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www.atis.org

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Alliance for Telecommunications Industry Solutions

Problem Solvers to the Telecommunications Industry

Standards Committee T1 Telecommunications

Carrier Liaison Committee

Telecommunications Industry Forum

Network Interconnection Interoperability Forum

Ordering and Billing Forum

Protection Engineers Group

Standards Committee O5

Network Reliability Steering Committee

Network and Services Integration Forum

Telecommunications Fraud Prevention Committee

Industry Numbering Committee

Internetwork Interoperability Test Coordination Committee

Generic Requirements Users Group

October 15, 2001

RECEIVED

OCT 15 2001

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

VIA HAND DELIVERY

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

Re: TTY Forum's Aggregate Report of Carriers for 3rd Quarter 2001, CC Docket No. 94-102

Dear Ms. Salas:

Enclosed are an original and four copies of the TTY Forum 19 Meeting Summary. Appendix L contains an aggregate report of wireless service providers, handset and infrastructure manufacturers for 3rd 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 enclosed extra copy of this filing to our messenger.

Please contact me at 202/434-8830 if you have any questions or comments.

Sincerely,

Toni E. Gilbert
Staff Attorney

Enclosures

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

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RECEIVED

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

VIA HAND DELIVERY

International Transcription Services, Inc.
1231 20th Street, NW
Washington, DC 20036

Re: TTY Forum's Aggregate Report of Carriers for 3rd Quarter 2001, CC Docket No. 94-102

To Whom It May Concern:

Please find enclosed a diskette containing the TTY Forum's Aggregate Report of Carriers for 3rd 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 contact me at 202/434-8830 if you have any questions or comments.

Sincerely,

Toni E. Gilbert
Staff Attorney

Enclosure

No. of Copies rec'd 0+4
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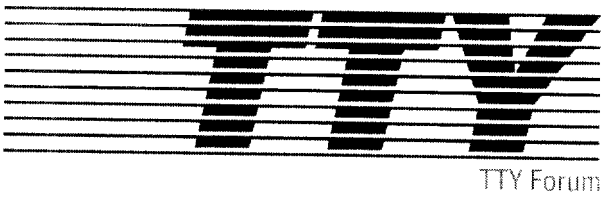

TTY FORUM - 19

Meeting Summary Report

September 26, 2001
ATIS Conference Center
Washington, DC

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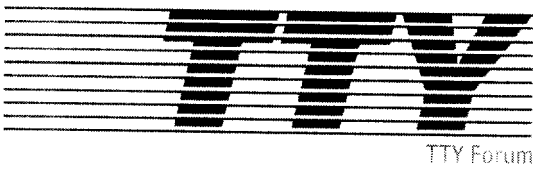


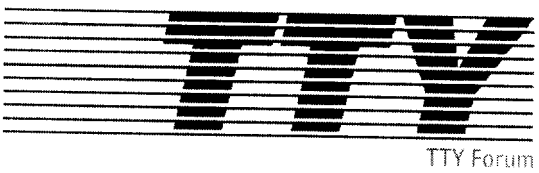
TTY/TDD Forum – 19

September 26, 2001
ATIS Conference Center
1200 G Street, NW, Suite 500
Washington, DC

Agenda

Chaired by Ed Hall, ATIS

1. Call to Order, Introductions and Attendance Roster
2. Call for and Number of Contributions
3. Review & Approve Agenda
4. TTY Forum #18 Summary
5. Correspondence
6. TTY Liaison Reports: *FCC; CTIA; NAD; TDI*
7. Review TTY Forum #18 Agreements and Action Items
8. Industry Implementation Status Reports
9. Technical Activities
   a. TTSI Report
      i. TDMA
      ii. CDMA
      iii. GSM
   b. Scoring
   c. TTY Devices
10. Terminal product labeling for TTY accessible devices
11. Next Meeting: December 11, 2001
12. New Business
13. Adjournment



TTY/TDD Forum – 19

September 26, 2001
ATIS Conference Center
1200 G Street, NW, Suite 500
Washington, DC

Meeting Summary

1. Call to Order, Introductions and Attendance Roster

Ed Hall, ATIS, Chair, called the meeting to order at 9:03am. He stated that there are quite a few members attending this meeting via the Conference/virtual link. He asked Megan Hayes, TTY Forum Secretariat, to make a few comments on accessibility. She explained that having a Virtual Meeting in addition to the face-to-face meeting presented serious challenges to accessibility and outlined some suggestions for all participants to make the meeting as accessible as possible. All participants took the opportunity to introduce themselves.

2. Call for and Numbering of Contributions

Ed Hall introduced all contributions, and asked for any additional contributions. There were none. All contributions provided to the Secretariat electronically are available for download on the TTY Forum web site at http://www.atis.org/atis/tty/documents, or by sending a request to Megan Hayes (mhayes@atis.org). Contributions were submitted and numbered as follows:

Number	Title
TTY19/01.09.26.01	Agenda
TTY19/01.09.26.02	Roster
TTY19/01.09.26.03	TTY18 Meeting Summary
TTY19/01.09.26.04	TTY18 Agreements and Action Items
TTY19/01.09.26.05	TTSI Report to TTY Forum – 19
TTY19/01.09.26.06	Digit Wireless Presentation
TTY19/01.09.26.07	Sprint PCS Report
TTY19/01.09.26.08	Ericsson Report
TTY19/01.09.26.09	Appendix B – Recommended Text, Consumer Notification
TTY19/01.09.26.10	Agreements & Action Items
TTY19/01.09.26.11	TTY19 Meeting Summary
TTY19/01.09.26.12	

3. Review & Approve Agenda

The agenda was distributed and approved without modification.

4. TTY Forum #18 Summary

Ed Hall asked if there were any suggested modifications to the TTY Forum #18 Meeting Summary. There were none and the document was accepted as final.

5. Correspondence

There has been no correspondence received since the last meeting.

6. TTY Liaison Reports: FCC; CTIA; NAD; TDI

- FCC—Mindy Litell thanked all entities that filed reports last quarter. She noted that the reports are a valuable source of information for the Commission and expressed her appreciation for the Forum's effort in compiling these reports. She stated her hope that all necessary equipment is available so that carriers can meet the 12/31/01 deadline. She reminded the participants that reports will continue to be required each quarter and the FCC looks forward to hearing about any further issues and concerns.

- CTIA, NAD, and TDI had no reports at this time.

7. Review TTY Forum #18 Agreements and Action Items

Ed Hall reviewed all agreements and action items from the TTY Forum #18. There were no further comments submitted on these items at this point.

8. Industry implementation Status Reports

Ed Hall noted that there were 2 written reports submitted for this meeting, and after their presentations verbal reports would be accepted. He noted that the verbal reports should be followed by a written submission to the TTY Forum Secretariat by October 10, 2001, 5pm, Eastern Time. Reports should be emailed to Megan Hayes (mhayes@atis.org).

SPRINT PCS

Rachelle Redfairn and Scott Freiermuth introduced contribution TTY/01.09.26.07. They reported that Sprint PCS began testing in its internal lab, and that testing of vendors is to proceed over the next few months. They reported that they are having some difficulty with interoperability tests, and they have not isolated the problem at this time. They will be testing to determine problems, using the Gallaudet software. Andrea Williams, CTIA, asked where they were seeing these problems, in the handsets or in the network. Scott Freiermuth responded that they do not have the answer to that question at this time, but they will be isolating the elements in testing to trace the difficulty. Ed Hall mentioned that Sprint PCS has been very active with the TTY Technical Standards Incubator (TTSI), and will figure prominently in the TTSI report.

Ericsson

Matt Kaltenbach introduced contribution number TTY/01.09.26.08. He reported that the TDMA network testing is complete and release is expected October 31, 2001. FOA testing is scheduled for November. He reported that the feasibility for carrying TTY has been proven across the board. GSM initial testing products have been constructed and released for testing. CDMA network code is currently under development, no test results are available at this time. Some participants noted their concerns with problems previously reported with TDMA systems. Mr. Hall reported that a lot of work had been done on TDMA, and more information on the progression of that work will be provided in the TTSI report.

Matt Kaltenbach also reported that TDMA handsets are behind schedule and have encountered problems in the development integration process with system elements. Tests are currently being run to solve these problems. GSM handsets are slightly behind schedule due to standards activity that was not completed until July 21, 2001. These changes have had a minimal impact on the overall GSM development schedule. CDMA handsets are slightly behind schedule and have encountered problems with the development integration process with TTY devices. Testing is being carried out to isolate and solve these issues.

He reported that development testing is complete or nearly complete and product testing on Infrastructure is in process. Testing done in early September yielded favorable results. Handsets will be available to carriers over the next 2-3 months.

Mr. Kaltenbach reported on Ericsson's support of the ATIS incubator initiative for TTY testing. This initiative has helped to solve several problems, and was absolutely invaluable for validating where the product was in the development process.

Beth Wilson, SHHH, asked about tests being developed in Voice Carry Over (VCO). Mr. Kaltenbach answered that they were dealing with secondary issues with VCO and that no detailed VCO testing has occurred yet. Gary Pelligrino, CommFlow Resources, asked about Short Message Service (SMS) signal issues. Matt replied that they have identified SMS as a test case that will need to be run, as SMS does cause an interrupt and it is a known interference. Norman Williams, Gallaudet University asked about the length of the interrupt from SMS Messaging. Matt referred that question to a carrier with more knowledge. Scott Prather, AT&T Wireless, responded that the interruption is device dependent. It depends on how the alert is set and, to his knowledge, most handsets can now disable the alert to cause only a 1 or 2 character loss. Mr. Prather also reported that you can receive the SMS message without the alert. Ed Hall stated that the incoming SMS does not interfere with the TTY message, it is the manner in which the device handles the message when it is received. He suggested the following action item.

ACTION ITEM: (19.1) The TTY Forum Chair will communicate to the TTSI Incubator Group that there should be a white paper written identifying the problem with SMS messaging tones with TTY. The white paper should also address any other features that use auditory alerts and may cause higher character error rates.

A suggestion was made by Mr. Williams that a third solution to the character loss with SMS would be the ability to turn off SMS while on a phone call. It was recommended that the three states of SMS were: (1) turning off SMS permanently, (2) having SMS disabled during a TTY call, and (3) having no alert tone sound during a TTY call.

Lee Whritenour, Verizon Wireless, reported that many handsets might already be meeting these needs with various methods. He suggested that other features with alerts might also need to be addressed.

Gallaudet University

Jim Huntley, Gallaudet University, reported that Gallaudet assisted with the TTSI testing, which was held September 11-14, 2001 in Lisle, Illinois. The Gallaudet scoring program was used, using both the fast and slow typist tests. Analog and TDMA tests were run and in all but analog there was an average result of an under 1% error rate. He reported that TDMA technology performed as well or better than analog. A participant asked about the recommendations from Gallaudet, and how they compare with the results. Judy Harkins, Gallaudet University, replied that the recommendations were based on the FCC requirements, and they are around the 1% character error rate. Al Sonnenstrahl, CAN, asked about the effects of high-traffic during testing on September 11, 2001. Jim Huntley replied that the high traffic did change the way the tests were run, focusing the testing on local calls where the network was less congested. He reported that internal testing has been done on long-distance calls.

Cingular

Ken Evens, Cingular, reported that Cingular is very pleased with their testing results. Handset test results are showing acceptable error rates. No testing has been done on the GSM side, and no equipment is expected until mid-November. Testing for GSM will begin in December. He reported that the progress to date has been good.

Concerns were expressed that tests be run during high-traffic times so that the error rate during a TTY call can be shown to be similar to the error rate on voice calls. Norman Williams, Gallaudet University, noted his concerns about being able to use the phone, and maintain a connection during an emergency when cell phone traffic is very high. Andrea Williams, CTIA, noted that all mobile subscribers, regardless of whether they were using TTY machines, would experience the same network congestion during high traffic times.

ACTION ITEM: (19.2) The TTSI Incubator Group should plan to include testing during high-traffic hours.

AT&T Wireless

Lori Buerger, AT&T Wireless, reported that AT&T has completed a lot of work since the last TTY Forum meeting. She introduced Scott Prather, AT&T Wireless, who reported on the Lucent Infrastructure testing occurring in their lab. Specifically, he reported that an FOA was performed in the Chicago area to test the Lucent Software IS823 Algorithm in the field. The test was performed under a variety of conditions and the results of these tests were favorable. Following the FOA, a hearing-impaired employee had been using different phones and reporting back with any problems or errors. Testing results with the Nortel Software provided the same favorable results as the Lucent tests. He reported that hand-offs were also tested and those results were favorable as well. AT&T hosted the ATIS incubator testing in September, and tests on the Lucent platform continued. Scott gave his thanks to everyone who helped out with the ATIS incubator tests, and he thanked all those who participated.

Nokia
Chris Wallace, Nokia, reported that Nokia is in the process of generating their final reports. He reported that TDMA is the most advanced in terms of testing and that GSM has presented the most challenges. He reported that testing with Nortel should begin in October. No devices are available to the market at this time, but the schedule is on track, and they are confident that they will meet the FCC deadline.

Nextel
Bob Montgomery, Nextel, reported that they are in lab testing with Motorola handsets and infrastructure, and in October they will be field testing. He had no results to share at this time, but noted that Nextel plans to meet the FCC deadline.

Beth Wilson, SHHH, applauded the work that has been done and all the effort that has been put into this subject. She expressed concern about the meeting of all consumer requirements. She plans to report to her membership that a lot of progress has been made, and that all companies were planning to meet the deadline. She expressed her concern about all the action occurring in December. Ed Hall, ATIS, clarified that the deadline for availability to consumers was June 30, 2002. Andrea Williams, CTIA, reiterated the importance of setting realistic deadlines and expressed concern about the aggressive deadlines.

Beth Wilson, SHHH, also expressed her concern over the lack of VCO/HCO testing. Al Sonnenstrahl, CAN, wanted to remind the industry that the market for VCO users was much wider than it initially appears. David Nelson, NAD, added to Beth's comments that he feels that testing needs to be expanded to deaf, hard-of-hearing and TTY users.

9. Technical Activities

a. **TTSI Report**—Ed Hall reported that TTSI has taken some issues from TTY off-line to help ensure that the manufacturers meet the deadlines. He reported that one of their deliverables is White Papers. The TTSI was created to allow for work to be expedited and coordinated testing to be completed. Jim Turner, ATIS Internetwork Interoperability Test Coordination Committee (IITC) Technical Coordinator, helped to coordinate the testing for TTSI. Mr. Turner reported that the testing in September went well and there is a methodology in place to protect vendor's information, yet still allow for the free flow of information to progress the work. Judy Harkins, Gallaudet University, asked which script was used in the TTSI Testing. Jim reported that the Gallaudet University scripts were used. When the tests are complete the test report will be made public. He noted the following schedule for testing:

   i. TDMA testing was held in Lisle, IL in September, various infrastructure and handset manufacturers ran a variety of tests with favorable results and the identification of some problems. Special thanks to AT&T Wireless, Scott Prather, Lori Buerger, and NENA, Toni Dunn.

   ii. CDMA tests are being scheduled.

iii. GSM tests are also being scheduled.

b. **Scoring**—Ed Hall stated that this would be discussed further during the TTSI meeting tomorrow. Matt Kaltenbach reported that Gallaudet provided a very useful tool covering many levels and provided TTSI with an automatic scoring software program. He noted that the TTSI testing also used the Lober & Walsh testing which is good for developmental testing for one-directional conversations. It also has a score for time delays between characters. The two tools are inherently different but combined they are extremely useful in both the field-testing and the developmental arenas. Mr. Hall asked about any problems encountered in the scoring. Mr. Kaltenbach replied that there have been some errors in the Gallaudet testing that will be addressed at the TTSI meeting. He reported that some of these errors could be removed to improve the use of this testing program. Scott Prather expressed his concern that scores could be different between Gallaudet and Lober & Walsh. Judy Harkins stated that the Gallaudet software uses Lober & Walsh scoring, however, it scores each direction separately. Judy Harkins noted that Norman Williams will be leaving Gallaudet on Monday, October 1, 2001, and the industry will need to contract with him separately for further software developments. Ken Evens, Cingular Wireless, gave his support to using the Gallaudet Software for the FOA testing. Sprint PCS also supported the use of Gallaudet testing

AGREEMENT REACHED: (19.3) TTY Forum participants agreed to use Gallaudet University's testing script version 1 (1.1) for all FOA type testing, and to continue to use Lober and Walsh for all lab testing.

c. **TTY Devices**
Dr. David Levy, CEO and Founder of Digit Wireless, introduced Contribution TTY/01.09.26.06, a presentation on Digit Wireless' FastTap technology. FastTap is a user interface designed to replace "triple tapping" for SMS and other text input devices. Lee Whritenour recommended using the benefits of this product to push this product forward. David Levy informed the group that he would be working on more tactical feedback through this keyboard. Al Lucas, Motorola, stressed that FCC's Section 255 is the way to indicate the accessibility issues related to E911 to the manufacturers. Dr. Levy asked about the plausibility of the use of Fast Tap for a 9-1-1 call. Judy Harkins stressed that it could be used only with the co-operation among several industries, including the TTY manufacturers. Dr. Levy reported that he would like the Fast Tap to become an integrated TTY unit in mobile phones.

USER REQUIREMENTS
Before getting into Terminal Product Labeling, Ed Hall re-introduced Appendix E of the TTY Forum Meeting Summary, which lists user requirements and the industry's response. Mr. Hall noted that it was important to review Appendix E at this time because of the questions posed earlier regarding error rates for static and mobile testing. Mr. Hall reviewed the list of consumer questions – TTY User Intervention (Contribution TTY/01.06.12.16). In regards to #13,

regarding eyes busy environments, there was discussion regarding the meaning of this point, and how it is important to the consumer.

ACTION ITEM: (19.4) The consumer community will review line item #13 in the TTY User Intervention Document (Appendix E) regarding "Is it usable in an "eyes busy" environment" and re-state it, if needed, to clarify confusion.

Appendix E was edited and revised, and the TTY User Intervention Questions were added. To view the revisions, please see Appendix E of the TTY Forum #19 Meeting Summary.

ACTION ITEM: (19.5) Line Item #7 of the TTY User Intervention Document (Appendix E) will be reviewed and edited off-line by Gallaudet to cover the interference of TTY with other phone features, including dialing.

ECHO

Mr. Hall noted that he wanted to address the echo control issue. He reported that a lot of discoveries have been made in TTSI. Matt Kaltenbach reported that some of these problems are related to the distance of the caller from the PSAP. Testing will have to continue on calls that are a great distance from the PSAP.

VOICEMAIL/TTY MAIL

Mr. Hall noted that he also wanted to continue the discussion of VoiceMail/TTY Mail that had begun at the TTY Forum #18 meeting. He referenced Contribution TTY/01.09.26.04, which is the Agreements and Action Items from the TTY Forum #18 meeting. Mr. Hall suggested that the TTY Forum draft a list of concerns regarding Voicemail for TTY users to be sent to the IVR Forum as a liaison. The issues identified include control of the voice-mail system, control over the number of rings before a call is forwarded to voice mail, and that the DTMF should still work if they have the audio cable plugged in. Beth Wilson also added the reminder that those using the TTY Systems are not necessarily deaf users.

Judy Harkins also added her questions to this issue: Does the system have the ability to accept TTY control? Will it record and playback TTY? Is the system set-up to go automatically to voice-mail? Can you take off the voice-mail system and route it elsewhere?

These questions were added as an action item in the document to the IVR Forum stating, "The IVR Forum should attempt to determine carrier capabilities when TTY over digital becomes available."

ACTION ITEM: (19.6) The Voice Mail Recommendations will be passed on to the IVR Forum for their review, via a liaison from the TTY Forum.

AGREEMENT REACHED: (19.7) The revised Appendix E of the TTY Forum Meeting Summary was approved as revised.

10. Terminal Product Labeling for TTY Accessible Devices

Ed Hall noted that this agenda topic was not discussed at the TTY Forum #18 meeting because of time constraints. Consumers would like labeling on all TTY compatible digital wireless phones to allow for easier purchase. The Chair recommended that the TTY Forum should not move forward with a specific labeling requirement, but should agree that TTY compatible phones should be labeled in such a way that their compatibility was obvious to the consumer. Lee Whritenour, Verizon Wireless, noted that CTIA created a labeling symbol to indicate that a phone was equipped with authentication technology and suggested that CTIA might be able to create a similar label for TTY compatibility. The Chair noted that he is hearing support that there should be some type of labeling. The Chair recommended the formation of a working group to address drafting Guidelines for the industry

AGREEMENT REACHED/ACTION ITEM: (19.8) There will be a TTY Forum Working Group to address drafting guidelines for the industry on labeling equipment to indicate that it is TTY Compatible (members will include: Beth Wilson, Chair, Al Lucas, Matt Kaltenbach, Chris Wallace, Ken Evens, Jim House, David Nelson, Linda Day, Ron Schultz and Al Sonnenstrahl).

11. Next Meeting—December 11, 2001

12. New Business

Susan Palmer requested having the distribution plan for handsets put on the agenda of the next meeting. The Chair said that this would only be possible if the manufacturers are prepared to present that information. The Chair asked manufacturers to present this information, if possible.

13. Adjournment

Ed Hall adjourned the meeting at 3:50pm.

Respectfully Submitted by Megan Hayes, TTY Forum Secretariat.

TTY Forum #19
Meeting Roster
September 26, 2001
Washington, DC

Name	Company	Telephone	Fax	Email
Brye Bonner	Motorola	847-576-5920	847-538-5564	brye.bonner@motorola.com
Dick Brandt	Gallaudet	908-310-7941		dbcon@att.net
Lori Buerger	AT&T Wireless	312-258-2906	312-441-2025	lori.buerger@attws.com
Linda Day	AT&T Wireless	559-438-2485	559-438-5713	linda.day@attws.com
Sandra DePaulis	FCC	202-418-2526	202-418-2804	sdepauli@fcc.gov
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David Nelson	NAD			
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Al Sonnenstrahl	CAN	301-770-7555	301-770-7555	sonny@clark.net
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Bonnie Stafford	PCS One	717-721-7262	717-721-7229	bstafford@pcsone.com
Jerome Stanshine	FCC	202-418-2417	202-418-3220	jstanshi@fcc.gov
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Ilan Vardi	Siemens	858-521-3537	858-521-3108	ilan.vardi@icm.siemens.com
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Norman Williams	Gallaudet	202-651-5257	202-651-5476	norman.williams@tap.gallaudet.edu
Chuck Wood	US Cellular	773-399-7090	773-399-4984	cwood@uscellular.com

Harry Wough	Motorola	908-822-5682	908-822-8033	harry.wougk@motorola.com

The following companies submitted their TTY Implementation Status Reports for the second quarter of 2001 through the TTY Forum, but did not attend TTY Forum #18.

Bluegrass Cellular, Inc.
Caprock Cellular Limited Partnership
Carolina West Wireless
Cellular Properties
Corr Wireless Communications LLC
Dobson Cellular Systems
Farmers Cellular Telephone Inc.
Midwest Wireless Holdings
Pine Belt Cellular
PYXIS Communications
Qwest Wireless LLC
Rural Cellular Corporation
Southern LINC
TMP Corporation

APPENDIX A

AGREEMENTS REACHED AND ACTION ITEMS FROM TTY FORUM – 19

19.1 The TTY Forum Chair will communicate to the TTSI Incubator Group that there should be a white paper written identifying the problem with SMS messaging tones with TTY. The white paper should also address any other features that use auditory alerts and may cause higher character error rates.
19.2 The TTSI Incubator Group should plan to include testing during high-traffic hours.
19.3 TTY Forum participants agreed to use Gallaudet University's testing script version 1 (1.1) for all FOA type testing, and to continue to use Lober and Walsh for all lab testing.
19.4 The consumer community will review line item #13 in the TTY User Intervention Document (Appendix E) regarding "Is it usable in an "eyes busy" environment" and re-state it, if needed, to clarify confusion.
19.5 Line Item #7 of the TTY User Intervention Document (Appendix E) will be reviewed and edited off-line by Gallaudet to cover the interference of TTY with other phone features, including dialing.
19.6 The Voice Mail Recommendations will be passed on to the IVR Forum for their review, via a liaison from the TTY Forum.
19.7 The revised Appendix E of the TTY Forum Meeting Summary was approved as revised.
19.8 There will be a TTY Forum Working Group to address drafting guidelines for the industry on labeling equipment to indicate that it is TTY Compatible (members will include: Beth Wilson, Chair, Al Lucas, Matt Kaltenbach, Chris Wallace, Ken Evens, Jim House, David Nelson, Linda Day, Ron Schultz and Al Sonnenstrahl).

AGREEMENTS REACHED AND ACTION ITEMS FROM TTY FORUM – 18

18.1 Contribution TTY18/01.06.12.13, "Testing Against User Requirements" will be added to Appendix D: TTY Test Completion Matrix of the TTY Forum Meeting Summary.
18.2 The Secretariat will add contribution TTY18/01.06.12.13, "Testing Against User Requirements" to Appendix D: TTY Test Completion Matrix of the TTY Forum Meeting Summary.
18.3 Judy Harkins will provide the URL for the web site describing the testing tools technology to the TTY Secretariat to make the information more readily available to TTY Forum participants.
18.4 The list of questions regarding user intervention (Contribution TTY18/01.16.12.15), will be considered for further discussion of user intervention.
18.5 The product labeling issue will be deferred until the next TTY meeting due to time constraints.
18.6 Regarding Features and Functions:

CALL WAITING (CW)

- CW interferes with TTY communications.
- CW as a feature is disruptive and often not used by TTY users. Disabling CW by default for phones in TTY mode is an acceptable solution to the consumer community.

- CW can be disabled in a GSM environment (either permanently or via the handset menu).
- CW cannot be disabled via the handset menu in a TDMA environment; it has to be disabled at the switch.

VOICEMAIL/TTY MAIL (VM)

- Some systems do not record and play back to TTY machines as well as others.
- VM should be placed on the next TTY Forum agenda and referred to the AVSS/IVR Forum.

SHORT MESSAGING SERVICE (SMS)

- SMS signals may cause interruption in TTY communications.
- SMS is a desired feature for the consumer community.
- Queuing of SMS messages during a TTY conversation is not supported in some networks.

18.7 Elizabeth Lyle will submit a written proposal for a consolidated report for submission to the FCC. This report will be posted to the TTY Forum web site.
18.8 The next meeting of the TTY Forum (#19) will be held September 26 at the ATIS Conference Center in Washington, DC.
18.9 TTY Forum #20 will be held December 11 at the ATIS Conference Center in Washington, DC.

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 SDO's (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 ? 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

Notes on Evaluating Solutions against the User Requirements List

Judy Harkins and Norman Williams, Gallaudet University, May, 2001

Some of the carriers have indicated a need to include in their tests and evaluations all of the user requirements generated in 1998 in the TTY Forum. This document annotates the requirements with notes about evaluation issues and field test procedures from a user perspective. This is obviously not a test plan but is sent out primarily for generating discussion and giving general guidance from the user viewpoint.

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.

See appendix.

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.

Suggestion: Generate all audio call progress signals (ringing, busy, fast busy, voice answer) and determine if there is an understandable visual indication for each. The line status light on the TTY will probably function appropriately in voice channel solutions, but this should be verified. Check that the visual indication is synchronized in time with the audio indication.

Comment: A particular issue in wireless telecommunications is that call to mobile phones often do not ring at all if the party is unavailable; a voice message is provided instead. There may not be a visual indication of the call status on the telephone. Another issue is that many phones revert to voice mail. In these situations, the TTY caller will not be able to monitor all aspects of call progress provided to voice users.

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

Suggestion: Place call and have other side hang up. What visual indication is given? If the user can tell, by looking at the handset for example, that the call is terminated, then this criterion is met.

Comment: It would help all users to have an explicit message, but if this is not provided, the user should know what the screen will look like upon call termination.

4. A volume control should be provided.

Comment: Determine and document the optimum volume control setting for the TTY being tested. (If performance is affected by volume control, users will need to be informed of this, and how to use the volume control to obtain a low error rate.)

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

Suggestion: Verify that the handset or accessory vibrates on receipt of calls (and preferably not at other times!). Can the tester receive calls in a timely fashion with the ringer turned off? (Test throughout the call; some external vibrators continue to vibrate throughout a call, which can be confusing.)

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.)

Suggestion: On outgoing call, press keys on the TTY during ring signals and immediately after answer. Baudot tones should be clearly audible by the answering party. (This should not be a problem for voice channel solutions, but is worth some quick tests in the field.)

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

Comment: This issue appears to be moot and does not need to be tested.

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: This is not an issue for testing. However, if an accommodation is required, such as retrofitting, a special model, or a cable, this should be well documented so that consumers know what types of equipment they will need. If PDAs or paging devices are used in place of a handset and TTY combination, attention will need to be paid to the rate of input that can be achieved through the keyboard or virtual keyboard.

9. VCO and HCO should be supported.

Suggestion: Evaluating the efficacy of VCO and HCO:

- VCO and HCO should be tested as they will be implemented. For example, if a custom cable is needed, tests should be run with that cable as part of the set-up. If the user needs to take action between turns (e.g., pushing a button), it should be tested with consumers to check usability.
- Does the system deliver acceptable error rates with devices on the market that are designed to work in VCO and in a mobile environment? (Ameriphone Q90, Krown Pocket VCO, and the Ericsson handset adapter are the three known examples.)
- Is the quality of voice on VCO calls the same as on non-TTY calls? This can presumably be tested using standard industry methods for voice quality.

- Is there any delay or cut-off of characters or words when switching between voice and TTY?
- Is there greater chance of disconnect when switching between voice and TTY? Other problems?

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.

This issue is now moot, and no tests are needed.

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

This would not appear to be a problem on voice channel solutions. On data channel solutions, the call would need to carry the same identifying information as would be carried were it in the voice channel.

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).

A variety of TTY models should be tested, but the amount of testing on each model will necessarily vary. The difficulty in testing with a large number of models is acknowledged, given the limitations in data capture possibilities with TTYs and some 911 TTY systems on the market. This may have to be handled by short tests – calling to direct-connect landline TTYs set to auto answer, where the tester can call send a string of identifying information about the call, which can then be sent back to the tester for scoring. This might be able to be arranged at Gallaudet if there is interest; more discussion is welcome. (Note that Gallaudet has produced some software tools and documentation for partially automated two-way TTY testing: www.tap.gallaudet.edu/ttytools

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

Tests for drive conditions should be run using carriers' individual methodologies and facilities. The consumer's goal is to be able to use the TTY and telephone while a passenger in a car, while on a train, etc.

Appendix User Requirement 1: Error rate of TTY over Wireless telephones

- Interoperability among handsets and infrastructure vendors should be tested using industry's usual tests.

- Varying signal conditions need to be tested.

- Varying network conditions need to be tested.

- Data should be collected and scored on both sides (directions) of the call wherever possible.

- See Requirement 12 on accommodating a range of TTY models. Compatibility testing with 9-1-1 TTY equipment should be coordinated via Toni Dunne.

- See Requirement 13 on drive tests.

- Calls through relay should be placed. A hearing person on the landline side should read one side of the script. (This is an example of where random characters will not be helpful). Relay operators cannot retain conversations; unless special arrangements can be made with TRS providers for test calls, the only way to ascertain is to ask the relay operator if the incoming text was garbled.

- We tentatively recommend that Lober and Walsh's SCORE program be used as this was developed through the TTY Forum. There is some indication based on limited tests that the Ericsson program results in a higher error rate.

- Scripts: A few comments -- Consumers have had the concern that the error rates generated by the TTY Forum's random character set may be inflated due to the excessive number of register shifts (sending a shift character between each figure/letter transition) in this script. It is not possible to eyeball the results in the field because of the random characters. The random character file also transmits only at full rate – there are no pauses.

Matt Kaltenbach of Ericsson has suggested that it would be helpful to base at least one script on the bit structure of Baudot or some other mathematical basis that would allow for diagnosis of problems in the field.

Gallaudet has produced a series of scripts that use conversational language and naturals shifts between letters and figures, pauses in typing and simulation of two typing speeds. These are available at http://tap.gallaudet.edu/ttytools

Comment on the 1% benchmark: It was our intention, when we wrote this requirement, that 1% would apply to reasonable signal conditions and network conditions, and *not* that a maximum of 1% error rate must be met on every single call in the presence of severe (and rarely occurring) impairments.

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.

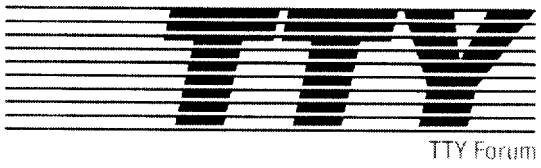
9. VCO and HCO should be supported where possible.

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.



TTY/TDD Forum – 18

June 12, 2001
ATIS Conference Center
1200 G Street, NW, Suite 500
Washington, DC

TTY User Intervention (*i.e.*, mode switch)

Questions:

1. How often does this have to be done?
2. How many steps are there?
3. How complicated are the steps?
4. Is it easily discovered without using the user's manual?
5. Is it clearly documented?
6. Is there a visual status indication?
   - During set-up?
   - Ongoing?
7. Does it interfere with other features? (e.g., dialing features, DTMF, etc.)
8. Will it be possible to make a voice call while in TTY mode?
9. Will VCO be a choice or will it be supported as a TTY mode? (Will VCO be incorporated into this mode or is there a series of choices in TTY mode?)
10. How long does it take? How fast can you set it up?
11. Is it possible to change modes during a call?
12. Is it standardized across handsets?
13. Is the process of hooking up the equipment and putting it into TTY mode too long or arduous to be able to answer a call in time?[1]
14. When receiving an incoming call, does the phone vibrate? Does the vibrator continue to work when an audio cable is inserted into the jack?

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[1] Can a user set up the equipment and get into TTY mode before the call is disconnected or goes to voicemail? Can the phone be answered prior to being connected to equipment?