TTY FORUM - 17

Meeting Summary Report

March 14, 2001
ATIS Conference Center
Washington, DC

TTY/TDD FORUM – 17

ATIS Conference Center
1200 G Street, NW, Suite 500
Washington, DC

Meeting Summary

Chaired by Ed Hall, ATIS

1. Call to Order, Introductions and Attendance Roster	Chair
2. Call for and Numbering of Contributions	
3. Review & Approve Agenda	
4. TTY Forum – 16 Summary	
5. Correspondence	
6. TTY Liaison Reports: *FCC; CTIA, PCIA; NAD; TDI*	
7. Review FCC Timeline	Chair
8. Review TTY Forum #16 Agreements	Chair
9. Industry Implementation Status Reports	
10. Technical Standards Activities (TR45, T1P1)	Per Contributions
11. Future views, Standardization Information	Ericsson
12. Review and update Appendix J	Chair
13. Enhanced Protocols	
14. Voiced Based Solutions (formerly “short term”)	Per Contributions
15. Data Solution (formerly “long term”)	
16. Next Meeting	Chair
17. New Business	
18. Adjournment	

Table of Contents

1. Call to Order, Introductions and Attendance Roster
   Ed Hall, chair of the TTY Forum, called the meeting to order, introductions were made and the attendance roster was circulated.

2. Call for and Numbering of Contributions
   All contributions provided to the Secretariat electronically are available for download at http://www.atis.org/tty/ttyforum.htm. Contributions were submitted and numbered as follows:

Number	Document	Agenda Number
TTY17/01.03.14.01	Agenda	3
TTY17/01.03.14.02	Roster	1
TTY17/01.03.14.03	TTY16 Meeting Summary	4
TTY17/01.03.14.03A	Appendix J	12
TTY17/01.03.14.03B	TTY16 Agreements	8
TTY17/01.03.14.04	Ultratec Memo	13
TTY17/01.03.14.05	Ericsson PowerPoint	11
TTY17/01.03.14.06	TTY Implementation Timeline	7
TTY17/01.03.14.07	TR451.20.01.02.20.16R1	10

3. Review & Approve Agenda
   The agenda was distributed and approved without modification.

4. TTY Forum – 16 Summary
   No corrections were noted and the summary was approved for FINAL form to be published via the Listserv and submitted to the FCC per their R&O.

   Ed Hall noted that at the last Forum, Appendix L was added to support implementation status reports. It was noted that the due date for the next report is March 28. In addition, Megan Hayes, ATIS, TTY Secretariat, asked that all written reports be submitted in Word Format. Reports should be submitted via email to mhayes@atis.org.

5. Correspondence
   Ed Hall noted that there were several pieces of correspondence submitted to the Secretariat, including the implementation status reports from Forum 16.

   Ed Hall noted that at the most recent ATIS Board of Directors (BOD) meeting, the ATIS BOD approved the TTY Forum as an officially sponsored ATIS Forum. He also noted that this will not change the meeting fee structure or how the meetings function. It will, however, allow for more services and continued support from ATIS.

   - **AGREEMENT: The TTY Forum recognized ATIS as its Secretariat and official sponsor.**

6. TTY Liaison Reports:

- FCC

  Ed Hall noted that Elizabeth Lyle retired from the FCC, but that there were several other FCC Participants at the TTY Forum. Blaise Scinto, Deputy Chief of the Wireless Policy Division introduced the FCC contingent and noted that the new participants to the TTY Forum were not new to the issues being discussed today. She noted that the agency is in transition, but that the Commission is dedicated to addressing the issues of the TTY Forum.

  Blaise Scinto introduced Mindy Littell to discuss the FCC 4th R&O from December 14, 2000 which set an implementation schedule for digital wireless systems to accept E-911 calls from TTY devices. The deadline for implementation is June 30, 2002. She also noted that the 4th R&O established a quarterly reporting requirement for carriers. The first implementation status report is due April 15, 2001. Mindy Littell also noted that the commission allowed for the industry to report through the TTY Forum and noted that the FCC is thankful to the Forum for all of the work that they are doing to ensure that the industry is able to meet FCC deadlines.

  For a copy of the 4th R&O, please visit http://www.fcc.gov/Bureaus/Common_Carrier/Orders/2000/fcc00436.txt.

  Mindy Littell noted that CTIA requested clarification of the commission's statement with respect to enhanced protocols. Several entities filed in support of CTIA's request.

  Ed Hall thanked the FCC for their report.

- CTIA

  No report was given.

- PCIA

  Ed Hall noted that he was contacted by PCIA, they will no longer be participating in the TTY Forum. PCIA Liaison will therefore be removed from the agenda.

- NAD

  No report was given.

- TDI

  No report was given.

7. Review FCC Timeline

   Ed Hall introduced Contribution TTY17/01.03.14.06 which is a "cheat sheet" on the FCC implementation timeline and suggested report contents. He noted that the plan is to have a TTY Forum well in advance of the due date to give the TTY Forum Secretariat ample time to collect everyone's report and to have sufficient time for participants to review the Meeting

Summary. He noted that the TTY Meeting Summary would be submitted by ATIS as an official document to the FCC.

8. Review TTY Forum #16 Agreements

Ed Hall noted that this is a new process that he would like to use going forward. He stated that it would be beneficial to go through all agreements from the most recent TTY Forum. For more information on the agreements reached at TTY Forum #16, please see the Meeting Summary from that Forum. It is available at http://www.atis.org/tty/ttyforum.htm.

16.1 TTY Secretariat, Megan Hayes, will add a non-attending participants list of those who submit implementation status reports to the chair but were unable to attend the TTY Forum.

Megan Hayes noted that there were no non-attending participants from TTY16, but she expects some from this meeting in light of the FCC R&O allowing for industry to submit their implementation status reports through the Forum.

16.2 The industry implementation status reports will be added as an appendix to the meeting summary (Appendix L). All written reports will be sent to the chair within ten working days following the Forum meeting. This agreement will be sent out to the list serve to ensure that all TTY participants (past and present) are aware of the agreement. The final Meeting Summary will be submitted to the FCC and will become public record.

Megan Hayes noted that the deadline for the next implementation status report is March 28, 2001. Reports should be sent to mhayes@atis.org.

16.3 TTY Forum industry members find that it is not within the scope and purview to address the e-protocol issue at this time. However, the chair will pass the concept and recommendation to SDOs (e.g., T1P1, TR45).

Ed Hall noted that this was complete in November, and that the SDOs were advised to do nothing at that time and that he provided them with the criteria that was provided by Ultratec.

16.4 A working group will be created to explore the e-protocol issue. There will be an effort to ensure that all industry sectors are represented.

Dick Brandt, Gallaudet University will provide the report later in the meeting (See Agenda Topic 13).

9. Industry Implementation Status Reports

The following is a summary of organizational status reports and follow-up discussion as captured by the TTY Secretariat. Precise information is contained in individual status reports found in Appendix L.

Cingular Wireless

Sean Campbell noted that Cingular stands committed to provide TTY access to its wireless system. Despite several requests, they have not been able to get implementation status from Lucent or from Ericsson. Because of this, they are unable to set up testing with TTY users. Both manufacturers were insistent that they would be able to meet the requirements. He noted that Cingular believes that this process is a complex one which needs to include many players. They would like assistance from the FCC and the Forum to ensure that the carriers will be able to meet the FCC deadlines and that the manufacturers provide their status reports in a timely manner. Cingular is concerned that Ericsson will not be able to develop the software necessary to meet the requirements for all TTY models. With little or no information coming from the vendors, Cingular is concerned that they will not be able to provide service to TTY users in time.

Norman Williams, Gallaudet University wanted to know whether beta testing included Gallaudet. Sean Campbell, Cingular noted that it was their intention to include consumers and that they were planning to include Gallaudet.

Norman Williams noted that Gallaudet University is developing software development that would include a process for testing. Ed Hall noted that the TTY Forum encourages the industry to include Gallaudet in any testing. Audrey Longhurst, Motorola asked Norman Williams how much involvement Gallaudet would like to have and what kind of support Gallaudet could offer, including how they could help with internal testing. Norman Williams noted that Gallaudet was planning to provide tools via a listserv, which would come with a scoring program from Lober & Walsh. The Forum has a license to use the scoring program. For resources, he cannot imagine that there are many different phones. Audrey Longhurst noted that there gets to be many different phone models which all have different implementation schedules. She doubts that Gallaudet University would want to be involved in all tests, but that any involvement would be appreciated. Jim House, TDI, offered his organization's assistance as well.

Lucent

Jim Huntley, Lucent Technologies noted that prototype mobiles are available for preliminary testing, and that there are problems in that mobile vendors are trying to use the hands free 2.5 mm jack for the mobile connection, but this produces too much echo. They do have one phone with the 2.5-mm jack that does not produce echo in either direction. They still have yet to address the VCO/HCO issue.

Sean Campbell wanted to be involved in the CDMA testing and Jim Huntley accepted that offer.

Jim Huntley noted that TTY Performance tests will not begin until he gets phones that will pass. Currently, Lucent has three CDMA and one TDMA vendor. Qualcomm phones are currently in test mode or prototype only. Cingular noted that they need the software and phones for testing by December in order to be ready to rollout by June 2002.

Steve Coston, Ericsson, noted that the point that is missing is that the industry is nine months from the deadline and we are still completing standardization requirements. He stated that the Forum should couple the deadline and standardization much more closely. Jim Huntley noted that what is considered the final code for CDMA is now available and that the TDMA code could be available in as soon as three weeks pending the outcome of the TDMA Forum which is meeting today.

Matt Kaltenbach, Ericsson, noted that the goal is to implement to a single published and released standard, but that the current TDMA standard is continuously changing. He wants to be sure that the entire industry is implementing to the same version of the standard. Jim Huntley noted that there is no TDMA code accepted and validated, but that the CDMA code is considered final. Matt Kaltenbach suggested that there be a freeze on further development of the implemented standards thereby allowing the industry to implement to the same version of the same standard. At that point, the industry could test the TTY function and bring any concerns to the FCC, so that everyone involved in testing the same version of their product, and are equal in the test process. Otherwise, there will not be a clear test result or consistent delivery date.

Jim Huntley wants to know which solution is the easiest to implement. Steve Coston noted that the industry still has some issues with the CDMA standards they are currently released and in test. These concerns have been expressed to Steve Benno from Lucent. Ericsson noted that they are still trying to hit a moving target and that the only way to ensure that the deadline is met is to freeze the development of standards so that they can solve for inter-operability in a single implementation and test. Matt Kaltenbach, Ericsson, noted that extending the deadline by three more months to incorporate changes in standards is not going to be sufficient if problems continue to exist in the developed standards, and have not been caught by an industry inter-operability test. If standards development is not halted, by July, there will be a new family of problems found in inter-operability testing, and there will need to be another three-month window to address those changes. He suggested that we need a process and a plan to freeze the development of the standards, implement them as they are currently written, test “as an industry” to a single level of the standards, and generate a single list of problems. Adjustment to the functional level can then be made at completion of interoperability testing, allowing the industry to ship a functional system by the deadline, that at least, inter-operates. Jim Huntley noted that if companies were to implement what is in the CDMA standard now, they would be fine. The TDMA problem is more complicated because they have nothing approaching a working phone so it’s hard to de-bug.

Chuck Spann, Nortel Networks, wanted to know whether the standards serve as an architectural template and if Lucent has provided the updated CDMA code. Jim Huntley noted that the standard has been approved and is awaiting validation. For TDMA, there is a bug-free switch change, which is to be available in three weeks. The TDMA Forum is considering this today, and if this happens favorably, Steve Benno will code the final version. Jim Huntley also noted that he has a complete list of bug fixes available.

Brye Bonner, Lucent, wanted to remind everyone that every manufacturer and carrier is invited to attend the standards meetings and has one vote. Laying the blame for implementation problems on one carrier and/or one manufacturer is unfair.

There were some questions from the participants about a rollout schedule for phones pending the approval of standards and codes. Jim Huntley noted that if Lucent gets a prototype phone by July then they should have a product by the December deadline for interoperability tests. Currently, most of the current phones that they are hand made and it is difficult to attain the necessary quantity of phones for prototype testing.

Matt Kaltenbach from Ericsson reiterated his suggestion of freezing the development of the standard, provided that there is no verifiable TTY functional failure, will allow the December 31 deadline to be achievable. He noted that the implementation deadline would remain the same regardless of the industry's standards process. He suggested that by freezing development of the standard, the industry could at least provide the consumer with a working product by the deadline and then make a second pass possible, to achieve full functionality.

Sean Campbell, Cingular, concurred with Matt Kaltenbach's idea of coming out with a release that might have flaws and replacing it with an updated product.

Scott Prather, AT&T Wireless noted that IS 823 release 17 for TDMA is being changed to IS 823A release 17. Chuck Wood, US Cellular explained that CDMA 10.1 includes bug fixes and that the TDMA bug fixes are being added to the TDMA standard but that testing has not begun.

Dick Brandt noted that we are hearing from Ericsson that we are currently having problems with the standards, which creates voice degradation. Lucent was unaware that there was a problem with VCO. Dick Brandt asked if any company was working on a solution to this problem.

Steve Coston, Ericsson noted that they just received that information from the latest test results in CDMA, and the test failure will be included to the proper path so that it goes back to the SDOs to validate that there is in fact an issue. They are bringing it up to the Forum so that each manufacturer present is aware of the problem. Sean Campbell, Cingular, expressed his concern that the manufacturers were not sharing this information with carriers in a more timely manner.

Ericsson indicated that approximately two weeks ago they had evidence that there was a problem, and only yesterday did they have a documented test report indicating that there was in fact a failure in voice. Ericsson is trying to ensure that the standards process includes a method to: document, verify, and release reports on failures. They want to separate these from the product development and implementation of TTY solutions.

ACTION ITEM: Ericsson, Lucent, and Nokia will look into the voice quality issue in terms of IS 127-2 CDMA and TDMA and report back to the TTY Forum whether or not there is a problem.

Nokia

Doug Neeley noted that Nokia engineers are also awaiting a final version of the standards.

Nokia is planning on TTY Compatibility in eight new phone programs with 10 to 18 different specific models having CDMA, TDMA, GSM and AMPS capability in various combinations.

Nokia mobile handset products are currently planning to support TTY/TDD Compatibility plus three-pin headset functions. Several models will use the bottom system connector to convert the Tx and Rx audio signals from XEAR and XMIC to a standard 3 conductor 2.5mm jack. Other projects have a built-in 2.5mm jack four-conductor on the handset that will eliminate the need for an external adapter. Nokia has formed a separate program team to implement the various interconnect cables according to TIA/EIA TSB-121.

Dick Brandt noted that the solution offered by Nokia might not be acceptable to all TTY users as the function key might complicate things too much. Ron Schultz, Ultratec noted that Nokia is treating the symptom as a temporary solution, but it's still a problem in that implementing the basic solution for HCO/VCO would still lead to voice degradation and certain people would still have problems.

Cheryl Gentry, Sprint PCS, noted that if the toggle is a user-friendly function she does not see an issue. But, she wanted to know if the voice degradation issue was a headset jack issue or whether it's because of the TTY. She asked if there is a way for the jack to recognize whether the plug-in is a TTY or a headset. Doug answered that right now, if you plug something into the headset jack, it says headset. Nokia's solution is to have an option to make it ALWAYS a TTY option if something is plugged into the headset jack.

Sean White, FCC Disability Rights Office, noted that the ADA Title 3 requires places of public accommodation and private entities to make accessibility and accommodation features. Section 255 requires telecommunications to make their services accessible to and usable by persons with disabilities. The FCC has left the market to decide which is the best solution. Sean White noted that the ADA and the Telecommunications Act have not provided specifics. He also noted that the Section 255 enforcement has been complaint driven.

In order to avoid complaints, some of the participants suggested surveying the consumers to ascertain whether the toggle function would be acceptable to them.

ACTION ITEM 2: Consumer groups will review the "user intervention" handset function and report back at the next TTY Forum on whether or not the function is considered a viable option.

In order to complete the action item, Dick Brandt, Gallaudet University, put together a statement regarding the toggle function for the use of TTY machines through the 2.5-mm jack. It reads:

User Intervention Issue:
The manufacturers of handsets have expressed a desire to have the 2.5-mm jack usable for both "handsfree" operation and "TTY" connection. As the voltages and impedance of these 2 different applications are not the same it would appear that some user intervention might be required to switch between these 2 modes of operation.

This proposal would enable the jack to be integrated into the handset and would make for a less cumbersome device for the user to deal with. The user might be required to decide between "handsfree" and "TTY" mode.

Opinions on the desirability or undesirability of such a capability are being sought from the use community.

Matt Kaltenbach from Ericsson noted that for the current standards, we are looking at the possibility of using conditional switching, and whether the users are amenable to having to make a decision between disabling and enabling the TTY mode in the cell phone.

Mary Brooner, Motorola, noted that the TTY requirement for E-911 is in the E-911 docket and is in the nature of a mandate to the industry. It has set requirements, but not methods (for testing, accuracy or implementation standards).

Matt Kaltenbach, Ericsson, expressed his concern that Section 301 of Title 2 of the ADA requires that the disability user not experience a lower quality of service for the function. He is dually concerned that the Nokia toggle option directly circumvents continuos TTY, and is a method of avoiding the impact of lower voice quality on the phones.

Ken Evans, Cingular explained that the plug in for a hands free jack has one set of impedances for voltage levels. When a TTY machine is plugged in, there is another. When the TTY software is used, voice degradation occurs. Matt Kaltenbach noted that the interaction between the algorithms does cause degradation in voice quality.

AT&T Wireless

Lori Buerger, AT&T Wireless, noted that at the last TTY Forum, AT&T Wireless (AWS) reported that they didn't anticipate any implementation problems. But, AT&T is now facing a new challenge because they are adding the GSM interface into their network. Lori Buerger recognized that AWS lacks the level of expertise of their competitors with respect to the GSM interface but are working hard to learn about and implement for compliance within their GSM interface. AWS wants to concur very strongly with Cingular on the timing of the vendors providing software, etc., by the deadline put forth in the R&O. If the vendors do not meet that deadline, AT&T Wireless is put in a bind. AWS also wants to concur with Cingular on the information flow between vendors and carriers on implementation.

Scott Prather, AWS, noted that the TDMA infrastructure vendors will support TTY with software prior to the December deadline with Lucent being the to release software. They are expecting software from Qualcomm in the third quarter of 2001and from Ericsson in the third

or fourth quarter of 2001. AT&T Wireless does not know for sure when the software loads will fall, but it seems that they will fall before the end of this year.

4 manufacturers have provided AWS with information on handset availability, and indicated that handsets would be available within the third or fourth quarter of this year. Early indications are that the uplink is operating well and there are few problems with the downlink. The downlink is sensitive to levels, which was anticipated given the variety of levels coming from different types of TTY machines.

AT&T Wireless noted that they are just beginning with GSM, therefore, they have not decided upon a specific plan. AWS is leaning towards the solution whereby the TTY solution resides in the translator and the service node. Obviously there are advantages and disadvantages to each which need to be weighed carefully. AWS is still open to both the Ericsson and Lucent solutions. GSM handset integration is going very slowly.

Chuck Wood, US Cellular, asked who the vendors were for TDMA handsets. AT&T replied that their vendors are Ericsson, Motorola, Nokia and Panasonic.

Ericsson

Matt Kaltenbach summarized Ericsson's status for the Forum. He noted that they just completed a company-wide review of TTY status (terminal, network, service node and related technologies). Risk, schedule, and test assessments were assessed in the report. He noted that they have 15 different development teams with several hundred people working on developing and implementing the solutions. The next phase is the identification of technical issues that need to be addressed at a standards level. From an evaluation of Ericsson's schedule for all product technologies, it is recommended that there be a freeze on published standards today, in order to meet delivery dates. Ericsson is currently attempting to coordinate all test labs and put into a relational database in order to manage the level of information coming into Ericsson at this time.

Currently, Ericsson has identified problems, but has not completed the verification process for these problems. Matt Kaltenbach reported that Ericsson has an acceptable status for TDMA and CDMA terminals, while GSM service nodes and transcoders are moving through the process quickly. They have identified concerns for echo and noise loops, multi-band products, dual band products, non-standard and standard protocol handshakes and other technical issues that are not addressed by the existing standards. The current versions of the standard have completed integration into the phones, and have been placed in ROM. It is unclear if sufficient time remains to incorporate any additional changes from the standards, into the products shipping at the end of the year. Several months are normally required to place changes into a phone, and very little schedule time remains.

The assumptions in the standards are in continuous, always-on TTY phones. Clarification of the process is required to determine whether or not Ericsson will meet their deadlines in light of the issues put forth during the Forum today. For this reason, Ericsson is interested in implementing a freeze, a process and a closure for these issues. They especially want to fast

track the standards process for these issues to ensure that the industry can meet ALL FCC deadlines for TTY implementation.

Matt Kaltenbach indicated that in short, his plan is to use the current standards to release a first generation of handsets so that the industry meets all testing marks and the roll-out can occur per the FCC's order. Sean Campbell, Cingular wants to be sure that the first generation of handsets that are released meet the basic E-911 functionality that is required by the FCC. Ken Evans, Cingular, noted that the industry and the consumers need to be prepared to accept a first generation of handsets that have voice degradation and quality reduction. Matt Kaltenbach answered that until the manufacturers report data to the Forum, they cannot be sure what the end solution will be. He also noted that Ericsson believes that it is possible to meet the FCC deadline with a terminal problem, but it might not solve the gap in the test window.

Finally, Matt indicated that Ericsson is also trying to develop a standard terminal user interface to deliver product level units to test labs later this year in order to meet the FCC implementation deadlines.

Sprint PCS

Cheryl Gentry stated that Sprint PCS is currently unable to obtain software to begin interoperability testing, but hopefully will begin testing by late summer/early fall to begin testing. The software delivery from their vendors has several bugs identified and it has limited their ability to begin lab and field testing within the timeframe.

Sprint PCS would like for the FCC to give some guidelines in terms of accountability. Specifically, are vendors liable to carriers, software providers, handset providers, etc., when their delays impact carriers' ability to rollout services on time. Sean White, FCC, noted that both to carriers and manufacturers are accountable as far as the FCC is concerned. He suggested that, for more information, participants should visit www.fcc.gov and click on disabilities.

Cheryl Gentry also wanted to address the Enhanced protocol issue. Accommodating high speed and Turbo Code would set the industry back at least 2 years for implementation. Ed Hall noted that there would be further discussion of E-protocols when the Working Group gave its report (see Agenda Topic 13).

Cheryl Gentry inquired as to the industry's ability to provide voicemail support for TTY users, and what the mandate requires for the support of voicemail, specifically voice prompts. Susan Palmer noted that there might be several avenues for exploring this issue outside of the TTY Forum. She noted that Jim Tobias, Inclusive Technologies has also been working on putting together accessible voicemail systems. Ed Hall sees this as a section 255 issue and that the TTY Forum was created to address only the 45.5 baudot part of 255. There is another forum being created to address the Section 255 IVR issues (which would include voicemail accessibility). Jim Tobias will chair the Interactive Voice Response (IVR) Forum, and it will be sponsored by ATIS. For more information on the IVR Forum, please visit www.atis.org/atis/ivr/ivrhom.htm.

Sprint stated that it has an issue regarding alerts that are sent to users in the form of audio tones. Specifically, which audio alert responsibilities and what kind of customer service support are other carriers able to support? Again, Ed Hall suggested that this would be an IVR Forum issue.

Rachelle Redfairn, Sprint PCS, continued the status report. She noted that most of the Sprint handset vendors use Qualcomm chip and software and are dependent upon the release of the software. Sprint is concerned with the availability of such software because they are dependent upon the handset manufacturers to get the product to them in order to begin lab and field testing before full implementation. She noted that Sprint plans to use consumers in testing before nationwide deployment and are plans to use Gallaudet University for this consumer testing.

Qwest Wireless

Floy Jeffares noted that Qwest has organized a task force with representation from all wireless departments that are working to ensure that Qwest will be in compliance with the FCC rule by the due date. K-1 handset is being developed by one of their vendors and Qwest is awaiting more information before scheduling testing.

Nextel

Bob Montgomery, Nextel, reported that his company does not have the same challenges that other carriers have due to the fact that Nextel has only one vendor (Motorola) and they do not currently see a problem in meeting the June 2002 FCC deadline.

US Cellular

Chuck Wood, US Cellular reported that his company is in the same position as many other carriers except that they utilize both CDMA and TDMA technologies. US Cellular has been assured by both of their infrastructure vendors that they will have the software loads by the end of the year in order to implement the Lucent TTY solution. However, the vendors are unsure of when the handsets will be available for testing in the field. As far as an implementation and testing schedule is concerned, US Cellular is dependent upon the availability of the handset. Much of their network is AMPS, not CDMA or TDMA, because the company serves many rural areas. For their other areas, they will need to do some extensive field testing as well as PSAP testing. US Cellular would like some clarification on ramifications of not meeting the full implementation deadlines put forth by the FCC.

10. Technical Standards Activities (TR45, T1P1)
    Doug Neeley, Nokia, presented an overview of TSB 121 2.5-mm jack developed by TR45.1

11. Future Views, Standardization Information
    Please see Contribution TTY17/01.03.14.05.

12. Review and Update Appendix J
    Ed Hall introduced changes that were proposed by Doug Neeley from Nokia. Appendix J was updated per the input of participants. Please see Appendix J for updated standards information.

13. Enhanced Protocols
    Toni Dunne reported in an email that "the E-Protocol Working Group was created to determine whether the TTY Forum should address the enhanced protocol issues, but in light of information from Ultratec and Ameriphone, it appears that no action needs to be taken by the industry at this time. It is also recommended that the E-Protocol Working Group be disbanded."

    Ron Shultz, Ultratec, noted that he had sent an email indicating Ultratec's position on Turbo Code. The two models will default the auto-mode for Turbo Code to "off" and users will be given information on how to toggle the code on and off.

    Dick Brandt noted that Ameriphone sent in a similar memo that explained that their machines would also use an on-off mode for HiSpeed™ protocol.

    AGREEMENT: It was agreed to disband the E-Protocol Working Group.

    AGREEMENT: It was agreed that the TTY Forum would file an ex parte to the FCC to report the solution proposed by the E-Protocol Working Group and the action taken by the TTY Forum.

14. Voice Based Solutions (formerly "short-term")
    No discussion at this time.

15. Data Solution (formerly "long-term")
    No discussion at this time.

16. Next Meeting
    The next meeting of the TTY Forum will be June 26th in Washington, DC

17. New Business
    There was no new business.

18. Adjournment
    Ed Hall thanked all of the participants for attending and participating. He then adjourned the meeting.

Respectfully submitted by Megan Hayes, TTY Forum Secretariat

TTY17

March 14, 2001

Washington, DC

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Scott McCloud	Bluegrass Cellular	270-234-6466	270-732-0580	smccloud@blue.net
Bob Montgomery	Nextel	703-433-8315	703-433-8355	bob.montgomery@nextel.com
Majid Nawaz	NEC America, Inc.	214-262-4463	214-262-4225	mnawaz@necam.com
Doug Neeley	Nokia	214-673-9284	972-894-5525	doug.neeley@nokia.com
Susan Palmer	Cingular Wireless	202-419-3009	202-419-3047	susan.palmer@cingular.com
Sherry Powers	Bluegrass Cellular	270-735-3222	270-769-0548	powers@blue.net
Scott Prather	AT&T Wireless	425-580-6220	425-702-3033	scott.prather@attws.com
Rachelle Redfairn	Sprint PCS	913-890-2252	913-890-2050	rredfa01@sprintspectrum.com
Ron Schultz	Ultratec, Inc.	608-238-5400	608-238-3008	rschultz@ultratech.com
Blaise Scinto	FCC	202-418-1380	202-418-7247	bscinto@fcc.gov
Pieter Seidel	Panasonic	770-338-6270	770-338-6210	pseidel@panasonicatlanta.com
Charles Spann	Nortel Networks	903-852-6798	903-852-3827	spann@nortelnetworks.com
Bonnie Stafford	PCS One	717-721-7262	717-721-9777	bstafford@decommunications.com

Jerome Stanshine	FCC	202-418-2417	202-445-3220	jstanshi@fcc.gov
Paula E. Tucker	Gallaudent University	202-651-5049	202-651-5476	paula.tucker@tap.gallaudet.edu
Ilan Vardi	Siemens ICM	858-335-8742	858-521-3108	ilan.vardi@icn.siemens.com
Sean White	FCC	202-418-2453	202-418-7247	swhite@fcc.gov
Norman Williams	Gallaudet University	202-651-5259	202-651-5476	norman.williams@tap.gallaudet.edu
Chuck Wood	US Cellular	773-399-7090	773-399-4984	cwood@uscellular.com

TTY Forum #17
Non-attending Participants
(These companies submitted Implementation Status Reports but did not attend TTY Forum #17)

Dobson Cellular
Southern LINC
VoiceStream Wireless
Washington RSA No. 8 Limited Partnership and Eastern Sub-RSA Limited Partnership

APPENDIX A

AGREEMENTS REACHED AND ACTION ITEMS FROM TTY FORUM - 17

17.1 The TTY Forum recognized ATIS as its Secretariat and official sponsor.
17.2 Ericsson, Lucent, and Nokia will look into the voice quality issue in terms of IS 127-2 CDMA and TDMA and report back to the TTY Forum whether or not there is a problem.
17.3 Consumer groups will review the "user intervention" handset function and report back at the next TTY Forum on whether or not the function is considered a viable option.
17.4 It was agreed to disband the E-Protocol Working Group.
17.5 It was agreed that the TTY Forum would file an ex parte to the FCC to report the solution proposed by the E-Protocol Working Group and the action taken by the TTY Forum.

AGREEMENTS FROM TTY FORUM — 16

16.1 TTY Secretariat, Megan Hayes, will add a non-attending participants list of those who submit implementation status reports to the chair but were unable to attend the TTY Forum
16.2 The industry implementation status reports will be added as an appendix to the meeting summary (Appendix L). All written reports will be sent to the chair within ten working days following the forum. This agreement will be sent out the list serve to ensure that all TTY participants (past and present) are aware of the agreement. The final Meeting Summary will be submitted to the FCC and will become public record.
16.3 TTY Forum industry members find that it is not within the scope and purview to address the e-protocol issue at this time. However, the chair will pass the concept and recommendation to SDOs (e.g. T1P1, TR45)
16.4 A working group will be created to explore the e-protocol issue. There will be an effort to ensure that all industry sectors are represented.

AGREEMENTS FROM TTY FORUM – 15

15.1 Toni Dunne, NENA, will be the principle point of contact for coordinating with PSAPs at a point in carriers, infrastructure, and mobile handset vendors field-testing.
15.2 The TTY Forum will hold its next meeting on October 24, 2000 (second choice is October 25, 2000) at Gallaudet University. Meetings thereafter will be held on an "as needed" basis. The summary of the report from the October 2000 meeting will be formally forwarded to the FCC with a cover letter written by the Co-Chairs. Furthermore, on a voluntary effort, carrier will post a status update on their Website and/or the TTY list serve on 3/01, 9/01, and 3/02.

AGREEMENTS FROM TTY FORUM – 14

14.1 Establish Appendix J which will be a "living" document of technical terms and organizations and Appendix J, also a "living" document of technical standards development essential to the TTY Forum's Scope.

AGREEMENTS FROM TTY FORUM – 13

13.1 Lucent announced they will distribute the TTY vocoder solution, royalty-free, to mftrs implementing the solution. Lucent noted that it is not relinquishing the patent rights, just making the solution available royalty-free.

AGREEMENTS FROM TTY FORUM – 9

9.1 The TTY Forum agrees to submit User Requirements to TR45 in December, 1998.
9.2 Appendix G will be created as a living document to identify membership of the TTY Forum Test Procedure Study Group that will meet to track test plan modifications, facilities, and dates, user expert, point of contact.
9.3 Appendix H will be created to identify the operational characteristics of TTY devices.
9.4 The TTY Forum will develop a list of TTYs that fall within the domain of reasonable operational characteristics to provide an informational guide for carriers. The list will be available to the public via web sites and mailings.
9.5 The TTY Forum agrees that IWF is broadly defined as a translation method to complete a call that is transparent to the user. The IWF is not limited to either voice or data. An IWF may not be confined to a single network but may be shared across multiple networks.
9.6 The TTY Forum agrees to submit the SRD for the 2.5 mm Jack to TR45 in December, 1998.
9.7 The TTY Forum agrees to submit the SRD for Circuit Switched Data to TR45 in December, 1998

AGREEMENTS FROM TTY FORUM – 8

8.1 The TTY Forum agrees that all testing will be done in test labs simulating field conditions.
8.2 The TTY Forum agrees that the short-term solution will now be referred to as voice-based solutions. The long-term solution is now referred to as data based solutions.
8.3 An experienced TTY user will be available at the beginning of lab testing to provide counsel or training, if necessary.

AGREEMENTS FROM TTY FORUM – 7

7.1 The TTY Forum should remain operational until solutions are provided and implemented for all digital technologies, to the satisfaction of the TTY Forum.
7.2 The baseline for the digital solution is wireless analog performance.
7.3 Accept Contribution #12 as a working document to represent the basis of the test plan. Test Plan as modified by the technology groups (CDG,UWCC,GSMNA) will be sent to all phone manufacturers. Test plan will measure the performance of various digital air interface technologies.
7.4 Where possible, VCO/HCO should be included in the testing, design, and availability of TTYs, cellular phones, and air interface technologies.
7.5 The TTY Forum will submit a request for a three month extension to the FCC.

AGREEMENTS REACHED AT TTY FORUM - 6

6.1 Any carrier not in compliance with the Consumer Notification Process established at TTY Forum should be brought to the attention of the TTY Forum for resolution.
6.2 Working Group #1 is officially dissolved having completed its initial charter. Any further testing results would be forwarded directly to the TTY Forum.
6.3 A lack of TTY technical standard has resulted in a variance of TTY performance levels manifested when used on digital networks. As such, in developing the "short-term" digital solution, certain least used models of TTY may not be supportable on all digital air interfaces.

AGREEMENTS REACHED AT TTY FORUM - 5

5.1 As an initial step, carriers who can offer TTY users at least one digital phone model for each digital technology that a carrier offers at a reasonable price by October 1, 1998 would be considered in compliance of the E9-1-1/TTY compatibility requirements.
5.2 The FCC can use the information contained in the notification letter in any way they feel would expedite getting the information to the consumer.
5.3 All test results submitted will be included in the next Quarterly Status Report.

AGREEMENTS REACHED AT TTY FORUM - 4

4.1 Objective test (Throughput Test) approved and to be sent to manufacturers and carriers with a matrix to record testing completion dates and documentation.
4.2 TTY Forum Test Completion Matrix approved.
4.3 Consensus reached that Testing Matrix should go to every manufacturer listed at CTIA as well as Wireless and Wireline Carriers. CTIA/PCIA will escalate/elevate TTY Forum efforts to reach wireless equipment manufacturers and inform of urgency and criticality of rapid response to the Testing Matrix via a letter from the TTY Forum and CTIA/PCIA. The group recognizes that participation is voluntary. Copies of letter and matrix responses will be sent to the FCC.
4.4 RFI will be put on issues list to explore possibility of interference between phone and TTY device.
4.5 Consensus to put TTY Forum's current research opinion on output voltages (coupling information) into a formal document and present to manufacturers for feedback. Give 30 days for feedback.
4.6 Subjective test (End User Test) to be finalized by committee. Testing will be handled through Gallaudet with assistance from Wireless manufacturers and TTY manufacturers. Will replicate authentic 9-1-1 calls with a deaf/hearing impaired caller and a trained calltaker.
4.7 CTIA will produce a list of Analog Phones that are compatible with TTY devices to be included in notification efforts and on web sites due as a Contribution at the next TTY Forum.
4.8 Gallaudet University and Consumer groups will draft a Consumer Requirements Document due as a Contribution at the next TTY Forum.
4.9 CTIA/PCIA will send letter to wireless equipment manufacturers requesting that they support Gallaudet University in their testing efforts by sending equipment.

4.10 Standards Requirements Documents (SRD) due for V.18 and the 2.5 mm jack as Contributions at next TTY Forum.

AGREEMENTS REACHED AT TTY FORUM - 3

3.1 6 sponsored spots for identified consumer groups, relinquished if member misses 2 consecutive meetings.

3.2 Accept modified "readability test" to be used by phone manufacturers to benchmark TTY over digital capabilities, to determine success rate for transport. (See Contribution TTY/98.02.11.06) Two tests: Manufacturers Readability Test, End User Test

3.3 Error rate is defined as "character" not "bit" for the purpose of this forum. (Shift error rate of ratio 1/8 (i.e. 1 shift error causes up to eight text errors and will be counted as such) to be determined)

3.4 Develop User Requirements Document. The outcome of Working Group #2. Represents the effort to provide for future advancements in technology by looking at solutions beyond 45.45 baud, Baudot.

3.5 Define process to update Notification Document: refer updated information to CTIA to be distributed to T-CAT.

AGREEMENTS REACHED AT TTY FORUM - 2

2.1 Combine Working Group #1 and Working Group #3. Develop new set of deliverables based on the October 1, 1998 deadline.

- Short term solution: solve for backward compatibility.
- Develop Standard Test to measure error rate of TTY over digital.

AGREEMENTS REACHED AT TTY FORUM - 1

1.1 "Solve for 45.45 Baudot, not to preclude looking for other solutions."

- Look for long term and near term solutions.
  - Near term - send through vocoder
  - Long term - circumvent vocoder, enhance quality and connectivity
- Provide for the analog function of wireless phones.
- The only body that can change the agreements reached is this body. All agreements remain intact until/unless action is taken in this forum.

APPENDIX B

Recommended Text
Consumer Notification

ATTENTION TTY USERS

Background

A TTY (also known as a TDD or Text Telephone) is a telecommunications device that allows people who are deaf, hard of hearing, or have speech or language disabilities to communicate by telephone. A TTY has a keyboard used to type a conversation, which then is transmitted as tones over a wired telephone line. The tones are translated to text that appears on a person's TTY screen.

911 and TTY Access Through Wireless Services

Federal law requires the telecommunications industry to provide a way for TTYs to communicate through **wireless systems** to make 911 calls. There are two types of wireless phones – analog and digital.

- Analog – It is possible today to use some analog wireless phones reliably to call 911 with a TTY.

- Digital – It is not possible today to use a digital wireless phone reliably to call 911 with a TTY.

Research is being done to improve the ability of digital phones to work reliably with TTYs. The industry is working to resolve this matter by October 1998.

[Optional: For more information, contact . . .]

DATE OF PUBLICATION:

APPENDIX C

TTY Forum Issue Statements

6.1 The TTY Forum doesn't support one solution over the other but it seems that the 2.5 mm jack is preferred

6.2 It is acceptable in concept to retrofit the TTY at no cost to the user. Concern was expressed regarding warranty work, and who would perform work on equipment. The retrofit should not eliminate or impact any functionality previously available to the user. Time to retrofit should be reasonable. A liaison should be established between manufacturers and user groups to ensure "certain conditions" are met.

6.3 The issue of the false propagation of errors, created by the incorrect receipt of a shift character should be addressed through use of an appropriate test script. The script should contain multiple shifts space apart so that a realistic distribution of character errors would result, based on frequent (although not universal) practice of correcting shift errors by user action. A normal distribution between 1 and 15 with a median of about 8 would be appropriate.

9.1 The issue of whether less than full rate transmission is an acceptable solution, if it can be shown to provide improved CER performance.

9.2 The User Requirements Document will be modified by the consumers before the December TR45 meeting.

APPENDIX D

TTY FORUM MANUFACTURER TESTING COMPLETION MATRIX

Manufacturer	Technology	Through Put Test (Contribution)	Type of Test (Field, Lab)	Contact Name & Number
Philips	Analog	98.07.21.07		Ken Wells
Motorola	Analog	98.05.20.20	Lab	Paul Mollar
Sendele	Analog	98.07.21.05	Lab	Steve Sendele
Motorola	CDMA	98.05.20.20	Lab	Paul Mollar
Lucent	CDMA	98.05.20.10	Lab	Ahmed Tauf
Lucent	CDMA	No Gain Solution 99.01.26.09	Lab	Dr. Steven Benno
Lucent	CDMA	99.09..09.16	Fixed Point Proof / Concept	Dr. Steven Benno
Nokia	CDMA	98.05.20.17	Lab	Mohamed El-Rayes
Qualcomm	CDMA	98.05.20.12	Lab	Nikolai Leung
Motorola	CDMA	99.05.18.15	Lab	
Ericsson	GSM	98.02.11.07	Lab	Christopher Kingdon
Nokia	GSM	98.05.20.17	Lab	Mohamed El-Rayes
Motorola	GSM	98.05.20.20	Static	Paul Mollar
Ericsson	GSM	98.11.04.14	Static	Steve Coston
Ericsson	All Digial	99.09.09.12 / .13	Static	Steve Coston
Nokia	GSM/TDMA	99.09.09.15	Theory	Doug Neily
Ericsson	TDMA	98.02.11.05	Lab	Christopher Kingdom
Ericsson	TDMA	99.01.26.10	Field	Steve Coston
Motorola	TDMA	98.05.20.20	Field	Paul Mollar
Nokia	TDMA	98.05.20.17	Lab	Mohammed El-Rayes
Philips/CPT	TDMA	98.07.21.07	Field	Jim De Loach 510-445-5510
Lober & Walsh	TDMA	98.09.08.10	Lab	Josh Lober
CPT	TDMA	98.07.21.08	Lab	Josh Lober
Ericsson	TDMA	98.11.04.14	Static	Steve Coston
AWS	TDMA	99.05.18.11	Static	Adrian Smith
NOKIA	TDMA	99.05.18.14	Lab	Massoud Fatini
Lucent	TDMA/CDMA	99.05.18.13	Lab	Steve Benno
Ameriphone	TDMA/CDMA	99.05.18.12	Static	Peter Lee
Lober & Walsh	IDEN	98.09.08.11	Lab	Josh Lober

APPENDIX E

TTY USER REQUIREMENTS

September 10, 1998

To: TTY Forum

Fr: Consumer Representatives

The CTIA has said that most of the consumer criteria previously submitted were not usable by the TTY Forum because the criteria covered marketing and distribution as well as design. Marketing and distribution issues for a possible "one-phone-model-per-technology" short-term plan will be taken up with CTIA's senior management, as suggested by them.

This contribution is a new set of criteria to address only functional characteristics of the solutions. The new criteria also reflect new information from the Forum since the first list was drawn up. It is intended to cover any solution.

1. The character error rate should approximate that of AMPS, which has been demonstrated at <1% for stationary calls. More research on AMPS performance with TTY would be useful to assist in specifying a range of conditions.

2. The TTY caller must be able to visually monitor all aspects of call progress provided to voice users. Specifically, the ability to pass through sounds on the line to the TTY (so that the user can monitor ring, busy, answered-in-voice, etc.) should be provided.

3. There must be a visual indication when the call has been disconnected.

4. A volume control should be provided.

5. The TTY user must have a means of tactile (vibrating) ring signal indication.

6. The caller must be able to transmit TTY tones independent of the condition of the receiving modem. (This is to permit baudot signaling by pressing a key, to let a hearing person know that the incoming call is from a TTY.)

7. The *landline* party's TTY must not require retrofitting in order to achieve the desired error rate.

8. The *wireless* party's TTY may require retrofitting, or a new model TTY to be developed, or the use of a portable data terminal such as a personal digital assistant.

9. VCO and HCO should be supported where possible.

10. Reduction of throughput (partial rate) on Baudot is highly undesirable and should not be relied upon to achieve compliance (see #7). It may be useful as a user-selectable option to improve accuracy on a given call.

11. Call information such as ANI and ALI, where provided in wireless voice, should also be provided for TTY calls.

12. The solution need not support little-used or obsolete TTY models, but in general should support the embedded base of TTYs sold over the past ten years. The landline equipment supported must not be limited to that used in Public Service Answering Points (911 centers).

13. Drive conditions must be supported, again using AMPS as a benchmark.

September 14, 1999

To: TIA TR-45.3

Fr: Consumer Representatives, Wireless TTY Forum
Authors: Judy Harkins, Gallaudet University and Dick Brandt, dB Consulting as consultant to Gallaudet
David Baquis, Self Help for Hard of Hearing People, Inc.
Alfred Sonnenstrahl, Consumer Action Network
Claude Stout, Telecommunications for the Deaf, Inc.
Karen Peltz Strauss, National Association of the Deaf
Norman Williams, Gallaudet University

Re: Guidance to TR-45 on Proposals for Solutions to TTY over TDMA

Presentations on three of the proposals being considered by TR-45 for the TDMA TTY solution were made at the September 9, 1999 meeting of the Wireless TTY Forum. Given the timeframe TR-45 is operating under, and given that the FCC has directed industry to consider consumer issues in determining solutions, we offer this document as guidance to TR-45 as it considers the alternatives.

The information presented at the September 9 meeting was, in some cases, sufficiently sketchy that consumers were unable to ascertain the functional implications of the proposals. Some presentations were also done very late in the process, so there is not sufficient time for analysis.

We do not state a preference for any proposal but hope the following discussion will be helpful.

General Questions and Issues:

1. There is a concern among consumers about the implications of roaming among digital technologies in the future, if a variety of approaches for TTY access are used. Thus we believe consistency in approach across technologies is needed. One of the carriers also strongly expressed this view. This problem needs to be solved for the long term, not just for the current situation where roaming tends to go to the more-accessible analog network. Once these solutions are implemented, if problems arise, consumers will have great difficulty having them addressed because the solutions are within the network and customer service personnel will not be equipped to deal with them.

2. Has there been any analysis indicating that approaches which propose network changes in switches versus changes in base stations, would lead to earlier availability as claimed? Consumers are interested in seeing solid, lasting and effective solutions, and the speed of implementation, while important, should not override usability considerations.

3. All test results presented to date have been obtained using blocks of data sent out from a file stored either in a TTY or in a computer and sent via a TTY modem. It has been noted in tests run by Gallaudet that results obtained in an interactive mode (two people typing to each other) yielded poorer accuracy. Thus proposals that show errors in transmission should be scrutinized carefully. A full range of system impairments has either not been used in simulation testing or not reported on all of the solutions.

4. Non-activated phone support for 9-1-1 calls is required by the FCC. Has this been considered in the proposals? (See class mark discussion below.)

Appraisal of Specific Solutions:

Vocoder solution. From a consumer perspective, the Lucent "no gain" solution has been most thoroughly presented and appears to have the most transparent accessibility and the most support for consumer needs and requirements. The inclusion of error correction is a major benefit, given that the air interface presents new challenges to TTY transmission. Other, comparable proposals may also have merit (e.g., Nokia), but they have not been thoroughly explained so that consumers can compare them.

Code conversion. The Ericsson (and Nokia?) Code conversion ("tone") proposals appear to offer the possibility of earlier implementation (see 2 above) and the ability to use many existing handsets, but have the potential of putting the retrofit burden on the consumer. They raise the following concerns:

1. Smart Cable: Consumers are not opposed to the idea of including intelligence in the cable per se, however the following concerns exist:
   1.1. How would this intelligence be powered? (This question could not be answered at the Sept. 9 meeting.) There is opposition to the requirement for an additional battery for reasons of cost, bulk, and reliability.
   1.2. Who would make and provide the cable?
   1.3. Would this intelligence be built into the regular cable product line or would this be a primarily or exclusively "deaf" product? If the latter, experience shows that provisioning and cost may be serious problems. Customers often have to wait many weeks for "special" accessories. We realize standards bodies do not ordinarily address cost issues, but please consider the additional cost of a phone that vibrates (over a low-end phone), the cost of the TTY, and now the potentially high cost of a special-purpose cable with a small market.
   1.4. Would one cable fit all (thereby lowering the price and expanding the availability)?

2. Class Mark: Any system that relies on the phone having a class mark denoting that the user uses a TTY is not likely to be successful, because many deaf and hard of hearing people consider self-identification as a possible threat to their security. 9-1-1 operators have never been successful in having deaf and hard of hearing subscribers "sign up" as a TTY telephone number. The procedure is fraught with potential problems and snafus. When someone roamed into a carrier using this solution (not marked), what would happen? Hearing people

who use TTYs may not realize they need to enroll their phones. People who have a phone and acquire a TTY later (e.g., after onset of hearing loss) would find the TTY does not work. TTY users could not use someone else's cell phone. One solution to this problem suggested at the forum was to mark all phones as TTY. Would carriers agree to this? In short, a system that provides automatic detection of the TTY signal is preferable.

IWF. Although we recognize that IWF proposals are not a part of the present TR-45 TDMA TTY discussions we would also like to provide the following for your information, as they should be considered in development of proposals:

1. There is a strong desire for VCO/HCO capability, which appears to be difficult to implement in IWF solutions at the present time.
2. There is also a strong desire for provision of the line signal power indicator (flickering light) used to interpret call status.
3. Consumers are opposed to (and the DOJ has mandated against) requiring any form of special dialing (e.g., two-stage) or conditioning sequences (e.g., #NN) to reach 9-1-1.
4. It will be important that the delay between powering on a data device and dialing out not exceed the delay experienced with a voice call.

Appendix: Consumer requirements with comments regarding proposed solutions:

1. The character error rate should approximate that of AMPS, which has been demonstrated at <1% for stationary calls. More research on AMPS performance with TTY would be useful to assist in specifying a range of conditions.

Comment: All proposals presented to date appear to meet this criterion. Consumers are concerned that there be sufficient testing to validate this in the field.

2. The TTY caller must be able to visually monitor all aspects of call progress provided to voice users. Specifically, the ability to pass through sounds on the line to the TTY (so that the user can monitor ring, busy, answered-in-voice, etc.) should be provided.

Comment: All proposals claim to meet this criterion and we have no concerns. (IWF solutions may, however, not be able to meet this one.)

3. There must be a visual indication when the call has been disconnected.

Comment: This specific issue has not been addressed in presentations but is covered by most if not all systems by a message on the display of the phone.

4. A volume control should be provided.

Comment: This item is intended to allow the TTY user to adjust volume for better reception of TTY tones as necessary. Most if not all handsets include this feature anyway. It has not therefore been addressed in presentations on solutions.

5. The TTY user must have a means of tactile (vibrating) ring signal indication.

Comment: Again, this is an issue of general provisioning and not related to voice-channel solutions. (However, this will be an issue in IWF solutions.)

6. The caller must be able to transmit TTY tones independent of the condition of the receiving modem. (This is to permit Baudot signaling by pressing a key, to let a hearing person know that the incoming call is from a TTY.)

Comment: All voice-channel solutions to date appear to support this.

7. The *landline* party's TTY must not require retrofitting in order to achieve the desired error rate.

Comment: All solutions to date appear not to require retrofitting of the landline TTY.

8. The wireless party's TTY may require retrofitting, or a new model TTY to be developed, or the use of a portable data terminal such as a personal digital assistant.
Comment: Solutions that do not require retrofitting or special treatment are preferred by consumer representatives.

9. VCO and HCO should be supported where possible.

Comment: Voice-channel solutions presented to date appear to support this requirement. (IWF solutions may not, however.)

10. Reduction of throughput (partial rate) on Baudot is highly undesirable and should not be relied upon to achieve compliance (see #7). It may be useful as a user-selectable option to improve accuracy on a given call.

Comment: No solution presented to date reduces throughput, as nearly as we can tell. This should be verified with the companies proposing solutions.

11. Call information such as ANI and ALI, where provided in wireless voice, should also be provided for TTY calls.

Comment: Voice channel solutions should not cause a problem with this.

12. On the landline side, the solution need not support little-used or obsolete TTY models, but in general should support the embedded base of TTYs sold over the past ten years. The landline equipment supported must not be limited to that used in Public Service Answering Points (911 centers).

Comment: This is of concern because of limited testing of solutions to date.

13. Drive conditions must be supported, again using AMPS as a benchmark.

Comment: This requirement has not been adequately addressed by testing.

APPENDIX F

WORK PLAN

Published as a separate TTY Form Document

APPENDIX G

Typical Operating Characteristics for Wire-Line Based TTYs

The following is a technical description of the typical operating characteristics for existing wire-line based Text-Telephones for the Deaf (TTYs). This document is not intended to be a performance description of any one product, but to give a representation of performance of the majority of the product supplied to wire-line TTY customers in the last five years. TTY manufacturing representatives has reviewed this information and agrees that it represents an accurate account of the performance characteristics of existing wire-line products.

It should be noted that it is not possible to precisely define performance for all products, in all situations, in the field. Variation beyond this technical representation does exist for older product, products that are no longer supported by a manufacturer, individual products that are not operating correctly and improper use of product. It is not possible to report this additional range of variation, only to say that these products performance would suffer on either a connection to wire-line or wire-less TTY.

TECHNICAL BACKGROUND

For Frequency Shift Keying (FSK) two signal frequencies are required to modulate the asynchronous serial data to be sent over the conventional voice grade telephone lines of the switched telephone network. For Baudot communications to be useful on the Public Switch Telephone Network (PSTN) these frequencies fall within the central portion of the telephone line pass-band (300 – 3300 Hz).

The two frequencies of the transmitted signal must be sent in accordance with FCC requirements defined in dBm (decibels with reference to a power of one milliwatt for metallic connections, where 0 dBm = 1 milliwatt). The acoustic measurements are in dBSPL for acoustic configurations. This signal is measured at the TTY interface, either at the metallic connections or where it is acoustically coupled to the telephone network.

The receive level, commonly referred to as sensitivity, is also given for each pair of frequencies. This signal, also measured in dBm for direct connections and dBSPL for acoustic configurations, is the typical signal measured at the connection that will result in error-free reception of a test message.

BAUDOT CODE OPERATION

All TTYs provide Baudot code operation employing half-duplex, simplex, asynchronous, FSK transmission.

Frequencies

Baudot code operation used the following frequencies:

Signal	Frequency	Tolerance	
		Transmit	Receive
Mark	1400 Hz	±1%	±4%
Space	1800 Hz	±1%	±4%

Bit Duration

The bit duration is 22.00 milliseconds (ms) ±0.40ms to provide a nominal baud rate of 45.45 bits per second.

CHARACTER FORMAT

Transmit

The Baudot code for each character is transmitted with the following format, the data bits assigned are in accordance with Table 1.2 with a “1” in the binary representation transmitted as a mark and a “0’ as a space.

Bit	Start	Data	Data	Data	Data	Data	Stop
Signal	Space	LSB	Bit 2	Bit 3	Bit 4	MSB	Mark
Number of Bits	1	1	1	1	1	1	1.5-2.0 2.0 Typ.

Table 1.1

Where the LSB is the Least Significant Bit and the MSB is the Most Significant Bit. The bits shall be transmitted from left to right.

Receive

The TTY is capable of receiving characters with the format of Table 1.1 with a stop bit of at least 1.0 bit length or longer. The receiver is capable of receiving characters either with the space tone of the start bit as the first tone received or with a mark tone preceding the start bit.

Mark Hold Time

The mark hold time defines an additional period of time during which the TTY transmits a mark hold tone (1400 Hz) following the last character transmitted. Mark hold tone is not transmitted between each character if the character is followed immediately by another character. The mark hold tone is transmitted for a period between 150ms to 300 ms after the end of the stop bit(s).

Transmit Levels		
Coupling Method	Level	Range
Acoustic Direct Connect	108 dBSPL -10 dBm	±6 dB * - 3 ,+1 dB

Sensitivity Levels		
Coupling Method	Level	Range
Acoustic Direct Connect	72 dBSPL -40 dBm	±6 dB * ±5 dB

Most receivers are capable of receiving signal up to at least –5dBm.

* NOTE: Acoustic performance variations greater than listed may be encountered and are a result of many variables including the type of telephone handset used and how well the acoustic coupling is made by the user. It is not possible to report this additional range of variation, only to say that these products performance would suffer on either a connection to wire-line or wire-less TTY.

TABLE 1.2

Set of Baudot Codes for TTYs

DEC	HEX	BINARY	LETTER	FIGURE
0	00	00000	BackSpace	BackSpace
1	01	00001	E	3
2	02	00010	LF	LF
3	03	00011	A	-
4	04	00100	Space	Space
5	05	00101	S	
6	06	00110	I	8
7	07	00111	U	7
8	08	01000	CR	CR
9	09	01001	D	$
10	0A	01010	R	4
11	0B	01011	J	‘
12	0C	01100	N	,
13	0D	01101	F	!
14	0E	01110	C	:
15	0F	01111	K	(
16	10	10000	T	5
17	11	10001	Z	“
18	12	10010	L	)
19	13	10011	W	2
20	14	10100	H	=
21	15	10101	Y	6
22	16	10110	P	0
23	17	10111	Q	1
24	18	11000	O	9
25	19	11001	B	?
26	1A	11010	G	+
27	1B	11011	FIGS	FIGS
28	1C	11100	M	.
29	1D	11101	X	/
30	1E	11110	V	;
31	1F	11111	LTRS	LTRS

Note: CR and LF may be manually or automatically generated by the TTY. If automatic generated, the sequence may contain an extra (non-printable) character to provide adequate time for older electromechanical TTYs to respond. CR & LF are inserted into the transmitted characters after a maximum of 72 characters to allow for the carriage return of older electromechanical TTYs.

APPENDIX H

Modem / IWF Manufacturer Contact List

List of Names and Addresses to Receive IWF Letter

Title	FirstName	LastName	JobTitle	Company	Address	Address2	City	State	Zip
Ms.	Veda	Krishnan		Cirrus Logic	110 Horizon Drive #300		Raleigh	NC	27615
Mr.	Zarko	Draganic	CEO	Alto Com Inc.	257 Castro Street	Suite 233	Mountain View	CA	94041
Mr.	Edward	Campbell		3Com					
Mr.	Raouf	Halim	VP and General Manager, Network Access Division	Rockwell Semiconductor Systems	4311 Jamboree Road		Newport Beach	CA	92660-3095
Mr.	Aaron	Fisher	Vice President , Wireless Products	Lucent Technologies	Room 55F-311	1247 S. Cedar Crest Blvd.	Allentown	PA	18105-6209
Ms.	Judy	Sheff	VP Intellectual Property	Lucent Technologies	Room 5SF18	2 Oak Way	Berkeley Heights	NJ	07922-2747
Mr.	Greg	Garen	General Manager Modem and Multimedia Products	Lucent Technologies - Microelectronics Group	Room 22W-219(Mail Stop EQ)	555 Union Blvd.	Allentown	PA	18103-1229
Mr.	Warren	Henderson	CEO	Henderson Laboratories					
Mr.	Moiz	Beguwala	VP and General Manager, Personal Computing Division	Rockwell Semiconductor Systems	4311 Jamboree Road		Newport Beach	CA	92660-3095

CC: National Association of State Relay Administration (NASRA)
Merilyn Crain, Chair
315 So. College Rd. Suite 208
Lafeyette, LA 70503

IWF letter dated November 16, 1998

Sent to:
3Com
Mr. Zarko Draganic, CEO, Alto Com Inc.
Ms. Veda Krishnan, (to be supplied) Cirrus Logic
Mr. Aaron Fisher, Vice President, Wireless Products, Lucent Technologies
Ms. Judy Sheff, VP Intellectual Property, Lucent Technologies
Mr. Greg Garen, General Manager Modem and Multimedia Products Lucent Technologies - Microelectronics Group
(To be supplied), Motorola
Mr. Raouf Halim VP and General Manager, Network Access Division, Rockwell Semiconductor Systems
Mr. Moiz Beguwala, VP and General Manager, Personal Computing Division, Rockwell Semiconductor Systems

Dear Sir/Madam

In response to a FCC inquiry, the Cellular Telecommunications Industry Association (CTIA) and the Personal Communications Industry Association (PCIA) have established a technical forum to address the issue of providing reliable communications for deaf and hard of hearing people over digital wireless systems. Specifically this forum is addressing the issue of deaf and hard of hearing people using digital wireless connections to access 9-1-1 centers.

A solution that appears to offer promise for the longer term, involves the use of new (or modified) communications terminals, used by deaf and hard of hearing people, (TTYs) connected through a serial interface to the digital cell phone. The data channel, provided by the air interface, would then be used to effectively extend this interface to the network. This of course, would require the use of an Interworking Function (IWF)*[1] in the network that would be capable of supporting TTY communications. We are aware that some of the IWFs being developed will support 45.45 Baudot TTY transmission (the transmission mode most commonly used by deaf and hard of hearing people in the United States). While this caters well to the present need, it has the drawback that it locks deaf and hard of hearing people into this older technology.

A more desirable solution would be one which would involve the use of ITU-T Recommendation, V.18, that specifies a protocol, which provides for higher speed ASCII based communications while at the same time maintaining compatibility with today's Baudot TTY devices. The problem with this solution is that V.18 has yet to be implemented by any major modem manufacturer. We have, however, been given a presentation by a UK based company that has developed a prototype "stand alone" V.18 product which it plans to introduce commercially early next year. In addition to this, we have been given a demonstration of an in-service Swedish IWF, which incorporates V.18 functionality. It might also be of interest to note

[1] The term IWF is used in its broadest sense in this letter. (See the definition in TIA TSB-100)

that the service provider sees text telephony as a generic service (e.g. not just for deaf or hard of hearing). These two events may be moving V.18 into the readily achievable category.

It seems likely that if the IWF function and the modems installed at the 9-1-1 centers were to incorporate V.18 capability, connections could be made at the higher V.18 rates. Likewise it would appear that the connect time could be shortened as V.18 incorporates a calling tone, which could be instantly recognized by equipment at the 9-1-1 centers, thereby eliminating the loss of precious time, which is normally incurred while attempting to determine the source of a "silent" call.

Assuming that you agree that the timely provision of this functionality is important, we are hoping that you can provide us with an indication of when we might expect to see products (e.g. consumer modems, IWFs) from your company that implement V.18. Any information you could provide to us, by 4th Quarter 1998, would greatly help us in developing our response to the FCC.

APPENDIX I

TTY Forum Chair's Update Memorandums

Date: March 22, 1999

FM: TTY Forum Co-Chairs; Ed Hall, CTIA and Todd Lantor, PCIA
TO: TTY Forum Members and Interested Parities

RE: TTY Forum Update

Greetings,

A recent conversation with Dr. Steven Benno of Lucent Technologies has informed us that he has completed the Lucent software simulation of the TTY "no-gain" solution and it is now released and available to all those interested in exploring its functionality, compatibility and potential benefits with various CLEP vocoders. According to Dr. Benno, the following equipment and infrastructure vendors have requested a copy of his newly released code for testing purposes; Ericsson, Motorola, Nokia, NORTEL and Qualcomm. As co-chairs, we remain hopeful that this Lucent contribution will spark an interest for some manufacturers to re-visit their past efforts with vocoders, which perhaps may lead to follow-on contributions at our next TTY Forum.

During the last TR45 meeting, (March 3-4) CTIA submitted the 2.5mm Jack SRD, on behalf of the Forum. TR45 accepted this contribution and remanded it to the TDMA (TR45.3) and CDMA (TR45.5) sub-committees for information and to the appropriate sub-committee (TR45.1) for Action. Likewise, the TDMA and CDMA sub-committees reported back to the Chair that both of these digital technologies have developed standards supporting the Inter-working Function (IWF) as described in the TTY Forum's SRD on Circuit Switched Data submitted during the December TR45 meeting. This news brings the industry one step closer to the Forum's proposed "long term" data solution. The willingness of some modem manufacturers (3COM) to support the V.18 protocol is the other critical issue needed to make the IWF a viable option to carriers as a means of supporting TTY over digital - long term. The IWF solution opens the doors to the future by allowing end-users the use of ultra-light computers, compact PDAs, etc.

At this point I think it is important to remember that it has been the synergy, team-spirit and positive environment provided by the members of the TTY Forum that has lead us to this point. But, we do not want anyone to have the false impression that the end-all, be-all solution(s) have thus far been developed. Although Dr. Benno's "no-gain" solution remains a major breakthrough for TTY, "short term", voice based (specifically CLEP vocoders) solution and the V.18 protocol a major breakthrough for TTY "long term", data solution these by no means require carriers or manufactures to implement anyone one or both of these solutions. Keep in mind the other solutions brought to the Forum by Lober and Walsh and Ericsson. These solutions have also proved to be quite successful and promising for certain digital technologies. It is important to keep in mind that the carrier is responsible for the selection and implementation of a solution(s) that will allow TTY users to access 9-1-1 over its digital system. The best we as a Forum can do

at this point is continue to provide the positive environment, feedback and input to manufacturers and carriers regarding testing and consumer needs and requirements and keep the standards development bodies involved when needed. CTIA and PCIA remain committed.

In conclusion, we propose that at the next TTY Forum we initiate the process to develop the final report to the FCC. Based on the contributions received to date and those anticipated at our next meeting, we believe we will have sufficient information to develop specific comments and recommendations. The TTY Forum can then plan to meet on a quarterly basis to "evaluate" progress and provide the FCC with a periodic, implementation status report.

My thanks to all members of the TTY Forum. Looking forward to seeing everyone in May.

July 23, 1999

Fm: TTY Forum Co-Chairs
TO: TTY Forum

RE: Update: TTY Forum and Interested Parties

Todd Lantor and I would like to take this opportunity to provide you with an overview of some interesting developments that have come to our attention since the last Forum held on May 18th, 1999.

The Lucent "no gain" vocoder solution has been widely accepted by TR45.5, the CDMA air-interface standards group. The "no gain" solution draft standards document has recently been prepared for ballot. Assuming a "clear" ballot response, the industry may have a CDMA TTY standard as early 4Q99. Likewise, TR45.3, the TDMA air-interface standards group is actively pursing the same course as the CDMA group. The Nokia variation, presented to the Forum during the May meeting is being reviewed and considered. The group plans to complete its deliberation quickly and move toward the final stages by preparing a draft document for ballot.

Ericsson has provided the co-chairs with a copy of a document that proposes an alternative approach to the Lucent "no gain" vocoder solution. In the interest of time, and to take advantage of the TR45.3 meeting cycle, Ericsson thought it prudent to submit the alternative approach directly to the TDMA working group. Although it is being discussed at standards, Ericsson will present this vocoder alternative at the upcoming September TTY Forum.

Concurrently, we are preparing a draft "TTY Forum Status Report" for the FCC. The report, as a minimum, will contain the following sections:

- Updated Work Plan
- TTY testing completed to date
- A Technical Standards Update
    - Voice Based Approach
    - Data Approach
- Comments and Recommendations

Todd and I plan on getting a draft of this report to the TTY Forum Steering Committee for their review and approval before the next TTY Forum: The Steering Committee is comprised of: Toni Dunne, Texas 9-1-1; Billy Ragsdale, Bell South; Claude Stout, TDI; Norm Williams, Gallaudet UN; Jeff Crollick, TIA; John Melcher, NENA.

Next Meeting: We are currently making arrangements for the **September 9**, **1999** TTY Forum and will get the meeting logistics out separately.

The meeting will be in the **Washington DC** area but WILL NOT be at Gallaudet Univ. Their calendar cannot support us. The meeting will start at **9:00 AM** and adjourn at 5:00 PM. Please

do not make travel arrangements leaving the DC area before 6:30 PM. Now that we have reduced the meetings to one day, I see this Forum's agenda as being quite full.

Thank you all and have a very cool and pleasant summer. See you September!

Appendix J

Technical Standards Reference

ID	Description
TIA/EIA 825	FSK
TIA/EIA TSB-121	"2.5 mm AUDIO INTERFACE FOR MOBILE WIRELESS HANDSETS - TEXT TELEPHONES (TTY)"
TIA/EIA-IS-823 (PN-4614)	TR 45.3 5.3 TDMA TTY Solution- 410 vocoder
TIA/EIA-IS-840 (PN-4721)	TR 45.3 5.3 TDMA TTY Min Performance.
TIA/EIA/IS-789-A:	Electrical Specification for the Portable Phone to Vehicle -
IS-733-1, IS-127-2	CDMA Vocoder Standards - high rate
IS-707-A-2	CDMA Data (V.18) Standard
TIA/EIA-136-270-B	TDMA Third Generation Wireless – Mobile Stations Minimum Performance
TIA/EIA-136-280-B	TDMA Third Generation Wireless – Base Stations Minimum Performance
3GPP TR26.226	Cellular Text Telephone Modem Description
3GPP TR26.230	Cellular Text Telephone Modem Transmitter Code
3GPP TR26.231	Cellular Text Telephone Modem Minimum Performance Specifications

Timeline of Events in CDMA and TDMA standards

CDMA: TIA TR45.5.1.1
==========
August 2000: Lucent proposed bug fixes to the TTY/TDD addenda and proposed a TTY/TDD Minimum Performance Specification for CDMA.

November 2000: Nortel proposes to add a test vector to the Min Perf Spec in order to handle the hard handoff scenario. This scenario uncovers another bug in the code.

Dec 2000: Lucent proposes another bug fix, which is approved, but the subcommittee doesn't baseline the fixes in order to give more time to find problems.
Jan 2001: Updates to the TTY specifications and Min Perf Specs are baselined and sent to V&V.

TDMA: TIA TR45.3.5
==========
October 2000: Proposed bug fixes to IS-823 TTY Extension to TIA/EIA 136-410.

December 2000: Proposed additional bug fix similar to the bug fix proposed for CDMA in Dec. 2000.

January 2001: Nokia and Ericsson present contribution questioning the necessity of any bug fixes. Nokia proposes change to standard to improve TTY performance during signaling.

February 2001: A problem is found with IS-840 TTY/TDD Min Perf Spec for TDMA. Nokia (the editor) will provide an update to fix problem and update based on Nokia's proposed change to IS-823.

March 2001: Changes to IS-823 are approved. Nokia commits to having a new version of IS-840 for review by next meeting. The subcommittee decides to ballot new versions of IS-823 and IS-840 together.

APPENDIX K

Glossary of Terms

Telecommunications Standards and Assignment Organizations

ANSI - American National Standards Institute

The ultimate accolade for any standard is ANSI certification. This does not mean that ANSI has reviewed the standard, but that it has been circulated widely throughout the industry and that it conforms to their document design and publication guidelines. TIA standards, for example, start their public life as an IS- (Interim Standard) and then proceed within a few years to a full ANSI standard. The analog cellular standard started as EIA/TIA IS-3 and is now the ANSI standard identified as EIA/TIA-553.

ATIS - Alliance for Telecommunications Industry Solutions

The major US telecom standards organization beside the TIA, most notably responsible for ANSI SS7 standards. This organization was previously called ECSA; Exchange Carriers Standards Association. SS7 and wireless standards are developed within the T1 committee.

Bellcore - Bell Communications Research

Bellcore is not a standards organization, but they do write technical documents that are treated as if they were standards by many telecommunications carriers, particularly their former owners, the 7 regional bell operating companies. These documents include the GR-145 specification for interconnect, enhanced SS7 specifications beyond ANSI and the WACS low-mobility PCS system. Bellcore also performs many other research and consulting functions.

ETSI - European Telecommunications Standards Institute

The mission of ETSI is "to produce the technical standards which are necessary to achieve a large unified European telecommunications market". This includes the specification of the GSM cellular and PCS standard.

IFAST - International Forum on ANSI-41 Standards Technology

A forum on international cellular carriers, vendors and service providers that attempts to resolve international roaming problems with AMPS-compatible systems (i.e. including IS-136 D-AMPS and IS-95 CDMA). The organization has taken responsibility for allocating the International Roaming MIN resources (MIN's starting with the digits 0 or 1) and new blocks of SID codes.

INC - Industry Numbering Committee

The Industry Numbering Committee (INC) is a standing committee

of the Carrier Liaison Committee (CLC). The INC provides an open forum to address and resolve industry-wide issues associated with the planning, administration, allocation, assignment and use of resources and related dialing considerations for public telecommunications within the North American Numbering Plan (NANP) area.

ITU - International Telecommunications Union

The ITU is the global equivalent of ANSI for telecommunications standards. In fact, the world is divided into the majority of countries that adhere to ITU standards, and the US and Canada that tend to use ANSI standards. AMPS cellular is an exception, as it has been implemented in many other countries. ITU standards that are used in AMPS cellular include:
E.164 - the global numbering plan.
E.212 - the global mobile identification plan.
Q.7xx - a series of standards defining Signaling System #7 (used as an alternative to ANSI SS7 in AMPS countries outside the US and Canada).

NANPA - North American Numbering Plan Administration

The organization responsible for allocating numbering resources within the North American Numbering Plan Area: USA, some of its territories, Canada and several Caribbean nations. Controlled by Bellcore until January 1998, it is now managed by Lockheed-Martin. It is responsible for assignment of new area codes within the North American Numbering Plan and office code assignments within US states and territories.

NENA - National Emergency Number Association

NENA, along with NASNA (National Association of State 9-1-1 Administrators), APCO (Association of Public Safety Communications Officials) and the TIA are responsible for promoting enhanced 9-1-1 standards for wireless systems.

TIA - Telecommunications Industry Association

WWITF – Wireline Wireless Integration Task Force

<u>Government and Regulatory Organizations</u>

Australian Communications Authority (ACA)

The organization responsible for the management of radio spectrum and telecommunications in Australia, formed by a merger of AUSTEL and SMA. APUMP represents people who are unhappy with the decision to eliminate analog cellular by the year 2000 in favor of the three GSM systems.

RSP - New Zealand Radio Spectrum Authority

Responsible for the management of radio spectrum in New Zealand.

US Dept. of Commerce
The Office of Telecommunications provides a great online source of worldwide wireless telecommunications information.

FCC - US Federal Communications Commission
The organization responsible for the management of telecommunications in the United States. Their responsibilities for public radio communications, such as cellular, include allocation of frequencies, the development of regulations that govern their use and monitoring to ensure that regulations are followed.

Wireless Telecommunications Trade Associations

ATIS – Alliance for Telecommunications Industry Solutions

CTIA - Cellular Telecommunications Industry Association
A trade association of wireless carriers in the United States, Canada and other countries. Originally a cellular organization, it now has members that are Manufacturers, PCS, ESMR and Satellite carriers.

CWTA - Canadian Wireless Telecommunications Association
A trade association of wireless carriers in Canada.

MMTA - Multi-Media Telecommunications Association
An association of companies focused on computer-telephony integration. They announced in November 1996 that they were merging with the TIA.

PCIA - Personal Communications Industry Association
Formerly Telocator, this organization represents Paging, PCS, ESMR, SMR and mobile data service providers as well as communications site managers, equipment manufacturers, and others providing products and services to the wireless industry.
TIA - Telecommunications Industry Association

United States Telephone Association.
A trade association for US local exchange carriers.

Wireless Forums

CDG CDMA Development Group
A trade association dedicated to the promotion of CDMA wireless technology.

MIPS Mobile Internet Phone Services Forum
A new group dedicated to promoting the development of Internet access technologies, services and features from mobile devices.

PACS Providers Forum
PACS (Personal Access Communication System) is a PCS system

based on Bellcore's WACS and Japan's PHS, that will provide 64kbps voice and data, but is restricted to low mobility applications.

Universal Wireless Communications Consortium
Promoters of the IS-136 TDMA digital cellular and PCS standards, mostly through conferences and symposiums.

WDF The Wireless Data Forum is an independent, protocol-neutral trade group dedicated to promoting the wireless data industry. WDF's members include wireless operators and equipment providers, application developers and information technology companies working to advance wireless and mobile data products and services.

Glossary

Analog Signal A signal that varies in a continuous manner, such as voice.
ANI Automatic identification of the calling station
ANSI American National Standards Institute.
ATIS Alliance for Telecommunications Industry Solution (formerly ECSA). Responsible for ANSI SS7 standards and US GSM standardization.
BS Base Station
CPAS Cellular Priority Access Service
ESN Electronic Serial Number
GETS Government Emergency Telephone Service
HLR Home Location Register (database of subscriber records)
IFAST International Forum for AMPS Standards Technology
INC Industry Numbering Committee
IS TIA Interim Standard.
JEM Joint Experts Meeting
J-STD Joint ATIS and TIA standard.
LERG Local Exchange Routing Guide
LEA Law Enforcement Agency
MS Mobile Station (i.e. wireless phone)
MSC Mobile Switching Center (aka MTSO)
NAG Numbering Advisory Group
PACA Priority Access Channel Assignment
PN TIA Project Number. Identifies a project during development of a standard.
SP ANSI Standards Proposal. ANSI equivalent of a PN
TLDN Temporary Local Directory Number
TIA Telecommunications Industry Association
TTY Text Telephony
TDD Telecommunications Device for the Deaf
VLR Visited Location Register
WIN Wireless Intelligent Network

APPENDIX L
Industry Implementation Status Reports
Contained within are written industry TTY implementation status reports as submitted to the chair.

Table of Contents

American Samoa License, Inc.

TTY Report
Friday, April 12, 2001

A. BACKGROUND

In response to the Federal Communication Commission's ("FCC"), Fourth Report and Order[2], in its Enhanced 911 proceeding in which it established new deadlines for digital wireless carrier's to be capable of transmitting (with the requisite error rates) 911 calls made using TTY devices, American Samoa License, Inc., ("ASLI") hereby submits its TTY Quarterly Status Report ("Report"). ASLI is an FCC licensed PCS system carrier which provides wireless service on the island of American Samoa.[3] The FCC requires licensees 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 the requisite infrastructure improvements and TTY capable handsets is discussed below. While ASLI has been diligently working with Nortel Networks ("Nortel"), its infrastructure vendor, to ensure timely TTY access to E911 for all of its customers, the absence of firm commitments remains a major obstacle. The following information is based upon representations made to ASLI by Nortel in response to ASLI's inquiries. In addition, information concerning the Ericsson Cellular Telephone Text Modem ("E-CTM"), is discussed below as ASLI has entered into preliminary discussions with Ericsson about the availability of its TTY software solution.

B. STATUS

Infrastructure Vendor Status

As a licensee utilizing a GSM PCS system, ASLI faces unique technological challenges. The FCC rules require an operator to acquire equipment or software to support a TTY (text telephone machine) to place a 911 call. ASLI's acquisition of Nortel's BSS software version 13.2 and replacement of major hardware components (specifically the Base Station Controller (BSC) and Transcoder Unit (TCU) in its existing network are prerequisites to its ability to support TTY. This would amount to a massive investment in capital and infrastructure re-design as ASLI is currently operating with Nortel's BSS software version 11 and was hoping to upgrade to the current Nortel available BSS software version 11.4 during third quarter 2001. Based upon

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[2]/ 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).

[3]/ American is a U.S. territory comprised of a cluster small islands in the South Pacific, approximately 4,150 miles from San Francisco. The main island has a land mass of 72 square miles and 64,000 inhabitants.

correspondence from Nortel, BSS release version 13.2 is not projected to be Generally Available ("GA") until December 2001, the month in which carriers must be TTY compliant. Unfortunately, based upon ASLI's past experience with Nortel and the fact that ASLI is a small GSM PCS operator, it can take at least six months, and as long as nine months, from a GA date for a product to 'trickle down' to ASLI. Thus, when Nortel states that the software is *projected* to be available in December 2001 -- this means that it will not get to the smaller markets such as American Samoa until at least June 2002 and perhaps not until September 2002. Thus, ASLI would be precluded by the unavailability of Nortel's TTY solution from meeting the December 31, 2001 deadline.

ASLI has also been involved in discussions with Ericsson on a newly developed Platform version of the E-CTM. The E- Platform would consist of a handset E-CTM and a Network TTY Service Node. There has been extensive discussion within the GSM community, including GSM North America (GSMNA) during which Ericsson's E-CTM solution has emerged as a de facto standard as it allows the operators to choose between an "Integrated approach" or the "Service Node Platform approach".

Handset Vendor Status

The GSM handset community is gearing up to make available to TTY users GSM PCS telephones, that have a 2.5 mm connection ports with the TTY terminal. It will be essential for the E-CTM and the handsets to be compatible if TTY users are to be able to make a wireless E-911 TTY call. ASLI is currently using handsets from Nokia, Ericsson, and Mitsubishi. Until wireless E911 TTY can be supported end to end, TTY service will not be possible. For this reason, ASLI is concerned that the December 31, 2001 deadline may prove to be unattainable.

C. SUMMARY

Based upon the response from its vendors ASLI is concerned that it, and many other carriers, will be unable to meet one or both deadlines. If the overwhelming majority of carriers report similar concerns, ASLI strongly encourages the Commission to consider extending the TTY deadlines rather than require the vast majority of carriers to submit waiver requests.

FCC QUARTERLY STATUS REPORT ON IMPLEMENTATION AND DEPLOYMENT OF DIGITAL WIRELESS/TTY SOLUTIONS

Date: 4/11/01

Carrier: **East Kentucky Network LLC d/b/a Appalachian Wireless**
P.O. Box 1380
Hindman, Kentucky 41822

OCN: 6940 & 6764

I. Development Activities

A. Network infrastructure software development

1. At present, we have Nortel SNSE with MTX 08 software. We will be installing MTX 09 version 7/2/01. Version MTX 10 will be available for installation 12/01.

B. Handset development and testing plans

1. We have no information from any manufacturer.

C. Beta testing and lab testing

1. We have no information from any manufacturer.

D. Release and general availability to carriers of network infrastructure software

1. Version MTX 10, December 2001

E. Availability to carriers of full acceptance test units

1. No information available

F. Efforts toward achieving digital wireless solution compatibility with enhanced TTY devices

1. No information available

II. Testing and Deployment Activities

G. Carrier coordination of testing with PSAP

1. As soon as the switching software and handset equipment capable of transmitting TTY information is available to us, we will schedule testing with the PSAPs.

H. Carrier testing activities, including field testing, consumer end-to-end testing and other message testing

1. When the equipment is available, testing will be scheduled.

I. Retail availability of necessary consumer equipment

1. No information available

J. Geographic scope of network infrastructure deployment

1. Kentucky RSA 9 & 10

TTY Forum #17 Carrier Status Report
March 28, 2001
AT&T Wireless Services

Please note: The following information is based on representations made to AT&T Wireless Services by its vendors. AT&T Wireless Services does not have the ability to independently verify these release dates. AT&T Wireless Services is entirely reliant upon its vendors to implement the TTY solution in its handsets and network.

- **Network Infrastructure Software Development**
  TDMA Network: AT&T Wireless Services has inquired of all three of our TDMA (ANSI-136) infrastructure vendors concerning the status of their TIA/EIA IS-823 software development efforts. The information obtained from each is outlined below:

  Ericsson: Ericsson reports that they plan to support IS-823 as a correction to Version 7 ANSI

  Lucent: Lucent reports that they plan to integrate IS-823A support into Version 17.0

  Nortel: Nortel reports that they plan to integrate IS-823 support into software release MTX10

  GSM Network: AT&T Wireless Services is currently evaluating the two currently available options for TTY support over GSM (3GPP TS 26.226). We do not have sufficient information to determine the status of software development for the GSM infrastructure at this time.

- **Handset Development and Testing Plans**
  TDMA Handsets: AT&T Wireless Services has inquired of four TDMA (ANSI-136) handset vendors concerning the status of their TIA/EIA IS-823 development and testing efforts. The information obtained from each is outlined below:

  Ericsson: Ericsson reports that they are planning to support IS-823 on a handset that should be available to our lab in Q4, 2001

  Motorola: Motorola reports that they are planning to support IS-823 on a handset that should be available to our lab in Q2, 2001

  Nokia: Nokia reports that they are planning to support IS-823 on a handset that should be in our lab during Q3, 2001

  Panasonic: Panasonic reports that they currently have a prototype handset with IS-823 support, and this handset should be available to our lab for testing in Q2, 2001

  GSM Handsets AT&T Wireless Services has obtained information from two GSM handset vendors concerning the status of their 3GPP TS 26.266 development and testing efforts. The information obtained from each is outlined below:

Ericsson: Ericsson reports that they are planning to integrate 3GPP TS 26.266 support into a handset for lab availability in Q3, 2001.

Motorola: Motorola reports that they are planning to support TS 26.266 on a handset that should be available to our lab in Q3, 2001

- **Beta and Lab Testing**
  ATTWS has in place a full integration lab for Ericsson, Lucent, and Nortel TDMA infrastructure equipment. Following the receipt of TTY-compatible software from any of these vendors, ATTWS plans to execute a full test suite (including regression testing) to identify any potential problems before the software is released to a FOA (First Office Application) market.

- **Release and General Availability to Carriers of Software**

  TDMA Network: AT&T Wireless Services has inquired of all three of our TDMA (ANSI-136) infrastructure vendors concerning the release of their TIA/EIA IS-823 software for general availability. The information obtained from each is outlined below:

  Ericsson: Ericsson reports that they are planning to support IS-823 as a correction to Version 7 ANSI, which should be generally available as of Q3, 2001

  Lucent: Lucent reports that they are planning to integrate IS-823A into Version 17.1, which should be generally available as of Q3, 2001

  Nortel: Nortel reports that they are planning to support IS-823 in MTX10, which should be generally available as of Q4, 2001

  GSM Network: AT&T Wireless Services does not currently not have sufficient information from vendors to determine general availability of GSM TTY support at this time.

- **Availability to Carriers of Full Acceptance Test Units**

  TDMA Handsets: AT&T Wireless Services has inquired of four TDMA (ANSI-136) handset vendors concerning the general availability (GA) of TTY-compatible handsets. The information obtained from each is outlined below:

  Ericsson: Ericsson reports that they are planning to have an IS-823 handset available for GA in Q2, 2002

  Motorola: Motorola reports that they are planning to have an IS-823 handset available for GA in Q1 of 2002

  Nokia: Nokia reports that they are planning to have an IS-823 handset available for GA in Q1 of 2002

Panasonic: Panasonic reports that they are planning to have an IS-823 handset available for GA in Q3 of 2001

GSM Handsets: AT&T Wireless Services does not currently not have sufficient information from vendors to determine the general availability of GSM TTY handsets at this time.

- **Efforts Toward Achieving Digital Wireless Solution Compatibility with Enhanced TTY Devices**

  Based on the agreements reached during TTY Forum 17, this issue has been sufficiently addressed by TTY manufacturers and should not require further effort on the part of carriers.

- **Carrier Coordination of Testing with PSAP**

  At the time this report was prepared, ATTWS has not made arrangements with PSAPs to conduct the requisite 911 call testing via TTY. However, this issue will be addressed during Q2 and Q3 of 2001 as ATTWS prepares for FOA (First Office Application) testing in the field.

- **Carrier Testing Activities, Including Field Testing and Consumer End-to-End Testing**

  Field testing of TTY-compatible TDMA handsets will take place in parallel with our infrastructure testing in FOA markets. Wherever possible and within the quantity limitations of available handsets, consumers will be asked to participate in these trials and report their findings.

  The status of GSM testing activities will be outlined in subsequent reports. Currently, ATTWS is awaiting more definitive information regarding the availability of TTY infrastructure software and handsets.

- **Retail Availability of Necessary Consumer Equipment**

  Because of the many variables present at this time, ATTWS cannot report on the status of retail availability of consumer equipment.

- **Geographic Scope of Network Deployment**

  Because of the many variables present at this time, ATTWS cannot report on the status of network deployment.

Kentucky RSA 3, Kentucky RSA 4 Cellular General Partnership
Cumberland Cellular Partnership
d/b/a Bluegrass Cellular Inc.
TTY Report
First Quarter 2001

Background

Bluegrass Cellular uses AMPS/TDMA (IS-136) technology.
Infrastructure vendor is Nortel
Phone manufactures include Nokia, Motorola, Ericsson.

Status

Bluegrass Cellular is waiting on solutions to be made available by the handset and infrastructure vendors. The infrastructure vendor has stated they will have a solution available to carriers by late fourth quarter to early first quarter 2002. The solution will be made available in software release MTX10.

Phone manufactures have also stated basically the same with possibility of a late fourth quarter 2001 release.

Until the equipment/software is available and dates are more precise, Bluegrass Cellular is unable to give timelines and procedures for testing, and consumer availability.

Bluegrass Cellular is actively working with both its vendors and the TTY Forum to ensure consumer availability as quickly as possible.

North Carolina RSA 3 Cellular Telephone Company

D/b/a Carolina West Wireless

TTY Report

First Quarter 2001

Background

Carolina West Wireless uses TDMA technology.
Infrastructure vendor is Nortel.
Phone manufacturers include Nokia, Motorola, Ericsson and NEC.

Status

Carolina West Wireless is waiting on solutions to be made available by the handset and infrastructure vendors. The infrastructure vendor has stated they will have a solution available to carriers by late fourth quarter to early first quarter 2002. The solution will be made available in software release MTX 10. Carolina West Wireless is currently operating on software MTX09.

Phone manufacturers have also stated basically the same with possibility of a late fourth quarter 2001 release.

Until the equipment/software is available and the dates are more precise, Carolina West Wireless is unable to give timelines and procedures for testing, and consumer availability.

Carolina West Wireless is actively working with both its vendors and the TTY Forum to ensure consumer availability as quickly as possible.

March 28, 2001

To: TTY Forum

From: Sean Campbell, Susan Palmer and Ken Evans

TTY Forum #17 Report
Cingular Wireless LLC

Overview

Cingular Wireless LLC (Cingular) stands committed to provide TTY access to consumers in its service area. Our provision of TTY access is contingent upon software development and delivery from vendors for two separate technologies impacted by the FCC's mandate, TDMA and GSM. Despite several attempts, we did not receive status reports from either Lucent on the TDMA solution or from Ericsson on the GSM solution until they provided information at the TTY quarterly forum. We ask the FCC to encourage the manufacturers who have promised delivery of the software to provide ongoing status reports to service providers. For service providers to meet internal and FCC deadlines, it is essential to know that delivery of the software will be completed in a timely fashion. If there are unexpected delays for technical reasons, all members of the TTY Forum should be notified as soon as possible in order to address these problems quickly.

Cingular Wireless has received requests from Motorola for timelines, testing protocols and development milestones needed to begin testing prototype handsets. We are pleased that Motorola clearly understands the importance of providing TTY access to E911. However, we are frustrated that we lack the information from Ericsson and Lucent that would enable us to respond to Motorola promptly. Without a clear understanding of the status of the GSM and TDMA network solutions, we are also unable to set up testing with the PSAPs or TTY users. Since the Forum meeting, we have received updates from Ericsson and Lucent, which, consistent with information presented at the Forum, lead us to believe that our ability to meet the June 30, 2002 deadline may be in jeopardy.

TDMA

The TDMA standard for the No-Gain solution has not been finalized as of the time of the Forum. Until the standard is finalized and stable, some handset manufacturers, with good reason, are reluctant to proceed too far into development. At the TTY Forum #17, Ericsson suggested that standards must be "frozen", as is, to allow products to be developed without any further delay. Cingular agreed with the need to "freeze" the standard, but reminded participants that no first pass products should be considered unless ALL 911 issues are resolved. Products should not be released, just to make the timeline, if it would in any way jeopardize consumers' safe usage of 911.

Once the standard is frozen, development would begin and proceed on these first pass handsets and later released to the consumer. Any bugs and issues identified in the first pass would be addressed and released in a second pass and standards updated, as needed. If we wait for the standards to constantly be updated, no product will materialize in the near future. Cingular has

been assured by Lucent that standards will be completed soon. However, system load testing for TDMA has not yet begun. Lucent has not provided a confirmed date for General Availability. Lacking a specific date from Lucent, Cingular's best estimate is that General Availability may not occur before the end of 1Q02 and could be later. As we stated in earlier reports, in the best of circumstances, we need at least 6 months to adequately test and implement the TTY solution. If General Availability of software is released after the end of this year, we may not be able to meet the FCC mandated deadline. **This stated, Cingular Wireless is currently prepared to conduct testing and begin upgrading our network infrastructure (and test labs first) with any software developed by the manufacturers.**

GSM

At the latest standards meeting in Puerto Vallarta at the end of January 2001, it was determined that the Service Node solution would not be available in time to meet the FCC mandate. Although, the Service is seen as a viable solution to work towards in the future, the Transcoder solution was chosen to increase the likelihood of meeting the date set forth by the FCC. As with our TDMA network, Cingular Wireless is prepared to begin testing any GSM software received from our vendor. We have consistently provided Ericsson with support on variations of their solution so that Cingular will be able, if at all possible, to meet the FCC mandate with a solution that will address the consumers' concerns.

Once asked publicly at the Forum, Ericsson responded quickly. Ericsson provided us with an implementation and rollout schedule that indicates that General Availability of software for the Transcoder solution and delivery to vendors will be provided by the end of this year. If the dates we have been provided are met, and the significant technical issues that were presented at the Forum are resolved, we may be able to meet the FCC deadline for our GSM network. This schedule is approximate and assumes that no MAJOR unforeseen problems occur, standards are "frozen" and viable, and technical fixes for the issues of noise, "echo" and voice degradation have been found. Also, the first handsets may need to have a manual type switch for VCO/HCO and to turn the TTY software on/off. More detailed information can be obtained from our vendors. We hope that in the future all vendors will respond promptly to our requests.

Significant Technical Problems in the TDMA and GSM Must Be Resolved

At the 17th Forum, participants were informed of noise, "echo", and voice degradation issues identified in the current development of TDMA and GSM solutions. These issues are significant. Noise and echo must be mitigated for either solution to work effectively. Based on input from Lucent, Ericsson, Nokia and Panasonic, the source of voice degradation may be both with the usage of the headset plug-in (jack) for the TTY module and perhaps the network solution itself. The level of degradation was not stated at the Forum. If the issue of voice degradation is not resolved, it may be that handsets, which are produced to be TTY accessible, will have a degraded voice quality as compared to "regular" handsets. In essence, this could mean that only a limited number of TTY handsets would be produced since the TTY compatible handsets would not be acceptable to the general market.

Voice Carry Over (VCO) and Hearing Carry Over (HCO) will likely not be functional if the issue of voice degradation is not resolved. This is clearly contrary to the expressed desire of the consumers at the Forum. A work group of manufacturers was developed to address this issue

immediately. This work group will determine what technical problems exist and attempt to find methods to resolve them quickly. They will document and attempt to implement fixes and report back to the Forum at the next quarterly meeting. In the interim, this report will be submitted to all members via the Forum listserve as soon as information is available.

Technical Issues That May Lead to Delays Must Be Communicated to Forum Participants Quickly and Worked Cooperatively

Potential voice degradation and other issues are of great concern to Cingular. Issues that could jeopardize meeting the TTY deadline need to be reported by vendors as soon as they are identified. Waiting for standards meetings or constant re-verification by one company will not lead to timely resolution. Since this is a mandated effort, such problems should be brought to light immediately, so all concerned manufacturers can help in the verification and solution process.

Summary

Cingular believes that meeting the deadline for TDMA TTY accessibility may be in jeopardy due to technical issues -- not only for Cingular but all TDMA service providers. Unless there is General Software Availability for the Lucent No Gain Solution by the end of this year, there may be a significant delay in deployment of the TTY solution. As stated in our earlier reports, we need a six-month window after General Availability to deploy the solution.

Based on information communicated after the Forum, Cingular expects a 3-month delay to our initial 9/01 target date for General Availability of software for GSM networks. If the technical problems with noise, “echo” and voice degradation are addressed quickly and Ericsson meets the current revised end of year target for General Availability of software, Cingular should still be able to meet the FCC deadline.

Information flow and commitments to specific dates from software manufacturers are essential to allow the operators time to schedule the network deployment and handset testing. Such communication is consistent with standard business practices for changes in networks that require cooperative efforts. It is essential to ensure service providers, PSAPs and manufacturers can schedule interoperability and handset testing and meet the other milestones identified in our last report. The FCC should encourage manufacturers, who have been unresponsive in the past, to improve communication provide ongoing updates to service providers and recognize those who have been responsive.

Corr Wireless Communications, LLC

Ms. Hayes:

Be advised that North Alabama Cellular, L.L.C. changed its name to Corr Wireless Communications, L.L.C. See number 64 in Appendix C (Waiver Petitions) of the FCC's Fourth Report and Order.

As of this date, Corr Wireless has not completed any of the milestones listed in the 4th R & O other than checking with our equipment vendor on availability of equipment. We operate a Lucent ECP and they have informed us that TTY will not be available until release 17 which is scheduled for release on June 1, 2001. Also, there are no TDMA handsets that are TTY capable at this time.

If you have any questions, please contact me at 205-237-3000.

Sincerely,
Tom Buchanan
General Counsel
Corr Wireless Communications, L.L.C.

Dobson Cellular Systems

March 24, 2001

Dobson Cellular Systems/ American Cellular Corporation

TTY Report

Dobson Cellular Systems (DCS) and American Cellular Corporation (ACC) remains committed to meeting the FCC's mandated timeline of 12/31/01 to provide E911 TTY access to our networks. DCS and ACC operates in two separate technologies, TDMA and CDMA. We have and will continue to work with our infrastructure and handset vendors to ensure TTY access to E911 for our customers.

We have been in contact with Lucent for their "No Gain" solution and have been keeping up on the availability of handsets from our vendors. We have also been in contact with Ultratec and Ameriphone for their solution.

A reply from Ultratec stated that the Turbo Code TM as part of the TTY network solution for the digital cellular is unlikely at this time. Ultratec will beginning in July 2001, default the Turbo Code automatic mode detection feature to "OFF" on those products that have the ability to directly connect to a digital cellular phone via the audio jack. This affects the Compact/C and the EZCom/C. However, the user may enable Turbo Code on these products manually for other calls.

DCS and ACC are not presently active in the TTY Forums, but intend to be more active in the future. We remain focused on providing a solution that is reliable, on time and meets consumer's needs.

Sincerely,

Sean O'Hara
Special Project Manager
Dobson Cellular Systems

Easterbrooke Cellular Corporation

TTY Report
Thursday April 12, 2001

1) Currently we have a one Nortel DMS 100 with the MTX07 software load.
(2) Currently Nokia and Ericsson have indicated that they will meet the deadline. We have not been updated on Audiovox or Motorola handsets.
(3) We are relying on our equipment vendors to conduct beta and lab testing.
(4) Nortel has not made the availability of compliant software/equipment known to us. We are still going on the assumption from the last update that there have been delays but they will still be compliant by the deadline.
(5) To date there has been no availability of full acceptance test sets to us.
(6) As with all carriers we are relying and encouraging our equipment/software vendors to comply with all TTY devices by the deadline.
(7) Once we have dates from our vendors we will be setting up testing with our PSAPs.
(8) Once we have all of the necessary infrastructure in place we will comply with all testing recommended or required.
(9) To date none of the necessary retail equipment is available to us.
(10) Our geographic area that Easterbrooke Cellular covers is WV RSA 5, Braxton, Upshur, Tucker, Randolph, Pocahontas, Nicholas, Clay, and Webster counties.

Andrew Havlik
Douglas Telecommunications, Inc.
415/446-2299

ERICSSON, INC.
Consumer Products Division, RTP, N.C.
TTY Forum #17 Report
March 14, 2001

This report was provided by Ericsson at the March 14, 2001 TTY Forum 17. This report details the summary presentation at that meeting.

Risks:
Ericsson continues to design and develop products that incorporate TTY technology. The process of integrating this technology requires a tremendous amount of work, some of which is contributible to technical problems. Ericsson continues to work these technical problems, to clarify, document, and monitor the situation, to determine what actions, if any are required. Ericsson has currently put a process in place, to assess and elevate any technical issue, which proves to be a valid problem, stemming from the integration of TTY technology into its products.

Concerns:
The placement of TTY technology within Ericsson's product line has developed dependencies related to changes in the TTY standards, and system integration problems. The integration of TTY has created technical concerns in the terminal and system design groups, with the behavior of echo, noise technologies in the presence of TTY signals. The development and implementation of TTY requires the involvement of various company employees, including development, product test, and inter-operability test. The management, allocation, and development of processes are being monitored to identify schedule conflicts, if they materialize.

Ericsson is concerned that possible operation of a TTY device, using a proprietary protocol or handshake, will create additional technical issues. Interaction within the system, where the detector fails to provide control and operation of signals passing through the cellular network could have undesired results. Problems that identify themselves during the test process may require changes to the published standards, to define a stable system. Completion of the development of existing products is dependent on developing to a fixed TTY regulated standard. All Interoperability tests conducted must use the released TTY software Standard(s)s and must be built to the same revision level of the Standard. Several revision levels of the TTY standards now exist in publication since the start of product development. The test, or start of test between various manufacturers, which incorporate different revision levels of the Standard, in product software code, could invalidate a large percentage of inter-manufacturer testing.

Changes to the development effort, outlined in the scope of the Forth Report and Order, in terms of changing function at this stage of the development process, are a significant concern. Product software code that is located in products, and destined for release at year-end has already been compromised by changes to the TTY standards. Ericsson is concerned that the products planned in development for the first half of the year may have already been compromised by changes, which will not allow completion of these products by the end of the year. Changes to the scope

of the products planned for the second half of the year will jeopardize the ability of Ericsson's development groups, to deliver compliant products by the FCC deadline.

Terminal Status:
Ericsson has initiated projects within the company to integrate TTY technology within its product line. The planning of and scheduling of products has been completed. The study phase of these products has been completed, for the products. Development of prototypes is complete for CDMA and TDMA, both, which developed technical problems in the area of system integration. Through simulation models hardware and software problems have been identified which require research and development resources to solve. GSM terminal products have moved into a technical design planning stage, and are entering simulation.

Plans:
Ericsson has initiated project control for Terminal products. Ericsson has developed methods to cross communicate information between its design teams, and is centralizing key common dependencies. Ericsson is planning and documenting its test schedule for its products and services.

Ericsson plans to leverage industry resources where ever possible, including user tests, centers of expertise, competitors, interoperability testing, and overall system testing. Ericsson is evaluating processes and procedures required to test confidential products, develop and expedite test data, and identify potential test partners. Ericsson is developing plans, which will involve all of its development, product, system test, user test, UI test, and interoperability test resources. For information regarding Ericsson's 2001 Terminal TTY plan, contact matt.kaltenbach@ericsson.com.

Schedule:
While Ericsson believes manufacturers, carriers and industry standards setting groups have made significant progress in terms of resolving difficult technical issues relating to digital TTY compatibility, Ericsson continues to believe that future technical problems integrating digital TTY compatibility within the terminal product line will be identified and will require expeditious resolution in order to meet the schedule deadline. We base this statement on recent software code changes submitted to standardization groups for review, and the results of our internal tests on prototype models in the area of system integration. The persistent technical problems that we are working today indicate that the commitment to an on-time delivery schedule will be jeopardized by continuous changes required to integrate TTY technology into the product platforms. Fixed Standards will enable a developed product to enter test, and interoperability test, that will result in a complete data set on the fastest possible schedule. System integration issues may require additional process steps; to complete the integration scope of enacted standards as they exist today.

TERMINAL ISSUES
TDMA
- System interoperation between echo, and noise processing within the infrastructure, and its effects on IS-823 code bit-exact SW continues to be a concern to system engineering.

Dedicated resources have been assigned to study these effects to provide definitive risk assessment on the fastest possible schedule.

- Interaction between V.18 devices, Ultratec Turbo™, and Ameriphone Hi-Speed™ mode require additional detector sophistication to force a deterministic network system. This interaction is also valid for GSM, CDMA, and hybrid technologies and dual band phone products.

GSM

- Development of Microcode for the CTM algorithm is underway. Continued testing for equipment interaction will require additional development activity.

CDMA

- Microcode changes from chipset vendors have added to scheduled testing of production product. Prototype product continues to be tested, and is being evaluated to achieve operation with terminal system features. Verified failures of the latest products that employ IS-127-2 are being documented.
- A process between the industry, forums, standards, and product manufacturers are required to validate and determine when functional differences in the code can be decoupled from the TTY compatibility schedule, to provide a deterministic delivery of TTY technology and the ultimate fully functional and integrated technology in a deployed system.

Ericsson stated earlier in its comments that development commitments by a manufacturer, during a period of change to the TTY Standards, incurs risk. Standards can change based on contributions, prototype test studies, or technology strategies. Although Ericsson anticipated these changes, our updates to the process for the products, are reflected to a new level of non-approved Standards, and now are in jeopardy, in lieu of a final coordinated requirement being defined. Further changes to interoperability and non-standard TTY terminal products continue to increase work and development requirements. Ericsson is concerned that changes to requirements, at this stage of development, will adversely affect its ability to integrate TTY technologies, into its currently planned set of product technologies, by the prescribed deadline.

The following is a text description of the Ericsson terminal's development plan for GSM, TDMA and GSM:

GSM

Ericsson has tentative plans to initiate GSM Development Test HW for Terminals TTY compatibility beginning week 14 to 21 (April through May). Product Test using the Test HW will follow during week 22 to 31 (June-July). Interoperability Test of the Test HW is planned for week 31 to 47 (August through November).

Following the roll out of the Test HW, Ericsson will initiate a new GSM product (A2229z) scheduled to begin Development Test for TTY compatibility beginning week 27-34 (July through August). The A2229z will follow with Product Testing during week 35 - 39 (Sept). Interoperability Testing of the A2229z will begin week 40-47 (October through November). General Availability (GA) is scheduled for the beginning of week 48 (December).

TDMA
Ericsson has plans to initiate TDMA Development Test HW for Terminals TTY compatibility beginning week 22 to 30 (June through July). Product Test using the TDMA Test HW will follow during week 31 to 43 (August through October). Interoperability Test of the Test HW is planned for week 44 to 47 (November).

Following the roll out of the TDMA Test HW, Ericsson will initiate a new TDMA product (T60d) scheduled to begin Development Test for TTY compatibility beginning week 35 to 39 (September). The T60d will follow with Product Testing during week 40 to 47 (October through November). Interoperability Testing of the T60d model will begin week 48 to week 13 of 2002 (December through March). General Availability (GA) is scheduled for the beginning of week 14 (April 2002).

CDMA
Ericsson has plans to initiate CDMA Development Test HW for Terminals TTY compatibility beginning week 9 to 17 (March through April). Product Test using the CDMA Test HW will follow during week 18 to 26 (May through June). Interoperability Test of the Test HW will follow.

Following the completion of the CDMA Test HW, Ericsson will initiate a new CDMA product (T60c) scheduled to begin Product Test for TTY compatibility beginning week 22 to 27 (June). The T60c will follow with Interoperability Testing of the mobile beginning week 27 to week 39 (July through September). General Availability (GA) is scheduled for the beginning of week 40 (October 2001).

Network Status:
Ericsson has initiated projects within the company to integrate TTY technology into its entire product line of network products. The assignment of key design resources onto the design and architecture of Transcoder, and Network projects has been accomplished. The development of prototypes is underway for TDMA and GSM products. Final schedule determination for network products is being compiled and released.

The assessment of Transcoder performance, with the incorporation of TTY technology, is in process. Actual performance simulation and prediction will be documented for early field planning and customer information.

Plans:
Ericsson has initiated project control for Network products. Ericsson has developed methods to cross communicate information between its design teams, and is centralizing key common dependencies. Ericsson is planning and documenting its test schedule for its products and services.

Ericsson plans to leverage industry resources wherever possible, including user tests, centers of expertise, competitors, interoperability testing, and overall system testing. Ericsson is evaluating processes and procedures required to test confidential products, develop and expedite test data, and identify potential test partners. Ericsson is developing plans, which will involve all of its development, product, system test, user

test, UI test, and interoperability test resources. For information regarding Ericsson's 2001 TTY network plans, contact your Ericsson Sales contact.

Schedule:
While Ericsson believes manufacturers, carriers and industry standards setting groups have made significant progress in terms of resolving difficult technical issues relating to digital TTY compatibility, Ericsson continues to believe that future technical problems integrating digital TTY compatibility within all product lines will be identified and will require expeditious resolution in order to meet the schedule deadline. We base this statement on recent software code changes submitted to standardization groups for review, and the results of our internal tests on prototype models in the area of system integration. The persistent technical problems that we are working today indicate that the commitment to an on-time delivery schedule will be jeopardized by continuous changes required to integrate TTY technology into the product platforms. Fixed Standards will enable a developed product to enter test, and interoperability test, resulting in a complete data set on the fastest possible schedule. System integration issues may require additional process steps to complete the integration scope of enacted standards as they exist today.

NETWORK ISSUES

TDMA

- The changes to the released standards will not be ready for existing products in development. Changes should be developed mutually and tested within the existing product test schedules, for release in the next available technology platform. Failure to decouple these events will lead to the test of several levels of incompatible technology within the same test window.

GSM

- The number of TTY Transcoder products in simultaneous development has placed dependencies on key resources, impacting overall completion of these products within the same time frame.

CDMA

- V&V of mobile algorithm performing with system networks
- Confirmed fatal errors operating voice calls with continuous TTY calls

Ericsson stated in its comments that early development commitments by a manufacturer while TTY Standards are being changed can be risky. Standards can change based on contributions, prototype test studies, or technology strategies. Although Ericsson anticipated these changes, our updates to the development process for the products reflect a non-approved code, in lieu of a final requirement being defined. Further changes to interoperability and non-standard TTY protocols continue to increase work and development requirements. Ericsson is concerned that changes to requirements, at this stage of development, will adversely affect its ability to integrate TTY technologies into the planned set of product technologies, which it is currently developing.

This report details Ericsson's planning assumptions.

TTY Standards Version:

Ericsson build and constructed the TTY Forum #17 Report with information and design assumptions, in place, on the preparation date of March 10, 2001. The schedules, design assumptions, test plans, and projections assume the versions of approved TTY standards, in place, as of March 10, 2001. The approved October 2000 versions of IS-823 and IS-127 are currently the only approved versions of the TTY standards in place as of the date of this report. Ericsson has completed the software design for several products and is virtually complete on other products, built to the released standards in place, during the development schedule.

Ericsson completed terminal product devices in year 2000, building to the initial versions of the TTY standards. Ericsson began to redevelop new versions of terminal products in November, after new-balloted versions of the standards were accepted by the industry. These new versions are nearly complete.

Request to Freeze the TTY Standards Version:
Ericsson has requested ATIS put in place a process to identify what version of product is required for the December 31, 2001 deadline. In conversations with our peers and among our design teams, it is clear that several implementation versions of products exist in the industry. Ericsson believes that implementation to several versions of the product standard will invalidate the data-set, gathered during the scheduled TTY interoperability testing, later this year.

Schedule Impact:
Ericsson is also monitoring the ballot process of new versions of TTY standards, for both TDMA and CDMA products. Ericsson has estimated that if the implemented version of the standards change, were required to change, it will require several months to reassemble the code. Ericsson therefore believes that if the required and declared versions of the standards are not identified and frozen, to Ericsson, on April 30, 2001, there will be insufficient time in the development schedule to implement TTY by December 31, 2001.

A delay of meeting the 2H01 product set would cause the planned test activities for 2H01 to be invalidated, until the industry could have products built to the same level of behavior.

Lucent Technologies
Bell Labs Innovations

Lucent Technologies, Bell Labs Innovations

Subject: **TTY TDD Forum 17 status from Lucent Technologies**

Date: **March 14, 2001**

From: **James Huntley**
(973) 386 4331

1. Introduction

This document briefly outlines the oral report presented at TTY/TDD Forum-17 held on 14 March, 2001, at ATIS in Washington, DC.

2. Status

- Lucent Technologies is progressing with the development of the no-gain solution for CDMA and TDMA . See the attached viewgraph.

- The TTY/TDD feature requires software updates in the handsets and in the infrastructure. Lucent is working with handset partners for both CDMA and TDMA.
  - prototype TTY mobiles for both technologies are currently available for preliminary testing.
  - **developers should be wary of possible echo problems with their 2.5 mm audio connections.**

- Lucent is currently working issues to prepare for deployment to Lucent customers (i.e. service providers) and Lucent is assisting CDMA and TDMA mobile vendors with their implementations of the TTY/TDD feature.
  - Northern NJ has been identified as the First Office Application (FOA) site with Verizon.
  - Lucent will be working with Verizon and public safety organizations to do emergency call testing.
  - Availability of TTY-capable mobiles for test is improving.

Respectfully submitted,
James Huntley

LUCENT INFRASTRUCTURE DEVELOPMENT/ TEST STATUS FOR TTY/TDD

Development/Test Stage	*CDMA Status*	*TDMA Status*
Code Development	Proposed Bug Fixes Approved by sub-committee; Awaiting V&V.	Proposed Bug Fixes to be voted 3/14; IS-840 Test Vectors Being Revised.
Voice Quality Baseline Tests	Completed; VQ Good, No False Alarms; Feature Active	In Progress
System Load Tests	Completed; VQ Good; Feature Active	4/2001
TTY Performance Tests	To Begin ASAP after TTY Mobile Passes Preliminary Tests	To Begin ASAP after TTY Mobile Passes Preliminary Tests
First Office Application (FOA)	In Planning; To Begin ~30 days after TTY Mobile Passes Preliminary Tests	6/2001 or ~30 days after TTY Mobile Passes Preliminary Tests
General Availability (GA)	To Begin ~90 days after TTY Mobile Passes Preliminary Tests	8/2001 or ~90 days after TTY Mobile Passes Preliminary Tests

jmh, 4/14/2001

First Quarter 2001 TTY Based Mobile 911 Calls

CC Docket No. 94-102
Notice Pertaining to CC docket No. 94-102
Mactel Quarterly Report on TTY 911 service over mobile phones

Background and Contact Information:

Mactel operates 3 Ericsson TDMA CMS 8800 cellular switches. There is one in Anchorage, one in Fairbanks, and one in Juneau Alaska. These 3 switches cover the following markets.

Anchorage MSA Market 187B
Kenai Peninsula (Bethel) RSA 2 Market 316B
Fairbanks (Wade-Hampton) RSA 1 Market 315B
Juneau RSA 3

Carrier Identifying Information:

Holding Company Name: Alaska Communications Systems (ACS)
Carrier Name: Mactel

Contact Information

Name Glenn Bunker	Title General Manager
Address 3900 Denali St	Anchorage AK 99503
Telephone 907-563-8000	Fax Number 907-561-8642

E Mail glenn.bunker@acsalaska.com

1. Mactel will not perform network infrastructure software development. Our switch vendor (Ericsson) will be performing network infrastructure software development.

2. Handset development and testing will be done by the major handset manufacturers. Mactel will accept any TDMA compatible handset developed by the handset manufacturers for TTY based 911 mobile calls.

3. Beta testing and lab testing will be done by handset manufacturers.

4. Mactel will make use of Ericsson software according to Ericsson's schedule of release and general availability of Ericsson's software versions.

5. When handset manufacturers announce full acceptance test units usable for testing, Mactel will obtain such a test unit for acceptance testing.

6. Mactel will comply with utilization of enhanced TTY devices that are compatible with the Ericsson TDMA platform that Mactel uses in all three markets.

7. Mactel will coordinate testing of TTY based 911 mobile calls with regional PSAPS within Alaska that are presently part of the 911 network that Mactel operates presently.

8. We will develop a detailed test plan when the proper network infrastructure and handsets have been identified.

9. Mactel will provide field tests and consumer end to end testing when our network infrastructure and TTY based mobiles are introduced into our market for testing purposes. We do not have a detailed test plan at this time.

10. When the necessary consumer equipment becomes available, Mactel will use its established chain of retail outlets and all other marketing sources to make the equipment available to interested consumers.

11. Mactel's geographic scope of network deployment is shown by our Phase II filings with the FCC for all three markets.

Midwest Wireless Holdings L.L.C.
TTY Status Report
April 10, 2001

Background

Midwest Wireless provides TDMA digital cellular service throughout its licensed markets in Minnesota, Iowa, and Wisconsin. Midwest Wireless is a small rural carrier and highly dependent on its major infrastructure provider, Nortel networks, and its two primary handset providers, Nokia and Motorola, to meet the 12/31/01 software and equipment installation compliance deadline.

Status

Of the manufacturers listed above, only Nortel Networks has provided to Midwest information relative to their anticipated capabilities which is included in this filing. The company is proceeding on a path that assumes it will be able to meet the June 30, 2002 deployment deadline.

Respectfully submitted
Gary Christopherson
Midwest Wireless Holdings L.L.C.

MOTOROLA
TTY COMPATIBILITY DEVELOPMENT STATUS REPORT
1ST Quarter 2001

March 28, 2001

Via Electronic Mail and Federal Express
Ed Hall
The Alliance for Telecommunications Industry Solutions
1200 G Street, NW
Suite 500
Washington, DC 20005

Dear Mr. Hall:

Motorola is pleased to submit a status report related to our efforts at attaining TTY compatibility with our digital phones and infrastructure. Motorola is a domestic supplier of cellular handsets in TDMA, CDMA, GSM, and iDEN technologies. We also provide infrastructure equipment in CDMA and iDEN technologies.

We are working closely with our carrier customers to provide them with the equipment necessary to meet the Federal Communications Commission's June 30, 2002 TTY deployment deadline. At this time, we are on track to enable these carriers to meet their obligations.

The attached report is provided to the TTY Forum for its quarterly report to the Commission. Please contact me at the number below if you have any questions.

Regards

Alfred R. Lucas
Vice President and Director
Office of Access Excellence
Motorola
Voice: 561-739-2505
TTY: 561-730-2506

MOTOROLA
TTY COMPATIBILITY DEVELOPMENT STATUS REPORT
1ST Quarter 2001

Product	On Target*	Status	Issues
CDMA Handset	Yes	Development	
GSM Handset	Yes	Development	
IDEN Handset	Yes	Integration	
TDMA Handset	While beta plans are on target there is some uncertainty in the production schedule	Development	Reviewing issues with the Standard reported by Ericsson at TTY Forum 17
CDMA Infrastructure	Yes	Integration	
IDEN Infrastructure	Yes	Integration	

*On Target is defined as supplying carriers with product by 12/31/01 per FCC Fourth Report and Order,
CC Docket No. 94-102.

Note: Motorola is working with its carrier customers and provides them with more specific information related to their respective products.

Al Lucas
Office of Access Excellence
Motorola
Phone: 561-739-2505
TTY: 561-739-2506

Nextel Communications, Inc.
2001 Edmund Halley Drive, Reston, VA 20191

March 27, 2001

Via Electronic Mail and Federal Express
Megan Hayes
The Alliance for Telecommunications Industry Solutions
1200 G Street, NW
Suite 500
Washington, D.C. 20005

Re: Nextel Communications, Inc. First Quarter 2001 Report to the TTY Forum

Dear Ms. Hayes:

Pursuant to the Fourth Report and Order of the Federal Communications Commission ("Commission") in CC Docket No. 94-102,[4] Nextel Communications, Inc. ("Nextel") hereby submits this report on the status of its efforts to attain TTY accessibility on Nextel's iDEN handsets and network. Working closely with its vendor, Motorola, Inc. ("Motorola"), Nextel is pleased to report that its TTY accessibility progress is moving ahead in a timely manner. Pursuant to this schedule, Nextel intends to fulfill the Commission's June 30, 2002 TTY deployment deadline.

Nextel is a provider of digital Commercial Mobile Radio Services using Motorola's iDEN technology. Nextel is one of only three such iDEN providers in the United States. Thus, Nextel has worked with Motorola in the research and development of a TTY compatibility solution for the iDEN product and network. Since the Telecommunications Industry Association ("TIA") approved the Lucent solution for providing TTY accessibility on digital networks, Motorola has invested significant time and resources in creating a solution that will provide the same accessibility on iDEN networks.[5] Specifically, Motorola has completed the requirements and design process, has implemented the TTY feature, and has begun lab testing of both the iDEN handset and iDEN network infrastructure.

With respect to handset deployment, Motorola has implemented the necessary changes in prototype handsets, and these currently are being tested in Motorola's labs. Once Motorola's testing is completed, Nextel can conduct "beta testing" of the handsets. The iDEN infrastructure

[4] *In the Matter of Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Calling Systems*, Fourth Report and Order, CC Docket No. 94-102, FCC 00-436, released December 14, 2000 ("Fourth R&O").
[5] *See, e.g.*, Fourth R&O at para. 3.

process also is on schedule for full deployment by June 2002. As with the handset, the requirements and design process is complete and testing in Motorola's labs is underway. Following Motorola's testing of the infrastructure upgrades, Nextel can conduct "beta testing" of the TTY-capable handset and infrastructure in late third quarter 2001. Nextel plans to test its TTY-capable handsets and infrastructure with both the TTY community and Public Safety Answering Points. Motorola currently anticipates product delivery of the TTY infrastructure in fourth quarter 2001.

At that time, Nextel can initiate full deployment of the TTY upgrades throughout its nationwide network. As Nextel has previously explained, these modifications will impact the process for encoding the voice channel on iDEN's system. Because such vocoder modifications have the potential to impact voice quality for all Nextel users, these base station controller modifications will require considerable time and attention. At this time, Nextel anticipates completing deployment by the Commission's June 30, 2002 deadline.

Nextel appreciates the opportunity to provide this report to the TTY Forum as part of the forum's quarterly TTY report to the Commission. If you have any questions about this report, please do not hesitate to contact me at 703-433-8315.

Sincerely,

Robert D. Montgomery
Senior Manager – Regulatory Technology Development

NOKIA Americas Standards
Compiled by: Douglas W. Neeley
Reveiwed by: NOKIA Government Affairs
Washington D.C.

March 14, 2001

Nokia Status Report to TTY Forum #17 – March 14, 2001

Nokia manufactures phones for virtually ALL wireless technologies; AMPS, TDMA, CDMA and GSM; at both 800 and 1900MHz. Nokia also supplies network terminals for GSM.

HARDWARE SOLUTIONS:

Nokia is planning on TTY Compatibility in eight new phone programs with 10 to 18 different specific models having CDMA, TDMA, GSM and AMPS capability in various combinations.

Interconnect Cable solutions (TIA/EIA TSB-121 compliant)
Nokia mobile handset products are currently planning to support TTY/TDD Compatibility plus three-pin headset functions. Several models will use the bottom system connector to convert the Tx and Rx audio signals from XEAR and XMIC to a standard 3 conducter 2.5mm jack. Other projects have a built-in 2.5mm jack four-conducter on the handset which will eliminate the need for an external adaptor. Nokia has formed a separate program team to implement the various interconnect cables as according to TIA/EIA TSB-121.

MOBILE TERMINAL SOFTWARE SOLUTIONS:

CDMA IS-127-2 (as of 3/4/2001) Six to eight base models
The implementation of the TTY feature within the mobile's memory allocation has just been completed. We are planning first round of testing with infrastructure in the next few weeks. Commercialization of the implementation will depend on the test results.

TDMA IS-136 / IS-823 (as of 3/12/2001) Five to seven base models
The TTY code is complete and we are waiting for integration with overall phone software.

GSM IS- ?? (as of 3/8/2001) Multiple base models, including a European startup.
The TTY feature will be implemented. There is still some waiting for the Standards bodies to finalize these requirements.
Lab testing with infra planned in nn-nn weeks.

NETWORK SOFTWARE SOLUTIONS:

GSM IS- ?? (as of 3/8/2001)
In 3GPP S2, there is an opinion difference of standardization methods. In T1P1, there is another opinion difference.
Some companies are pushing for the CTM Service Node in CN.
Other parties are asking to include a BSS transcoder-based CTM solution as part of the 3GPP architecture for Release 4.
TTY feature is being implemented. Lab testing with infra will start when the final location for the code to reside is decided.

TTY Overall Time Plan

PROGRAM/TASK	2001									2002					
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
TSB-121 CABLES HAD-8/DCT-3 DCT-4	Pre	P-2 Pre				- P-3									
CDMA Test with *Carrier X* Test with **Carrier Y**	C1														
TDMA Test with *Carrier X* Test with **Carrier Y**															
CDMA – 1900MHZ Test with *Carrier X* Test with **Carrier Y**															
TDMA – 1900MHZ Test with *Carrier X* Test with **Carrier Y**															
GSM Test with *Carrier X* Test with **Carrier Y**															
GSM Network Test with *Phone Model* Test with **Carrier Y**															

CODE:

Pre Pre-production models
P-2 Full Production Line DCT-3
P-3 Full Production Line DCT-4

C1: CDMA Lab Testing with Infra-structure

Respectfully Submitted By:

Douglas W. Neeley
Sr. Technical Standards Eng.
972-894-4874
doug.neeley@nokia.com

Leo Fitzsimon
Government Affairs
(202) 887-0145

NORTEL

INFORMATION SUPPLIED TO CUSTOMER'S BASED UPON AIR INTERFACE TECHNOLOGY USED.

RESPONSE TO CUSTOMER April 11th 2001

Dear (Customer's Name),

Enclosed is information regarding Nortel Networks' plans to comply with FCC TTY requirements, in response to raised questions.

- Network infrastructure software/hardware development and testing
  Nortel response: Nortel Networks' development is complete, and product test has been completed as well. Nortel has tested with Qualcomm prototypes (note other handset vendors were not available during Nortel's NBSS10.1 test cycle).

- Network infrastructure software/hardware planned general availability date
  Nortel response: In order to comply with the FCC's December 31, 2001 requirement for TTY/TDD, Nortel will be committing to deploying the enabling software as part of the MTX10 load only. MTX10 is scheduled for General Availability Week 44, 2001. The order code for CDMA TTY/TDD is A0862455. Nortel Networks CDMA TTY solution does not require any new hardware besides what is currently available (ESEL cards - 13K, EVRC and SEL cards - 13K). The network provisioning for TTY must be done the same way as for the voice subscribers.

- Schedule for deployment of the software/hardware in the (Customer Name) switches
  Nortel response: The minimum baseline software requirement for this feature to be deployed in (Customer Name) switches is MTX09 or higher. On the BSCs, the baseline requirement is NBSS 10.1 or higher. Software is scheduled to be available Week 44 and will be scheduled for deployment on specific (Customer Name) switches on a market-by-market basis.

  - Nortel Network's plans to test and confirm solution performance including additional tests referenced in Sections 20-23 of the order during the six-month extension allowed for this purpose in the order, January 1 through June 30, 2002.

  Nortel response: Regarding Section 20-23
  Turbocode/ HiSpeed is a proprietary feature on Ultratec/Ameriphone TTY device and is not supported by CDMA standards. If CDMA standards are enhanced to support these devices, Nortel will support this in a future release. However, standards are designed to avoid supporting propriety methods and there is no known effort to standardize the propriety features.

  Background: At the TTY Forum #16, Ultratec identified a unique problem their equipment users may have had calling 911 using their advanced proprietary protocol.

Ameriphone also uses an advanced proprietary protocol. While the FCC directive and the Mission of the TTY Forum was only to provide a solution for a Baudot message to 911, a committee from Forum #16 was formed to explore the feasibility of solutions for proprietary systems.

At the TTY Forum #17, March 14, 2001, the committee reported that

- Proprietary protocol manufacturers would advise their customers how to avoid problems with a digital wireless TTY/911 call
- Solution development should continue focus on providing solutions for Baudot TTY messages
- The Committee be dissolved

The proposals were adopted at the TTY Forum #17.

- Plans to test your own or other vendor CDMA handsets with your switch solution

  Nortel response: Even though the infrastructure software is scheduled well in advance of the Dec 31, 2001 FCC requirement, commercial handset general availability dates have not been scheduled by handset vendors. Nortel Networks recommends (Customer Name) engage its handset vendors for a thorough response to the FCC.

  Nortel Networks understands that it is most challenging for handset manufacturers to design CDMA TTY/911 solutions into handsets and have commercial availability by the FCC December 31, 2001 date, especially with "improved" code being suggested on a frequent basis. Nortel Networks is not surprised that, despite diligent work, firm handset availability dates were not generally available at the March 14, 2001 TTY #17 Forum. Nortel Networks believes that for CDMA solutions, the standard and any improvements should be locked down in order for all vendors to design to a common standard and common code set.

- Plans to work with any wireless carrier to perform end to end customer tests

  Nortel response: Nortel recommends (Customer Name) engage the chosen CDMA TTY handset vendor during network testing to do interoperability testing with the Nortel Networks solution.

- Plans to test with the Public Safety Community (PSAPs).

  Nortel response: Nortel recommends (Customer Name) schedule this testing with the PSAP centers during its network testing. Nortel Networks will work with (Customer Name) to identify PSAPs that would be willing to test an end-to-end solution. Additionally, it is recommended that 711 functionality be tested with Telecommunications Relay Service Centers (TRS's); the 711 service requirement is also mandated by the FCC.

Beyond the questions already responded to, we would like to address the issue raised at the TTY Forum #17 relating to echo cancellers and voice quality. Nortel Networks lab testing to date has not identified an echo canceller problem with Nortel Networks' equipment and software. Nortel Networks is aware that some other manufacturers have identified that the echo canceller issue has created a performance problem with their TTY/911 solutions. Nortel Networks will continue

to carefully review further results for any echo canceller problem in future testing, but we do not anticipate a problem with our solution at this time.

In conclusion, please note that the TTY Forum #17 Draft Report is available. This report includes information summarizing the activities and discussions that took place at the most recent forum. Should (Customer Name) require access to this report, please contact ATIS (Alliance for Telecommunications Industry Solutions) via Ed Hall (202) 628-6380 or Megan Hayes (202) 662 8653.

Regards,

Nortel Networks

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Regards,
Nortel Networks

Pine Belt Cellular, Inc.
3984 County Road 32
P. O. Box 279
Arlington, Alabama 36722

TTY Report – April 12, 2001

Pine Belt Cellular, Inc. is completely reliant upon its vendors to implement the TTY solutions in its handsets and network. Pine Belt does not have the ability to independently verify the release dates of the solutions that will be provided by the vendors.

Network infrastructure software development:
Lucent Technologies, our switch and infrastructure manufacturer is aware of the TTY requirements. Our understanding is that Lucent is currently working on software solutions at this time. Pine Belt is dependent upon Lucent providing these solutions.

Handset development and testing plans:
Pine Belt Cellular uses handsets made by a number of manufacturers. The manufacturers most predominantly used by Pine Belt are Motorola, Nokia, and Kyrocera. Pine Belt will stay abreast of the developments by these manufacturers so when TTY solutions are made available, we will be able to provide these units to our customers as soon as possible.

Beta testing and lab testing:
Pine Belt Cellular will begin testing TTY compatible equipment as soon as both our handset and infrastructure manufacturers provide solutions to us.

Release and general availability to carriers of network infrastructure software
Pine Belt Cellular is awaiting updated reports of software availability from switching and infrastructure vendors.

Availability to carriers of full acceptance test units:
Pine Belt Cellular is awaiting software and hardware availability from switching, infrastructure, and handset vendors.

Efforts toward achieving digital wireless solution compatibility with enhanced TTY devices:
Pine Belt Cellular remains dependent upon the availability of vendor provided solutions to meet the FCC's tentatively mandated timeline (12-31-01) to provide E911 TTY access to our networks.

Carrier coordination of testing with PSAP:
This testing target date is dependent upon solutions provided by network infrastructure vendors and handset vendors.

Carrier testing activities, including field testing, consumer end-to-end testing, and other necessary tests:
Testing will begin immediately upon receipt of software and hardware. Pine Belt Cellular is dependent upon network infrastructure vendor solutions.

Retail availability of necessary consumer equipment:
Pine Belt Cellular is dependent upon the availability of handsets from vendors. No firm commitment has been received at this time from handset vendors.

Geographic scope of network infrastructure deployment:
Pine Belt Cellular service area: Alabama RSA3B2 & BTA415

SpectraCom, Inc. d.b.a PYXIS Communications
TTY Report
Thursday, April 12, 2001

PYXIS Communications uses CDMA technology to provide digital wireless service in all of our markets. PYXIS Communications is completely reliant upon its vendors to implement the TTY solution in its handsets and network.

Infrastructure Vendor Status

Nortel is PYXIS' infrastructure provider. Their response is as follows:

Nortel Network Solution Set

The Nortel Network software solution is in release MTX-10, scheduled for general availability week 44, 2001.

Development and Testing

Lab testing has not identified problems – in house testing has been done with one handset. Lack of availability of CDMA test handsets prevented testing of a wider range of subscriber apparatus.

Product Time Line

MTX-10, scheduled for general availability week 44, 2001, supporting code for the IS-127-2 & IS-733-1 standards, and at least one function of the code relating to the future IS-127-3 & IS-733-2 standards.

Issues and Concerns

- The changes to CDMA TTY/911 code, and the coming standard change has created much difficulty to design solutions to a "moving target".
- The FCC's date for carriers to acquire TTY/911 equipment is December 31, 2001; a standard change is expected in April 2001. There is not sufficient time between April and December to fully evaluate all changes, and incorporate all proposed changes in software that customers will have in December
- Some proposed changes are more important than others. Manufacturers can incorporate important changes without incorporating all. It is not known how different equipment using different mixes of equipment will interoperate
- Nortel Networks believes standards must be "locked down" for equipment developers to design to a common target for initial equipment deployment. Future changes in initial equipment standards should provide time developing a stable and fixed second round design target
- Industry solutions only support Baudette 45.5 TTY transmissions, propriety TTY transmissions, and European Baudot 50 is not supported.
- Ericsson has filed a Report Number 47 with ATIS that identifies a test failure where the Voice Recognition function is incompatible with the existing TTY Detector. It is not clear if the recent Lucent code change will cure this problem, or if the problem applies to Nortel Network equipment and software.

Handset Vendor Status

KYOCERA Response:
Kyocera Wireless Corporation (KWC) is in the process of developing the TTY feature. KWC is planning to have completed the development in order for this feature to become available on commercial handset offerings in 1H2002 to meet the implementation deadline established by the FCC.

In order to meet the deadline KWC is planning to develop TTY feature support in an existing, approved, handset platform that can be used for testing. In that regard the feature can be tested and modified as necessary using a process external to our commercial product development schedules and processes.

At this time some preliminary development has commenced, but has been limited to producing feature support in the User Interface of our handsets. With respect to standards, we are also coordinating and tracking the development of the latest code changes being implemented in Qualcomm ASICs. Our understanding is these changes support Lucent's recommendations (changes to the IS-733-1 and IS-127-2 standards) proposed at the end of last year.

We have also been coordinating with the infrastructure manufacturers Lucent Technologies, Nortel-networks, and Motorola CIG with respect to their schedules and plans for feature completeness of their infrastructure. These tests will be coordinated with infra-development labs, Interoperability labs, or carrier network, depending upon availability and timing. From our communications with the infrastructure manufacturers, our understanding is that by 4Qtr2001 carriers should also have the ability to test this feature in their network. It is our intention to have the feature development process matured to the extent it could be tested on a network in that time frame.

In support of the testing we are planning, KWC has procured TTY devices manufactured by Ultratec and Ameriphone. Our understanding is these are the most widely utilized devices in the industry therefore it is our intention to limit end to end customer testing to these devices.

Motorola response:
No update/response has been received from Motorola.

Qwest Wireless, LLC
1860 Lincoln Street
14th Floor
Denver, Colorado 80295

March 14, 2001-03-06

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of

Revision of the Commission's Rules
To Ensure Compatibility with
Enhanced 911 Emergency Calling Systems

CC Docket No. 94-102
)
)

Report of Qwest Wireless, LLC, to be filed through TTY Forum

Pursuant to the FCC's Fourth Report and Order, dated December 14, 2000, in the CC Docket referred to above, Qwest Wireless, LLC ("Qwest") hereby submits its first report to the TTY Forum for compilation and timely filing with the FCC.

1. Network Infrastructure Software Development

In connection with E911 compliance efforts, Qwest recently sent a questionnaire to software vendors and received responses with anticipated software release dates.

2. Handset Development and Testing Plans

Qwest is talking with its vendors. No testing has been scheduled, as it is too early in the process.

3. Beta Testing and Lab Testing'

No beta testing has been scheduled, as it is too early in the process.

4. *Release and General Availability to Carriers of Network Infrastructure Software*

Vendor 1: tentative release March 31, 2001
Vendor 2: expects release November 5, 2001

5. ***Availability to Carriers of Full Acceptance Test Units***

Qwest has identified one vendor developing a K1 handset that will have a TTY connection. This is the handset that Qwest will need for E-911 P2. Qwest expects to test these units.

6. ***Efforts Towards Achieving Digital Wireless Solution Compatibility with enhanced TTY Devices***

In June of 2000, Qwest sent a Request for Information to its network and handset vendors to gauge the availability of network and handset technology compatible with TTY devices. The responses Qwest received at that time showed no significant progress in the development of TTY compatibility. Qwest intends to send another RFI to its vendors in March or April of this year to determine the status of handset compatibility with TTY devices.

In connection with E911 compliance efforts, Qwest recently sent a questionnaire to software vendors and received responses with anticipated software release dates.

Qwest has organized into a task force consisting of representatives of all its internal departments that are affected by the TTY 911 mandate. The sole purpose of the task force is to search for solutions of the TTY 911 requirement.

7. ***Carrier Coordination of Testing with PSAPS***

Qwest expects this to be accomplished after E99 P2 will be turned up. Timing is undetermined as no P2 requests have been received at this time..

8. ***Carrier Testing Activities***

There are no testing activities scheduled as it is too early in the process.

9. ***Retail Availability of Necessary Consumer Equipment***

Qwest has identified one vendor developing a K1 handset that will have a TTY connection. This is the handset that Qwest will need for E-911 P2. Qwest expects to test these units.

10. ***Geographic Scope of Network Infrastructure Deployment***

The geopgraphic scope will depend on the vendor's offerings.

Floy H. Jeffares, Government Affairs Manager

Siemens
TTY Report
March 28, 2001

Siemens is investing a significant amount of effort in order to comply with the FCC requirement to support E911 calls made from TTY devices on wireless digital networks. The status provided below is based on the currently available TTY/CTM standards and assumes no changes to these standards.

Network Implementation

Siemens is developing a TRAU based TTY solution for GSM networks. This solution is in line with the consensus reached in January this year, at a meeting held in Puerto Vallarta between the US GSM operators and the major infrastructure vendors. The Siemens solution will not impact the existing vocoders already deployed and supported by Siemens.

Siemens expects the first prototype units (including the necessary hardware and software) to be made available to wireless operators for testing at the end of 2001. This will allow sufficient time for the network integration testing required to meet the in service date of June 2002.

Handsets Implementation

Siemens Handset group plans to support TTY in 2002. This product is currently in the planning phase and availability of beta units for testing as well as general availability dates will be published at a later date.

Respectfully submitted,
Ilan Vardi
Siemens

Southern LINC®

SOUTHERN COMPANY
Energy to Serve Your World℠

Southern LINC TTY Status Report
1st Quarter 2001

Southern LINC continues to pursue compliance with the FCC's TTY requirements. It is working closely with its sole vendor, Motorola, to ensure that it meets the FCC's deadline of June 30, 2002. Based upon the information it has received from Motorola, Southern LINC is currently of the belief that it will be able to deploy TTY capability to its customers by June 30, 2002. As its plans for testing and deployment emerge, based upon equipment availability, Southern LINC will be pleased to share that information with the Commission in a future report.

Sprint PCS Report to the FCC

Provided by Cheryl Gentry
3/27/01

1. ***Network Infrastructure Software Development***
   - Lack of availability of bug-free software has delayed our ability to begin interoperability testing. This is resulting in a significant delay in our initial rollout projections. In our previous report we stated that we expected software delivery from our vendors first and second quarter this year.
   - Two of our infrastructure vendors have provided software to our labs; however, several significant bugs have been identified, inhibiting our ability to begin lab and field testing in the planned time frames. (Specifically, we are concerned with the time it will take for network vendors to add the bug fixes in Lucent's changes to the standard).
   - The other two infrastructure vendors have committed to providing software to our labs by late summer or early fall.
   - We are looking to the FCC to hold infrastructure software manufacturers accountable if we are going to be held to the drop-dead date of 6/02.
2. ***Handset development and testing plans***
   - TTY compatibility is dependent on Qualcomm's commercial release of their DMSS software (reference software integrated into their handset) - scheduled for late April 2001, at the earliest.
   - Following that release, handset manufacturers need to build user interface (software).
   - Interoperability testing w/ infrastructure will follow - both at SPCS and in infrastructure labs.
   - We are dependent on handset vendors to provide TTY capable handsets prior to field-testing.
   - SPCS is anxious for the report from the TTY sub-committee regarding the solution to impedance issues related to the audio interface through the 2.5-mm jack.
   - We are looking to the FCC to hold handset manufacturers accountable if we are going to be held to the drop-dead date of 6/02.
3. ***Beta testing and lab testing***
   - SPCS requires both lab- and field-testing prior to implementation.
   - Our internal lab-testing and field-testing are extremely intensive and require approximately two to three months each.
   - We had planned to begin FMA testing in May or June, now we are looking at late summer or early fall, which may be optimistic.
   - We are planning to test with consumers in various markets prior to nation-wide deployment.
4. ***Release and general availability to carriers of network software***
   - We continue to experience frustration with the inability to obtain bug-free software in order to begin interoperability testing.
5. ***Availability to carriers of full acceptance units***
   - See # 2
6. ***Efforts toward Achieving digital wireless solution compatibility with enhanced TTY devices.***

- In regards to any requirement to support enhanced protocols - We emphasize that this is beyond our technical capability for this launch, a requirement to do so would take an additional 2 years of development.

7. Carrier Coordination with testing with PSAP

- PSAP testing will be conducted at the time of Beta trials.

8. Carrier testing activities, including field testing, consumer end-to-end testing

- As stated previously, SPCS requires both lab and field-testing prior to implementation.
- The internal lab-testing and field-testing processes are intensive, requiring approximately two to three months each.
- As a result, FMA testing has been delayed until at least late summer, or early fall.

9. Retail availability of necessary consumer equipment

- TTY capable handset sales are projected for first quarter, 2002.

10. Geographic scope of network deployment

- SPCS plans to launch in specific markets in 2002, with nation-wide launch completed by June 2002.

US Cellular TTY Forum 17 Quarterly Report

1. *Network infrastructure software development*
   US Cellular is relying on its infrastructure vendors to complete software development.

2. *Handset and development and testing plans*
   US Cellular is relying on the handset vendors for the development of any product. When available product is available, US Cellular will perform field testing in accordance with the Loeber and Walsh test plan, previously submitted in the TTY Forum.

3. *Beta testing and lab testing*
   US Cellular is only able to field-test beta units. Testing of beta units will only take place after the final release of the infrastructure is in place. Presently, there are no beta units available.

4. *Release and general availability to carriers of network software*
   US Cellular has been assured by its infrastructure vendors, Lucent and Nortel, that the software releases to support the "TTY Solution" will be in place by December 2001.

5. *Availability to carriers of full acceptance test units*
   US Cellular is awaiting a firm commitment from its handset suppliers for the availability of full acceptance test units..

6. *Efforts towards achieving digital wireless solution compatibility with enhanced TTY devices.*
   US Cellular will work with the various manufacturers to achieve a standard to transport enhanced TTY devices (proprietary faster turbo codes).

7. *Carrier coordination of testing with PSAP*
   US Cellular will conduct TTY testing with larger PSAPs in its coverage area and with any PSAP that requests testing. No requests have been received. Scheduling of these tests will commence after acceptable handsets and infrastructure equipment is in place.

8. *Carrier testing activities, including field testing, consumer end-to-end testing*
   Scheduling of consumer end-to-end testing will commence after acceptable handsets and infrastructure equipment is in place.

9. *Retail availability of necessary consumer equipment*
   There are no available TDMA and CDMA handsets available that will pass TTY baudot tones. There are no firm schedules from our handset suppliers for the availability of production units. Retail availability is uncertain at this time.

10. *Geographic scope of network deployment*
    US Cellular is planning on having the "Network" portion of the TTY solution installed in all our CDMA and TDMA markets throughout the country. Availability of acceptable handsets will determine when the TTY solution is turned on for commercial use. US Cellular will not deploy a marginal and/or an unacceptable solution.

TTY Report for March 2001

Contents

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.