

## **THE VALUE OF TOTAL CONVERSATION CALLS WITH EMERGENCY SERVICES**

*Introducing Total conversation and supporting services  
enhances usability of emergency calls*

GUNNAR HELLSTRÖM, LISA ÅSTRÖM  
*Omnitor, Hammarby Allé 93, 12063 Stockholm, Sweden*  
*Email address:*  
*gunnar.hellstrom@omnitor.se , lisa.astrom@omnitor.se*

**Abstract.** Total Conversation is the combination of video, real-time text and voice in a standardised way in a call. This combination and subsets of it has proved to be very important for communication with people with communication related disabilities. One important situation is the emergency service call. For sign language usage and for communication with people with speech impairments it is essential to include a relay service in the emergency call, translating between voice and other modes of communication while still providing all available media to the emergency service for a rich experience of the situation. This has been verified in a project, Call direct, in Sweden. Experiences and conclusions from this trial is presented here, together with a discussion of wider deployment.

### **1. Experience from accessible conversational emergency services**

This paper contains results of a relay service calling project called "Call direct", run by Omnitor for the Telecommunication Agency in Sweden, including combination of calling emergency services and including relay services for people with disabilities in the same call.

It also describes results from participation in accessibility standardisation and service development by Omnitor in co-operation with Trace centre and Gallaudet university with NIDRR funding.

Finally it summarises related standards activities in IETF, ITU-T, 3GPP and ETSI and sets out some new specification and trial tasks related to recent finding in multimedia calling to emergency services.

When this paper is presented, it is followed by video examples from successful trial emergency calls from deaf users using sign language and text in mobile and fixed terminals

## 2. Total Conversation

Total conversation is a concept closely related to video telephony. It is achieved by adding the real-time text medium to a video telephone call in a standardised manner. This concept provides very good accessibility properties for people with disabilities. Most users will find some common way to communicate when there are the three media of real-time text, video and voice to select from and combine. Deaf, deaf-blind, hearing impaired, speech-impaired, as well as all have good benefit of the rich media contents of the call. It is implemented in a way so that it is also compatible with voice telephony and text telephony, so that it combines earlier communication methods used for people with disabilities.

The real-time text component is transmitted with the same real-time flow as the other media. The users thus do not need to do any extra action to get the entered characters sent. This way of handling text transmission gives less stress in moments of urgency and a better feeling of contact than the traditional instant messaging method of text transmission in completed sentences. This need to improve text communication is well reported in "When Conventions Collide: [The Tensions of Instant Messaging Attributed](#)". Total Conversation meets the needs to avoid tension in stressful communication as well as anytime.

The Total Conversation concept was first defined and standardised by ITU-T in ITU-T F.703 Multimedia Conversational Services. Definitions for how the real-time text components shall be transmitted are available for many multimedia communications environments.

A modern mainstream environment for Total Conversation is the IP Multimedia Subsystem IMS, forming the base for conversational services in Next Generation Networks. Total Conversation is well specified in this environment in 3GPP TS 26.114, Multimedia Telephony, Media aspects.

Figure 1 shows a typical Total Conversation user interface in a softphone, with communication in sign language, real-time text and voice.

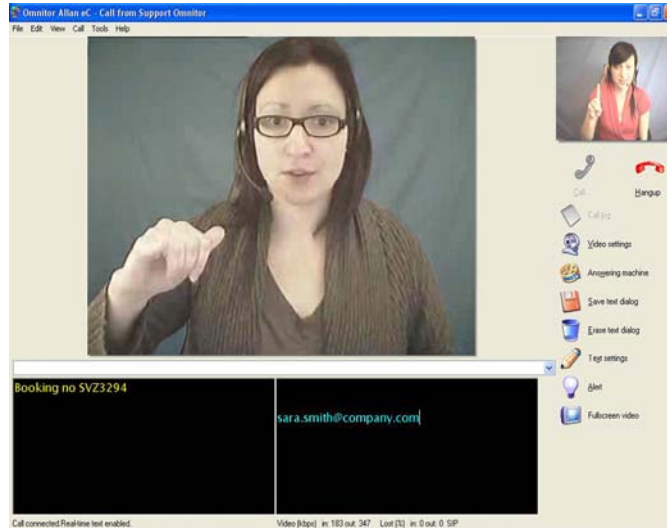


Figure 1. Typical Total Conversation user interface: The Omnitor Allan eC softphone.

### 3. Emergency service call trial

Some of the findings are from a trial with Total conversation calls to emergency services performed in Sweden in October 2007 in the "Call direct" project. The project made user trials with convenient ways to invoke relay services in a call, for getting on-line translation between voice calls and modes used by disabled people.

The trial was performed in one day in the Omnitor office. It involved eight users: Three deaf sign language users, three hard-of-hearing text users and two voice users with speech- and mental disabilities.

A simulated emergency call taker point (PSAP) was arranged with a Total Conversation terminal and two experienced emergency call takers.

A sign language interpreter was engaged for the trials involving sign language, and equipped with a Total Conversation terminal.

The same terminal was used for the text communication trial, with a person with good typing skills performing the text relay part.

The public Swedish speech-to-speech relay service "Teletal" was used for support to the speech and cognitive disabled users.

The user got a scene description to describe in the emergency call, and then performed the trial emergency call acting as the scene description required.

As many media as possible were presented between the PSAP and the user.

Timing was observed during the call, and subjective views of the calls were collected immediately after the call.

The general conclusion was that video, real-time text and voice in emergency calls increase confidence and efficiency for all call types.

The conclusion for people with disabilities was also that including relay services in three party multimedia calls increase confidence and efficiency very much of emergency service calls.

### 3.1. VIDEO FOR SIGN LANGUAGE

Calls were made with video support for sign language users. A video relay service with a sign language interpreter was brought into the call in a 3-party call arrangement.

Trials were made both with good quality broadband video connections, and with current circuit switched 3G videophones who are just on the rim to be usable for sign language. In both cases, the PSAP and interpreter terminal was a Total Conversation device.

When the user also had a fixed network broadband connected Total Conversation terminal, the quality was excellent in all media, and sign language as well as the situation at the location of the person in emergency was easily perceivable for the interpreter and the PSAP. This provided an appreciated extra information source for the PSAP. The deaf user felt assured to be well cared of by seeing the professional PSAP call takers acting on the case.

The 3G trial was also successful but slightly less appreciated. The sign language quality through today's videophones is so limited that it often causes insecurity and need for repetition. Still it was felt to be a very important step towards wireless emergency calls for deaf users, and very well worth deploying. The situation was outdoors, and light conditions and all motions around an emergency situation easily put more load on the video coding than can be handled over the 64 kbit link.



Figure 2: 3G Video emergency call with sign relay service

### 3.2. REAL-TIME TEXT IN EMERGENCY CALLS

Trials were also made with emergency calls with real-time text for hard-of-hearing users. The IP environment allows a very welcome enhancement of functionality over the legacy PSTN textphones. Now, users can talk, and communicate in text simultaneously. It opens for a great usability increase. This was verified in the trial.

The user has a softphone with real-time text. The PSAP had the same Total Conversation terminal as in the other situations. A text relay service was invoked in the calls in a three-party call fashion, so that all parties could see the text and take part in the voice dialogue according to personal capabilities.

The PSAP call takers found it very efficient to have a voice dialogue about the case, but also get the typed dialogue displayed to complete the information about the case.

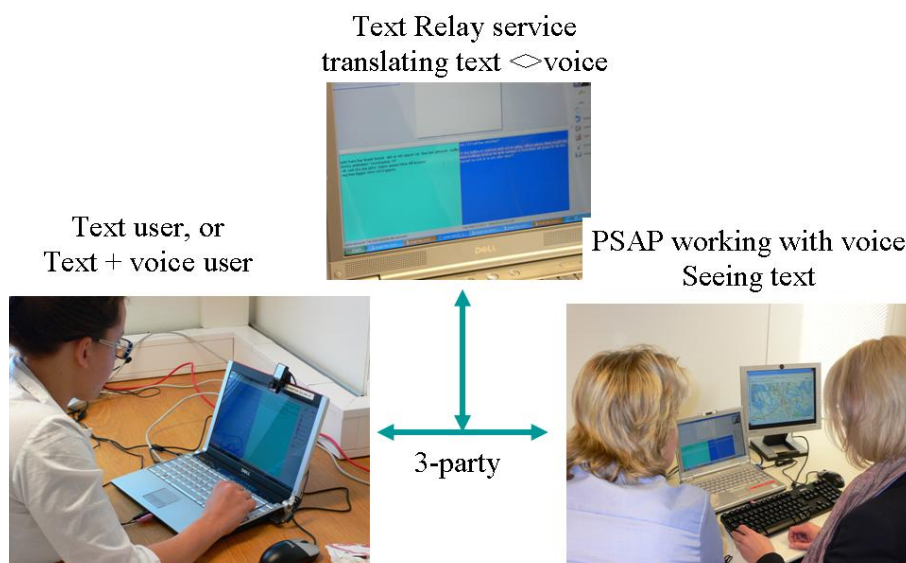


Figure 3: Text emergency call with text relay service invoked

### 3.3. SPEECH RELAY SERVICE SUPPORT

Also the speech-to-speech service was tried in connection with emergency calls. It gives an important support for people with speech that is hard to understand because of a speech related disability. Speech experts are joined to the call in a tree-party fashion, and can explain whenever the flow of the conversation gets stuck.

### 3.4. MAIN IDEA - MORE MEDIA MEANS MORE OPPORTUNITIES

The governing idea was that it would be of value for the PSAP personell to participate in a 3-party call with all media exchange with the user, thus

getting a richer picture of the situation than when communicating only with voice through a traditional relay service. This was confirmed.

### 3.5. TRIAL CONCLUSIONS

The conclusion from all trial situations were positive. It is essential for people with disabilities to be able to call emergency services, and the trialled situations show that multimedia calls and invocation of relay services in the calls are important parts of a satisfying solution.

It was also clear that the relay service connection must be rapid, and take place automatically in parallel to the call establishment to the emergency service itself.

Planning is thus needed to make it possible to both connect to emergency and to relay services.

One important aspect is that the call from the user must be compatible with the emergency system and the relay service. The call and the media must be limited to a few variants supported by the services.

Standardisation and activities to encourage use of standards must be part of the work for establishment of emergency services encompassing people with disabilities.

## 4. Standardisation support

Emergency service calling is currently going through a phase of intensive standardisation to encompass the move to IP based communication. The needs from people with disabilities are acknowledged in this work, and the specifications include use of audio, video, real-time text and instant messaging. This is especially true for the standards currently developed by the Internet Engineering Task Force IETF. The family of standards developed by the "ecrit" group bring in the required multimedia standards for use in emergency services in a good way. A base is RFC 5012 Requirements for Emergency Context Resolution with Internet Technologies.

Related work is also done in ETSI, e.g. in the work with a standard for Harmonised Telecommunications Relay Services.

Even with this relatively good situation, more work is needed on establishment of convenient procedures for relay service invocation in emergency calls.

## 5. Conclusion on use of Total Conversation in emergency calling

The next required steps in accessible emergency call handling in the actions worldwide to include IP communication with relay services are proposed to be in assuring that multimedia Total Conversation calls and relay service invocation is detailed and deployed. User experience was very encouraging during the trial. The methods to invoke the right relay service smoothly in 3-party calls with emergency services is clearly a function that would benefit many users when it is deployed..

The result will be emergency calling mechanisms that are essential for people with disabilities and fruitful for all.

## Acknowledgements

The Call direct project was funded by the Swedish National Authority on Electronic Communication PTS.

This work was also supported with funding from the National Institute on Disability and Rehabilitation Research (NIDRR), U.S. Department of Education, under grant number H133E040013 as part of a co-operation between the Telecommunication Access Rehabilitation Engineering Research Center of the University of Wisconsin – Trace Center joint with Gallaudet University, and Omnitor. The opinions herein are those of the authors and not necessarily those of the funding agency.

## References

- 3GPP: TS 26.114, 2007, *Multimedia Telephony, Media and Codec Aspects*, 3GPP
- ETSI: 2008, DES HF 0007, *Harmonised Relay Services*, ETSI ( work in progress )
- ITU-T F-703: 2000, *Multimedia Conversational Services*, ITU Geneva.
- IETF RFC 5012: 2008, *Requirements for Emergency Context Resolution with Internet Technologies*, IETF
- Amy Voida, Wendy Newsletter, Elizabeth Mynatt. *When Conventions Collide: [The Tensions of Instant Messaging Attribution](#)*. CHI 2002 Vol 4, pp187-194