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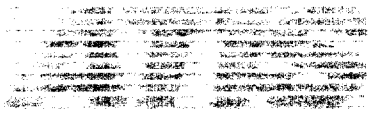


Alliance for Telecommunications
Industry Solutions

Problem Solvers to the Telecommunications Industry

July 13, 2001

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 2nd 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 2nd 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.

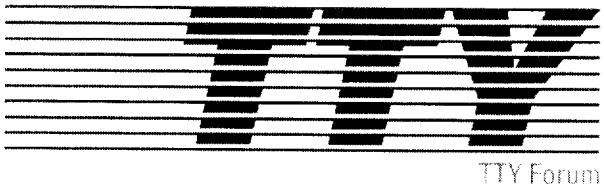
Please contact me 202/434-8830 if you have any questions or comments.

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



TTY FORUM - 18

Meeting Summary Report

June 12, 2001
ATIS Conference Center
Washington, DC

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TTY/TDD FORUM – 18

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

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3. Review & Approve Agenda
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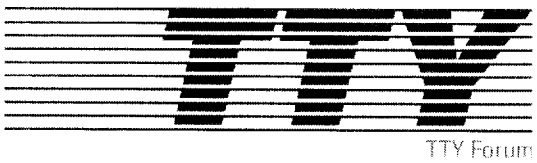
   - Circuit Pooling Effects on TTY Resources
   - Other
   - TTY Error Rate Testing Tools
   - TTSI
   - Other: Echo control; Features and functions
10. Next Generation TTY
11. Next Meeting
12. New Business
13. Adjournment



TTY/TDD Forum – 18

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

Meeting Summary

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	Title
TTY18/01.06.12.01	Agenda
TTY18/01.06.12.02	Roster
TTY18/01.06.12.03	TTY17 Meeting Summary
TTY18/01.06.12.04	TTY17 Agreements and Action Items
TTY18/01.06.12.05	Lucent Report to TTY Forum – 18
TTY18/01.06.12.06	TTSI Report to TTY Forum – 18
TTY18/01.06.12.07	TTY Error Rate Testing Tools
TTY18/01.06.12.08	Krown FastType
TTY18/01.06.12.09	GTT Standardization
TTY18/01.06.12.10	TTY Status and Solution Enhancement
TTY18/01.06.12.11	VoiceStream TTY Report for June 2001
TTY18/01.06.12.12	TTY Standard
TTY18/01.06.12.13	Testing against user requirements
TTY18/01.06.12.14	Ericsson Report to TTY Forum – 18
TTY18/01.06.12.15	Notes on Evaluating Solutions against the User Requirements List
TTY18/01.06.12.16	TTY User Intervention (i.e., mode switch)
TTY18/01.06.12.17	Motorola Report to TTY Forum – 18
TTY18/01.06.12.18	Features and Functions
TTY18/01.06.12.19	Tools for Field Testing TTYs with Wireless Phones
TTY18/01.06.12.20	TTY18 Agreements and Action Items

3. Review & Approve Agenda

The agenda was distributed and approved without modification.

4. TTY Forum #17 Summary

Ed Hall asked if there were any suggested modifications to the TTY Forum #17 Meeting Summary. There were none and the document was accepted as final.

5. Correspondence

- Judy Harkins, Gallaudet, introduced Contribution TTY18/01.06.12.07 and TTY18/01.06.12.13 which introduce the topic of testing against user requirements. She explained that Gallaudet University is currently set up to aid in testing.
- Ed Hall, ATIS, introduced Contribution TTY18/01.06.12.08, which is an email from Krown TTY Manufacturers. The email explains that there is no difference between FastType and TurboCode.
- Ed Hall, ATIS, introduced Contribution TTY18/01.06.12.12, which is an email from David Baquis of the Access Board. The email noted that V.18 does not include FastType or TurboCode because they are proprietary codes.

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

- FCC: Mindy Littel introduced all FCC attendants and their titles and departments at the Commission. She thanked all entities that filed their reports last quarter and noted that the reports will continue to be required through the deadline of June 2002. She noted that the reports are helpful to the FCC for the purpose of knowing what is being done and what challenges lie ahead for the industry. Ed Hall thanked Mindy and asked if there was anything that could be done to make the reports more effective. Mindy noted that she thought that the reports were on target.
- CTIA: no report
- NAD: no report
- TDI: Jim House noted that TDI is currently planning their conference and that the deadline for registration is next week.
- ATIS: Ed Hall noted that ATIS is co-sponsoring with TIA the FCC Part 68, ACTA terminal certification program. He also noted that Beth Wilson from SHHH was both a member of the ACTA and a TTY participant. In addition, Ed noted that June 13-14 is the inaugural meeting of the AVSS/IVR Forum, which is a continuation of the AVSS forum held by Gallaudet University last year and will address the topic of making IVR Systems more acceptable to users with disabilities.

7. Review TTY Forum #17 Agreements and Action Items

Ed Hall reviewed all agreements and action items from the TTY Forum #17. There were no comments submitted on those items.

8. Industry Implementation Status Reports

Ed Hall noted that verbal reports could be made at this meeting, but should be followed by a written submission to the TTY Forum Secretariat by July 11, 2001. Megan Hayes, ATIS, noted that more information regarding status reports was available on the TTY Forum web site at http://www.atis.org/atis/tty/ttyforum.htm.

LUCENT TECHNOLOGIES

Jim Huntley and Steve Benno from Lucent Technologies introduced Contribution TTY18-01-06-12-05, which is an overview of Lucent's Implementation Status Report for the second quarter of 2001.

VOICESTREAM WIRELESS
Mark Cosgrove, VoiceStream Wireless, introduced Contributions TTY18-01-06-12-11, which is VoiceStream's Implementation Status Report for the second quarter of 2001.

CINGULAR WIRELESS
Sean Campbell, Cingular, noted that there has been a huge improvement in the communications between manufacturers and operators since the last TTY Forum. He further noted that the improved communication has put Cingular in a better position to meet the FCC deadlines.

However, Cingular still has some concerns on the availability of hardware and software both on the infrastructure and the handset sides. Mr. Campbell wanted to stress that the manufacturers and the operators need to continue to work together in order to be able to meet the FCC deadlines.

Mr. Campbell noted that TDMA centric testing of the no gain solution for the TDMA markets should commence shortly. They plan to have an implementation schedule developed in the third or fourth quarter of 2001. Cingular is ready to test GSM infrastructure in their markets. During the last GSM-NA conference in Calgary, there was an agreement on a final architecture solution to allow operators to choose which architecture best fits the operators' needs. At this time, the solution does not delay the roll out but allows for further interoperability and roaming for consumers. In addition, no pre-subscription is required. Cingular will begin work with the PSAPs as soon as the infrastructure testing is complete.

AT&T Wireless
Scott Prather, AWS, noted that the focus of their report is on test activities and mentioned that test documentation has been developed. Recently, they submitted a proposed preliminary field test plan to the GSM-NA for GSM handsets. A similar document exists for the TDMA handsets and they would like to make the document generally available to the forum as appropriate. The test plan is evolving as they continue with ongoing lab testing.

They are using modems supplied by Ultratec, the Intelimodem 2400, modified for use with a wireless device. That test bed is set up in their lab and they are using the Lober & Walsh set up. Their lab testing has been in a static environment. When they ran through the normal scenario of tests, evaluating both up-link and down-link on TDMA on a Panasonic and Nokia handset, they found character error rates which were consistently at 0%, with rare error rates seen at under .10%. There are some interactions with commonly used network functions that need to be addressed. For example, call waiting will interrupt the audio path briefly for the beep tone. If the caller hangs up to answer the call, 2-3 characters are lost during the interrupt and 3-5 characters are lost during the hanging up.

A typical character loss for a Short Message Service (SMS) message 70 characters long is a 7-10 TTY character loss. If the alert tone from the phone is brief, there will be a loss of 8-10 characters, but if the alert tone is longer, there will be more characters lost. If someone accidentally hits a key on the handset keypad, there will also be character loss. They were not able to do any inter-system handoff testing.

Usually, there is no character loss when the call is first set up, but occasionally, there is a one character loss or repetition. In the non-TTY mode, they found a considerable problem with a character error rate as high as 18%. Mr. Prather noted that there is quite a bit of impact on the lasting effects of echo characters depending on the quality of cable that connects the TTY to the handset. The quality of those cables needs to be addressed if there is to be reliable communication over TTY.

It was noted that this problem is not due to echo from the handset but is caused by intermediary cables that the consumer may use between the handset and the TY device. The users questioned how the consumer would make the selection of cable to ensure the least echo and the clearest message delivery. It was noted that this topic would be put aside to be further discussed during the technical activities portion of this meeting.

David Nelson, NAD, Norman Williams, Gallaudet, and Beth Wilson, SHHH, stated that they felt a sufficient solution to the loss of characters during a call waiting interrupt would be the ability to turn off the call waiting feature.

ERICSSON

Matt Kaltenbach presented Contribution TTY18/01.06.12.14, showing the status of testing and development at Ericsson. He noted that within handset development CDMA and TDMA work is now almost complete. Testing has begun on a number of products currently in development, and agreements are being reached on 711 and 911 PSAP testing. In testing that has already concluded, they have found that there are very low error rates for CDMA and that the Vocoder passes data bi-directionality. They found the GSM error rates below 1% under non-fading signal conditions, and that specific signal levels need further study.

On the network side, the latest ballot version of the CDMA standard is being used for testing in the transcoder solution. The test case executions will begin around the end of July and the software development tests should be completed by August 15th. The development schedule for TDMA is on track and ballots are being monitored to incorporate any changes of standards. With GSM they have moved to the circuit pooling solution to follow the industry consensus per 3GPP TS 23.226.

Sean Campbell, Cingular, thanked Ericsson for the level of detail in their report and invited other manufacturers to provide similar detail in their reports.

David Nelson, NAD, asked the FCC if the 311 non-emergency call center has to be accessible to TTY users, and Pam Gregory from the FCC noted that they haven't designated 311 nationwide to date and that her understanding is that the Commission is still considering it. Ms. Gregory also noted that the FCC needs to further investigate the requirements of the ADA before deciding on this issue. Toni Dunne, NENA, noted that there are areas of the nation that are implementing 311 for non-emergency calls and that in those areas, the same staff or level of training is found for 311 call takers as with the 911 call takers. David Nelson noted that the TTY Forum should keep in mind that 311 might become a future requirement for TTY accessibility.

MOTOROLA
Paul Hall, Motorola, introduced all the Motorola representatives present. He then presented Contribution TTY18/01.06.12.17, which is a schedule of testing for CDMA, GSM, and TDMA. He noted that IDEN and CDMA are currently ready for First Office Application (FOA).

Norman Williams, Gallaudet, asked for the details on the user-test plan. Paul responded that the handset would be given to a test group of users to provide feedback of their experience. He noted that Motorola would be interested in having Gallaudet involved in the testing.

NEXTEL
Bob Montgomery, Nextel, noted that they, too, are on track for user and infrastructure testing.

NORTEL
Charles Spann, Nortel, reported that they will have product availability before the FCC deadline. They do see some challenges including handset availability because testing is revealing small problems with user interface. They are looking to handset manufacturers to get handsets for testing as soon as possible. Mr. Spann noted that one of the most pressing issues in testing is the lack of precise information from TTY manufacturers. This lack of information is making it difficult to determine whether unidentifiable problems in the carrier and handset testing are coming from the TTY machines or whether there is an issue that needs to be addressed on the part of the carrier or handset manufacturer.

9. Technical Activities

GTT Standardization:

Gunner Hellstrom, Ericsson, presented Contribution TTY18/01.06.12.09 regarding GTT Standardization.

A participant asked Mr. Hellstrom to define SIM-less phone, and he noted that SIM stands for Subscriber Identity Module and is a card that goes in a GSM phone to designate the user. A participant asked how a SIM-less phone could be used in an emergency. Chuck Wood, US Cellular, noted that only a 911 call could be made from a SIM-less phone. Mr. Wood then asked how CTM service would be accessed. Mr. Hellstrom responded that the phone would be able to access the CTM from the call set-up within the phone. Patrick Forster, FCC, asked if the phone would need to be set up or if the phone would automatically detect a TTY device. Mr. Hellstrom responded that there are several options at this point for how a phone would recognize TTY capabilities.

GSM Standards Update

Mark Cosgrove, VoiceStream, mentioned that a lot of the standards work for GSM has been distributed for approval as release 5 in the 3GPP. A lot of the work currently being done is on the architectural side. The changes have moved forward to the final GSM-NA approval at

the end of June. The new solution using a circuit-pooled solution has moved on for approval from the GSM-NA.

User Intervention (Action Item #17.2)

Judy Harkins, Gallaudet University, noted that at the last TTY meeting, GU was tasked with researching the feasibility of having user intervention in order to make digital wireless systems work in concert with TTY machines. She introduced Contribution TTY18/01.06.12.13, which is entitled "Testing Against User Requirements." She explained that this document annotates the requirements with notes about evaluation issues and field test procedures from a user perspective. Several participants thanked Ms. Harkins for the document and suggested that it should become a permanent part of the TTY Forum Record.

AGREEMENT REACHED (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.

ACTION ITEM (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.

ACTION ITEM (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.

Ms. Harkins also noted that in her conversations with TTY Users, there were a number of common questions asked about the set-up of such user intervention features.

Questions regarding user intervention for TTY users:

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?
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 it usable in an "eyes busy" environment?
14. Is the process of hooking up the equipment and putting it into TTY mode too long or arduous to be able to answer it in time?

15. When receiving an incoming call, does the phone ring, or does it vibrate?

AGREEMENT REACHED (18.4): The list of questions regarding user intervention (Contribution TTY18/01.16.12.15), will be considered for further discussion of user intervention.

TTY Technical Standards Issues (TTSI) Incubator

Ed Hall, ATIS, presented Contribution TTY18/01.06.12.06, which is a report on the TTSI Incubator. Mr. Hall noted that during April 2001, a special TTY technical focus group was formed under the ATIS Incubator Program, the TTY Technical Standards Implementation (TTSI). The incubator was set up to address specific problems faced by wireless handset manufacturers, some network equipment and TTY manufacturers. It is an opportunity to address problems with standards to people involved, and then bring the results back to the standards organizations.

Mary Brooner, Motorola, asked if there was precedent for this type of a model for the impact to the standards industry. Mr. Hall replied that there was no precedent at this time, but the hope in this case is to meet the FCC deadline. Ms. Brooner was also concerned with what changes could be made in the incubators, and how set in stone these results would be. David Nelson, NAD, asked if the final standards would be obvious to the consumers, to help assure them that they are purchasing an appropriate product. Beth Wilson, SHHH, replied that changes in standards are common and would continue to occur after the FCC deadline, but the priority is to ensure that the standards accurately reflect all the issues, problems and questions that are discovered. David Nelson further inquired if it would be necessary to do a lot of research on the consumers' part to be sure that the models being purchased would be the appropriate ones. Norman Williams, Gallaudet University, noted that all televisions that are capable of closed captioning are labeled per FCC regulations. Ed Hall responded that from his experience, when a phone has been developed and brought to the point of sale it will, in fact, be labeled "TTY Compatible". Susan Palmer, Cingular, emphasized that it may not be that simple and the discussion requires further thought and input from the consumers. Ed Hall suggested continuing the discussion under the New Business agenda item.

AGREEMENT REACHED (18.5): The product labeling issue will be deferred until the next TTY meeting due to time constraints.

Other

- ***Echo Control:*** Matt Kaltenbach noted that Ericsson engineers have been discussing echo control since November but it has taken until several weeks ago to evaluate how it effects TTY. He presented TTY18/01.06.12.19, which is a diagram depicting the Echo Suppressor issue.
- ***Call Features and Functions***
  Ed Hall introduced this topic by stating that several of the industry participants have asked for input from the consumers on which features and functions are most useful, and which, if any, can be disabled for TTY users. He noted that the discussion would proceed on a feature-by-feature basis.

Ed Hall asked if call-waiting is a feature that can be disabled for TTY Users. Sean Campbell, Cingular, stated that call waiting can be disabled, but it is a more permanent solution. It was also noted that some available handsets do have the ability to turn off call waiting on a per call basis.

There was discussion regarding the level of interruption that call waiting produces in a TTY call, as compared to the interruption of call waiting into a voice call. The users also expressed concern about how a TTY user would identify call waiting without the ability to hear the tone. They stressed that it is harder to answer an incoming call when you are already typing a conversation as a TTY user needs to wait until the person on the other end of the call concludes typing before they can answer an incoming call. The users emphasized that call waiting is not a feature often used in conjunction with TTY. Beth Wilson proposed that call waiting is an underused and interruptive feature, and proposed that it is not a significant loss to have call waiting disabled for TTY users. There was a comment by Dick Brandt that some cell phone packages do not even include call waiting. The final concern of the users was what happens when one call comes in on another call. Linda Day asked if disabling call waiting also disables "missed call" Dick Brandt answered that in his experience the "missed call" feature is not deactivated, and people are usually forwarded to voice mail.

The following are agreements reached (they will be recorded as 18.6) regarding features and functions for digital wireless service for TTY users:

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.

10. Next Generation TTY

Ed Hall introduced Elizabeth Lyle, formerly of the FCC, to present on Next Generation TTY. Elizabeth Lyle, Wallman Strategic Consulting, explained that it is important to keep disability accessibility in mind when designing new products. Jim Tobias, Inclusive Technologies, discussed how the evolution of text products has been discussed in both current and next generation text issues. He noted that it is important to promote the disability accessibility requirements of text-messaging. Jim emphasized that innovations in the future of wireless text can promote the use of such features as call waiting.

Elizabeth Lyle also noted that she had sent a proposal to ATIS for Wallman Strategic Consulting to produce a cover letter for the FCC report, summarizing the information within the report.

ACTION ITEM (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.

11. Next Meeting

AGREEMENT REACHED (18.8) The next meeting of the TTY Forum (#19) will be held September 26 at the ATIS Conference Center in Washington, DC.

AGREEMENT REACHED (18.9) TTY Forum #20 will be held December 11 at the ATIS Conference Center in Washington, DC.

12. New Business

There was no new business at this meeting.

13. Adjournment

Ed Hall adjourned the meeting at 4:30pm.

Respectfully submitted by Megan Hayes, TTY Forum Secretariat.

TTY18
June 12, 2001
Washington, DC
Meeting Roster

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Chuck Wood	US Cellular	773-399-7090	773-399-4984	cwood@uscellular.com
Watson Zan	Rogers Wireless	416-935-6031	416-935-7502	wzan@rci.rogers.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
Corr Wireless LLC
Dobson Cellular Systems
Farmers Cellular Telephone, Inc.
Great Lakes of Iowa inc.
Midwest Wireless Holdings L.L.C.
Pine Belt Cellular, In.c
PYXIS Communications
Qwest Wireless
RTSC Corporation, Inc.
Rural Cellular Corporation
Southern LINC
TeleCorp Communications, Inc.
TMP Corporation
Tritel Communications, Inc.

APPENDIX A

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.