

services, and closed captioning of video programming. Throughout her legislative efforts, Ms. Peltz Strauss frequently has been called upon to testify as an expert witness before the United States Congress.

Ms. Pelz Strauss has written extensively on telecommunications access, has served on several national telecommunications advisory committees, and has given presentations at various national telecommunications conferences. Most recently, Ms. Pelz Strauss served on the Architectural and Transportation Barriers Compliance Board's Telecommunications Access Advisory Committee, which developed recommendations for the implementation of the 1996 Telecommunications Act's requirements for access to telecommunications products and services.

Prior to her work at the National Association of the Deaf, Ms. Pelz Strauss served as Supervising Attorney at the National Center for Law and Deafness at Gallaudet University for eleven years. IN 1993, she received the H. Latham Breunig Humanitarian Award for her outstanding efforts to expand telecommunications access for deaf and hard of hearing individuals. In July of 1996, she received a similar award from the Pennsylvania Law School and an L.L.M. from Georgetown University Law Center.

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**BILLY RAGSDALE**  
BIOGRAPHY UNAVAILABLE

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**TONI DUNNE**

Texas Advisory Commission on State Emergency Communications, 333 Guadalupe St., Suite 2-212, Austin, TX 78701, 512-305-6918 v/tty, 512-305-6937 fax.

Toni Dunne is the Training and Access Program Manager for the Texas Advisory Commission on State Emergency Communications. She is responsible for the statewide program that assists 9-1-1 centers in providing access for Deaf, Hard of Hearing, and Speech Impaired citizens through the placement and training while serving as the agency's Americans with Disabilities Act (ADA) Coordinator.

Over the past 20 years, she have been involved with advocacy issues for the Deaf community and recently was awarded the 1997 "Robert H. Weitbrecht Award, given by Telecommunications for the Deaf Incorporated (TDI) for contributions made towards equal access to telephone emergency services. She is involved with a variety of organizations such as: the National Emergency Number Associations Accessibility Issues Committee Chair, CPE Committee Member and Texas Chapter President; the Association of Public Safety Communication Officials International's ADA Committee Chair, 911 Committee Member, and Operations Committee Member, and the National Association of the Deaf's 9-1-1 Access Committee Co-chair. Toni holds an Instructor Certificate

from the Association of Public Safety Communications Officials, and the Texas Commission on Law Enforcement Officers Standards in Education, as well as Interpreter Certification from the TX Board for Evaluation of Interpreters.

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**RON SCHULTZ**

**Ultratec Inc.**

Vice President, Quality and Compliance

450 Science Drive

Madison, WI 53711

Phone: 608-238-5400

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Ron Schultz serves as Vice President of Quality & Compliance at Ultratec, Inc. In this position, he is responsible for the company's Quality System and all Compliance requirements for Ultratec, Inc. He is also intimately involved with new product design at Ultratec, Inc.

Ron is a graduate of the University of Wisconsin-Madison with a BS - Electrical & Computer Engineering and has been with Ultratec, Inc. since its beginning in 1978 working as a hardware Design Engineer, Engineering Manager, Vice President of Engineering and now in the position he currently holds. Ron has been and is currently involved with different industry groups for setting standards sponsored by the Electronics Industries Association, Canadian Standards Association and Underwriters Laboratories Inc.

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**JEFF CROLLICK**

BIOGRAPHY UNAVAILABLE

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**ED HALL**

BIOGRAPHY UNAVAILABLE

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**CHRIS WALLACE**

BIOGRAPHY UNAVAILABLE

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**JEREMY PEMBLE**

Manager of Government and Regulatory Affairs

Siemens Wireless Terminals

Related information:

- Chaired the GSM-NA Phase I Subcommittee on TTY Compatibility
- Served on the US Telecom Access Advisory Committee
- Work with PCIA E9-1-1 Coalition and TIA Section 255 Committee

- Siemans Wireless Terminals is a new division of Siemans AG which is manufacturing GSM and CDMA mobile phones for the North American market

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**CHRISTOPHER KINGDON**  
BIOGRAPHY UNAVAILABLE

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**DICK BRANDT**

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Richard "Dick" Brandt specializes in consulting and representation in the domestic and international data communications standards process. In this capacity Dick provides advice on the development of standardization strategies and representation at standards forums.

A former AT&T manager, Dick has over 28 years experience in data communications and over 14 years experience in the standards process. He is Chairman of Telecommunications Industry Association (TIA) Technical Committee TR-30, Data Transmission Systems and Equipment and serves on the TIA Technical Standards Subcommittee (TSSC) which gives final approval to all TIA/EIA Standards, the TIA Technical Steering Committee which sets TIA technical policy, the US State Department's Information Technology Advisory Committee (ITAC) and the USA delegation to the ITU-T Advisory Group (TSAG).

In the past, in addition to being a member of various CCITT and T1 committees, he was Vice Chairman of ITU-T SG 14 Data Transmission over the Telephone Network, the Head of Delegation for the USA to ISO/IEC JTC 1/SC 6, Chairman of the Electronic Industries Association (EIA) TR-FO panel, EIA's representative on the ANSI Information Services Standards Board (ISSB) and a member of EIA Engineering Department Executive Committee (EDEC).

He is a contributing author to the Encyclopedia of DATA Communications and Encyclopedia of Microcomputers published by Marcel Dekker, Inc., the Telecommunications Journal of the ITU, Technology and Disability published by Butterworth and Heinemann and the Communications Standards Review published by Action Consulting.

He was the 1993 recipient of the Telecommunications for the Deaf Incorporated (TDI)'s "Robert H. Weitbrecht Award" for his work on the development of ITU-T Recommendation V.18 "Operational and Interworking requirements for modems operating in the text telephone mode." He also received an award from TIA for "Exemplary leadership and career contributions in the creation of national and international standards for data transmission".

He presently works primarily for Motorola and Gallaudet University. His client list has included AT&T, CISCO Systems, Paradyne Corporation, Rockwell International, Telebit Corporation.

## ATTENDANCE

| NAME                 | COMPANY                | PHONE             | FAX          | E-MAIL                           |
|----------------------|------------------------|-------------------|--------------|----------------------------------|
| Almond, Ben          | BellSouth Cellular     | 202-463-4112      | 202-463-4198 | almond.ben@bsc.bls.com           |
| Ander, Sidney        | Krown TTY Mfg.         | 817-738-2485      | 817-738-1970 | krowntty@aol.com                 |
| Baffer, Barbara      | Ericsson               | 202-783-2200      | 202-783-2206 | barbara.baffer@ericsson.com      |
| Bennett, Gary        | Lucent Technologies    | 630-979-0849      | 630-979-8431 | gdbennett@lucent.com             |
| Bonner, Brye         | Motorola               | 847-576-5920      | 847-538-5564 | bonner-CDYN30@email.mot.com      |
| Brandt, Dick         | Gallaudet, RERC-UTA    | 908-547-5026      | 908-547-5026 | dbcon@worldnet.att.com           |
| Brooks, Terri L.     | Nokia                  | 817-490-5991      | 817-491-5884 | terri.brooks@ntc.nokia.com       |
| Chow, Wendy          | CTIA                   | 202-736-3223      | 202-785-8203 | wchow@ctia.org                   |
| Crollick, Jeff       | SCC Communications     | 813-985-3581      | 813-985-3582 | jeff_crollick@notes.scc911.com   |
| Donovan, Diana       | Lucent Tech's          | 630-979-5735      | 630-979-7423 | diana@lucent.com                 |
| Dunn, Toni           | TX 9-1-1 Comm          | 512-305-6918V/TTY | 512-305-6937 | tdd@earthlink.net                |
| Erfanian, Javan      | Bell Mobility          | 905-288-3299      | 905-288-3337 | jaerfani@mobility.com            |
| Feldman, Paul        | Matsushita             | 703-812-0403      | 703-812-0486 | feldman@fhh-telcomlaw.com        |
| Gutierrez, Annabel   | Nortel                 | 972-684-1416      | 972-684-3881 | annabel.gutierrez@nortel.com     |
| Hall, Ed             | CTIA                   | 202-736-3259      | 202-466-7239 | ehall@ctia.org                   |
| Hall, Lynsie         | Contractor             | 410-489-2808      | 410-489-2806 |                                  |
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| Holmes, David        | AT&T Wireless Services | 425-828-1843      | 425-828-1848 | david.holmes@attws.com           |
| Holmes, Pam          | Ultratec               | 608-238-5400      | 608-238-3008 | pholmes@ultratec.com             |
| Howe, Wesley         | GTE Wireless           | 770-391-1727      | 770-395-8505 | whowe@mobilenet.gte.com          |
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## CTIA TTY/TDD FORUM - 1 REPORT

|                           |  |                                   |              |                                   |
|---------------------------|--|-----------------------------------|--------------|-----------------------------------|
| Kuzchkanani, Ali          | Lucas, McGowan                         | 202-828-9486                      | 202-828-8405 | akuzehkanani@fcc<br>law.com       |
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| Moller, Paul              | Motorola                               | 847-523-5210                      | 847-523-8274 | paul_moller@css.<br>mot.com       |
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| Neeley, Doug              | Ericsson                               | 972-583-0562                      | 972-583-1809 | doug.neeley@eric<br>sson.com      |
| Nguyen, Annie             | Cox<br>Communications                  | 714-628-5164                      | 714-623-5156 | nguyen_annie@co<br>xpcs.com       |
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| Peltz Strauss,<br>Karen   | National<br>Association of<br>the Deaf | 301-587-<br>7466/301-587-<br>1788 | 301-587-0234 | kpstrauss@aol.co<br>m             |
| Pemble, Jeremy            | Siemans                                | 972-997-7312                      | 972-997-7386 | jhpemble@sieman<br>s-wireless.com |
| Plummer, Bill             | Nokia                                  | 202-887-0570                      | 202-887-0431 | william.plummer@<br>ntc.nokia.com |
| Ragsdale, Billy           | Bell South,<br>NENA                    | 404-329-4146                      | 404-325-2798 | bragsdal@bellsout<br>h.net        |
| Rayburn, Terry            | Sprint PCS                             | 816-559-64444                     | 816-559-2181 | t.rayburn@ieee.or<br>g            |
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| Ruby, Laura               | AT&T Wireless<br>Services              | 425-828-1354                      | 425-828-8452 | laura.ruby@attws.<br>com          |
| Sahin, Semih              | Pacific Bell<br>Mobile Services        | 510-227-4548                      | 510-227-3238 | ssahin@pacbell.m<br>obile.com     |
| Schultz, Ron              | Ultratec, Inc.                         | 608-238-5400                      | 608-238-2008 | rschultz@ultratec.c<br>om         |
| Singer, Beth              | Gallaudet RERC-<br>UTA                 | 202-651-5049                      | 202-651-5476 | bsinger@gallaudet<br>.edu         |
| Smith, Bennie             | Nortel                                 | 615-734-4189                      | 615-734-5189 | bennie.smith@nt.c<br>om           |
| Spann, Charles            | Nortel                                 | 972-231-0162                      | 972-685-3478 | charles_spann@n<br>ortel.com      |
| Stout, Claude L.          | Telec. for the<br>Deaf, Inc.           | 301-589-3786<br>(V)               | 301-589-3797 | tdiexdir@aol.com                  |
| Suprock, John             | Motorola                               | 847-632-5370                      | 847-435-9970 | QA4884@email.m<br>ot.com          |
| Sweet, Richard            | QUALCOMM                               | 619-651-8812                      | 619-651-8962 | rsweet@qualcomm<br>.com           |

CTIA TTY/TDD FORUM - 1 REPORT

|                  |                           |              |              |                                 |
|------------------|---------------------------|--------------|--------------|---------------------------------|
| Thomas, Al       | Bell South Cell           | 404-713-0361 | 404-713-0361 | AL_THOMAS@BS<br>CC.BLS.com      |
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| Velez, Ed        | American<br>Personal Comm | 301-571-4070 | 301-214-9496 | evelez@apci.com                 |
| Wallace, Chris   | Nokia                     | 972-257-9947 | 972-257-9988 | chris.wallace@ntc.<br>nokia.com |
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| Westbrook, Ray   | GM ON Star                | 248-269-1362 | 248-269-1399 | rwestbrook@onsta<br>r.com       |
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| Williams, Norman | Gallaudet<br>University   | 202-651-5257 | 202-651-5476 | nswilliams@gallau<br>det.edu    |
| Zan, Watson      | Rogers Cantel             | 416-935-6031 | 416-935-7502 | wzan@rci.rogers.c<br>om         |



**Wireless  
TTY/TDD FORUM - 2**

**Seeking Solutions to TTY/TDD Through  
Wireless Digital Systems**

**December 11 - 12, 1997**

**Final Report  
(January 20, 1998)**

**Ellicott City, Maryland**

This report will follow the structure of the agenda (included below) and will make the changes in agenda order agreed to and recorded in the opening remarks section. The agenda number will be used to precisely identify topics and will be offered out of numerical order to reflect the order in which each topic was presented during the forum. Several additional headings were added to accurately reflect the discussion topics added during the forum.

CTIA  
TTY/TDD FORUM - 2

**Ellicott City, MD**  
**December 11-12, 1997**  
**(9:00 am - 5:00 pm)**

**AGENDA**

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Forum Goal: *Seeking Solutions to TTY/TDD Through Wireless Digital Systems*

- |  |   |
|--|---|
| 1. Call to Order & Opening Remarks   | Ed Hall, CTIA                                   |
| 2. Introductions and Attendance Roster   | All   |
| 3. Review & Approve Forum-1 Meeting Summary  | Ed Hall   |
| 4. Review & Approve Forum-2- Agenda  | Ed Hall   |
| 5. Introduction & Numbering of Contributions                                       | Ed Hall   |
| 6. CTIA, PCIA, NAD, TDI, Gallaudet Un, Consumer Action Network Consensus Agreement | Mike Altschul, CTIA                             |
| 7. FCC Order of December 1, 1997   | Mike Altschul,                                  |
| 8. WEIAD - 2 Report  |   |
| 9. Review TTY Forum-1 <i>Agreements</i>  | Steering Committee <sup>1</sup>                 |
| 10. Review TTY Forum-1 <i>Statements</i>   | Steering Committee                              |
| 11. Address Unanswered Questions form Forum-1                                      | Steering Committee                              |
| 12. Working Groups   |   |
| • Review Charge and PIN Form   | Ed Hall   |
| • Reports: Review and Comment  |   |
| • Working Group #1: Performance of TTY Signals over Voice Services                 | Wesley Howe, Chair                              |
| • Working Group #2: Performance of TTY Signals over Data Services                  | Brye Bonner, Chair                              |
| • Working Group #3: Coupling Work Group  | David Holmes, Co-Chair<br>Doug Neeley, Co-Chair |
| 13. FCC Status Report: Structure TTY Section                                       | Ed Hall   |
| 14. TTY Forum Administrative Issues  | Ed Hall   |
| 15. New Business/Next Steps  | Ed Hall   |
| 16. Next Meeting   | Ed Hall   |
| 17. Adjournment  |   |

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<sup>1</sup> CTIA, TTY Forum Steering Committee: Ed Hall; Toni Dunn; Billy Ragsdale; Claude Stout; Norm Williams; Jeff Crollick, John Melcher

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| <b>3. Review &amp; Approve Forum-1 Meeting Summary</b>                                   | <b>5</b>  |
| <b>9. Review Agreements Reached at TTY Forum-1</b>                                       | <b>5</b>  |
| <b>10. Review Statements From TTY-1 Forum</b>  | <b>5</b>  |
| <b>11. Address Unanswered Questions From Forum-1</b>                                     | <b>6</b>  |
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| <b>12. Report of Working Group #3 - Coupling</b>   | <b>11</b> |
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| <b>12. Report of Newly Formed Working Group #1/3</b>                                     | <b>16</b> |
| <b>13. FCC Status Report: Structure of TTY Section</b>                                   | <b>17</b> |
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| <b>ATTENDANCE ROSTER</b>   | <b>19</b> |

## **1. CALL TO ORDER & OPENING REMARKS - Ed Hall, CTIA, Co-chair**

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Forum was called to order by co-chair, Ed Hall, on behalf of himself and Mary Madigan, co-chair. In a call to review the contents of the TTY Forum Report, the co-chair stated that the report provides extensive documentation of the activities at the TTY/TDD Forum-1. The group must review topics and ensure that all issues can be discussed that are of significance to the forum. Refer to the goal: Seeking solutions to TTY/TDD through Wireless Digital Systems. Address request for adjustment of the agenda order of topics. Suggestion offered to move up agenda topics 9, 10, and 1<sup>st</sup> bullet of 12 because they represent the point where the last meeting left off and then move on to new activities. Agreed. Also agreed to move to agenda item 3 then move on to subsequent topics. Ericsson requested a demonstration be added to the agenda showing results of various tests with acoustic coupling and direct coupling. Demo placed between agenda items 11 & 12. Norm Williams will provide a demo of the direct coupling tests performed at Gallaudet at the same time.

Call for contributions. None offered.

The chair offered a numbering plan for contributions to afford good record keeping. Numbering sequence will be: TTY/97.12.11\_\_ \_\_. The Agenda will be numbered TTY/97.12.11 01, etc. - all contributions in package to be labeled in this form. The group can refer to agenda topics and the contributions and/or documentation related. Agreed.

## **2. INTRODUCTION & ATTENDANCE ROSTER**

---

Steering Committee was introduced:

Jeff Crollick - Chair TIA, TR45.2  
Toni Dunn - TX 9-1-1 Commission  
Ed Hall - CTIA  
Mary Madigan - PCIA (absent )  
John Melcher - Harris County 9-1-1  
Billy Ragsdale - Chair NENA CPE committee, Bell South  
Claude Stout - Telecommunications for the Deaf, Inc.  
Norm Williams - Gallaudet University

Attendance roster circulated.

### **3. REVIEW & APPROVE FORUM-1 MEETING SUMMARY - Ed Hall, CTIA**

---

#### **MEETING SUMMARY FROM FORUM-1:**

Requests for modifications and clarifications. None. Moved to accept as stands, seconded and accepted.

### **9. REVIEW AGREEMENTS REACHED AT TTY FORUM - 1**

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- "Solve for 45.45 Baudot, not to preclude looking for other solutions."
- Also agreed to look for long term and near term solutions.
  - Near term - send through vocoder
  - Long term - circumvent vocoder, enhance quality and connectivity
- Also agreed to provide for the analog function of wireless phones - statement from Forum-1 regarding this was read. No dissent.
- The only body that can change the agreements reached is this body. All agreements remain intact until/unless action is taken in this forum.

### **10. REVIEW STATEMENTS FROM TTY-1 FORUM**

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*Statement 1 - Most E9-1-1 trials have focused on AMPS and MF signaling, we seem to be behind with respect to digital technologies and ISUP signaling solutions.*

Comment: Testing on AMPS only

*Statement 2 - There does not seem to exist a mechanism to coordinate and integrate requirements on wireless service providers or wireline 9-1-1 tandem and PSAP terminals/capabilities. Workshops such as this are doing an outstanding service/contribution to a common understanding and teamwork, but this does not replace the need for implementation coordination.*

No comments.

*Statement 3 - Even a 1% character error rate is unacceptable due to the fact that a deaf person in an emergency situation will be upset and mistype themselves and then add to the 1% error rate via transmission wireless resulting in misinterpretation on the part of the calltakers at 9-1-1 centers.*

Comment: We have seen error rate on wireline, and wireless will have error rate. Could we get away from hard numbers when talking about error rate? We need to review statement #3 for discussion.

Comment: After Agenda topic 12 we will use this statement as a discussion topic.

Action taken at Forum - 1: Request to the FCC asking for an extension of 18 months. Statement read with no discussion.

**Issues:**

**Issue 1 - Support for VCO/HCO in digital**

- VOCODER
- MODEM
- Echo Cancelor

No comment

**Issue 2 - What is an acceptable performance/error rate? Compared to what...?**

- Voice call in similar environment
- Need for Certification Process

Comment: Add error rate on wireline as a comparison

**Issue 3 - Physical connection options (TTY to MS)**

- Acoustic
- Audio-direct (RJ-11/2.5mm)
- Digital-direct

No comment

**Issue 4 - Project timeline**

No comment

**Issue 5 - Follow-on standards work**

- TI
- TR45

No comment

**Issue 6 - Are TTY companies willing to retrofit products?**

No comment

**Issue 7 - Future effort - monitor the development of Section 255.**

Comment: add "of Telecom act of 1996"

**11. ADDRESS UNANSWERED QUESTIONS FROM FORUM - 1**

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Unfinished from TTY Forum-1 - Provide the answers to written questions submitted during forum. This completes open issues from TTY Forum -1

**Non -TTY Questions:**

1. **Explain 67% accuracy rate.** Location of caller must be known 100% of the time, 67% of the time it must be within the metric for the required area.
2. **GPS vs. Triangularization .** No one technology meets all needs. The market will determine the best location technology to meet the requirement for 125m 67% of the time.
3. **Where can I get a copy of section 255?** Contact Government Printing Office or download from the FCC's website at [www.fcc.gov](http://www.fcc.gov).

4. **LNP related to ANI and ALI?** Does not directly relate to a TTY user. The 9-1-1 call centers call back through the LEC. It is network based and transparent to the caller. Both the ported number and the callback number reside within the database.
5. **Trunk lines are different for wireless and wireline 9-1-1 calls?** The wireless and wireline both come in to the PSAP on the same trunks.
6. **Deaf person calls 9-1-1 and call dropped - what happens?** Normal procedures are used at the PSAP to ask for call back phone number so they can call back.
7. **Deadline (Oct.1) is around the corner - can it be met?** The FCC has imposed a deadline of 12 months (October 1, 1998) rather than the extension of 18 months recommended by the TTY Forum and the "15+3 months" extension recommended by the TTY Consensus Agreement..
8. **Feature group D migration to SS7** - They are not compatible protocols, an upgrade to the interface will be agreed to by CLEC and PSAP.
9. **Cost recovery?** For states and localities that do not have a legislated cost recovery mechanism in place, carriers are considering contractual arrangements/private agreements with the PSAPs to address cost recovery. This issue was raised with the FCC on reconsideration of E9-1-1 Order, but the FCC's News Release re: E9-1-1 Recon Order does not address cost recovery. There is concern that some legislatures are putting caps on cost recovery. Ten to twelve states have adopted legislation as of last session. NENA magazine has reported on State legislature progress in this area. This information is probably on their website as well.
10. **Liability** - Carriers and PSAPs are lobbying state legislatures for indemnification. Carriers are also including indemnification clauses in their contractual arrangements/private agreements with the PSAPs.

#### **TTY related Questions:**

1. **Baudot tones used on MOS test?** Likely not used in the test. Is still a topic for discovery. Music is not a varying transmission the way Baudot would be. Vocoder anticipates and predicts next tones. Baudot not predictable, as would non-professional music. Running at full speed the bits in Baudot can be dropped. 300bps works better than Baudot. (MOS stands for Mean Opinion Score, a test of spoken word developed in the early days of wireline telephones.)
2. **What portion of TTY devices powered through RJ11 connection?** Basically network started with acoustic devices and low cost, largest population have both acoustic and RJ11, recent some high end are just rj11
3. **Do digital vocoders work the same?** Answer is that all have different error correction and prediction methods. That is why they all need to be tested and at last meeting recommended to investigate other technologies.

**6 & 7. CONSENSUS AGREEMENT AND FCC ORDER OF DECEMBER 1, 1997 - Andrea Williams, CTIA**

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**CONSENSUS AGREEMENT**

Signatories: CTIA, PCIA, NAD, TDI, CAN, Gallaudet University

**MAJOR PROVISIONS:**

- Extension of compliance date (15 months + 3 months extension = 18 months maximum)
- PCIA amends petition
- NAD & CAN withdraw opposition to PCIA petition
- Brief quarterly status reports to FCC
- Consumer Advocacy Groups provide appropriate technical experts to the working groups

**FCC INTERIM E9-1-1 ORDER**

**MAJOR PROVISIONS:**

- Adopted & released December 1, 1997
- Interim Order to clarify obligations of wireless carriers until the rules adopted by FCC in the E9-1-1 Reconsideration Order are effective.
- Carriers using analog wireless systems are subject to the TTY compatibility rules effective December 1, 1997
- For carriers using digital wireless systems, enforcement of the TTY requirement is suspended until October 1, 1998

**FCC E9-1-1 RECONSIDERATION ORDER**

**MAJOR PROVISIONS:**

- Adopted : Dec 1, 1997 Released: ?
- Carriers using analog wireless systems are subject to the compatibility rules effective December 1, 1997.
- Carriers using digital wireless systems, enforcement of the TTY requirement suspended until October 1, 1998. 12 month extension of initial compliance date.
- Additional requirements: Waiting for release of E9-1-1 Reconsideration Order for specifications:

FCC's E9-1-1 Reconsideration Order will be attached to meeting summary if it is released in time for inclusion.

**QUESTION RAISED FOR DISCUSSION:** What does Oct. 1, 1998 mean?

- commercial availability and extent of availability OR
- pass the TTY signal over digital systems OR
- field trials

What is the level of technology success available in the field? Discuss lab vs. Field tests.

The proper coupling is the most significant area of problems with the transmission of TTY signals.

Need to explore interim responsibilities, specifically consumer notification of capabilities of wireless to carry TTY.

Comments:

- *FCC is a very reasonable group. They would prefer to see a schedule to show how the industry would be able to accomplish this by the deadline. Understanding that the FCC is looking for an analog and a digital solution.*
- *The group needs to establish a standardized testing method.*
- *Analog system could be down while digital available.*
- *Need to set our goal and lab tests to meet the goal to provide a commercially available product by the Oct. 1, 1998 date. May miss the date but need to work toward that.*
- *The solution will require cooperation between carriers and manufacturers*
- *The coupling is the key to the solution.*
- *Working Group 3 has tried multiple systems and do not know if it works for all cases.*
- *The product development cycle will eat up the R & D time to make a good solution.*
- *No one wants a quick and dirty solution.*

## **8. EXECUTIVE SUMMARY FOR THE WEIAD-2**

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The stated purpose of the WEIAD is to prepare an annual status report to the FCC. The FCC mandated that the parties to the E9-1-1 Consensus Agreement, PCIA and TDI be represented in the WEIAD group.

One of the elements to be included in the report is the solution to digital TTY. After two meetings of the WEIAD, it was determined that the WEIAD is the best forum to resolve issues. Strongest Signal and TLDN remained unresolved and were remanded to a technical forum under guidelines that are set by TIA. The first workshop (January 5/6, 1998) will address Strongest Signal, chaired by Jeff Crollick. The TLDN issue, chaired by Terri Brooks, will meet January 6/7, 1998. Recommendations from these two technical workshops will be forwarded to WEIAD-3 on January 7 & 9, 1998 for inclusion in the report to FCC.

## **12. REPORT OF WORKING GROUP #1 - PERFORMANCE OF TTY SIGNALS OVER VOICE SERVICES**

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Wesley Howe, Chair

*Need two types of tests to perform: Voice and bit-error rate. All need to agree on tests and data and acceptable level of performance.*

*Two standards here: FCC and test mechanism. What we have to establish is maximum error rate to give acceptable performance and does anything exist that provides that. I don't think we are into comparing technologies.*

*We have different flavors to establish baseline. We need to see a timeline.*

*We have to deal with knowns - test pattern and same input sample to give statistically valid results. Consumer groups will get together to give some standard tests of value to the testing.*

#### **DEMONSTRATION OF ACOUSTIC COUPLING - David Fitzpatrick, Ericsson, Christopher Kingdon, Ericsson, Doug Neeley, Ericsson**

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GSM is the same transmission as PCS1900. We get good digital transmission with that solution. We have difficulty with the digital 800MHz solution.

First demonstration showed an acoustic coupler using an external handset attached to phone. 2.5 mm plug patched directly into back of an adapted TTY set. Both used analog transmission using the AMPS system. Working Group#3 is working on coupling and is not demonstrating analog vs. digital signals. The TTY device was modified. The resistors and capacitors could be on the cable but the connection is not totally simple. The TTY device will have to have design changes to accommodate this solution. Another coupler that provides an RJ11 connection is publicly available but requires external power supply. What is needed is possibly some middleware rather than making changes to all existing TTYs. Portability is a big issue with TTY users so the handset needs to be streamlined.

#### **DEMONSTRATION OF ANALOG AND DIGITAL TTY - Norman Williams, Gallaudet University**

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This is the result of an informal test. It was just completed yesterday, since we just recently received a phone and phone service. The test was done with a Nokia CDMA phone with service provided by Bell Atlantic. I modified the receiver to use a standard 2.5 mm jack. This is nice because it is very portable and does not require an external box. The resistor value is 56k and 1 mg. I checked the performance of this connector by testing analog transmission first. Most analog calls were very clear; once in awhile there was a little trouble. The testing script was sent through as a

macro (not in conversational, two-way mode). There was also pretty good two-way communication in analog. However, when I tested it in digital mode, there was a lot of garbling of Baudot. Results were much better for ASCII at 300 bps (Bell 103) digital transmission. Again, the problems were not with coupling, as the same coupling was used for analog and digital.

(Hand-out of preliminary results was distributed.)

## **12. REPORT OF WORKING GROUP #3 - COUPLING**

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Doug Neeley, Co-chair

*Group is in process of answering questions from the TTY group. Demonstration of coupling by Ericsson offered as examples of potential. Shows it can be done.*

*Connecting the phone via an RJ11 jack is one solution not to overlook since the TTY devices already accommodate the RJ11 without adaptation. Is it better to have a small adapter at an inexpensive cost or a specially devised device that is very expensive? The digital that can operate a modem via RJ11 exists today. It is bulky and expensive. The trade-off is that it is readily available, off-the-shelf. Elegance will not be available in the field in 10 ½ months. All these ideas are not worth anything since the vocoder doesn't work well with the Baudot solution. That leaves the question whether 300 baud is preferable to Baudot.*

## **TTY FORUM - 2 CONSENSUS RECOMMENDATION**

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Combine Working Group #1 and Working Group #3. Develop new set of deliverables based on the October 1, 1998 deadline. Would a phased approach offering a solution in analog and GSM by October 1, 1998 be acceptable?

Short term solution: solve for backward compatibility.

FCC sees one type of digital when there are three basic types which need to be tested.

Come up with a standard test. A consistent recording that can be used by all technologies to test. One of the most important aspects is the TTY.

**FOCUS OF WORKING GROUP #3:** Develop a specification for interface using:

- 2.5 mm PLUG
- RJ11
- ACCOUSTIC
- OFF-THE-SHELF
- AUDIO TO VOCODER

- ANALOG - EIA-553, IS-91
- DIGITAL:
  - IS-54 - TDMA 800MHz
  - IS-95 CDMA 800MHz
  - IS-136 TDMA 800MHz
  - PCS-1900
  - J-007 GSM
  - IS-136 UPBANDED
  - IS-95B UPBANDED
  - EFR VOCODER - newest vocoder technology (still not perfect for TTY)
- TWO MAIN TTY UNITS:
  - COMPACT TTY UNIT (EZ? AND ULTRATEC),
  - ULTRACOM 400
  - Remember: the vocoder is a problem. Also, some phones modulate out tones and that feature would have to be turned off.

**WORKING GROUP #1:** Use interface to work solution in the vocoder.  
Evaluate Performance

- Acoustic
- RJ11
- 2.5mm plug

**WORKING GROUP #2:** Deliverable will be written report due October 1998.

- A consumer ready product.

## **DAY 2 DISCUSSION**

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What does October 1, 1998 deadline mean to this group?

On or before October 1, 1998, group will submit:

- Consumer ready product ready
- Working plan with timelines, goals, alternative solution, technical review

**Remanded to next meeting:**

**Dual mode approach - analog/digital, if phone cannot make connection on digital then default to analog**

### **OPTIONS**

- Extensive, documented technical baseline required

- Best solution may require more time - file request for extension beyond 10/1/98
- Please examine:
  - PCS1900 available by 10/1/98
  - Others available after 10/1/98

#### **ISSUES**

- Field test vs. Lab
- standardized testing
- error rate
  - max.
  - typical

#### **REMANDED TO NEXT MEETING**

- **Interim responsibility to notify consumers... Judy Harkins (Gallaudet) and Laura Ruby (AT&T Wireless) will work on notification requirements to consumers from now until the problem is resolved.**

#### **REMANDED TO NEXT MEETING**

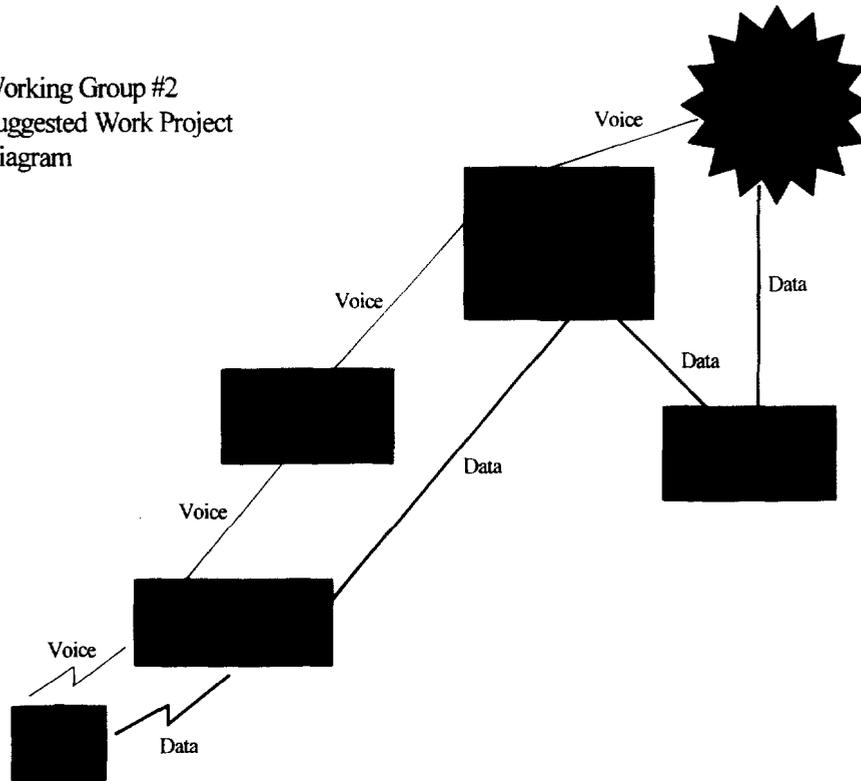
- **How do we implement solutions?**

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## **12. REPORT OF WORKING GROUP #2**

Brye Bonner, Chair

Working Group #2  
Suggested Work Project  
Diagram



*Circuit data completely bypasses the vocoder. Presently signal goes to mobile station, then to the base station, through the transcoder, on to the MSC and MSTN mobile. Digital has a problem because it goes through the transcoder which is designed to receive voice signals. Another issue is that the TTY device doesn't wait as long as required to make hand shake. The MODEM pool needs to be TTY compatible, use v.18 to make it compatible.*

*BAUDOT vs. ASCII :*  
*ASCII - high risk of disconnect in transfer or loss of signal*  
*BAUDOT is more robust.*

*Call in number is the same for both voice and TTY.*

*A close liaison seen with TIA TR45.1.4 "Vehicle Interface Working Group."  
Not all wireless technologies are equal. Digital speech vocoders use several different sampling techniques.*

*All digital means bypassing the vocoder.*

*New modems between the caller and the PSAP expected - 3-5 years.  
TTY modem pool for that data function - includes 45.45 Baud on the data  
channel as well as forward looking options.*

*Confusion between voice and data in call back is a concern to the deaf  
community.*

*Guidance to group: take Baudot as main focus and explore all alternatives  
possible.*

## **CLARIFICATION OF PHONES, SERVICES & STANDARDS, TTY COMPATIBILITY**

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### **PHONES AND SERVICES**

- 800MHz analog
- 800 MHz analog +800 MHz IS-136
- 800 MHz analog +800 MHz CDMA
  
- 1900 MHz PCS 1900
- 1900 MHz PCS 1900 +800 MHz ANALOG
- 1900 MHz CDMA
- 1900 MHz CDMA + 800 MHz ANALOG
- 1900 MHz IS-136 + 800MHz IS-136 +800MHZ analog

### **TTY COMPATIBLE**

| <u>DATE</u> | <u>TECHNOLOGY</u>       |
|-------------|-------------------------|
| Now         | 800 MHz analog          |
| 10/1/98     | 1900 MHz PCS1900        |
| ?           | 800 and 1900 MHz IS-136 |
| ?           | 800 and 1900 MHz CDMA   |

### **ANALOG AND DIGITAL STANDARDS**

- ANALOG
  - EIA/TIA-553, IS-91
- DIGITAL, 800MHz:
  - IS-54 - TDMA 800mHz
  - IS-95 CDMA 800mHz
  - IS-136 TDMA 800mHz
- DIGITAL 1900MHz
  - PCS-1900
  - J-STD-007 PCS1900 (GSM)
  - IS-136 UPBANDED
  - IS-95B UPBANDED

## **12. REPORT OF NEWLY FORMED WORKING GROUP #1/3**

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Wesley Howe, Doug Neeley, David Holmes, Co-chairs

### Scope:

Utilize existing TTY units with existing wireless phones, transport Baudot data over "voice" channel paths through the wireless vocoder circuitry. This interim combined group shall concentrate on short-term solutions, identify optimal coupling that is readily achievable, to maximize compatibility with existing products.

Recognizing that a single inter-connect may not fit all combinations, evaluate and benchmark possible achievable multiple solutions to achieve working TTY/wireless compatibility.

Establish specification for common 2.5 mm audio path interconnect and present contribution to applicable TIA MS standards organizations (e.g. TIA TR-45.1)

### Deliverables:

1. Preliminary Acoustic-direct coupling. Preliminary Acoustic handset.
2. Activities:
  - A) Recommend specific connection types/levels and specifications (physical and electrical) for connecting existing TTY devices to existing wireless phones.
  - B) Develop a standard test for error rate using contribution (below) to assist in developing test pattern.
  - C) Develop acceptance test for interactive TTY over wireless
  - D) Recommend for other future changes to improve TDD support via wireless.

(Deliver at least one connection type and a standard test for error rate by the end of January, 1998.

  - Meet in January
  - Seek commitment to apply tests from capable parties.)
3. Electrical specifications for 2.5 mm audio interface.

*Add Consumer thoughts on testing - Judy Harkins to help develop an exact bit stream to represent the requirements of a 9-1-1 call. Recommended to use a typical TDD device and interface and then further test on other equipment. Coverage for TTY user over the network is the same as for speech.*

*Check quickly for technologies that will have the potential for success, and eliminate all technologies that cannot meet the deliverable of TTY by October 1, 1998.*

*Base:           Analog generally less than 1% error  
                  GSM less than 7%*

*Other considerations/deliverables from Working Group #1/3 for next meeting:*

*Christopher Kingdon, Ericsson, resubmit test from TTY1 using new test pattern.*

*Other manufacturers will submit test using similar test to Chris's and new test pattern.*

*Tests will not be applicable for CDMA.*

*Reach the deliverable within the parameters and with respect for proprietary issues. Be able to identify that tests were acceptable. But establish the benchmark for acceptability. Determine usability rate in the various equipment combinations and be able to increase challenges to determine where level of unacceptability begins.*

### **13. FCC STATUS REPORT: Structure of TTY Section - Ed Hall, CTIA**

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What needs to be included?

- Four Interest Groups working together
  - working groups - scope and charter
  - seeking short term/long term solutions
- Tutorial on digital telephony and vocoders
  - Various digital air interface may require further study for best solution
  - Various TDD may present various challenges
  - Interface issues may require further analysis
- Attach Forum 1 & 2 Reports

### **14. TTY FORUM ADMINISTRATIVE ISSUES**

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- Payment for Interpreters
  - ANSWER: Remand to Steering Group.
- Future Meeting Sites
  - ANSWER: Agreed to Wash/Baltimore area for meeting sites to accommodate Consumer Groups.
  - Consumer Fees
  - ANSWER: Cost recovery fee for meetings was agreed to by Steering Committee because it was not budgeted for by CTIA/PCIA. A lottery or 1:4 subsidy of paid industry seats for 1 free

consumer seat was suggested. The consumer groups need to be represented as a team so the consumer groups can represent their views properly. Remand to Steering Group.

- SHHH/ASHA included at meetings
  - ANSWER: Add them to meeting list. CTIA will take this for action.
- Advanced Agenda Issued
  - ANSWER: No longer a problem - next agenda will be attached to Meeting Report for distribution

#### **15. NEW BUSINESS/NEXT STEPS**

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Do not lose sight of progress of Working Groups. Next steps will come from them. Deliverables for January critical.

#### **16. NEXT MEETING**

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FEB 11/12 (as closely as possible) at Gallaudet University or FCC location.

#### **17. CLOSING REMARKS AND ADJOURNMENT**

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##### **Claude Stout, TDI**

The meetings have been good. Progress has been made and commitment has been made on everyone's part. Combining the two working groups will give a lot of impetus to meeting the deliverable.

##### **Art Prest, CTIA**

Thank you for your support. Please participate in the working group because some of the chairs may have been left hanging because of non-participation.

##### **Doug Neeley, Ericsson**

Thank you to David and Christopher for showing results when not even on a working group. And Norm for bringing data and results on an issue of great concern.