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Human Factors (HF);
IP-based text telephony - as deployed in Scandinavia (and in some other countries)

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Human Factors (HF).

Introduction

ICT-mature and experienced end users often wish to extend the reach of their text communication services beyond the limited range of traditional, desk-based text telephones [i.13], in many cases being the only option on offer. Furthermore, users prefer inter-connectivity with other text telephony services (e.g. between v.21-based fixed network text telephone services, voice and sign relay services supporting a multitude of devices, and emergency services).

Some well-established legacy solutions and other, currently deployed and emerging standardized technologies provide a solid, basic, framework for the provision of text communication services perceived as real-time by the user. Users prefer and require reliable text communication services supporting main-stream, off-the-shelf and out-of-the-box mobile devices, Internet applications, Web clients and v.21 text telephones [i.1] and [i.12].

In the era of continuous IMS-based service availability, the technology described in the present document will become historical. However, it may take time to embrace the most recent generation of mobile, IP-based technologies on a large scale and reach nation-wide coverage with the real-time text option implemented, supported and used - a reason why other solutions, based on plain Internet access may be considered alternatives for the provision of RTT.

The method described in the present document, "Reliable RTT", is reliable for end users, with a low risk for loss of characters. Furthermore, although not part of the specification, the connection of the communication session can be made such that the device identity of the counterpart is assured.

1 Scope

The present document provides a description of user, functional and some technical aspects of an IP-based text telephony service, supporting the use of fixed and mobile mainstream devices, as currently deployed in Scandinavia (Denmark, Finland, Norway and Sweden - known as "Reliable RTT") and some additional countries (such as Germany and the Netherlands).

The present document provides a pointer to the source where the full details of the implementation, including a private Session Initiation Protocol header and some SIP examples, are made openly and freely available to any developer, service provider or other stakeholder interested in the service.

The present document carries no operational, interoperability or other requirements on terminal manufacturers, software developers or fixed or mobile network operators or service providers or their regulators, who are not involved in the provision of the service described.

2 References

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

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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2.1 Normative references

Not applicable.

2.2 Informative references

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

[i.1] Swedish Post& Telecommunications Authority: "Real-time text (RTT) using SIP Message [IETF RFC 3428]: Technical specification: Reliable RTT (real-time text)".

NOTE: Available at http://www.pts.se/reliableRTT.

[i.2] ETSI ES 202 975: "Human Factors (HF); Harmonized relay services".

[i.3] ETSI TR 102 548: "Human Factors (HF); User Experience; 3G and Mobile Broadband Interoperability Plugtest: Approach, scenarios and test specification; Outcomes, conclusions and recommendations".

[i.4] ETSI/CEN/CENELEC DEN 301 549: "Human Factors; Accessiblity requirements suitable for public procurement of ICT products and services in Europe".

[i.5] ETSI EG 202 416: "Human Factors (HF); User Interfaces; Setup procedure design guidelines for mobile terminals and services".

[i.6] ETSI EG 202 417: "Human Factors (HF); User education guidelines for mobile terminals and services".

[i.7] ETSI EG 202 423: "Human Factors (HF); Guidelines for the design and deployment of ICT products and services used by children".

[i.8] ETSI TS 126 114: "Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS); Multimedia telephony; Media handling and interaction (3GPP TS 26.114)".

[i.9] ETSI EG 202 320: "Human Factors (HF); Duplex Universal Speech and Text (DUST) communications".

[i.10] ISO 26800: (2011): "Ergonomics - General approach, principles and concepts".

[i.11] IETF RFC 4103: "RTP Payload for Text Conversation", June 2005.

[i.12] IETF RFC 3428: "Session Initiation Protocol (SIP) Extension for Instant Messaging".

[i.13] Swedish Post and Telecom Authority: "Örebro Läns Landsting - Psykiatri och Habilitering: "Försöksprojekt FLEXITEXT - Flexibel texttelefoni" (in Swedish; in translation: "Örebro County Council: The FLEXITEXT trial project - Flexible text telephony").

NOTE: Available at http://www.pts.se/upload/Rapporter/Funktionshinder/2011/Flexitext-slutrapport-110630.pdf.

3 Definitions and abbreviations

3.1 Definitions

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

accessibility: extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of characteristics and capabilities, to achieve a specified goal in a specified context of use (from ISO 26800 [i.10])

NOTE 1: Context of use includes direct use or use supported by assistive technologies.

NOTE 2: The context in which the ICT is used may affect its overall accessibility. This context could include other products and services with which the ICT may interact.

real-time text: 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

relay service: telecommunications service that enables users of different modes of communication to interact by providing conversion between the modes of communication

sign (or video) relay service: service that enables sign language users and other users to interact by providing conversion between the two modes of communication in substantially real-time, typically provided by a human operator

terminal: combination of hardware and/or software with which the end user directly interacts and that provides the user interface

NOTE 1: The hardware may consist of more than one device working together e.g. a mobile device and a computer.

NOTE 2: For some systems, the software that provides the user interface may reside on more than one device such as a telephone and a server.

text relay service: telecommunications service that enables text telephone users and voice telephone users to interact by providing conversion between the two modes of communication in substantially real-time, typically provided by a human operator

text telephone: device offering text telephony functions, either as a stand-alone unit or as an addition to a voice telephone or as an application in a multi-function computer based terminal or device

3.2 Abbreviations

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

ICT	Information and Communication Technologies
IETF	Internet Engineering Task Force
IM	Instant Messaging
IMS	IP Multimedia Subsystem
IP	Internet Protocol
PSTN	Public Switched Telephone Network
RTT	Real-Time Text
SIP	Session Initiation Protocol
SMS	Short Message Service
TTS	Text-To-Speech
UAC	(SIP) User Agent, Client side
UAS	(SIP) User Agent, Server side

4 Evolving enabler technologies and user requirements

4.1 From local availability to mainstream integration

Information and Communication Technologies (ICT) play a central role in the everyday life of an ever-increasing number of people.

Conventional fixed-line text telephone services provide considerable communication benefits to many people with hearing and/or speech impairments and are still used by these groups in several European countries. This technology has traditionally required the use of a fixed PSTN landline for text telephone terminal access, provided from a certain location (typically in the home or workplace), using robust modem technology (supporting alternation between voice and text during the call) from the 1970s.

Most users of these services also have a clear need and preference for real-time text communication (RTT) when on the move, with support for additional communication services - such as the capability to communicate with other text telephones or get access to emergency services. Mobility has become an increasingly important user requirement, due to changing demographics and habits and has been strengthened by the capabilities offered through modern ICT technologies [i.3].

Young people, including those with functional hearing limitations, expect full access and functional equivalence to what voice users have through mainstream technologies (e.g. mobile communication devices using mobile networks, offering Internet access).

The maturity and capabilities offered by mobile systems and devices evolve continuously and considerable progress has been achieved with regard to the user experience and accessibility attributes of these services. Devices with increasingly advanced capabilities, operating over mobile networks with instant access to the Internet and the Web, in combination with ever-increasing penetration enable the development and uptake of a new generation of mobile and IP-based services. Smartphones, tablets and their apps are fast becoming the preferred communication device of many users [i.3].

The mobile industry has developed the necessary specifications for the integrated support of real-time communication services over emerging mainstream technologies, e.g. [i.11] and [i.8]. IP based real-time text services based on [i.11] are established and available since about 2002 and are being used in wireless and fixed networks. Services using IMS and [i.8] are currently not widely available and dependend on the wide installation of 3G and 4G networks.

The mass-market availability of new technology deployment takes time and requires considerable investments in infrastructure and capacity. During the necessary transition until IMS-based multimedia telephony (MMTel, [i.8]) services become available, reliable and well spread, and includes RTT, there is a need to provide mobile and IP-based text telephony services over currently available mobile infrastructures. In this way, end users will be offered the required functionality, together with the free choice of using mainstream communication devices (that typically means reduced costs and more varied use than if dedicated devices were used and the creation of new services and concepts).

In the mean time, it is a well-accepted fact that several generations of telecommunication systems will co-exist simultaneously in many markets - while users require interoperable services [i.3].

4.2 Generic, context-specific user requirements

Conventional fixed-line text telephone services provide considerable communication benefits for many people with hearing and/or speech impairments and are still used by these groups in several European countries (e.g.Italy, Finland, France, Germany, the Netherlands, Norway, Sweden, Spain and the UK) and others. This technology has however lagged behind in development, being available for direct use only from fixed locations, requiring the use a fixed PSTN landline for text telephone terminals, using modem technology from the 1970s, providing limited functionality.

Mobility has become an increasingly important user requirement, due to changing demographics and habits and strengthened by the capabilities offered through modern ICT technologies. Young people, including those with functional limitations expect full access and functional equivalence to voice telephony through mainstream technologies (e.g. mobile communication devices using mobile networks, offering Internet access), instead of fixed-line text phones perceived as outdated, and provided at costs often higher than for modern equipment.

The maturity and capabilities offered by mobile systems and devices evolve continuously and considerable progress has been achieved with regard to the user experience and accessibility attributes of these services. Devices with increasingly advanced capabilities, operating over mobile networks with instant access to the Internet, in combination with ever-increasing penetration enable the development and uptake of a new generation and IP-based services.

Mobile communication provides reasonable global coverage and bandwidth, while increasingly capable devices enable a state-of-the-art user experience. In such an environment, it is becoming less acceptable to restrict users to the use of fixed-line-bound accessibility services. Some services offered through mainstream technologies (such as SMS, e-mail and various chat/messaging systems) are regarded as complements to real-time communication (such as voice calls), rather than full alternatives.

ES 202 975 [i.2] and EG 202 320 [i.9] provide functional service requirements on relay services and on text telephony, of importance to many text telephony users and service providers. IP-based text telephony services implemented for the provision of relay services and certain personal user-to-user communication services complying with those service requirements and relay services implemented accordingly, should be able to use IP-based text telephony services and certain personal user-to-user communication services complying with the requirements in [i.2] and [i.9], taking into account [i.6] and the following user needs:

- Communicate over any public network, and any combinations of public networks and communication modalities using compatible devices.
- Communicate via any available relay service addressing their needs.
- Reach emergency call services, directly and/or through relay services.
- Use mainstream, non-customized, off-the-shelf mobile terminals and IP-based text telephony clients for their communication (integrating support for RTT).
- Connect with commonly used legacy text telephones in the target country or region.
- Rely on interoperability capabilities with other real-time text telephony services, preferably offering standardized interoperability interfaces.
- User education, installation, setup, configuration and error handling guidelines, applicable to main stream products are available in [i.5] and [i.6] (with some emphasis on accessibility across all stages).
- Customizeable client installation, available on demand (e.g. over the Internet) to se up different services.
- Server configurations to enable service providers to fine-tune the services offered for communication with the users' preferred devices (e.g. a service administrator should be able to set other parameters such as language settings, national characters, charging, statistics, and other service parameters).
- Current networks may imply complex firewall rules, which may (to some extent, or even completely) block text and/or voice communication. In such cases, users benefit from the provision of clear, accessible information regarding firewall settings and limitations on the service platform level, when necessary.

NOTE: This may mean that firewall problems [i.3] and [i.13] may at times block the desired functionality; however, a minimum level of communication should be ensured whenever this is in agreement with policies in the involved networks (such as text in block mode instead of RTT, so that the parties involved can establish a limited dialogue anyway).

- Service and interaction design, personalization and localization options may benefit from consulting the guidelines and recommendations available in [i.5] to [i.7]. Specifically:
  - user preferences through user profiles may be considered for inclusion, once standardized and if applicable;
  - error handling should be provided using good, established practices (e.g. as specified in [i.5]), with a special emphasis on accessible error handling.
- Client customization may benefit from taking into consideration specific needs of the users including font size, background colour, connection to alerting devices, supported input and output alternatives and connection to external software for deaf-blind people (TTS), zoom view, etc.
- Simultaneous use of real-time text and audio in communication with other terminals providing that functionality is advisable.
- Alternating use of real-time text and audio when interoperating with PSTN based text telephones.
- Time sampled text transmission is preferable (so that no text is older than 500 ms when it is sent from the transmitting terminal unless the user has selected a mode with less rapid transmission).
- Calling other users by their number or address.

5 Technical details

The present document and [i.1] describe the way in which reliable real-time text functionality using SIP MESSAGE [i.12] requests can be implemented. Technical details concerning the headers, protection against loss of data, content type and interoperability are available in [i.1].

The purpose of the method reported is to present the text characters typed by the sender, as typed as soon as possible on the device of the receiving party (unless otherwise preferred by the sender - e.g. an individual preference for word completion through predictive text input).

The method is typically implemented in the user agent client (UAC) by sending a MESSAGE request as soon as possible, after the detection of user input. The difference from the standard behaviour is that the UAC does not wait for the user to hit the return key before sending, instead typed character are sent as a group of characters with a certain minimum interval between transmissions.

The P-Header defined in this method is used to facilitate a simple negotiation procedure, where the UAC and user agent server (UAS) indicates support for this method of sending text by including the header.

The SIP extension specified makes no assumptions regarding the surrounding environment in which it operates, except a SIP compliant UAC and UAS. A UAS not implementing the mechanism described in the present document can safely ignore the P-Header described.

Details are provided of a way to address the requirement to let characters appear in real-time as they are typed, not as a block of text (unless otherwise preferred by the user), after they are entered and ended by a specific message transmission delimiter (usually by pressing RETURN), as they do in a typical IM or SMS application, using only the SIP protocol.

In certain cases, Reliable RTT may be required to interoperate with other ICT systems (networks, devices, services and protocols) providing alternative implementations of RTT functionality. In such cases, the party interested in, or assigned with the task to provide interoperability, may opt to implement:

- a conversion between Reliable RTT and the other RTT method (following one of the four mechanisms listed in clause 6.3.3 in EN 301 549 [i.4]); or
- both RTT methods and a procedure for method selection on a call-by-call basis.