution, however it would require political consensus and a decision on who would be responsible for creating and maintaining the database. It is not recommended as a short term solution, but could be considered in the longer term.

7.2.4.5 Solution #4: include a SIP field in the call to use for assisting relay service invocation

7.2.4.5.1 Description

The party invoking the assisting relay service includes a SIP header or parameter in the session establishment signalling that indicates that the session is related to an emergency. A suitable mechanism for such an indication would be the addition of a Call-Info field with a purpose parameter indicating relay service request for an emergency call.

The Call-Info field is specified in RFC 3261[i.18]. It contains a URI and a purpose parameter. The URI would be the URI used to call the relay service from a multi-party bridge to invoke it to the relay service call. The "purpose" parameter would be registered with IANA to indicate emergency related assisting relay service call, e.g. "emergency-relay".

7.2.4.5.2 Evaluation

This proposed method has promising properties. It would however require IETF standardisation and IANA parameter registration. Such operations have a tendency to take a long time.

Conclusion:

This is a possible solution, but not one that can be recommended in the short term due to the additional standardisation work needed. It has benefits that may be explored for other reasons but is not recommended for discriminating emergency calls from normal call.

7.2.4.6 Solution #5: include a SIP priority tag in the call to the assisting relay service to indicate its emergency status

7.2.4.6.1 Description

As an indication to the assisting service that the call is related to an emergency service call, a priority indication with value "emergency" is included in the invite to the relay service. The assisting service can recognize this indication and handle the session appropriately.

There are currently two standardised ways to do this. One is to include the SIP header field "Priority" with value "emergency" in the Invite. This field is specified in RFC 3261 [i.18]. Another is to use the feature tag "Priority" with the value "emergency" in the Contact and Accept-Contact fields as specified in RFC 3840 [i.50] and RFC 3841 [i.15]. The assisting service could also make its SIP registration for the emergency queue with the same value in order to support automatic internal routing of the calls. The following discussion is valid for the approach with the priority feature tag.

7.2.4.6.1 Evaluation

The indication of the feature tag "Priority: emergency" offers an already standardised way to indicate to the assisting service that the call is about an emergency. This is a straightforward and apparent way that can be easily implemented. There are also standardised methods to make automatic routing based on existence of this feature tag that may be used by the assisting service.

When this tag is used, the URI used to call an assisting service can be the same for everyday calls as for emergency calls.

There are risks for fraud and Denial of Service attacks, but no more so than for solutions #1, #2 and #4.

NOTE: The mitigation of these risks is outside the scope of the present report.

Conclusion:

This solution is recommended as it has many positive aspects. In addition, it should be included in the interface specification that is in any case needed between the invoking entity and the assisting relay service.

7.2.5 Issue #4: Automatic translation

7.2.5.1 General

Editor's note: Include introductory text here about Automatic translation.

7.2.5.2 Solution #1: Automatic translation at the PSAP

7.2.5.2.1 Description and analysis

The indication of the Total Conversation user's communication needs are signalled by the Total Conversation user terminal using the user preference extension mechanism described in clause 7.2.3.2 above.

This solution requires the use of an "off the shelf" or specifically developed application providing automatic spoken/text language translation, i.e. spoken to spoken language, spoken to text, text to spoken and text to text language translation.

1. The PSAP is configured to use an application for automatic spoken/text language translation;
2. The PSAP receiving the incoming Total Conversation emergency session checks the indication of needed language / modality to see if automatic translation between the requested Total Conversation user language/modality and the language/modality understood by the call-taker is available.
3. If automatic translation is available, then it takes place at the PSAP between the Total Conversation user and the PSAP call-taker. The Total Conversation user terminal should receive information about the PSAP's spoken language/modality supported in the RESPONSE messages from the PSAP;

7.2.5.2.2 Evaluation

Advantages:

- The method can re-use the indication of the Total Conversation user's communication needs as described in clause 7.2.3.2, but avoids the additional challenges presented by having to identify and invoke a separate relay service.
- Translation applications are generally easy to install and link to the SIP and IMS software (some may already be included) and can be available to all. This can also make it a cost effective solution.
- This method can be convenient for roaming scenarios when the Total Conversation user contacts a local PSAP for the emergency session.
- No additional standardisation work is needed to support this method, as it is performed at the PSAP or Total conversation user terminal.
- Support of automatic translation in the Total Conversation user terminal as the general solution would reduce the need to indicate the Total Conversation user's communications needs to the PSAP.

Disadvantages:

- Automatic translation is limited to support of translation between spoken languages, between spoken and written languages and between written languages only. It cannot currently be used to support the communication needs for someone requiring translation between signed and spoken language.

NOTE: It is possible that reliable automatic translation will be developed also for signed languages in the future. It is not within the scope of the present TR to consider this further.

- Automatic translation applications for use in an emergency context would require rigorous testing and in some jurisdictions potentially certification in order to provide sufficient confidence in PSAP operators and Total Conversation users of their utility and acceptability.

Conclusion:

Whilst automatic translation applications would be easy to deploy and be in-line with developing trends the ICT area, their accuracy and acceptability by stakeholders should be carefully considered.

In the longer term as the technology evolves, automatic translation could potentially be used to reduce the need for translation relay services offering translation between spoken languages, between spoken and written languages and between written languages. It is therefore recommended that the usage of such applications are further explored by stakeholders.

7.2.5.3 Solution #2: Automatic translation at the Total Conversation user terminal

Editor's note: This is to be completed.

8 Recommendations

8.1 General

The following clauses contain recommendations for an implementation based on solutions evaluated in clause 7.2 of the present report.

8.2 Assisting services

Looking at existing 3GPP and IETF specifications to see how Total Conversation for Emergency Communications can be supported, as documented in the earlier clauses of the present report, there is one major difference compared to voice only emergency sessions. This is the fact that the additional media capabilities of Total Conversation session enable the inclusion of an assisting relay service between the Total Conversation user and the call-taker at the PSAP to provide interpretation between one modality of communication via one medium and another modality via another medium, e.g. between sign-language via video and spoken language via audio.

Whilst it is possible to support assisting relay services for non-emergency Total Conversation sessions, the technical interfaces are not clearly specified by existing standards. Current standards are also sufficiently flexible to allow for different implementations in different networks. However, for Total Conversation for Emergency Communications to be in accordance with European Policy [1.27] is it necessary for such assisting relay services to be available to users having additional communication needs, regardless of whether they are calling in their home networks or travelling to another member state. This means that a well specified and general solution is desirable.

The ability to invoke an assisting relay service in a range of different operating environments presents a number of challenges, solutions for which have been described and evaluated under 7.2 of the present document. Based on the discussions and conclusions in that clause, the following recommendations are made with respect to implementation of Total Conversation for emergency communications with assisting services.

Recommendation #1 – Invocation of assisting services:

- Invocation and control of the multi-party conference to include an assisting relay service should be the responsibility of the PSAP. See clause 7.2.2.4.
- When the Total Conversation user terminal is IETF SIP registered, or IMS registered in their home network, the Total Conversation user terminal or the Application Service Provider in the home network may invoke an assisting relay service for the Total Conversation user in the same way for Total Conversation emergency sessions as it does for Total Conversation non-emergency sessions.

- In the case that an assisting relay service is invoked by an entity other than the PSAP:
 - It is recommended that Additional Data is used to notify the PSAP that the relay service is included in the session.
 - The indication of the Total Conversation user's communication needs should be updated to indicate support of spoken language in both directions (if applicable) so as to avoid unnecessary additional invocation of a relay service by the PSAP.
 - The invoking entity should not wait for the connection of the assisting relay service before attempting to connect the PSAP, i.e. the connection should take place in parallel.
- In the event, that the assisting relay service is not invoked by the Total Conversation user terminal or by the Application Service Provider including the URI of the needed assisting service in the routing path of the emergency session, i.e. the relay service does not receive the "urn:service:sos" indication which would be included in the INVITE towards the PSAP, the invoking entity should include SIP priority tag in the call to the assisting relay service to indicate its emergency status as per clause 7.2.4.5.
- In the event of roaming where the Total Conversation emergency session is routed via the Total Conversation user's home network to the home PSAP, an assisting relay service may if needed be invoked by the home PSAP before it connects a PSAP in the visited network.
- If a Total Conversation user makes an emergency call and requires support of another modality than plain speech in both directions, but the PSAP answers with only audio enabled, then the calling user or its communication service provider may invoke a suitable assisting relay service as a third party in the call in a way that does not interrupt the call if that functionality is supported. This situation would occur if the addressed PSAP were not NG112 enabled.

Recommendation #2 – Indication of communication needs:

- If the Total Conversation user has particular communication needs that can be indicated using language / modality tags, then their communication needs should be signalled by inclusion of the needed language / modality tag per media line in the SDP offer sent with the INVITE by the Total Communication user terminal or the communication service provider. See clause 7.2.3.2.

NOTE: The language / modality tags could be either the existing "lang" tags [i.36] or the "humintlang" tag being developed in IETF SLIM [i.41].

- If the Total Conversation user has particular communication needs that cannot be indicated using language / modality tags, then their communication needs should be signalled by inclusion of an additional service request sent with the INVITE by the Total Communication user or communication service provider.

Editor's note: The signalling of such service invocation request is FFS.

Recommendation #3 – Identification of assisting service:

- A Europe wide database of trusted assisting relay services for inclusion by PSAP in Total Conversation emergency sessions, similar to that for PSAPs described in [i.52] should be developed e.g. by EENA to enable PSAPs in any country to identify an appropriate relay service to meet the Total Conversation user's identified communication needs. See clause 7.2.x.

Editor's note: Clause 7.2.x still needs to be drafted.

- This database should contain as many signed, spoken, and written languages as possible, including all the national languages of European member states.

- The database should be a machine readable online resource so as to facilitate automatic invocation of the necessary assisting relay service during session establishment.
- The database should also be accessible by the PSAP call-takers to solve needs of relay services appearing during calls.
- The services listed in the database should provide a SIP interface suitable for invocation as a third party in a multi-party conference, see RFC 4353 [i.26], e.g. as specified in EENA NG112 LTD[i.1].

Recommendation 4 – PSAP support of text communication:

- If the user requires text communication, or text one way and spoken communication the other way, and the PSAP is NG112 enabled (implying that it supports and is interoperable with the user terminal in real-time text), then the call should be connected to the PSAP without any assisting relay service. It is assumed that the PSAP and the user will then be able to communicate in text, possibly combined with speech.

8.3 Roaming sessions routed via the home network

A challenge not directly related to the inclusion of assisting relay services, or even especially unique to Total Conversation emergency sessions, is how to deal with sessions from user roaming in visited networks whose emergency sessions are routed via their home networks. This will be the case for IETF SIP registered users, and might be the case for some IMS roaming architectures.

Recommendation #1:

- A specified system, e.g. using the HELD protocol, should be implemented for routing of emergency calls from access networks covering all of Europe, even for countries who are not yet NG112 enabled.

Editor's note: Further work is need on this issue, taking into account output from M.493 work.

Recommendation #2:

- The existing EENA/ECC PSAP database [i.52] should be extended to include URIs for NG112 based PSAPs in order to allow the home PSAP to contact an appropriate PSAP in the visited network, for the case when the call cannot be routed automatically to a PSAP in the visited network.
- The database should be developed into a machine readable online resource for PSAPs to enable automatic identification of the appropriate PSAP in the visited network based on the location of the calling Total Conversation user.
- The database should also be accessible to the call-taker for manual calling between PSAPs.

9 Recommended updates and new specification work

9.1 Gap analysis and remedial actions

9.1.1 Use of terms GTT and RTT in 3GPP specifications

9.1.1.1 Description of issue

References in TS 122 101 [i.9] to GTT (Global Text Telephony) steer the reader of the specification towards specifications TS 122 226 [i.37] and TS 123 226 [i.38] for requirements and implementation respectively. However,

RTT as part of a Multimedia Emergency Session (MES) supporting Total Conversation is covered in TS 122 173 [i.6], with codec implementation specified in TS 26.114 [i.7]. It is not clear from the existing references which path should be followed for implementation, and it is possible that the resulting confusion could lead to incompatible implementations.

TS 126 114 [i.7] is the most appropriate and up to date specification for media handling and interaction for Total Conversation in IMS, so the references in TS 122 101 [i.9] should guide the reader towards that specification for implementation. In addition, the text in the specification should make it clear that GTT is a feature that enables Real Time Text conversation, and that text media is part of the multimedia service enabled by IMS.

9.1.1.2 Remedial action

A Liaison Statement to SA1 outlining the issue was sent to SA1 #71. . Two draft CRs were produced by the STF for consideration by SA1.

Editor's Note: Further information on the document / CR numbers will be provided when available.

9.1.1.3 Status

Editor's Note: This clause is tbc pending outcome of activities in 3GPP SA1 #72.

9.1.2 Order of payload types for real-time text in 3GPP specifications

9.1.2.1 Description of issue

In TS 129 332 [i.39], clause 10.2.3.5, an example SDP is provided for a session including Real-Time Text with redundancy. The order of the payload types in the m-line of the SDP is however incorrect. The payload type number for T140 occurs first, followed by the payload type number for the payload including redundancy. In order to prioritize use of redundancy the order should be reversed. If not, then there is a risk that the Real-Time Text medium is transmitted without redundancy, which could result in an unacceptable rate of text loss.

The correct order is shown in TS 126 114 [i.7], so there is also an inconsistency in the 3GPP standard. This order is also shown by Errata 1203 to IETF RFC 4103. See http://www.rfc-editor.org/errata_search.php?rfc=4103 [i.40]

9.1.2.2 Remedial action

The issue was communicated to 3GPP CT4 by email and a Change Request was produced by a 3GPP member company in C4-151346 CR0196 TS29.332 Correction on SDP for Real-Time Text.

9.1.2.3 Status

The Change "Correction on SDP for Real-Time Text" is approved in CP-150430.

9.1.3 Provision of feedback and comments on ETSI DES 202 975 version 1.4.01

9.1.3.1 Description of issue

Feedback and comments on relay service requirements in ETSI DES 202 975 version 1.4.01 was requested by ETSI HF. The following gaps were found by the STF:

- Missing condition in clause 6.3.1 that imply the requirement of 24 hour service has to be implemented for the case of Emergency services;
- Missing requirement in clause 6.5, where emergency services need to be given high priority in the queue;
- Missing requirement in clause 6.15, where the establishment of an emergency call by a relay service on behalf of a user, 'shall' provide the location information for that user; and

- Other minor editorial corrections.

9.1.3.2 Remedial action

The STF provided resolutions to insert the missing requirement listed above. This was shared with the rapporteur of the specification by email.

9.1.3.3 Status

The proposed changes listed above (clause 9.1.3.1) except the first one are accepted and included in the published version ES 202 975 version 2.1.1 [i.5], in the following manner:

- Missing condition in ES 202 975 clause 6.3.1 was not accepted, since the existing sentence “*A service claiming to be a 24-hour service shall be open 24 hours a day, every single day of the year.*” was seen to cover the condition for emergency services.
- Missing requirement in ES 202 975 clause 6.5 and 6.15, the changes have been incorporated in clause 6.15 as follow:
“*When the relay service receives information related to the emergency call, e.g. location information, such information shall be made available to the emergency service.*
Emergency calls shall be given priority in getting a communications assistant assigned to them.”

9.1.4 Inclusion of Total Conversation for emergency services as a regional requirement

9.1.4.1 Description of issue

The GSMA Interworking and Roaming Experts Group (IREG) produces a number of Permanent Reference Documents (PRDs) related to implementation of services using IMS. In particular, the Next Generation Roaming in LTE (NGRiLTE) activity has produced PRDs IR.92 [i.48] and IR.94 [i.49] that respectively specify IMS profiles for Voice and SMS, and for Conversational Video Service. These GSMA PRDs are interdependent, and IR.92 also specifies support of Global Text Telephony as a regional requirement.

GSMA PRDs IR.92 and IR.94 include good provision for support of IMS Multimedia Emergency Sessions as specified in ETSI TS 122 101. They also support Total Conversation as PRD IR.94 is intended to be combined with PRD IR.92 and all three media of video, audio and real-time text refer to TS 126 114 [i.7]. However, there is no explicit mention of Total Conversation for emergency communications as fulfilled by TS 122 173 [i.6] and TS 126 114 [i.7]. Moreover, the latest version of PRD IR.92 does not reflect European policy requiring the support of Total Conversation for emergency communications.

9.1.4.2 Remedial action

A Liaison Statement was sent from EMTEL #33 in EMTEL(15)000023r2 to officially inform GSMA NGRiLTE of the activities of STF489, and to request the inclusion of support for Total Conversation for emergency communications as a regional requirement in order to comply with European policy as per [i.27].

9.1.4.3 Status

The GSMA NGRiLTE group updates PRD IR.92 in March each year so if GSMA NGRiLTE accede to EMTEL’s request, the requested change to the document should be made in March 2016. However, at the time of writing no official response has been received from the group to the EMTEL Liaison Statement.

Editor’s note: Revisit this clause when more information is available and before seeking approval for the TR.

9.2 New specifications

Editor’s note: The need for this clause will be reviewed when depending on the recommendations of the report.

9.3 Open issues

9.3.1 Use of non-usual terminals

One issue that arises for all potential solutions to the issue of the Total Conversation user indicating their particular communication needs, is that this will only work if they are registered in the network using their usual subscription (e.g. are IETF SIP registered via their usual account), or are using their own Total Conversation terminal that is configured to include an indication of their communication needs in the emergency session signalling. In the event that the Total Conversation user is having to use a third party terminal via which it is not possible to log into their account, or in which they have not configured their preferences, then it will not be possible to communicate their needed language/modality to the PSAP that would in turn enable automatic invocation of an appropriate assisting service.

This is one instance where it does not appear possible to ensure that accessibility for disabled users is equal to that of non-disabled users who benefit from being able to use the default speech mode of emergency services. However, whilst this is a gap that cannot be filled, it would seem to be one likely to occur with little probability. Also in the event that it were to happen, it would seem possible in most instances to communicate using the media that was available to the Total Conversation user and the PSAP, in order to identify and manually invoke the appropriate relay service. The means for invocation of appropriate assisting relay services manually by the PSAP during a call have been discussed and proposed solutions appear in other clauses of the present document. It is therefore noted here as an open issue, but one for which there appears no need to develop a solution.

9.3.2 Configuration of Total Conversation settings by Application Service Provider

Editor's note: There is no commercial incentive for Service Providers to configure Total Conversation user preferences and terminal settings in Application Servers. Moreover, there is little commercial incentive to implement Total Conversation per se. It is FFS how this will impact the recommendations of the present TR.

10 Conclusions

Editor's Note: Awaiting review by EMTEL and stakeholders before drafting.

Annex A. Alternative solution for relay service identification and invocation

A.1 General

The assumption in the present document is based on guidance provided by stakeholders that it should always be the PSAP which identifies and includes a relay service if needed by the Total Conversation user (see clause 7.2.3.4). However, in some cases it would also be possible for relay service to be added to the emergency session in the same way that they are for a non-emergency session. E.g. when the Total Conversation user is IETF SIP registered or SIP registered in the IMS home network in which case the session will be routed via the home service provider able to interrogate the User Profile.

This annex describes a hybrid solution that would allow a mix between PSAP and other entity invocation and inclusion of relay services depending on the registration status of the Total Conversation user terminal.

A.2 Hybrid solution rationale

A.2.1 Sessions where the Total Conversation user terminal is IETF or IMS SIP registered

A.2.1.1 Sessions where the Total Conversation user terminal is not roaming

For emergency sessions where the Total Conversation user terminal is IETF SIP or IMS registered, i.e. when the terminal is not IMS emergency registered, call routing for the session will be via the home service provider. In that case, it should be possible to include relay services in a call using the same mechanism that is used for non-emergency sessions, e.g. the relay service could be included automatically by the service provider, or the necessary routing information could be included directly by the Total Conversation user terminal in the INVITE message. There would be no need for the Total Conversation user terminal to provide any indication to the PSAP about the user's communication needs, or a specific relay service. Such emergency sessions would appear likely to account for the majority of emergency sessions so it could be considered beneficial that the same relay services that are normally used by Total Conversation users when making calls, can be included in a similar way. Indeed, in the case where a "PSAP only" invocation of relay services solution was adopted, it would be necessary to specify behaviour for Total Conversation user terminals and/or home network service providers such that any normally used relay services were not invoked.

Any relay service that was added to and present in the session when it was answered at the PSAP should use the Additional Data mechanism described in [i.41] to insert information about itself in the signalling of the session for the information of the call-taker. This would facilitate inclusion of the same relay service in the event of any call-back to the Total Conversation user. As call-back is treated as a "normal session it would be useful also to consider potential interaction with mechanisms used for invocation of the relay service in the incoming call. This may be a terminating filter in the call path. The "SIP PSAP Callback Indicator" could potentially be used to "disable" triggering of any terminating filter criteria in that case to ensure that the same relay service was not added twice to a session.

NOTE: The SIP PSAP Callback Indicator could be seen as not trusted in some IMS implementations, and will in any case be ignored by the IMS user terminal. As such its utility would be limited in IMS implementations and it might not be supported at all.

A.2.1.2 Sessions where the Total Conversation user terminal is roaming

When the user is roaming outside of their home country and is IETF SIP registered, the user will still be SIP registered as normal and the session signalling will be routed via the home service provider. This could potentially present a problem if location support using the LoST/HELD protocols are not deployed across networks in different countries, because the home service provider may not be able to find routing information for the PSAP in the roamed-to country.

NOTE 1: This problem is not unique to Total Conversation for emergency communication, but to all emergency sessions.

In this case, when the access network is not able to identify an appropriate ESInet entry point based on the present location of the Total Conversation user, it should route the session to a designated PSAP in the home network. The designated PSAP should answer the session from the roaming Total Conversation user, and should then conference in a PSAP from the country to which the caller was roaming for the dispatch of the necessary emergency service(s).

NOTE 2: It is beyond the scope of the present report to specify how the designated PSAP can obtain information about the PSAP in the roamed to country. However, the cross border PSAP contact information as collected by EENA as described in [i.52] and maintained by ECC could be used for this purpose.

A.2.2 Sessions where the Total Conversation user terminal is IMS emergency registered

When the user is IMS emergency registered, as will be the case for all roaming IMS subscribers and for some non-roaming IMS subscribers as described in TS 123 167 [i.8], the session will not be routed via the home service provider. Also in that case, only calls to permitted emergency numbers are permitted. As such, it will not be possible to include the necessary relay service by the “normal” means outlined above. This is where the solutions described in clause 7.2.3 can be used, including a language/modality or service preference indication in the call signalling.

The Total Conversation user terminal will be aware of when it is emergency registered, and in that case should be configured to include a needed language / modality indication in the session signalling, using the solution recommended for issue #2 in clause 7.2.3. That indication can be used in the ESInet for routing to a PSAP / call taker that supports the indicated language/modality. This might not be the one local to the Total Conversation user or the incident being reported.

NOTE: It is not in the scope for the present report to specify how the ESInet routes based on SDP.

If a PSAP operator cannot be found that supports the language / modality needs of the Total Conversation user, then it will be necessary to invoke a suitable relay service. If the Total Conversation user is calling in their home network, the PSAP should be able to identify a suitable relay service to meet the user’s communication needs. If the PSAP were not able to identify a suitable relay service, then another mechanism would be needed to assist the PSAP. This is where the Additional Data mechanism as defined in draft-ietf-ecrit-additional-data-34.txt [i.41] could be used.

When the PSAP is not able to handle the indicated communication needs of the Total Conversation user, the call-taker can use information provided by the Total Conversation user terminal in the “Comment” block of the Additional Data as described in clause 7.2.3.4. If the Total Conversation user terminal were configured to include an indication of the Total Conversation user’s communication needs and the URI of an associated relay service in this way, the PSAP operator would be able to manually invoke a conference and add the necessary relay service near the start of the emergency session.

Editor’s Note: It is FFS whether information about a relay service + associated URI provided in this would be considered as trusted by the PSAP.

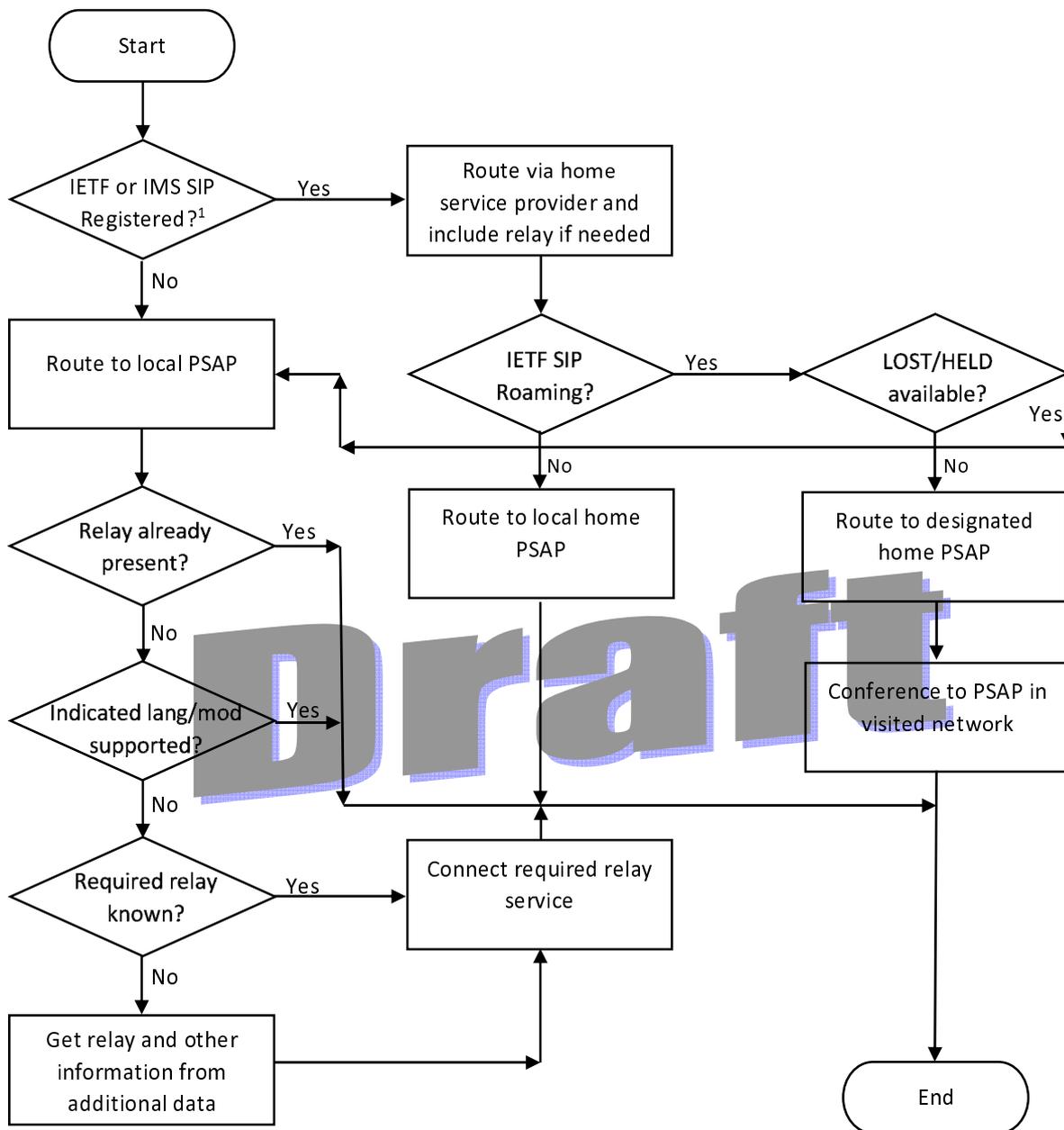
A.3 Hybrid solution example call-flow

The following call-flow provides an example based on the rational in A.2 and shows how the different mechanisms can be used in combination with each other to ensure that appropriate relay services are included when needed, in a range of scenarios. This is not an ideal solution, and could almost certainly be improved through further specification. However, it would seem to represent what might be achievable in the short term using currently specified means and those in the process of being specified. The call flow is shown in figure A-1 below.

At the start of session establishment:

- If the Total Conversation user is not IMS emergency registered, i.e. is SIP IETF registered or SIP IMS registered in home network:
 - The call is routed via the home service provider and include the relay service if needed as per a non-emergency session. The Total Conversation user terminal need not include a language/modality indication in the signalling.
 - If the Total Conversation user is not roaming:
 - The home network routes the session to the appropriate home PSAP.
 - The home PSAP answers the call and the session ensues with the relay service included as needed.
 - If the Total Conversation user is roaming:
 - If an appropriate PSAP in the roamed to country cannot be identified, e.g. using LOST or HELD protocols:
 - The home network routes the session to a designated PSAP in the home country.
 - The home PSAP answers the call and the conferences in an appropriate PSAP in the roamed-to country using the EENA / ECC maintained PSAP contact database.
 - The session ensues with the relay service included as needed.
 - If an appropriate PSAP in the roamed-to country can be identified:
 - The home network routes the session to an appropriate PSAP in the roamed-to country.
 - As the relay is already present (if needed), the session ensues without further action necessary.
- If the Total Conversation is emergency registered:
 - The network (home or visited) routes the session to the appropriate PSAP with a language/modality indication included in the signalling by the Total Conversation user terminal, and an indication of any preferred relay service URI plus any non-specified interpretation requirement in the “Comment” block of the Additional Data.
 - As there is no relay present in the session when it arrives at the PSAP:
 - If the PSAP supports the indicated language/modality:
 - The PSAP answers the call and the session ensues without the need for a relay service.
 - If the PSAP does not support the indicated language/modality:
 - If the PSAP is able to identify an appropriate relay service for the language/modality information:
 - The local PSAP connects the appropriate relay service to the session.
 - The session ensues with an appropriate relay service included.
 - If the PSAP is not able to identify an appropriate relay service for the language/modality information:
 - The PSAP operators checks the “Comment” block in the Additional Data provided by the Total Conversation user terminal
 - The PSAP operator notes the communication needs of the of the Total Conversation user and connects the appropriate relay service as identified in the Additional Data.

- The session ensues with the appropriate relay service included.



¹ I.e. Not IMS Emergency Registered

Figure A-1. Call-flow for Total Conversation emergency session potentially involving a relay service.

There is no need to explicitly direct the PSAP call-taker to the Additional Data in the event that the communication needs of the Total Conversation user are not included, because the PSAP call-taker should in any case check the Additional Data sent with an emergency session signalling, regardless of what information is included in the signalling. In this case, the PSAP call-taker acts as the final check point to make the sure communication needs of the Total Conversation user will be satisfied.

This call flow should ensure that in most cases, an appropriate relay service can be identified and connected to an emergency session, albeit with a slight delay in the case where the PSAP operator has to interrogate the Additional Data in order to identify the needed relay service and add it manually.

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Annex B. Outstanding issues from TS 101 470 v1.1.1

B.1 General

This annex provides analysis of issues of TS 101 470 v1.1.1 [i.2] that are either not in-line with the existing standards of 3GPP and IETF or not covered by this TR.

B.2 Analysis of issues regarding TS 101 470 v1.1.1

B.2.1 Text related to clause “5.4.2.1 Relay service”

- In regard of the following Note; the need of means for reducing the noise is not studied in this TR.

“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.”

B.2.2 Text related to clause “5.4.2.1.2 IMS support”

- This requirement; “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.”, is not specified in IMS existing specifications. If this were agreed to serve some Total Conversation for emergency communications scenarios as an optional solution, then it would be a gap that requires a technical specification to be developed.

B.2.3 Text related to clause “5.4.3 Multi-party multi-media call”

- The requirement; “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.”, is not mandatory for the serving network, however it is a possible solution and if followed then this requirement applies.

B.2.4 Text related to clause “5.4.4 Transfer and Forward supplementary services”

- In regard to the paragraph; “Transfer and forward supplementary services shall be available for Total Conversation emergency calls for invocation from the PSAP and the application service provider.”, TR 103 170, clause 5.2 describes just one case when it would be desirable for a Total Conversation user to make a call transfer during a Total Conversation emergency session. Others exist, also for the Application Service provider. However, once a Total Conversation emergency session is established then it is recommended to ignore call forwarding and call transfer on the user side for a predefined period of time IETF 6881 [i.13], IETF 6443 [i.16], and TS 122 173 [i.6]. Changes in that policy would need much more preparations than simply stating it in the TS.

B.2.5 Text related to clause “5.11.1 Basic SIP support”

- The Note; “NOTE: It is for further study how a Total Conversation user terminal can prevent PSAP impersonation call-backs.” Is out of scope of this TR as it is general for emergency services and not specific for Total Conversation for Emergency Communications.

B.2.6 Text related to clause “5.17.1 Basic SIP support”

- The security solution: “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” is seemingly unnecessarily requiring more than the IMS and IETF solutions where ZRTP is not required (see clause 6.5.6).

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Annex C

Change History

Date	Version	Information about changes

Draft

History

Document history		
<Version>	<Date>	<Milestone>
0.0.1	07/04/2015	Proposed alternative TR structure
0.0.6	2015-04-16	Skeleton for publication
0.0.8	2015-04-25	Skeleton with modified structure
0.0.9	2015-05-18	Cleaned skeleton, definition adjusted
0.0.10	2015-05-20	Skeleton and base for early draft
0.0.11	2015-05-31	BA006r1 was made the base GH002r2 was applied Definitions reordered and NOTE 2 inserted in IETF SIP definition BA005 was applied. BA004r7 was applied BA001r5 was applied CB005r5 was applied CB006r1 was applied CB007r2 was applied Editorial adjustments to finalize v0.0.11 CB004r2 was applied Reference list and references were numbered
0.0.12	2015-06-15	CB008r1 applied CB009r3 applied Minor editorials
0.0.13	2015-06-26	Incorporated comments received during EMTEL #33, sent on EMTEL reflector for review (26/06/2015)
0.1.0	2015-07-15	Comments received from Peter Sanders, and HF Chair applied in CB013r2
0.1.1	2015-07-27	BA008r2 applied CB010r5 applied CB011r2 applied CB012r3 applied CB014r1 applied
0.1.2	2015-09-25	BA007r3 applied BA009r2 applied BA011r2 applied BA012r4 applied CB015r2 applied CB016r1 applied CB017r3 applied
0.1.3	2015-10-01	BA013r1 applied BA014r1 applied
0.1.4	2015-10-09	BA010r2 applied CB018r2 applied CB019r3 applied CB020r3 applied CB020r1 applied Rapporteur clear up of editor's notes, use of consistent terms, etc

0.1.5	2015-10-13	CB022r1 applied CB023r2 applied CB024r2 applied BA015r2 applied
0.2.0 0.2.1	2015-10-22	EMTEL #34 changes applied Output of EMTEL #34

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