Before the

Federal Communications Commission

Washington, DC

In the Matter of	)	
	)	
Petition for Rulemaking to Update the Commission's Rules for Access to Support the Transition from TTY to Real-Time-Text Technology, and Petition for Waiver of Rules Requiring Support of TTY Technology	)	GN Docket No. 15-178
	)	
Facilitating the Deployment of Text-to-911 and Other Next Generation 911 Applications	)	PS Docket No. 11-153
	)	
Framework for Next Generation 911 Deployment	)	PS Docket No. 10-255
	)	
IP-Enabled Services	)	WC Docket No. 04-36
	)	
Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities	)	CG Docket No. 03-123
	)	
Implementation of Sections 716 and 717 of the Communications Act of 1934, et al.	)	CG Docket No. 10-213
	)	

REPLY COMMENTS FROM THE REHABILITATION ENGINEERING RESEARCH CENTER ON TELECOMMUNICATIONS ACCESS ON PETITIONS OF AT&T REGARDING THE SUBSTITUTION OF REAL-TIME TEXT FOR TEXT TELEPHONY TECHNOLOGY

Summary

The Rehabilitation Engineering Research Center on Telecommunication Access (RERC-TA) respectfully submits the following reply comments to comments filed to the above-referenced petitions: Petition for Rulemaking[1] and Petition for Waiver[2] (henceforth, the Petitions) filed by AT&T Services, Inc. (AT&T). The RERC-TA is a joint project of Gallaudet University, the Trace Center of the University of Wisconsin, Madison, and Omnitor AB in Sweden, funded by the National Institute on Disability, Independent Living and Rehabilitation Research of the U.S. Department of Health and Human Services.

The comments submitted in response to the Petitions were largely positive. These reply comments clarify some issues raised in the comments by various organizations. Furthermore, they provide data on the preferences of people with disabilities with respect to real-time text (RTT), which have been collected from an experimental trial.

In particular, the following topics will be discussed:

- A key goal of RTT is to provide functional equivalence with real-time voice communication. Some text communication methods that have been suggested for comparison do not work in real-time, and thus comparing them with RTT is akin to comparing apples and oranges.
- RTT is not nascent. It is mature, has been standardized for many years by the telecommunications communications industries in international standards organizations, and has been used in the field.
- One functional requirement for accessible telecommunications is to provide people with disabilities the opportunity to have real-time interactive calls with other users in a manner that is functionally equivalent to voice calls. This requires interoperability. A prerequisite for interoperability is that the same communication methods and media are used by the interoperating parties. This is achieved by consistent application of standards. Flexibility in innovating new communications solution is good, but this must not come at the expense of having full interoperability of accessible real-time communications.
- The experimental trials have revealed that RTT is preferred over messaging by a majority of persons using it in intensive communication situations. Real-time text is a feature designed for all, and would benefit from being deployed as a feature that is both of general interest and meets accessibility needs.

All these clarifications and associated discussion are aimed at supporting the goals and conditions described by AT&T in their Petition for Rulemaking.

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1 *See* Petition of AT&T Services, Inc. for Rulemaking, PS Docket Nos. 11-153, 10-255, WC Docket No. 04-36, CG Docket Nos. 03-123, 10-213 (filed June 12, 2015) (Petition for Rulemaking).

2 *See* Petition of AT&T Services, Inc. for Waiver, PS Docket Nos. 11-153, 10-255, WC Docket No. 04-36, CG Docket Nos. 03-123, 10-213 (filed June 12, 2015) (Petition for Waiver).

Reply Comments on the petition for rulemaking

A key goal of Real-time text is to provide functional equivalence with real-time voice communication

Some commenters, e.g. TIA[3], have argued that SMS could be seen as an alternative to RTT. The RERC-TA disagrees respectfully. It is true that SMS is widespread and used for communication by both voice phone users, and users of TTY and other forms of text communication. But that does not make SMS a solution functionally equivalent to voice communications. Functional equivalence is the ultimate goal of the accessibility requirements. Voice telephony provides the ability to exchange information in real-time and, lets the both parties take stock of each other's thoughts the moment they are expressed in words, and enable immediate interruption and interaction in a rapid conversational way. The goal of RTT is to provide equivalent functionality to people who are unable to speak and/or listen on the phone; that is, to persons who rely on reading and writing for communication instead of voice, or in any combination with voice communications. SMS does not meet this criterion of functional equivalency, due to its turn-taking-based nature, and delays in sending and receiving messages.

SMS is a good tool when real-time conversational mode is NOT needed. It is important for 9-1-1 access because of its wide deployment, but it is an insufficient replacement for a real-time call in either voice or real-time text or a combination thereof. That is clearly indicated in the information to the public about text-to-9-1-1 disseminated by both FCC and wireless carriers, which stresses, among other things, that SMS is not a substitute for voice calls[45]. Thus the introduction of SMS for 9-1-1 access must not delay the introduction of the proper real-time conversational replacement of TTY with RTT as a means to carry out efficient text dialogues with 9-1-1. That SMS is an interim solution, not a long-term solution, was also stated in the reports from EAAC, including the reports on text-to-9-1-1 and on the TTY transition.

We reiterate that the EAAC report already has laid out the functional requirements for a TTY replacement – particularly with respect to achieving functional equivalency with voice

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[3] IN TIA comment, section B " SMS, for example, serves as another alternative technology that is currently playing a role in text-to-911 services."

[4] "What you Should Know about Text-to-9-1-1." CTIA blog post, April 11, 2014. Online: http://blog.ctia.org/2014/04/11/text-to-911-3/

communications. A few are summarized below, most taken from the EAAC TTY Transition report,[6] chapter 9.2, which should be consulted when setting the goals for the TTY replacement.

A few of these requirements are:

- A rapid transmission, and continuous display of text in real time.
    - (Transmission within 1 second or less from creation of text)
- Possibility to use real-time text along with voice – in the same call as voice.
    - (The user does not have to make a voice call and then initiate a real-time-text call.)
- Be supported on all network equipment, and phones on the network
- And work with the default phone calling functionality.

RTT is mature, has been standardized for many years by the telecommunications communications industries in international standards organizations, and has been used in the field

TIA claims in its comments section II A that RTT is a nascent technology idea. The RERC-TA respectfully disagrees. As described below, RTT is instead a mature feature. This can be seen both from all of the standards that specify its use, and all of the examples of technology and systems that use it today.

Note that proper references to many of the documents mentioned in this section can be found in the EAAC TTY transition report.[7]

Citations of RFC 4103 in standards

Communication features that are to be implemented with interoperability between many implementing organizations need to be standardized. The communication industry recognized the need to standardize conversational text in digital networks in the 90's.

[5] "What you Need to Know about Text-to-9-1-1." FCC Guide, April 20, 2015. Online: https://www.fcc.gov/text-to-911

[6] https://www.fcc.gov/document/emergency-access-advisory-committee-eaac-report-tty-transition

[7] https://www.fcc.gov/document/emergency-access-advisory-committee-eaac-report-tty-transition

The service level description was made with human factors research support in ITU-T in year 2000, and resulted in inclusion of real-time text media component description in ITU-T F.700 and its use in services in ITU-T F.703 (Multimedia conversational services; service description).

The coding and presentation of Real-Time text was specified in ITU-T T.140 in 1998 and used in a number of multimedia standards. The first standard for transport of real-time text in the IP environment was made in IETF in year 2000, in RFC 2793 "RTP Payload for text conversation" and applied first in the multimedia protocol environment ITU-T H.323, in ITU-T H.323 Annex G, and soon thereafter applied in the now dominating IP based multimedia protocol RFC 3261 SIP. In 2005, the transport standard RFC 2793 was refreshed and was assigned the number **RFC 4103**, also titled "RTP payload for text conversation".

3GPP, the global organization for standardization of wireless communication standardized use of RTT in SIP calls in 2001, called GTT-IP, in specifications TS 22.226 and TS 23.226. These specifications use the same transport for text; **RFC 4103** as specified by IETF.

Later a more general multimedia communications system called IMS Multimedia Telephony was introduced in 3GPP, and Real-time Text was included as standardized medium together with audio and video in 2007 in 3GPP TS 26.114 "IMS Multimedia Telephony, codec considerations". Still, IETF **RFC 4103** is the base for transport of text and ITU-T T.140 the base for coding and presentation of conversational text in this environment.

Later on, the use of Real-Time text as specified in these 3GPP specifications TS 26.114 (which specifies **RFC 4103**) and TS 23.226 (which specifies **RFC 4103**) has been picked up and its use clarified in further detailed 3GPP specifications for different situations, such as for emergency services in TS 23.167 (thus specifying **RFC 4103**), and in general service specifications in 3GPP TS 22.101 (thus specifying **RFC 4103**) and interoperation with TTY in 3GPP TS 29.163 Annex I (thus specifying **RFC 4103**).

GSMA is the organization picking up 3GPP specifications to be used in wireless products. Real-Time text as specified in 3GPP TS 26.114 (which specifies **RFC 4103**) was picked up and described for inclusion in wireless products in GSMA IR.92 IMS Profile for voice and SMS (thus specifying **RFC 4103** for real-time text).

In IETF, the use of Real-Time text in the SIP environment was described in 2008 in RFC 5194 "Framework for Real-Time Text over IP using the Session Initiation Protocol (SIP)". This specification clarifies the use of **RFC 4103** for transport of text.

The use of **RFC 4103** in emergency services is also specified by IETF in 2013, in RFC 6881, "Best current practices for communications services in support of emergency calling", and **RFC 4103** is also specified for USA by NENA in NENA NG9-1-1 08-003, "Detailed functional and interface specification for the NENA i3 solution.", and for Europe in EENA NG112 LTD.

The European Standards Institute ETSI has specified **RFC 4103** for Real-Time text in a number of standards, including EG 202 320 Duplex Universal Speech and Text, ES 202 975 Harmonized Relay Services and TS 101 470 Total Conversation Access to Emergency Services.

SIPFORUM, in their profile for US VRS providers interoperability in SIP (under last call for approval) specifies use of **RFC 4103** for real-time text..

Accessibility requirements standards are also including Real-Time Text. In the USA, the Section 255/508 draft refresh includes requirements for interoperable real-time text wherever there is voice communication, and refers to **RFC 4103** for IP. In Europe, the accessible procurement standard EN 301 549 requires interoperability of Real-Time Text, and points out what to support in three named environments, the telephone network PSTN, where ITU-T V.18 is referenced as the fallback for real-time text calls in the legacy environment, SIP, where **RFC 4103** is referenced as the transport, and IMS, where the real-time text part of 3GPP TS 26.114 (which requires **RFC 4103**) is referenced for transport of real-time text. (The European standard also provides a fourth option which allows anyone to use any standard on any network, which we do not support).

CTIA mentions EN 301 549 in their comments, section IV B, and points at its multitude of enumerated standards as a reason to allow a variety of standards in USA. Analyzing the list in EN 301 549, it is found that it already corresponds to the draft section 255/508 guidelines for USA (except that it also supports the fourth option which is any standard on any network).

For PSTN, the European standard references ITU-T V.18 or a nationally used subset of it for text telephony. That corresponds to the TTY requirement in USA. TTY is a sub-mode of ITU-T V.18.

For SIP, both the European standard and the 255/508 draft refresh point at **RFC 4103.**

IMS is not mentioned in 255/508 refresh, because it is an environment also using SIP (which requires **RFC 4103**), and its specification TS 26.114 (which requires **RFC 4103**) is referenced by EN 301 549.

So the IP based standards named in EN 301 549, all refer to **RFC 4103**.

In summary, **RFC 4103** has been specified for RTT in standards set by major standards organizations around the world -- standards that have been adopted by telecommunications carriers in the United States.

RFC 4103 in products and networks around the world

RFC 4103 has been implemented in services and products in the US and abroad. Text relay services in the Netherlands and Sweden provide access for communication providers using SIP and RTT using **RFC 4103**. Video relay services in France, the Netherlands, Norway and Sweden have been procured to provide real-time text during the video call also using SIP with **RFC 4103** for RTT. At least four communication technology providers and a number of communication service providers in Europe are providing terminals, terminal software, communication services, interoperability with other providers, interoperability with legacy PSTN text telephones, answering machine services, relay service access and emergency service access all using **RFC 4103**. The first of these services has provided SIP based calls with **RFC 4103** RTT since 2003. In most cases the real-time text is provided together with video and audio in the calls, forming the total conversation service, defined by ITU-T in year 2000 in the standard ITU-T F.703, but users are also using only audio and **RFC 4103** real-time text. In USA, the systems provided by Star VRS (formerly CAAG), and used for RTT by Deaf-blind user communication and as accessible telephony to enterprises, includes support for RFC 4103 as well as Safe-text. Providers of NG9-1-1 technology provide RTT access to the systems using SIP and **RFC 4103** as specified by NENA and have been performing interoperability test events with that functionality.

Prerequisites for interoperability

The benefits of a communications system increase sharply as more users and services can be reached by it. And a national communication system that is not interoperable is a contradiction in terms. Voice telephony has had a long tradition of providing interoperability between different users, providers, devices and services. The functional equivalence requirements require a similar scope of interoperability for RTT services.

The traditional way of achieving interoperability is to agree on a common specification for technologies used on a network and specification of the exchange in the borderline between providers, equipment or technologies, and then verify that interoperability has been achieved by verification tests when the technologies are implemented.

In this case it is about a complete eco-system that needs to provide interoperability. That means interoperability so that users of different providers using different terminal equipment can reach and be reached by other users of the same and other providers, relay services and emergency services and have both voice and real-time text work.

Interoperability not only means that the endpoints need to be able to communicate, but also that connectivity is provided through all of the networks and all equipment from one end of the call to the other.

Both CTIA and TIA ask for flexibility in regulation to allow other standards than the ones proposed by AT&T to be used. It is unclear how interoperability could be achieved (i.e. a manufacturer could design something for a SIP or IMS networks that would be interoperable) if they do not know what the other equipment in that network (or other SIP / IMS networks) would be using.

We suggest that when deciding this issue, extreme care shall be taken so that the interoperability and functionality goals are not compromised, and also so that no extra complexity is forced upon the implementers who only want to implement the standardized solution proposed by AT&T. A feasible way to achieve both interoperability, good functionality and flexibility is to require interoperability with the standards already specified by NENA, 3GPP, IETF and GSMA in interfaces between services using technologies where these standards are relevant, and request standardization of any specifications used to achieve interoperability between other technologies. That is the approach taken by the section 255/508 refresh and it can be applied in this domain as well.

For interoperability, it is especially important that the interface between services follow agreed interoperability standards, so that users are not locked into a single network. In addition, terminals also need to meet interoperability standards so as to avoid locking the user into a single device or carrier and to ensure that people with disabilities have the same kinds of choices in a competitive markets as their non-disabled counterparts. As a cautionary tale, historically this has not been the case with the Video Relay Services industry, and which is now one of the foremost issues that the Accessible Communication for Everyone (ACE, formerly VATRP) project is intended to tackle. We anticipate that the telecommunications providers will see the need to provide a cost efficient solution, and therefore prefer to use the already commonly specified standard where applicable, rather than trying to invent similar solutions and nevertheless be required to implement the required standardized solutions in the interface to NG9-1-1, to other

providers, and to relay services. However, several have expressed concern that unless and until a common standard is named they can not risk releasing products.

It would likely serve the interest of the users better if providers competed by providing the solution with the best functionality within the agreed interoperability standards, rather than inventing new ways.

RTT is preferred over messaging by a majority of persons using it in intensive communication situations.

In the AT&T petitions and in the comments, the prevailing view is that RTT would be an accessible communications feature of interest for communication with disabilities related to hearing or speech. However some comments seem to indicate that the commenting parties are not convinced that RTT will be appreciated and used much even by this primary target user group.

Research indicates the opposite. In a number of studies, with varying participation by both persons with hearing or speech disabilities and with other participants, it has turned out that the majority of users prefer the real-time text style, rather than handling completed messages turn-by-turn. Especially the receiving party appreciates the real-time flow of text in RTT. (In one study it was even.) (Listed below)

The studies are outlined below. They provide information of interest to the organizations involved in preparing for and deploying RTT enabled services. According to the research results, RTT would suit as a service designed for all, but with specific considerations for its use as an accessible communications service. The benefits are huge for the users if RTT were established and deployed as a general service for all.

> ***It should be noted that by adding a "hold until return" or "hold until send" option to any real-time text service, would also allow users who would like to review their message before sending to do so. Requiring that RTT be supported on all phones does not mean that all users must be required to send their communications character by character. Only that everyone would have the option to send real-time if they wished.***

Real-time text and IM

Real-time text and IM By Jacob Bennion Solomon. Thesis.
http://deepblue.lib.umich.edu/bitstream/handle/2027.42/71384/SolomonThesisSI.pdf?sequence=1

This is a thesis reporting a study at University of Michigan. Real-time text is compared to instant messaging regarding a number of conversational factors. 24 hearing students participated, performing conversational tasks in pairs using real-time text and Instant Messaging (IM). No audio was used.

The only significant differences that were found between real-time text and IM all showed an advantage for real-time text.

- Less typing out of turn. 29% typed out of turn for RTT and 39% for IM.
- Less editing of own text. 38% edited their own text for RTT and 51% for IM.
- Less simultaneous typing. 11% typed simultaneously for RTT and 17% for IM.

This can be taken to imply that the conversation flows better with RTT. Fewer cases are created where confusion can appear. It was also found that real-time text was preferred among the participants who read more but typed less, while the IM style was preferred among those who typed a lot and read less.

Speaking though text

Jacob Solomon, Mark Newman, Stephanie Teasley. Speaking Through Text: The influence of real-time text on discourse and usability in IM. School of Information, University of Michigan.

http://dbonline.igroupnet.com/ACM.FT/1890000/1880105/p197-solomon.pdf

This is a shorter article summarizing the research reported in the thesis "Real-time text and IM" above, reporting the same conclusions.

Text-Based Mobile Communication

Text-Based Mobile Communications; Usability Study Results August 2011. RIM. Presentation in EAAC meeting. (Available in FCC EAAC archives)

Overview of the study; Cited from the presentation:

- Usability study of three different text-based communications modalities (Push Email, IM and RTT) was used by participants with hearing loss.

- Results intended to inform RIM efforts as applicable, be included in AEGIS project consortium, and inform applicable policy working group activities around the world.
- Builds on previous studies, including specifically a “Native TTY” or TTY Emulation prototype built by RIM for use in emergency situations.

In the study 8 participants participated; 5 Deaf and 3 hard-of-hearing

Observations:

- 100% of participants preferred RTT in emergency situations
- 88% of participants reported that they would use IM over RTT to contact someone they were not familiar with, because they would not want the other person to see their mistakes and corrections.
- 50% of participants would rather use RTT over or push email and IM to check in with the office.
- 50% of participants raised concerns about what the person would see (i.e., mistakes, corrections, immediate thoughts).

Summary

- **RTT Preference** - participants preferred RTT over Email and IM initially because it felt like a text message, but was as quick as TTY.
- **Selective RTT Usage** - participants preference for RTT was limited to casual short conversations, whereas, professional and/or long communications would be sent using Email or IM.
- **Expected RTT Ubiquity** – participants expected/hoped RTT would be available as an option in the future, and expect the same level of quality as found using other communication methods.

Comparison between Real-Time Text Conversation and Message Oriented Text Communication

"Comparison between Real-Time Text Conversation and Message Oriented Text Communication". Chapter 5 in ToIP[8] functionality in Asterisk: Making ToIP communication more available and interoperable by integrating it in the IP-PBX Asterisk. Final thesis by Sara Hörlin, TDXD20. Linköping University 2007

http://liu.diva-portal.org/smash/get/diva2:24141/FULLTEXT01

This is a description of an investigation aiming at clarifying how different methods for two-way text communication over data or telecommunications networks are perceived by the users. The compared methods are real-time text conversation and message oriented text communication.

The survey was performed by two persons at a time communicating with each other through one computer each using the text communication software SipCon1 (SipCon1 2007). This program can be set to communicate in real-time as characters are typed or sentence by sentence. It can also be set to present the dialogue in two columns or in a one column chat style with real-time preview. The real-time preview mode was used in the trial. Each pair of persons in the trial made two trial sessions, one in each mode.

11 persons performed the trial. Four of them answered they were deaf or hard-of-hearing. All persons in the trial had experience from message-oriented text communication. 10 of these also had experience from real-time text communication. Nine persons answered they preferred the real-time text method. One of the two persons preferring message-oriented text communication had never experienced real-time text communication before.

The persons who preferred real-time text conversation thought this mode was more efficient because you could see all the time what the other person was typing. The real-time communication was experienced to be more interactive and giving a better perception of the other person's feelings and presence.

The persons who preferred to communicate with message-wise text thought the conversation became easier to follow and understand with this mode and communicating with this method made it easier to focus on the task.

[8] ToIP is Text over IP, another term for RTT.

Several persons stated that a disadvantage with communicating with the message-oriented text method was that it was slow and inefficient. Also several persons answered that this method made the conversation less natural and fluid.

No difference could be found in the answers from hearing, hard-of-hearing or deaf participants.

The result shows that most of the people participating in the trial prefer communicating with the real-time text method.

This test also shows there exists an interest for using real-time text communication, both among deaf and hard of hearing people and hearing people. The extent of this interest is hard to assess exactly based on this trial because there were so few participants.

Field testing of text interoperability

"Field testing of text interoperability." Ongoing study within the RERC on Telecommunications Access project, with an expected end date of late September 2015.

This is an ongoing study in the RERC on Telecommunications Access project, performed by Trace Center, Gallaudet University, and Omnitor. The study is forecast to end during September 2015.

The study is performed in Sweden and USA, with slightly different approaches in each country. The ability to have calls between TTY and RTT is provided in the US part of the study through use on an interworking function in the network. Similarly, the ability to have calls between SIP based RTT and Web based RTT is provided through an interworking function in the network in both countries.

The users are mixed, deaf, hard-of-hearing or hearing. The hearing users have family reasons to communicate with hard-of-hearing and deaf participants.

In Sweden, the participants performed an interview before and after usage of an RTT terminal solution for communication with a family member, also equipped with RTT. The RTT solutions were either SIP based or Web based for each user. The SIP based solution is installed in a tablet.

In the USA, the users performed an interview before and after trying RTT in conversational communication with TTY through a gateway, and RTT in conversational communication with RTT. Both SIP based and Web based RTT solutions were used. The SIP based solution is installed in a tablet.

To date, a total of 38 participants have evaluated RTT in the two countries. The final interview has been performed by 7 hearing and 31 deaf or hard-of-hearing participant. The final report will be published during the fall of 2015.

A few highlights from the intermediate results are presented below. The results are presented as percentage figures for convenience, with n=38.

- **Preferences for receiving text**
  66% prefer to receive text in real-time mode so that text becomes visible at the same rate as it is typed, while 17% prefer to send complete messages, and 17% have no opinion.
- **Preferences for sending text**
  62% prefer to send text in real-time mode, while 19% prefer to send completed messages, and 19% have no opinion.

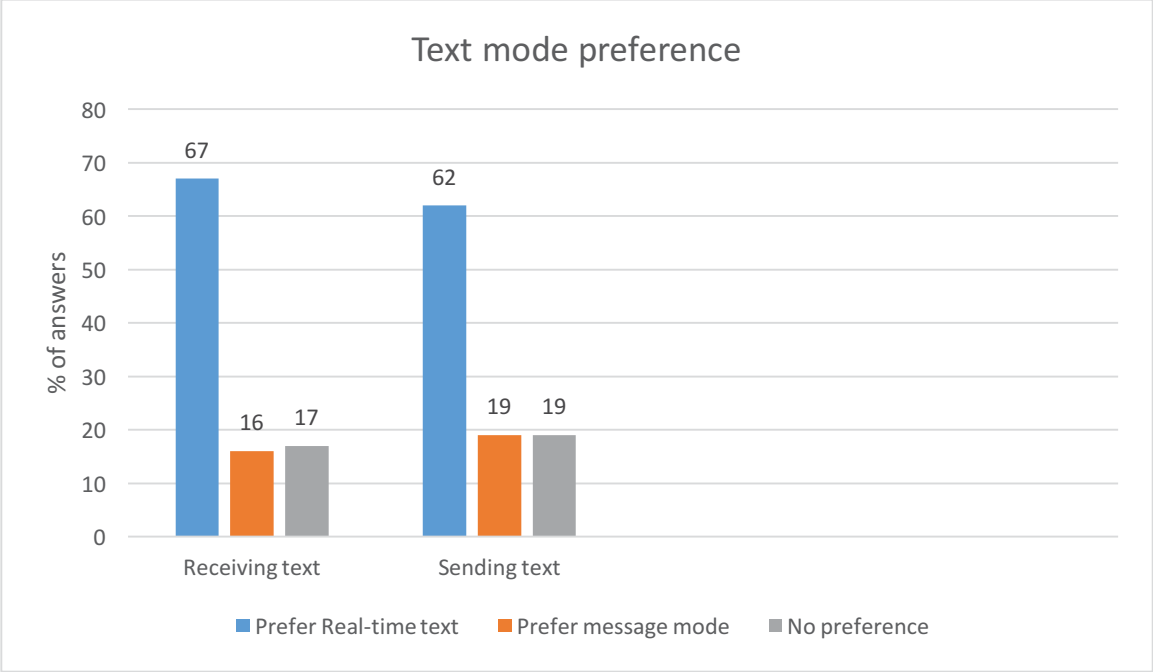

Figure 1 Text mode preference

- **Intermixing text and voice**

  Of those who can use voice on a phone – 83.3% replied that it was very important to them to be able to mix text and voice in the call. 8.3% thought it was somewhat important to them and 8.3% thought it was not important. The remaining 64% users were not using voice communication.

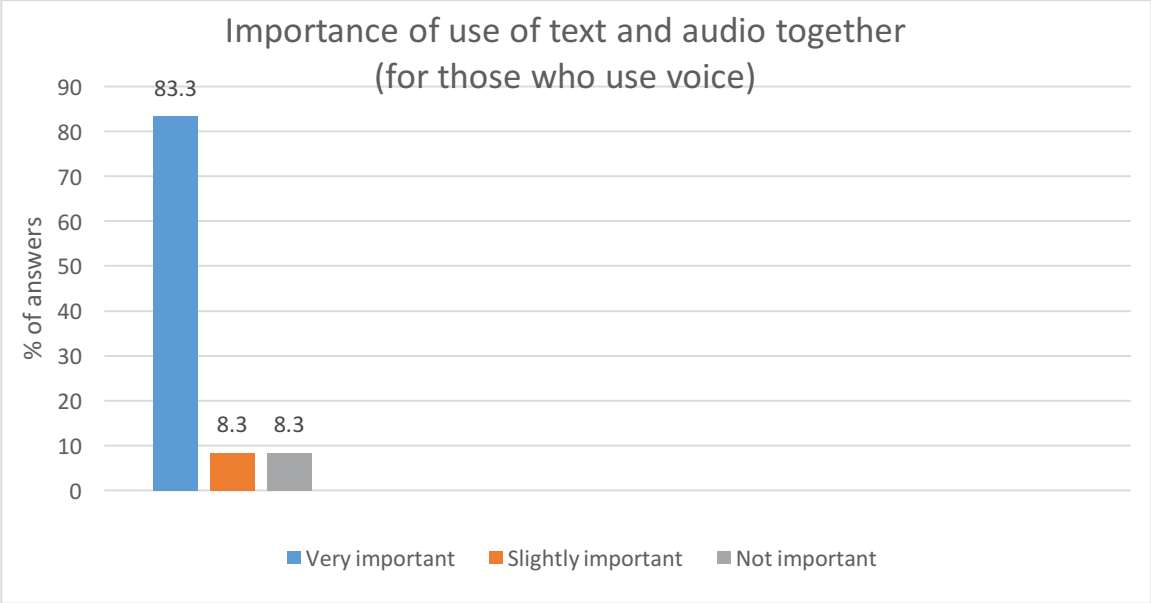

Figure 2 Importance of using text and audio together

- **General satisfaction with the technology**

  74% chose “I liked it a lot” , 26% chose ““I liked it but it had some problems”. 0% chose “I didn't like it very much” or “I didn't like it at all”. The most common comment for the 26% was that they wanted a mobile solution rather than a tablet or computer based.

Figure 3 General satisfaction

- **Desire to use**

  50% wanted to continue using the technology for everyday calls. 42% wanted to continue but expected to use it occasionally. 8% would probably not use it.

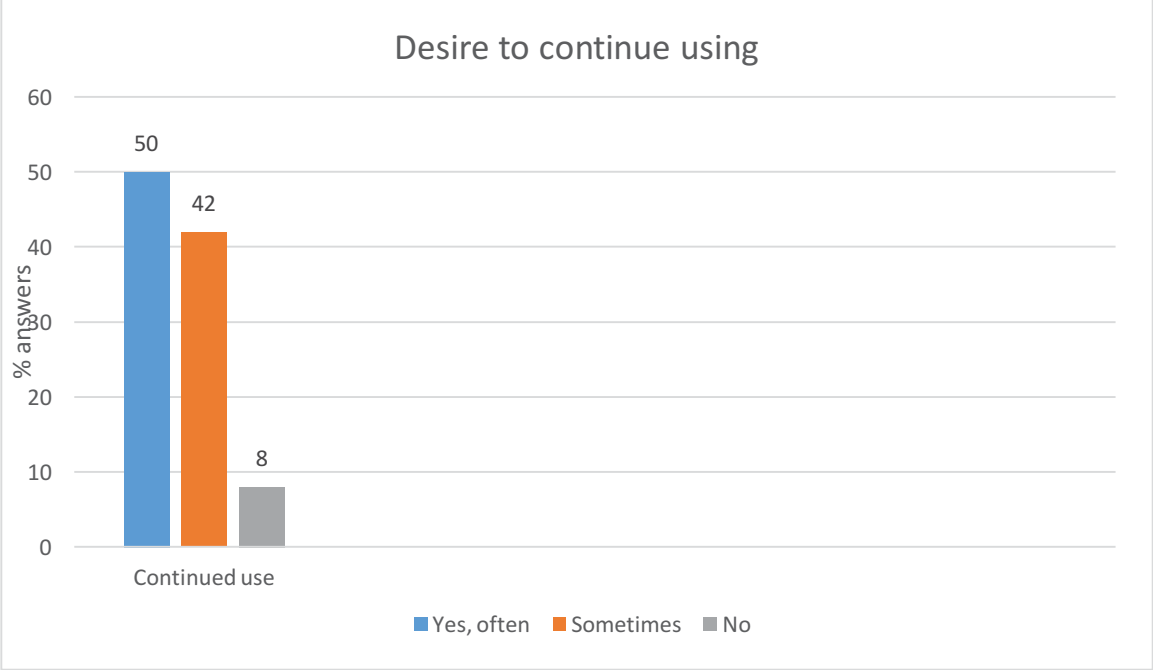

Figure 4 Desire to continue using the solution

- **Importance of interoperability between TTY and IP RTT**

  97% thought it is important that TTY and IP RTT can call each other. 3% did not think that that was important.

- **Importance of interoperability across IP RTT technologies**

  100% thought it is important to have calling between different IP based technologies, e.g. between Web and installed apps.

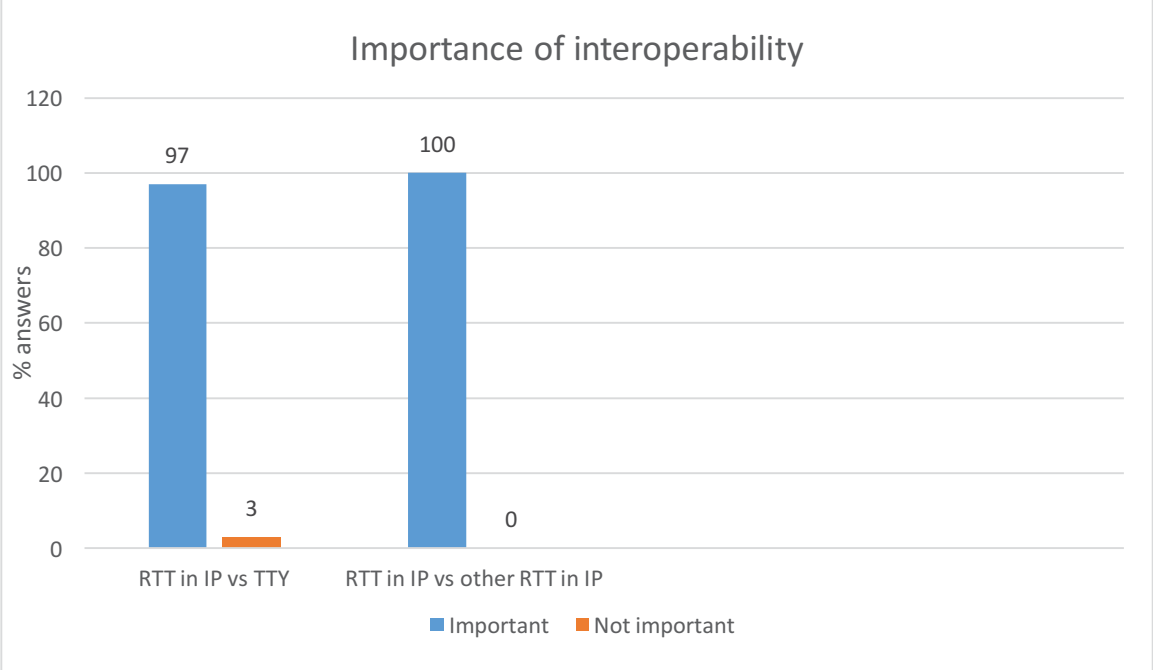

Figure 5 Importance of interoperability

- **Desired features**

  On an open question about other features the users wanted beyond what was available on the devices they tried, the features that were asked for by more than one user were: 23% said that they wanted video as well, and 13% said that they wanted the functionality in a mobile device.

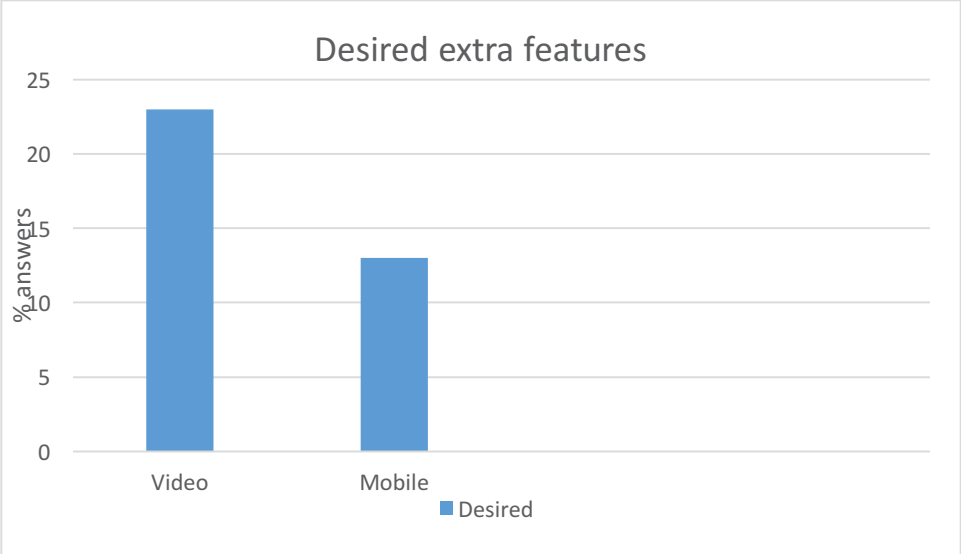

Figure 6 Desired extra features

The RERC-TA's preliminary conclusion based on this trial is that the functionality proposed by AT&T in the petition for rulemaking seems to have opportunities to satisfy users needs. Real-Time text, simultaneity with voice as part of the same call, interoperability with TTY, interoperability between RTT providers, and implementation in mobile devices, all are preferences by the users in the study and mentioned among the goals by AT&T. Only the clear desire to also have video in the call is not mentioned among the AT&T goals.

Conclusion for all referenced studies:

All these five studies on Real-Time text find that when users are reading incoming text the majority have a preference for real-time text over text messaging. Some studies also showed the majority wanted to send in real-time text, while one study showed that the number who wanted to send in real-time and the number that wanted to send in message format was equal. Since some studies were made with hearing participants and no significant difference was found between the real-time and messaging format, it seems that RTT could be popular as a general communications feature, and not only as an accessibility feature. We not again that systems that can communicate in real-time can also all send in message mode by simply including a "hold until return" or hold until SEND" feature allowing people with both preferences or needs to be able to be accommodated. The opportunities to use RTT together with voice and the opportunities for having calls with RTT between various technologies including TTY is also verified to be viewed to be important.

Summary and Conclusions

The RTT technology proposed by AT&T in the petition for rulemaking (RFC 4103) is mature in both standardization and implementation, and that real-time text will improve the user options and experience, for people with and without disabilities alike. Services exist in Europe, where the functions of the AT&T proposal already have been implemented including: the real-time text, the ability to mix voice and text, the interoperability between providers, the ability to have calls with legacy PSTN TTYs, the relay service connection support and the emergency service connection support. This situation clearly contradicts claims that the technology isc be nascent, even if mass market deployment is still to come.

Gunnar Hellström,
Investigator,
RERC on Telecommunications Access,
Vice President , Omnitor AB
Box 92054
120 06 Stockholm, Sweden
gunnar.hellstrom@omnitor.se
+46 708 204 288

Christian Vogler, Ph.D.,
Co-Principal Investigator,
RERC on Telecommunications Access,
Director, Technology Access Program
Gallaudet University
800 Florida Ave., NE, SLCC 1116
Washington, DC 20002
(202) 250-2795

and

Gregg C. Vanderheiden, Ph.D.,
Co-Principal Investigator,
RERC on Telecommunications Access,
Director, Trace R&D Center
University of Wisconsin-Madison
1550 Engineering Drive, 2107 ECB
Madison, WI 53706-1609
(608) 262-6966

via electronic filing
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