

1200 G Street, NW • Suite 500  
Washington, DC 20005  
202-628-6380 • Fax: 202-393-5453  
www.atis.org



Alliance for Telecommunications  
Industry Solutions

Problem Solvers to the  
Telecommunications Industry

**RECEIVED**

**APR 13 2001**

**FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY**

April 13, 2001

VIA HAND DELIVERY

Magalie Roman Salas  
Office of the Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, SW  
Washington, DC 20554

Re: TTY Forum's Aggregate Report of Carriers  
for 1<sup>st</sup> Quarter 2001, CC Docket No. 94-102

Dear Ms. Salas:

Enclosed are an original and five copies of the TTY Forum's Aggregate Report of Carriers for 1<sup>st</sup> Quarter 2001 filed on behalf of ATIS' sponsored TTY Forum and in response to the Commission's Fourth Report and Order in the above-captioned case. Please date-stamp and return the extra copy to our messenger.

Please contact me 202/434-8847 if you have any questions or comments.

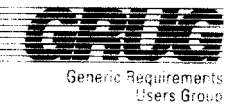
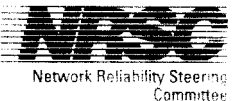
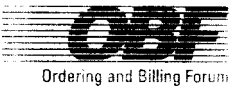
Sincerely,

Megan L. Campbell  
General Counsel

Enclosures

cc: Kris Monteith, Chief, Policy Division, WTB  
Pam Gregory, Director, Disabilities Rights Division, CIB  
Mindy Littell, Attorney Advisor, Policy Division, WTB

No. of Copies rec'd 074  
List A B C D E



Chairman  
**Martin McCue**  
Global Crossing

First Vice Chairman  
**Ross K. Ireland**  
SRC Communications

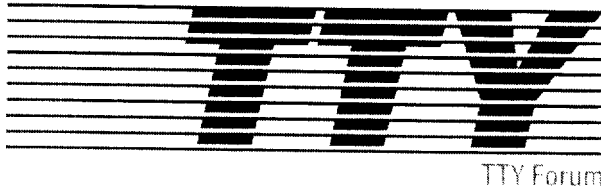
Second Vice Chairman  
**Asok Chatterjee**  
Ericsson, Inc.

Treasurer  
**David R. Maccarelli**  
nTelos

President & Chief  
Executive Officer  
**Susan M. Miller**  
ATIS

Vice President of  
Finance & Operations  
**William J. Klein**  
ATIS

General Counsel  
**Megan L. Campbell**  
ATIS



# **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: <i>FCC; CTIA, PCIA; NAD; TDI</i> |                   |
| 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 .....	4
2. CALL FOR AND NUMBERING OF CONTRIBUTIONS.....	4
3. REVIEW & APPROVE AGENDA .....	4
4. TTY FORUM – 16 SUMMARY .....	4
5. CORRESPONDENCE.....	4
6. TTY LIAISON REPORTS: .....	5
7. REVIEW FCC TIMELINE .....	5
8. REVIEW TTY FORUM #16 AGREEMENTS .....	6
9. INDUSTRY IMPLEMENTATION STATUS REPORTS .....	6
10. TECHNICAL STANDARDS ACTIVITIES (TR45, T1P1).....	14
11. FUTURE VIEWS, STANDARDIZATION INFORMATION .....	14
12. REVIEW AND UPDATE APPENDIX J .....	15
13. ENHANCED PROTOCOLS .....	15
14. VOICE BASED SOLUTIONS (FORMERLY “SHORT-TERM”) .....	15
15. DATA SOLUTION (FORMERLY “LONG-TERM”).....	15
16. NEXT MEETING .....	15
17. NEW BUSINESS.....	15
18. ADJOURNMENT .....	15
MEETING ROSTER.....	16
APPENDIX A - TTY AGREEMENTS.....	18
APPENDIX B - CONSUMER NOTIFICATION DOCUMENT.....	22
APPENDIX C - TTY FORUM ISSUES STATEMENT .....	23
APPENDIX D - TTY TEST COMPLETION MATRIX.....	24
APPENDIX E - USER REQUIREMENTS .....	25
APPENDIX F - WORK PLAN .....	32
APPENDIX G - TYPICAL OPERATING CHARACTERISTICS .....	33
APPENDIX H - MODEM/IWF MFTR. CONTACTS .....	37
APPENDIX I - TTY FORUM CHAIR'S UPDATES .....	40
APPENDIX J - TECHNICAL STANDARDS REFERENCE .....	45
APPENDIX K - GLOSSARY OF TERMS.....	47
APPENDIX L - IMPLEMENTATION STATUS REPORTS .....	51

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](mailto: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 4<sup>th</sup> 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 4<sup>th</sup> 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 4<sup>th</sup> R&O, please visit  
[http://www.fcc.gov/Bureaus/Common\\_Carrier/Orders/2000/fcc00436.txt](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](mailto: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 continuous 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 2001 and 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](http://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](http://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 26<sup>th</sup> 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**  
**Meeting Roster**

<b>Name</b>	<b>Company</b>	<b>Phone</b>	<b>Fax</b>	<b>Email</b>
Jan Biga	Qwest Wireless	720-947-4648	720-947-1975	jbiga@quest.com
Brye Bonner	Motorola	847-576-5920	847-538-5564	brye.bonner@motorola.com
Richard Brandt	Gallaudet University	908-310-7941		dbcon@att.net
Lorraine Buerger	AT&T Wireless	312-258-0062	312-441-2025	lori.buerger@attws.com
Sean Campbell	Cingular	510-305-1757	925-227-3238	sean.campbell@cingular.com
Steve Coston	Ericsson, Inc.	919-472-7527	919-472-6105	steve.coston@ericsson.com
Linda Day	AT&T Wireless	559-438-2485	559-438-5713	linda.day@attws.com
Ken Evans	Cingular	404-713-0888	404-249-0304	ken.evans@cingluar.com
Patrick Forster	FCC	202-418-7061	202-418-7247	pforster@fcc.govq
Cheryl Gentry	Sprint PCS	913-762-7193	913-523-0048	cheryl.gentry@mail.sprint.com
Ed Hall	ATIS	202-434-8836	202-393-5453	ehall@atis.org
Paul Hall	Motorola	425-487-5921	425-483-3400	paul.hall@motorola.com
Megan Hayes	ATIS	202-662-8653	202-393-5453	mhayes@atis.org
Gunnar Hellstrom	Ericsson	+46708204288	+4684482751	gunnar.hellstrom@era.ericsson.se
James House	TDI	301-589-3786	301-589-3797	jimhouse@tdi-online.org
James Huntley	Lucent Technologies	973-386-4331	973-386-2651	jmhuntley@lucent.com
Floy Jeffares	Qwest Wireless	720-947-1189	720-947-2356	fjeffares@qwest.com
Matt Kaltenbach	Ericsson, Inc.	919-472-1818	919-472-6105	matt.kaltenbach@ericsson.com
Peter Lee	Ameriphone, Inc.	714-897-0808	714-897-4703	peterl@ameriphone.com
Melinda Littell	FCC	202-418-1310	202-418-8188	mlittell@fcc.gov
Audrey Longhurst	Motorola	206-923-3454	206-923-3454	audrey.longhurst@motorola.com
Scott McCloud	Bluegrass Cellular	270-234-6466	270-732-0580	smcccloud@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	Gallaudet 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 mfrs 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
Sendelev	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 Repre

The CTIA has said that no consumer...  
the TTY Forum because the...  
Marketing and distribution issues...  
plan will be taken up with CTIA's...  
...phone-model-per-technology... short-term  
...agement, 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.