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Purpose

This document outlines the progress made by VoiceStream toward the mandates required by the FCC for 911 -TTY. The document is for information purposes only and does not represent a commitment to pursue a particular strategy.

Executive summary

Standardization work for a GSM TTY solution is continuing and VoiceStream is active in facilitating a decision. VoiceStream is discussing both NSS and BSS solutions with vendors, and will rollout the most cost-effective and timely solution, as it becomes available.

NSS Solution:

- Currently this is proprietary and requires vendor co-operation and requires all E911 calls to be routed through the server (s) and not just the TTY.
- Needs Server development and standardization,
- Needs HLR development
- Parameter adjustments of the algorithm are foreseen.
- Problems with the TTY server will affect all 911 users.
- The reliability may be one of the most critical aspects of the deployment.

BSS Solution:

- Requires significant Hardware replacement
- Transcoder Development needed
- Time needed to replace Transcoders
- False baudot detection in the TRA will possibly affect ALL users in the network.

Background and Standards Activity

Since September 1997, the Wireless TTY Forum (TTY Forum), representing wireless carriers, wireless equipment manufacturers, manufacturers of TTY devices, public safety organizations, and consumer organizations representing individuals who are deaf or hard-of-hearing has been meeting in an effort to develop solutions that will enable TTY users to make 911 calls on digital wireless networks. Technical solutions had been proposed for all major wireless standards and these solutions have been under going study in the relevant technical bodies, TR4.5 (CDMA), TR45.3 (TDMA) and T1P1/3GPP (GSM).

The GSM solution revolves around using CTM (Cellular Text Telephony Modem) as a method of transmitting Baudot over the GSM network. It is difficult to transmit Baudot code over the digital channel of GSM to the FCC-mandated 1% Total Character Error Rate (TCER), as the digital codecs have been optimized for speech. Baudot uses frequency components at 1.4 and 1.8KHz which would be attenuated by the low pass filtering in the codecs. In addition the error correcting protocols of GSM result in the character error rate for a Baudot Code transmission increasing dramatically in case of a decreasing channel quality.

For this reason, CTM had been designed to work with all speech coding strategies and it has been successfully tested with the relevant codecs for the US, which are the GSM FR, EFR and all modes of the AMR codec. CTM signals have components only between 400 Hz and 1000 Hz, which corresponds to the nature of human speech. A converter would handle the CTM functionality at the mobile, which would be either incorporated in to the mobile or available as a clip-on/add-on unit.

At the time of the FCC issuing it's Forth Order Report in November 2000, the solution for GSM was focused around a solution from Ericsson which used a Server Node to convert CTM signals to Baudot.

The Ericsson proposal would need the networks to be CAMEL Phase 1 compliant. Vendors have been studying the Ericsson proposal and found that to support the architecture software development would be needed in several nodes, and that possible problems with feature interaction could occur. Several vendors were of the opinion that they could not carry out such a development in the time available and proposed an alternative solution based on placing the CTM detection in the current Transcoders.

The Transcoder (BSS) solution relies on the codecs being able to detect that the call is a CTM call and switch in the Baudot translation functionality. This approach would require software development in the transcoders only. However, for some vendors, support for the new functionality is hardware dependent due to the increased requirement for memory and processing power in the codecs.

T1P1 has been evaluating the BSS and NSS proposals and there was a growing consensus that the NSS solution from Ericsson would require too much development work. T1P1 issued the following liaison statement on February 2nd 2001:

> "T1P1 has studied multiple solutions for handling GTT and requests that 3GPP SA2 include a BSS-based CTM solution as part of the 3GPP architecture for Release 4. This solution is being requested due to United States TTY regulatory requirements. T1P1 evaluated a network server-based approach to CTM and has determined that if T1P1 undertook to standardize such a solution at this point in time, most manufacturers and service providers would not be able to develop, deploy, and implement it in service provider networks in time to meet the US TTY regulatory requirements."

At the 3GPP plenary meeting this week, VoiceStream, other operators and vendors proposed that both the BSS and NSS solutions be retained at present, in order to give vendors time to resolve any technical difficulties in producing an NSS solution. To facilitate progress, VoiceStream will chair a technical workshop in April in which all technical specifications for developing interoperable solutions for both the NSS and BSS approaches will be developed. This will allow operators to chose a solution that best fits its time and cost requirements.

VoiceStream's Network Progress

Due to the lack of a firm standard from either T1P1 or 3GPP, VoiceStream is not able to state which solution will be chosen as the final configuration. It is possible that VoiceStream may opt to deploy a mixture of NSS and BSS based solutions depending on vendor.

In lieu of such a decision however we are making preliminary preparations to be compliant with either solution within the required timelines.

VoiceStream has had regular meetings with all it's vendors and has firm proposals for both the NSS and BSS based solutions.

Based on our current understanding we expect to have an NSS solution available for testing in October 2001, ready for deployment in December 2001, dependent on a decision at T1P1 and 3GPP.

In order to support an E911 NSS solution VoiceStream has completed a software upgrade to all it's switches such that they are CAMAL phase 1 compliant.

VoiceStream has also started a program to replace older BSS equipment with newer units that can be software upgraded to support CTM to Baudot conversion, this process is nearly half-complete.

Markets that have Hardware updated and are ready for Software include:

- Columbus
- Des Moines
- Houston
- Kansas
- Minneapolis
- Orlando
- Phoenix
- Pittsburgh
- Portland
- Seattle
- St Louis
- Tampa

Progress of the software development that contain the TTY features is monitored monthly and will be deployed as soon as it is delivered in areas that have the upgraded equipment. This is expected to be in the 4th quarter.

Handset testing is waiting the delivery of CTM capable phones.

PSAP testing coordination will be started after the network software has been delivered and handset are available for testing. Consumer end-to-end testing will only be started after all other testing is complete. Because this is a 911 service only, some benefit may be gained by publishing how the end to end testing should be achieved.

Washington RSA No. 8 Limited Partnership and Eastern Sub-RSA Limited Partnership
TTY Report
Wednesday, March 28, 2001

A. BACKGROUND

In response to the Federal Communication Commission's ("FCC"), Fourth Report and Order[6], in its Enhanced 911 proceeding in which it established new deadlines for digital wireless carrier's to be capable of transmitting 911 calls made using TTY devices, Washington RSA No. 8 Limited Partnership, the licensee of Washington RSA No. 8B, Idaho RSA 1 B2, and Idaho RSA 2 B2, and Eastern Sub-RSA Limited Partnership, the licensee of Washington RSA 5 B2, collectively ("WA8LP and ESRLP") hereby submit jointly their TTY Quarterly Status Report ("Report").[7] The FCC requires carriers to submit Reports to chronicle the progress of E911 TTY preparations as the FCC's December 31, 2001 and June 30, 2002 deadlines approach.

The current status of requisite infrastructure improvements and TTY capable handsets is discussed below. While WA8LP and ESRLP have been diligently working with Nortel Networks ("Nortel"), their infrastructure vendor, to ensure timely TTY access to E911 for all of their customers, the absence of firm commitments and definite standards from both infrastructure and handset vendors remains a major obstacle. The following information is based upon representations made to WA8LP and ESRLP by Nortel in response to WA8LP's and ESRLP's numerous inquiries.

B. STATUS

Infrastructure Vendor Status

Based upon correspondence from Nortel, WA8LP and ESRLP have been informed that Nortel has decided not to provide the "patches" necessary to provide TTY capability in its MTX08 or MTX 09 software and to only make its upcoming MTX10 software TTY compatible. Unfortunately, Nortel did not inform WA8LP and ESRLP of its change in plans until March 22, 2001.

More disturbing is the fact that Nortel now predicts that MTX10's General Availability date ("GA") is September 2001. Based on WA8LP's and ESRLP's experience with Nortel, it can take at least eleven (11) months from a GA date for a product to 'trickle down' to WA8LP and ESRLP. WA8LP and ESRLP have previously been told by Nortel that the MTX09 would be the

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[6]/ Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, Fourth Report and Order, CC Docket No. 94-102, FCC 00-436 (rel. Dec. 14, 2000), 65 Fed. Reg. 82,293 (Dec. 28, 2000).

[7]/ This Report is being submitted jointly by both carriers as ESRLP does not have its own switch and instead leases its switching capacity from WA8LP. Thus, ESRLP is reliant upon WA8LP's receipt of the requisite software in order to be compliant with the FCC's TTY rules.

platform utilized to deploy TTY enabling software. In response, WA8LP ordered the MTX09 which was to be GA in June 2000. WA8LP and ESRLP have been informed that the new delivery date for the MTX09 is now May 31, 2001 which is eleven months after the initial GA date. Based on this example, while the current GA deadline for the MTX10 as promised by Nortel is September 2001, it will likely be at least another eleven months, until July 2002 before the software is available to the WA8LP and ESRLP. Thus, WA8LP and ESRLP would be precluded by the unavailability of the necessary software from meeting the December 31, 2001 deadline.[8]

Handset Vendor Status

In response to WA8LP's request for information regarding the availability of CDMA solution handsets, Nortel stated that, "the most difficult issue is no handset manufacturer would commit to dates when "test" handsets would be available, or when commercial units would be available to carriers." See attached Nortel email. As there is currently not a GA date as to when the handsets will be available WA8LP, ESRLP, and other carriers have no way of knowing whether they will be able to meet the deadline. For this reason, WA8LP and ESRLP are concerned that the June 30, 2002 deadline may prove to be unattainable.

WA8LP and ESRLP hope that Nortel's predictions are overly pessimistic and that the December 31, 2001, and June 30, 2002 dates are attainable. However, WA8LP and ESRLP will continue to monitor Nortel's progress and, in the event that WA8LP and ESRLP conclude that the December 31, 2001 deadline may not be met due to software unavailability, WA8LP and ESRLP will seek waivers.

C. Summary

Based upon the response from their vendor WA8LP and ESRLP are concerned that they, and many other carriers, will be unable to meet one or both deadlines. If the overwhelming majority of carriers report similar concerns, WA8LP and ESRLP strongly encourage the Commission to consider extending the TTY deadlines rather than require the vast majority of carriers to submit waiver requests.

Carriers cannot design either software or handsets. Instead, carriers are totally dependent upon suppliers to provide them in a timely manner. Once the carriers are provided the requisite software and handsets, it becomes their responsibility to expeditiously test and roll out TTY service. WA8LP and ESRLP pledge to do so.

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[8]/ In order to meet the December 31, 2001 deadline, WA8LP and ESRLP would have needed a GA date of January 31, 2001.