

Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of)
Transition from Circuit-Switched)
Network to All-IP Network) GN Docket Nos. 09-47, 09-51,
NBP #25) 09-137
_____)

Comments of the **Rehabilitation Engineering Research Center on
Telecommunications Access and
Communication Service for the Deaf**

I. Introduction

The Rehabilitation Engineering Research Center on Telecommunications Access (RERC-TA) and Communication Service for the Deaf (CSD) submit these comments in response to the Federal Communications Commission's (FCC or Commission) Public Notice seeking public input on the transition from the public switched telephone network (PSTN), to an all Internet Protocol (IP) network.¹ The RERC-TA is a joint project of Gallaudet University and the Trace Center of the University of Wisconsin, Madison, funded by the National Institute on Disability and Rehabilitation Research of the U.S. Department of Education. CSD is a private, non-profit organization that provides programs and services intended to increase communication, independence, productivity, and self-sufficiency for all individuals who are deaf and hard of hearing. CSD provides direct assistance to individuals through education, counseling, training, communication assistance, and telecommunications relay services.

Both the RERC-TA and CSD have previously submitted comments in numerous FCC

¹ *Comment Sought on Transition from Circuit-Switched Network to All-IP Network*, NBP Public Notice #25, DA 09-2517, GN Docket Nos. 09-47, 09-51, 09-137 (December 1, 2009) ("NPB PN # 25").

proceedings on broadband-related issues, including comments on the National Broadband Plan (NBP) (submitted July 21, 2009), on barriers, opportunities and policy recommendations (submitted October 6, 2009), and on public safety issues related to persons with disabilities (submitted December 1, 2009). Both also participated in the Commission's October 20, 2009 workshop and its November 6, 2009 hearing on broadband accessibility for people with disabilities.

In the instant comments, the RERC-TA and CSD focus on the need for a reliable and interoperable standard for real-time text, in response to the migration away from the PSTN to an all IP network. As the FCC acknowledges in its Public Notice on this issue, federal policy plays an important role in protecting consumers from losing essential communications services when a major technological transition takes place.² Yet, more often than not, the loss of access is precisely what has occurred for people with disabilities as each new major communications or video programming innovation has been introduced to the American public. Some examples demonstrate this unfortunate state of affairs:

- It took approximately half a century after broadcast television was first introduced for people with hearing loss to obtain access to television programming through closed captioning. Moreover, the transition from analog to digital television signals has not been an easy one for this community. Numerous problems arising from the transition have impeded the ability to receive and display closed captions, prompting the FCC to develop a technical working group to ascertain and resolve these problems *after* the digital system was put in place.
- It took over a decade for people who wear hearing aids to obtain access to digital wireless services after the transition from analog services was initiated. This created a gap for this population, which continued to rely on bulky and expensive analog devices long past the general public simply because these were the only mobile devices that could provide the access they needed.
- People who are blind still do not have audio access to text messages on the vast majority of cell phones, despite their widespread acceptance and use throughout our society.
- People who are blind still do not have equal access to television programming, and in

² NPB PN # 25 at 1.

particular, lack aural information about televised emergencies when such information is provided to the public via crawls or other visual means.

To prevent the loss of services by people with hearing loss as the transition is made from circuit switched to IP communication technologies, it is critical for the FCC and the communications industry to act now, while new communications technologies are still being designed and developed. This is when the resources and efforts needed to incorporate access will be minimal; waiting will just result in burdensome retrofits that many in the industry may later argue are too costly.

II. A Reliable and Interoperable Standard for Real-Time Text

The primary device used to achieve real-time text communication for people who are deaf and hard of hearing since the 1960s has been the TTY, a device that relies on antiquated Baudot technology. Although TTY technology offers a reliable method of text communication over analog networks, it has many limitations that need not be replicated with IP telecommunications. TTY users must purchase specialized customer premises equipment that has no other functionality, TTY transmissions are slow, and TTY technology uses a half-duplex mode, requiring its users to wait until the other party finishes before being able to respond.

In addition to these disadvantages, serious concerns have been raised about the extent to which TTY transmissions can be effectively carried over IP-enabled services. Specifically, when audio signals such as speech and TTY tones are broken up into packets to travel over the Internet, some packet loss occurs. Minimal loss does not ordinarily create much of a problem for voice communications. The systems are engineered to tolerate as much packet loss as possible while not seriously affecting the voice quality as judged by (hearing) listeners. But TTY garbling occurs even at the low levels of packet loss and other transmission errors that are acceptable for voice (e.g. 1-2% error rates). When this occurs, the incoming TTY messages can

be unintelligible. Compression technologies can also distort TTY signals.

As we migrate away from analog-based TTYs and move into the IP environment, there needs to be a common protocol that allows people who cannot use conventional voice telephones to continue communicating in real-time text. The provision of real-time text wherever real-time voice communications are available will be useful for people who are deaf, those who are hard of hearing including those that use captioned telephony, people with speech disabilities, and people who are deaf-blind in all situations. But it is particularly critical in emergencies. Moreover, the need for this form of communication is taking on a greater urgency, as TTY owners increasingly abandon these legacy devices in the digital environment. The ability to communicate using character-by-character transmissions, rather than in a “type and send” format common to instant messaging, SMS or e-mails, can mean the difference between life and death when information to and from an emergency authority needs to be instantly conveyed. “Type and send” communication is slower, confusion can occur when messages cross, and interrupted messages (by fire or assailant) may *never* be sent if the person does not have time to press the “send” key – if that occurs, nothing is received at the 9-1-1 center – not even an “open line.”

The greatest barrier at this time to the effective use of real-time text is the lack of an FCC-specified format that all carriers and equipment manufacturers must support where they interconnect to each other’s systems and equipment. A call cannot make its way from a terminal device (VoIP phone, computer, etc.) across networks and to its recipient unless all links in the chain support a common format where they interconnect. But without an FCC ruling on this matter, companies have told the RERC-TA that they will have to proceed with product deployment without any real-time text support because it will be unclear what format would later be required. The RERC-TA and CSD agree that it would be appropriate to have different

internal formats (e.g., a phone system within a company might use a different format), as long as all systems and devices support a common format at points of interconnection, so that the text is not lost from the call at these interconnection points.

Standards setting organizations have looked at this issue and international standards for real-time text now exist. There are even some commercial implementations. However, without support in the networks and terminal voice communication products, commercial products that support real-time text cannot be used effectively. Thus there is a chicken-and-egg situation that awaits a determination of the common real-time text interconnection format and a requirement that systems and devices support it. For this reason, it is critical for the FCC to step in, as the agency tasked with authoring the National Broadband Plan and facilitating the migration to an IP environment, to ensure that interoperable implementation of this type of communication proceeds in an orderly way, in step with upgrading the voice network call handling by broadband providers and equipment manufacturers. Unless a clear path forward is determined through an FCC rule, interoperability and international harmonization on this issue are at risk and people with hearing loss will be left behind at the same time that their old TTY system is being rendered obsolete. Delaying the specification of a standard will result in burdensome retrofits that are unlikely to work reliably with the (then) installed base without extensive and expensive re-testing and scattered modifications and/or equipment replacement. Effective real-time text needs to be included in the 'installed base' as it is rolled out.

To this end, the RERC and CSD propose that the Commission adopt as regulation and proceed with implementing the following recommendations made by Telecommunications and

Electronic and Information Technology Advisory Committee (TEITAC), contained in its Report to the Access Board (submitted in April 2008):³

6-A: Real-Time Text Reliability and Interoperability

If hardware or software provides real-time voice conversation functionality it must provide at least one means of real-time text communication where the following reliability requirements are met:

1. Products must use a real-time text (RTT) system that meets the following requirements:
 - a. RTT format must be a standard real-time text format for the voice platform that is supported by all terminal, router, gateway and other products on that platform;
 - b. RTT format must transmit characters with less than 1 second delay from entry;
 - c. RTT system must transmit text with less than 1% Total Character Error Rate at the peak network traffic specified for intelligible speech transmission (text must work on the network as long as speech does);
 - d. The RTT system, together with the audio system, must support speech and text in both directions in the same call session (and support speech and text simultaneously in both directions in the same call session if IP based)
 - e. RTT system must not utilize audio tones for transmission of real-time text over IP.
Note: this is subject to a waiver of the TTY support requirement from the FCC for systems that implement IP based RTT. Also subject to consumer acceptance of prefixes or phone numbers to direct TTY traffic to gateways capable of handling TTY translation.
2. Where products or systems interoperate outside of their closed systems, they must:
 - a. If product interfaces with PSTN, it must use TIA 825A Baudot where it interfaces to the PSTN.
 - b. If product interfaces with other VoIP products or systems (outside of a self-contained product-system) using SIP it must support transmission of text as per XXX where it interfaces with other VoIP products or systems. Note: this is subject to a waiver of the TTY support requirement from the FCC for systems that implement IP based RTT. Also subject to consumer acceptance of prefixes or phone numbers to direct TTY traffic to gateways capable of handling TTY translation.
 - c. If product connects to other products or systems using a protocol other than SIP it must use the standard real-time text protocol that meets provision 1 above that has been established for that protocol.

Note 1: RFC-4103, TIA 1001, and MSRP (RFC4975) are being explored to fill the role of

³ TEITAC was convened by the Access Board to update the accessibility standards for electronic and information technology covered under Section 508 of the Rehabilitation Act and Section 255 of the Telecommunications Act, as well as to harmonize these standards with international accessibility standards. Members of TEITAC included consumers, representatives from the telecommunications, electronics, and information technology industries, federal agencies, international standards organizations, and academics.

XXX. The intention is that XXX will be replaced by one interconnection format in all places it was used.

Note 2: All products may support and use other protocols in addition to these as long as they meet the 5 requirements of 5-B(1) above.

Note 3: A self-contained SIP system that uses the same real-time text protocol can be treated as a single product and can use any protocol internally as long as it supports XXX where the system-product connects to other systems or products.

Rationale: This provision . . . allows people with disabilities to communicate using standard IP methods rather than continuing to support TTY within IP networks and devices.

Because companies can choose their compatibility method without regard to interoperability, the failure of the FCC to act could result in the failure to support real-time text telephony at all (with different parts of the system supporting different, incompatible text transport methods). There are also dangers associated with treating text, even in a digital/IP format, at a lower level of “Quality of Service” compared to voice. In times of heavy network usage, such as emergencies, text calls could be dropped long before voice calls.

As the RERC-TA noted in its comments on the Commission’s Public Safety PN,⁴ the Telecommunications Industry Association (TIA) has acknowledged that real-time text “should be considered for consumers with speech and hearing disabilities to communicate with PSAPs via text . . . after proper review by an expert forum.”⁵ The need for real-time text was also recognized as an issue by the Network Reliability and Interoperability Council Focus Group 1B on Long Term Issues for Emergency/E9-1-1 Services in its final report (December 2005). We appreciate industry’s support on this issue, but we reiterate our opposition to handing this over to a new advisory body. Real-time text has already been the subject of review by several expert

⁴ RERC-TA Comments submitted in *Public Safety Issues Related to Broadband Deployment in Rural and Tribal Areas and Broadband Communications to and from People with Disabilities*, NBP Public Notice #14, DA 09-2369, GN Docket Nos. 09-47, 09-51, 09-137 (December 1, 2009).

⁵ Comments of TIA submitted in GN Docket No. 09-51 (November 25, 2009).

forums that have identified RFC 4103 as the most effective standard for this purpose.⁶

Additionally, there was no negative feedback received from industry when this standard was distributed for comment in December of 2008, and large and small companies have all chosen this same standard for their prototypes and/or commercial implementations. Finally, the same standard is specified for real-time text in the 3GPP TS 26.235 Packet Switched Conversational Multimedia Applications; Default codecs, and the ECRIT documents for next generation 9-1-1.

III. Conclusion

The FCC needs to act swiftly to develop rules to govern the migration away from TTY services to IP-based real-time text communications services, to ensure that text has equal priority with voice in emerging networks and services. Unless there are mandates in place to guarantee real-time text interoperability and compatibility, there is nothing to prevent the proliferation of incompatible solutions by different segments of the industry. If this occurs, consumers with hearing loss who rely on real-time text will be left out of the broadband transition.

Respectfully Submitted,

/s/		/s/
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⁶ The need for real-time text and this proposed standard was also profiled in a document submitted previously to the FCC in Dockets 04-36, 92-105, 96-198 and 03-123 (May 28, 2009).

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December 21, 2009