Before the

Federal Communications Commission

Washington, DC

In the Matter of	)	
	)	
Section 68.4(a) of the Commission's Rules	)	WT Docket No. 01-309
Governing Hearing Aid Compatible Telephones	)	
	)	
	)	

Status Report #2

Efforts toward compliance with FCC Report and Order 03-168 submitted by the Alliance for Telecommunications Industry Solutions (ATIS) on behalf of ATIS Incubator Solutions Program #4

I. Introduction

The Alliance for Telecommunications Industry Solutions ("ATIS"), on behalf of its Incubator Solutions Program #4 ("AISP.4-HAC" or "Incubator")[1], hereby files this second Status Report on the efforts and inputs of wireless device manufacturers and Service providers to comply with the Federal Communications Commission's ("FCC's" or "Commission's") hearing aid compatibility ("HAC") requirements as defined in the Commission's Report and Order in WT Docket No. 01-39 ("Report and Order or "R&O").[2] This second Status Report is filed pursuant to the reporting requirements adopted by the Commission in the R&O, and is filed on behalf of the members of the AISP.4-HAC.[3]

This second Status Report filed by AISP.4-HAC represents collective inputs from Incubator members and, pursuant to the Commission's Public Notice, is being submitted in lieu of individual status reports from those members.[4] The collaborative single Status Report is submitted in the current format primarily due to the test measurement uncertainties of the referenced standard in the R&O and the pending multiple changes that are being submitted to the C63.19 Committee through the HAC Incubator.

The purpose of this second Status Report is to document the Incubator's accomplishments, objectives, testing methodology, and results for wireless devices that will utilize the ANSI C63.19 Standard,[5]as defined in the AISP.4-HAC Hearing Aid Compatibility Test Specification ("HACTS") document, which satisfies the Commission's mandates in the R&O.

Additionally, this second Status Report will document:

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[1] ATIS Incubators are industry-driven workgroups that provide a "fast-track" process for resolving technical and operational issues. For more information visit www.atis.org/incubator.shtml.
[2] In the Matter of Section 68.4(a) of the Commission's Rules Governing Hearing Aid Compatible Telephones, *Report and Order*, WT Docket No. 01-309, released Aug. 14, 2003.
[3] The members of the AISP.4-HAC are listed in Section IV A of this document.

[4] Public Notice, WT Docket No. 01-309, DA 04-630 (rel. Mar. 8, 2004).
[5] The Commission's R&O cites the C63.19 Standard as the Standard to employ to determine the compatibility of hearing aids and wireless devices

- How future changes identified by the AISP.4-HAC Working Group 4[6] ("WG-4") will be incorporated with ANSI C63.19 Sub Committee 8 ("SC 8").
- Supportive measurement data that will address "significant" changes made by the Incubator in the HACTS document;
- The examination of test data repeatability for a given phone;
- The examination of test data reproducibility from lab to lab;
- A planned approach by the wireless industry to satisfy the Commission's HAC requirements; and
- Consumer outreach efforts undertaken by the Incubator participants.

II. EXECUTIVE SUMMARY

AISP.4-HAC Incubator

This second Status Report documents the Incubator accomplishments, objectives, testing methodology, and testing results for wireless devices using the ANSI C63.19 Standard and defined in the AISP.4-HAC Hearing Aid Compatibility Test Specification document, product labeling and outreach, which satisfies the Commission's mandates in the Report and Order.

Testing

The Working Group 4 –Testing was created to conduct a thorough review of the C63.19 Standard and to determine how to enable reliability and accuracy in a wireless device lab's test results when using the C63.19 Standard.[7] Thirteen (13) wireless devices representing 22 different frequency band /air interface combinations were tested for Radio Frequency ("RF") emissions per the described measurement guidelines defined in the AISP.4-HAC Test Plan. Each device was tested by a minimum of three (3) different labs. All test results were collected by the AISP.4 Incubator and evaluated and reviewed

[6] Working groups are created by the Incubator to focus on an issue and report back to the Incubator with proposed resolutions.
[7] The C63.19 Standard has two distinct test areas – hearing aids and wireless devices; this test specification pertains to wireless devices only.

for consistency and measurement accuracy. The tables in **Attachment B** provide an overview of the reported test results.

In the course of performing the round robin tests, WG-4 was unable to obtain reproducible test results. Several possible causes for variability of the test results were uncovered and have been or are being addressed. The potential sources of uncertainty identified thus far include:

- measurement uncertainty related to the test equipment used;
- different probe modulation factors;
- inconsistencies in how the test data is reported and used in the calculations;
- insufficient reference data for dipoles.

Product Labeling

Since the last reporting period, consumers have been consulted to determine choices for product labeling. A questionnaire was developed in Working Group 6 and used at the Self Help for the Hard of Hearing ("SHHH") 2004 Convention, and on the American Speech-Language-Hearing Association ("ASHA") and SHHH Web sites to garner consumers' preferences for labeling the wireless device packaging. Consumers showed some preferences and provided information that indicated the pros and cons of each proposed icon. These results are provided in **Attachment E.**

Outreach Efforts

The Incubator , in cooperation with the Cellular Telecommunications Internet Association ("CTIA"), produced the "Compatibility of Digital Wireless Telecommunications and Hearing Aids: Rules, Requirements and Responsibilities" a brochure to explain HAC to the wireless industry;[8] member companies produced collateral materials and added information to public websites; and, consumer information was disseminated at the SHHH 2004 Convention via handouts[9] and presentations.

[8] Appendix C: "Compatibility of Digital Wireless Telecommunications and Hearing Aids"
[9] Appendix D: "Hearing Aids and Digital Wireless Phones"

Standards activities

Extensive work has been completed, yet significant efforts remain related to ANSI C63-19 SC 8 and its adoption of the changes made to the C63.19 Standard by the Incubator. This second Status Report includes:

(1) changes identified by AISP.4-HAC that will be incorporated in the ANSI C63.19 Standard;

(2) supportive measurement data addressing significant changes in the HACTS document;

(3) examination of test data repeatability for devices; and,

(4) examination of test data reproducibility from laboratory to laboratory.

Future Reports

Future status reports will include Status Report Forms[10] completed by Incubator member companies to report each company's HAC compliance data. The un-reproducibility of test results makes including measurements on specific wireless device models, or compliance of specific models, inappropriate at this time. In addition, the following summary table will continue to be updated in all future filings:

Consolidated Status Report on Hearing Aid Compatibility	Quantity
Wireless industry companies participating in AISP.4-HAC	32
Wireless Service Providers participating in AISP.4-HAC	22
Wireless device manufacturers	10
Total HAC compliant WD models	TBD
Total WD models offered	TBD

III. Background

The Commission's Report and Order in WT Docket No. 01-39 established new rules relating to hearing aid compatibility and wireless phones. The R&O also adopted the American National Standards Institute ("ANSI") C63.19 technical measurement

[10] Appendix E: "Status Report on Hearing Aid Compatibility"

Standard for measuring and rating the wireless devices' compatibility with hearing aids[11], requiring manufacturers and service providers to make available a minimum number of HAC-compatible wireless devices, and established labeling requirements for HAC-compliant devices. Importantly, the Commission recognized that the 2001 C63.19 Standard remained something of a work in progress subject to further revisions, and acknowledged that its rules would need to accommodate such revisions.[12] The R&O also required wireless Service providers and digital wireless handset manufacturers to report on their efforts toward compliance. For the first three (3) years after the effective date of the R&O, status reports must be filed semiannually. After the first three years and through the fifth year of implementation, the reports must be filed annually.[13]

On March 8, 2004, the Commission issued a *Public Notice*[14] announcing November 17, 2004, as the deadline for the filing of the second report.[15] In the *Public Notice*, the Commission noted that ATIS was collecting reports from manufacturers and Service providers for the purpose of submitting a collective report. The *Public Notice* provides that "manufacturers and service providers may submit joint reports."

ATIS is a technical planning and standards development organization accredited by ANSI and is committed to rapidly developing and promoting technical and operational standards for the communications and related information technologies industry worldwide using a pragmatic, flexible and open approach. More than 1,100 industry professionals from more than 350 communications companies actively participate in ATIS' open industry committees, fora and "Incubators." The ATIS membership spans all segments of the industry, including local exchange carriers, inter-exchange carriers, wireless equipment manufacturers, competitive local exchange carriers, data local

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[11] *American National Standards for Methods of Measurement between Wireless Communications Devices and Hearing Aids* ANSI C63.19-2001 ("C63.19 Standard").

[12] *See R&O* at ¶ 63.

[13] *R&O* at ¶89.

[14] Public Notice, WT Docket No. 01-309, DA 04-630 (March 8, 2004)

[15] This *Public Notice* also announced future filing dates of: May 17, 2005, November 17, 2005, May 17, 2006, November 17, 2006, November 19, 2007, and November 17, 2008.

exchange carriers, wireless providers, cellular and other providers, broadband providers, software developers and internet service providers.

The ATIS AISP.4-HAC Incubator is focused on the technical issues addressing interoperability and compatibility of wireless devices with hearing aids, including the evaluation and test methodology of the measurement standard as referenced in the C63.19 Standard. The Incubator's mission is to investigate and identify interference issues affecting the performance of hearing aids and wireless devices, and to determine methods of enhancing interoperability and usability for consumers with hearing aids. The hearing aid and digital wireless industries face complexities and challenges in attempting to make their products compatible. Through an open and impartial consensus process, AISP.4-HAC is investigating and developing recommendations to the C63.19 Standard for measuring hearing aid immunity, magnetic coupling and interference caused by wireless devices.

IV. General Overview

AISP.4-HAC is composed of technical experts from the wireless industry representing wireless manufacturers and Service Providers, as well as technical experts representing the hearing aid industry. Representatives for consumer advocacy and disability groups (e.g., SHHH, Gallaudet University, Georgia Tech Information Technology Technical Assistance and Training Center) also participate in AISP.4-HAC meetings.

A. Membership

The AISP.4-HAC has the following membership as of November 17, 2004:

VOTING MEMBERS

Alltel Communications, Inc.
Alpine PCS
American Cellular Corporation
Audiovox

Brookings Municipal Utilities d/b/a Swiftel Communications

Carolina West Wireless

Cingular Wireless, LLC[16]

Corr Wireless Communications, LLC

Cricket Communications

Dobson Cellular Systems, Inc.

Epic Touch

Hearing Industries Association

Key Communications

Keystone Wireless

Kyocera Wireless

Leap Wireless

Louisiana Unwired

Motorola Inc.

NEC America, Inc.

NEXTEL Communications, Inc.

Nextel Partners Inc.

Nokia

Panasonic

Pine Belt Cellular Inc.

Qwest Wireless

RFB Cellular

Research In Motion Limited

Samsung Telecommunications America, LLP

Siemens Communications Inc.

Sprint PCS

Sony Ericsson Mobile Communications (USA), Inc.

T-Mobile USA

[16] On October 26,2004 Cingular acquired AT&T Wireless

Verizon Wireless

Western Wireless Corporation

WORKING PARTICIPANTS

American Academy of Audiology

American Academy of Dispensing Audiology

Alexander Graham Bell Association for the Deaf and Hard of Hearing

APREL Labs

American Speech-Language-Hearing Association

American National Standards Institute

ANSI ASC C63

Cellular Telecommunications & Internet Association

ETS-Lingren

Gallaudet University – Rehabilitation Engineering Research Center

Information Technology Technical Assistance and Training Center

PC Test Engineering Laboratory, Inc.

Self Help for Hard of Hearing

Siemens Hearing Instruments

B. Status of Fast-Track Process

AISP.4-HAC uses a "fast track" process to identify, agree to, and manage changes to the C63.19 Standard in order to facilitate compliance with the deadlines set forth in the *R&O*. This fast track process was defined in the initial report.[17]

As part of this "fast track" process, the Incubator formed the test plan working group (WG-4) to evaluate the C63.19 Standard and to ensure the test methods defined in the C63.19 Standard are repeatable and reproducible. AISP.4-HAC has submitted 39 changes against Version 2.0, 111 changes against Version 2.8, and 41 changes against

[17] The fast track process is used to identify, agree to and manage changes to the Standard in order to facilitate compliance with the deadlines set forth in the *R&O*

Version 3.1 of the C63.19 Standard[18]. These submitted changes have resulted in over 400 comments from the balloting group. Most of these noted changes and clarifications/enhancements identified by the test plan WG-4 were commented on by ATIS during the rd2.8 and are included in the current recirculation ballot of C63.19 rd3.1. Representatives from the Incubator's WG-4 and C63.19 SC 8 Working Group 3 (WG-3), the hearing aid compatibility WG, continue to 'hand-off' suggestions and recommendations put forth by the ATIS Incubator members. In order to utilize the improvement in the testing protocol and to clarify testing processes identified by the Incubator WG-4 testing, meetings will continue between these two groups to discuss process methodologies, test documentation, and a review of future changes, which will be submitted after the C63.19 Standard is balloted and published. In addition, ATIS Incubator members are participating in C63 Standard Committees as Officers and review members. This enhances coordination between AISP.4-HAC and the ANSI C63 Committee. The test plan WG-4 has a detailed report on the round robin test results and its continued work on the C63.19 Standard.

An extensive series of round robin testing[19] has been conducted among nine (9) labs, including two (2) independent facilities, to ensure that all testing is being performed consistently and under supervised procedures to ensure that HAC results reported to the Commission are accurate and repeatable. To address measurement consistency among the various labs, WG-4 has initiated a series of validation checks and balances to identify the problematic areas and root-causes of measurement variances between labs and manufacturers. More detailed information about the testing process is included in Section V.A.1 of this second Status Report.

C. Purpose of Report

Future status reports will include Status Report Forms (see **Attachment A**) completed by Incubator member companies to report each company's HAC compliance

[18] The 2001 version of C63.19 was V1. Subsequent revision drafts ("rd") were balloted in 2004.
[19] Round robin testing is a method for comparing lab results by having several labs test the same device.

data. In addition, the following summary table will continue to be updated in all future filings:

Consolidated Status Report on Hearing Aid Compatibility	*Quantity*
Wireless Industry Companies Participating in AISP.4-HAC:	**32**
Wireless Service Providers Participating in AISP.4-HAC	**22**
Wireless Device (WD) Manufactures:	**10**
Total Compliant WD Models :	**TBD**
Total WD offered	**TBD**

V. Working Groups

Working Groups have been formed within the Incubator to: (1) direct the focus of experts on specific issues; (2) promote effective member collaboration on ideas; and (3) document recommendations for review and discussion by the full Incubator. Each request for a Working Group must have a defined scope and specific deliverable. The full AISP.4-HAC then decides if the Working Group should be created. Once the deliverable is accomplished, the Working Group is dissolved. The Working Group deliverable is then brought to full AISP.4-HAC for adoption as an Agreement Reached. Currently, there are three (3) active AISP.4-HAC Working Groups: (1) Test Plan; (2) Labeling and Consumer Outreach; and (3) Timeline.

A. WG-4: Test Plan Working Group

This Working Group was created to conduct a thorough review of the C63.19 Standard and to determine how to enable reliability and accuracy in a wireless device lab's test results when using this Standard.[20] The Working Group implemented a round robin testing effort to evaluate the wireless device lab results, which consisted of seven (7) manufacturers, three (3) independent Labs, testing 13 different WD models using 22

[20] The C63.19 Standard has two distinct test areas – hearing aids and wireless devices; this test specification pertains to wireless devices only.

different frequency band /air interface combinations were tested for RF emissions per the described measurement guidelines defined in the AISP.4-HAC Test Plan.

1. Round-Robin Testing

The thirteen (13) wireless devices representing 22 frequency bands/air interface combinations were tested for RF emissions per the described measurement guidelines defined in the AISP.4-HAC Test Plan. Each device was tested by a minimum of three (3) different labs. All test results were collected by the ATIS ASIP.4 Committee and evaluated and reviewed for consistency and measurement accuracy. The tables in **Attachment B** show an overview of the reported test results.

In the course of performing the round robin tests, several sources for variability of the test results were uncovered and addressed as possible causes for the inability to obtain reproducible test results. The potential sources of uncertainty identified thus far include: measurement uncertainty related to the test equipment used; different probe modulation factors; inconsistencies in how the test data is reported and used in the calculations; and insufficient reference data for dipoles. Without reproducible results, a Wireless Device ("WD") manufacturer cannot be confident that its assessment of a handset's ability to be hearing aid compatible is accurate.

A. Measurement Uncertainty as a source of variability in results

All participating Round Robin labs declared their ability to repeatedly obtain the same test results on the same Wireless Devices when measured in the same lab with setups and equipment unchanged. These repeatable measurements can be made within the margin of error. The uncertainties in the test setup and process can result in a margin of error 4.04 dB. This cumulative dB tolerance noted in the measurement uncertainty could shift a WD rating up or down one category.

The following are excerpts from the C63.19 Standard concerning measurement uncertainty:

8. Calibration and measurement uncertainty

It is important that measurements made using the procedures contained herein follow acceptable practices sometimes called "good engineering practices" as it relates to the calibration of the instrumentation used. The basic accuracy and reproducibility of measurements made in accordance with this standard depend primarily upon the accuracy of the test equipment used, the care with which the calibration and the measurements are conducted, and the inherent stability of the WD under test. Where a given set of measurements is repeated in the same laboratory and by the same operator, a relatively high degree of reproducibility should normally be obtained. However, when comparing measurements made by 59 of 123 different laboratories, allowances should be made for the influencing factors mentioned. As a minimum the following guidance should be used:

For each measurement instrument, the following shall be clearly marked on the instrument:

1. Date of last calibration
2. Date of next calibration
3. Validation initials and/or source and location of calibration records

Such calibration records are also used as inputs into the calculation of overall measurement uncertainty, which is discussed in Section 8.4.

Annex E.1.1 Primary Uncertainty Factors

Contributor	**Influence Quantity**	**Type**	**Source of Information**
RF Reflections	±0.8 dB	Tolerance	§Section 4.2.1 (Reflections < –20 dB)
Field Probe Conversion Factor	±1.76 dB	Tolerance	Annex C.3

Field Probe Anisotropy	±0.5 dB	Tolerance	Typical Probe Manufacturer Data
Positioning Accuracy	±1.62 dB	Tolerance	Annex E.2.3.2
Probe Cable Placement	±1 dB	Tolerance	Annex D.11 & Annex D.12.

Annex E.2.3 Positioning Variability

Positioning variability involves the WD near-field emissions measurement. It encompasses two parts as follows:

The first part of the positioning variability derives from the device holder. A device holder is used in the WD near-field emissions measurement to maintain the test position of the WD. And the actual WD test positions established by a single test operator using a device holder may deviate from the test positions described in the C63.19 standard. The E-field and H-field strength measurement uncertainty due to WD positioning deviations may vary by WD design.

The second part of the positioning variability is due to the mechanical tolerance of the probe positioning system.

This field strength uncertainty is assessed according to the specifications of the probe positioning system with respect to the actual position defined by the geometric center of the probe sensors.

B. Probe Modulation Factors as source of variability in results

Several labs reported results with different probe modulation factors. The raw test results that were reported, directly from the assessment system, showed closer correlation of test data between labs. Thus the WG-4 has theoretically calculated the probe modulation factors for each air interface and made it a part of HACTS. The WG-4 also created a method for calculating probe modulation factors since some wireless technologies could not use the original method in the C63.19 Standard. This method is

currently being balloted as part of Revision Draft 3.1 of the C63.19 Standard due to be completed November 26, 2004.

The following is an excerpt on probe modulation from HACTS and is not in the C63.19 Standard:

HACTS 4.3.2.2 footnote 5

> Probe anisotropy may add significantly to the measurement uncertainty. This factor may be minimized by first moving the probe to the location of maximum measurement and then rotating the probe to align it for the maximum reading at that position. This rotation is recommended in order to minimize uncertainty due to anisotropy in the probe.

C. Reporting test results in a consistent manner

The WG-4 participants reported the raw data from their respective lab assessment systems for all nine (9) cells of the 5 cm by 5 cm assessment grid. All reported data was in accordance with the diagram in **Attachment C**. Analysis of this data assisted in developing a more consistent method with clarification tools for measurement labs when reporting the data. In addition, labs reporting data were required to submit positioning, orientation, probe views, and setups to eliminate the potential for positioning errors or orientation that may have occurred.

All measurement data was input into a computer database which generated spreadsheets to look at correlations, probability, and statistical analysis.

Once all the results from the labs were compared and variables identified and adjusted for, specific handset measurements reported from the labs were spread across the rating range. The variation of M-ratings recorded in the table are understood to be a result of the previously described measurement uncertainty factors, calibration, setups, and positioning variables as referenced in the C63.19 Standard for wireless device

measurement tests. As a result of this, the raw data is being studied further by the Incubator members and is not included in this second Status Report.

D. Thick Dipole test

WG-3 for C63.19 added a dipole test to allow labs to baseline their setups and equipment used for the Hearing Aid Compatibility (HAC) Wireless Device (WD) testing. The dipole described in the C63.19-2001 version was not sufficiently defined to ensure consistent measurements to be made for the WD. The WG-4 used the SAR dipole descriptions for 800 to 950 MHz and 1.6 to 2.5 GHz, and has now added these description changes to the C63.19-2004 version. The WG-4 modeled these dipoles in free space and calculated their reference values. The Round Robin tests were initiated with the dipole test being the first test for each lab. However the dipole test results reported by the different labs resulted in a wide variety of results across labs. The standard deviation results that were calculated were over ± 25%. Analysis of the data and correcting test methodology resulted in the collected dipole test results to be within a standard deviation less than 10%. **Attachment D** shows the test results after corrections to test methods were implemented.

E. Strategies for gaining consistency

1. Common reporting spreadsheet

The WG-4 is developing a spreadsheet that will take the assessment system raw test results and:

i. Eliminate the three highest reading cells without eliminating the center cell.

ii. Automatically calculate the probe modulation factor based on the air interface.

iii. Scale the highest remaining reading with the probe modulation factor, articulation weighting factor, and convert the scaled number to an M-rating

This will greatly reduce the inconsistencies caused by reporting errors.

2. Planar Dipole Test

To re-validate the setups, equipment, and corrected results of the WD data achieved after the Incubator reviewed and analyzed the measurements taken, the WG-4 initiated comprehensive tests using the same planar dipoles. There will be eight (8) labs performing a round robin coordinated test effort on three planar dipoles. Each lab will illuminate the dipoles with CW, 80%AM, as well as the respective air interface for CDMA, GSM, *i*DEN, and TDMA signals. The labs will collect measurement data results and compare these results to the calculated dipole results for each. The end result should be an understanding of where each of the labs are, either diverging or aligned, and recommendations or suggestions to enable 'out-liars' to align themselves with consistent labs and the calculated results. The Planar dipole test is designed to achieve the same results that were accomplished in the original thick dipole test. Labs with identified issues will be required to correct these and repeat the dipole test prior to beginning or continuing to participate in future round robin efforts.

3. Coordination with the ANSI C63 Standards Committee and plans for future changes to the C63.19 Standard

The Incubator has identified needed changes with the original C63.19-2001 Standard as referenced in the original FCC Report & Order in WT Docket No. 01-39. WG-4 has created and documented recommendations for these issues, and conveyed these changes through the C63 liaison for incorporation in the planned released C63.19-2004 version, currently being balloted. The Incubator has focused its efforts on meeting the FCC mandate for 2005, addressing the RF interference and testing.

The Incubator expects that the measurement requirements as defined in the C63.19-2001 Standard for T-coil compatibility will require the same level of changes as needed by the RF interference section, to ensure clarification and consistent understanding of the measurement standard. Changes in the audio band magnetic ("ABM") coupling sections will require Incubator members to evaluate and thoroughly review and test these sections for compliance to the magnetic requirements as defined.

In order to meet the T-coil mandates for 2006 as defined in the Report & Order, the Incubator members will require the continued support from the FCC. This will be important in the continuing development of the ATIS HACTS document in the area of the magnetic compatibility, allowing the C63-19 Standards Committee to follow the ANSI standards processes. A close coordination with the C63 Standards Committee will continue to address the needed changes that the Incubator members identify in the existing standard in time to meet the September 2006 deadline.

Emerging technologies require the assignment of an Articulation Weighting Factor ("AWF") to be included in the C63.19 Standard. Standard transmission protocols such as WCDMA, iDEN, UMTS, CDMA2000 and variants of OFDM modulation will be assigned a value of zero for the AWF. The incubator will undertake studies of the previous research reports used to assign AWF factors to determine the AWF for emerging technologies.

Future changes to the C63.19 Standard will be communicated by the WG-4 Test Plan to the C63 Committee liaison for review and consideration. Discussions with the ANSI C63 SC8 WG-3 indicate that changes submitted from the Incubator will be added in the following alternative methods:

- Open C63.19 in 2005
- Create a normative addendum to C63.19
- Create a lab testing guide to use with C63.19

The C63 Committee will continue to use an accelerated process to quickly implement the non-controversial changes. At the time of this second Status Report the revision draft for C63.19-2004 is being balloted. Until the C63.19 Standard is finalized, balloted, and published the ASIP.4-HAC HACTS document will provide the most current and representative measurement information for manufacturers and independent labs capable of conducting both RF emission measurements and magnetic compatibility measurements for wireless devices. The AISP.4-HAC Incubator objective is to continue

identifying and documenting those changes to the Standard that Industry feels are necessary to provide consistent and accurate measurements for magnetic compatibility. These changes will continue to be coordinated with C63 Committee representatives to ensure incorporation and implementation in the Standard.

ATIS Incubator members are active in HACTS and also participate in the C63.19 Standards Committee as Officers and voting members linking the two technical groups tightly.

B. Labeling and Consumer Outreach Working Group (WG-6)

This Working Group draws on the extensive expertise of consumers, audiologists and representatives from Gallaudet University and Georgia Tech Information Technology Technical Assistance and Training Center, wireless manufactures, wireless Service Providers, as well as various advocates in the hearing loss field. The deliverable for this Working Group is to develop a labeling and outreach plan that is consistent, concise and clear. Once completed this plan will be communicated to the FCC, Industry, and consumers in efforts to broaden the education around the wireless device compatibility, its language, and identifiable markings. In preparation for targeted outreach prior to the effective date of the order, an outreach database has been created and is continually being updated. In addition, several key consumer, audiology and industry conferences have been identified for outreach opportunities and additional material will be developed to support the specific needs of those diverse audiences. This information will not be proprietary and will be available for dissemination for those working in the wireless industry, hearing health industry, and by consumers and audiologists.

1. Marking (rating) Identification Test:

Attachment E is a questionnaire used at the Self Help for the Hard of Hearing 2004 Convention, and in the American Speech-Language-Hearing Association and SHHH web sites to garner consumers' preferences for labeling the wireless device packaging. While some consumers showed preferences and provided information that

should indicate the pros and cons of each proposed icon, many continued to express confusion by the rating system.

2. SHHH 2004 Convention:

The Incubator had a major presence at the SHHH 2004 Convention. The Incubator hosted a round table panel comprised of service providers, Wireless Device manufacturers, and Hearing Aid Manufacturers. Each gave a presentation and then answered questions from the audience. In addition, information for consumers developed by Gallaudet University was disseminated to those attending the conference. (See **Attachment F.**)

A theater was created in the "Wireless Center of Excellence" section of the show floor. Incubator roundtable panel presentations and Q&A session afterwards covered:

(1) How does the FCC Report and Order for wireless compatibility with hearing aid devices impact consumers?

(2) Who is ATIS, what does the organization do, and what is the Incubator doing to solve issues of wireless device compatibility with hearing aid devices?

(3) How does the wireless phone work with my hearing aid, telecoil?

(4) What should I look for when selecting a wireless phone for my hearing aid?

(5) What are the differences between the Telecommunications Act of 1996 Section 255 and the Hearing Aid Compatibility Act?

Eight (8) of twelve (12) booths within the Wireless Center of Excellence were manned by representatives from wireless device manufacturers and service providers. Within the Wireless Center of Excellence, consumers were able to try activated wireless devices and determine (subjectively) if these wireless devices were compatible with their hearing aids. The majority of consumers who tried these available wireless devices were able to find at least one usable device.

Based on experience at the SHHH 2004 Convention, consumers should be encouraged to purchase wireless devices now – and not wait until the September 2005 implementation

deadline – since it was shown consumers may currently find a device that works with their unique hearing aids.

Most wireless carriers (and all major wireless carriers) have adopted a "Consumer Bill of Rights," which allows consumers to try out a wireless service and device for two weeks, risk free. This will enable hearing aid wearers in particular to determine whether their hearing aids work with a particular wireless device, without being "locked in" to the underlying service.

While labeling may help identify handsets that may be more likely to work effectively for hearing aid wearers, the highly individualized nature of hearing loss and the customization of hearing aids, often necessitates that consumers try different handsets to determine usability with their levels of hearing loss and hearing aids in use.

3. OUTREACH: Wireless Industry Brochure

The Cellular Telecommunications and Internet Association provided assistance to members of WG 6 toward the development of a basic information brochure for wireless industry members who may not be aware of the ATIS HAC Incubator efforts and resources or unclear of the requirements they face regarding hearing aid compatibility. That brochure is included as **Attachment G**. In addition, CTIA is working directly with members of the hearing loss community to better understand the communication needs of people who have a hearing loss and to help consumers access the information and infrastructure available on CTIA's Internet site for consumers.

4. OUTREACH: Audiologists and Hearing Health Professionals

WG6 believes that information about hearing aid compatibility must be developed to assist those who may request information about use of cell phones with hearing aids. Because of the technical information that should be included, this material will be developed after the WG4 testing has been completed.

C. WG-7: Timeline

Incubator members discussed the need to establish a working group to identify the critical milestones and mobile launch and roll-out plans that will need to occur between now and the implementation deadline of September 16, 2005. The Incubator members agreed to the proposed Working Group recommendation and assigned it Working Group-7 ("WG-7").

As noted earlier in this report, currently the Incubator members are focused on completing the round robin testing and are focused on working with the C63 Committee to complete the new version of the C63.19 Standard. It is the intent of the Industry to have a standard that is stabilized and validated for use to prevent inaccurate testing or improper setups or methods as a result of utilizing a non-released standard with which to develop products. The wireless industry must have the next release of the C63.19 Standard expeditiously accepted and adopted by the FCC. The anticipated release of the next version is late 2004 or early 2005. Subsequent changes must be accepted and approved in a timely fashion. These steps described are critical and necessary in order to provide manufacturers with finalized measurement guidelines and documentation. Wireless device manufacturers have to know the standard by which their handsets are tested before they can determine what changes, if any, need to be implemented in handsets in order to make them HAC compliant. This information is also needed to determine if new models will have to be developed.

While identifying the various next steps, the WG-7 is also estimating how long each of these steps would take and if any of them can be compressed; what steps could take place in parallel; and which steps are dependent on the next. For example carrier acceptance testing typically takes four (4) months. At this point, it is unknown how long FCC certification will take, and whether these tests could take place in parallel. However, carrier acceptance testing has to occur before handset rollout which can take about three (3) months and typically includes the ordering, delivery and distribution of handsets. The WG-7 has outlined what are believed to be the critical paths necessary to

complete the HAC compliant handsets and meet the FCC mandates in the R&O. These steps are identified as follows:

(1) industry finalizes the C63.19 Standard;

(2) FCC incorporates the C63.19 Standard into the HAC rules;

(3) manufacturers test handsets and complete handset development;

(4) Service providers complete acceptance testing, which may include third party validation of handset testing, and FCC completes grant acceptance test of handsets; and

(5) Service providers rollout handsets.

VI. Conclusion

AISP.4-HAC Incubator Members have put forth an exemplary effort in their outreach to various hearing impaired groups, clinicians, and consumers. This includes the participation in various conventions, shows, and exhibits. The Incubator has established a relationship with and secured the cooperation of the C63.19 Standard Committee, their members, and their Officers. This collaborative effort has enabled both groups to identify and work through needed changes referenced in the C63.19 Standard at a faster process than what is typically a standards review and approval process. This expeditious effort is necessary in respect to the deadline for RF emissions. The Incubator has initiated Industry 'checks and balances' for labs, equipment, and processes within the HACTS document to allow new manufacturers/labs to come up to speed quickly without the undue burden of measurement questions, clarifications, and general understanding of the HAC measurement requirements. The Incubator has completed the prescribed Phase I Round Robin test effort, while at the same time, reviewing and developing contributions to C63 Standards Committee for needed changes.

Our effort of accomplishments include the dipole and probe validations conducted by those participating manufacturers and labs, correlation of the dipole data, and

identification of variables, and measurement uncertainties, which are outside the control of the Incubator members.

The ASIP.4-HAC Incubator members believe that there will be many more changes needed in the current C63.19-2004 rd 3.1 Standard, which is currently being balloted. The focus of the Incubator will be directed at the magnetic coupling and compatibility issues related to the wireless device. Currently the wireless industry is at a critical junction in its efforts to support the requirements and mandated deadlines defined by the FCC. Our concerns stem from the fact that the Industry is working with an *unreleased* document that is needed to support compliance, how that compliance is achieved, and the ability to repeat that compliance measurement given the measurement uncertainties described in the WG-4 Status Report above. This raises an additional concern for the consumers and the ability to show them consistency among the wireless industry with respect to the wireless device rating. Our WG-4 Status Report explains that an M-3 rating for a wireless device by one manufacturer/lab may not necessarily represent the same rating when tested by an alternate lab. Therefore, the consumers may find that M-3 phones from one manufacture may not work as well as M-3 phones from a different manufacturer, even though both manufacturers are accurate and correct with their test measurements. This would be a result of the measurement uncertainties described in the C63.19 Standard.

In our efforts to finalize the C63.19 Standard and enable manufacturers and labs to follow a clear and concise measurement procedure, the Incubator recommends to the FCC that the following suggestions be implemented to support the wireless industry efforts and its future development and use of C63.19 Standard:

- Amend the *R&O* and Commission rules to incorporate the most current version of C63.19 beginning with the version being balloted by the C63 Standard Committee and due to close on November 29, 2004.

- Continue supporting the Incubator's effort to pursue solutions in the testing methodology to ensure consistency between testing facilities.
- Encourage the C63 Standard Committee to remain active, taking into consideration future changes, emerging technologies, and contributions initiated by the Incubator WG.
- Consider future changes, emerging technologies, and contributions initiated by the Incubator Working Group prior to acceptance and adoption into the C63.19 Standard.

The FCC coordinates directly with the Incubator WG-6 on Outreach to consumers. This information would include "try before you buy" opportunities available today, rating explanations, and FAQ's. [21]

Continue to work with the Food and Drug Administration ("FDA") to coordinate efforts that will better enable hearing aid users to understand the impact of the hearing aid part of the HAC system.

WHEREFORE, THE PREMISES CONSIDERED, ATIS, on behalf of AISP.4-HAC, respectfully submits this Second Report on Hearing Aid Compatibility Compliance Efforts for inclusion on the record in this proceeding.

Respectfully submitted by:

ATIS on behalf of AISP.4-HAC,

Megan L. Campbell
General Counsel
ATIS
1200 G Street, NW
Suite 500
Washington, DC 20005

[21] The majority of hearing aid users who tried currently available wireless devices at the SHHH 2004 Convention were able to use at least one device offered.

November 17, 2004

AISP.4-HAC REPORTING COMPANY MEMBERS

Alltel Communications, Inc.
Alpine PCS
American Cellular Corporation
Audiovox
Brookings Municipal Utilities d/b/a Swiftel Communications
Carolina West Wireless
Cingular Wireless, LLC
Corr Wireless Communications, LLC
Cricket Communications
Dobson Cellular Systems, Inc.
Epic Touch
Key Communications
Keystone Wireless
Kyocera Wireless
Leap Wireless
Louisiana Unwired, LLC
Motorola, Inc.
NEC America, Inc.
NEXTEL Communications, Inc.
Nextel Partners Inc.
Nokia
Panasonic
Pine Belt Cellular Inc.
Qwest Wireless
RFB Cellular
Research In Motion Limited
Samsung Telecommunications America, LLP
Siemens Communications Inc.
Sprint PCS
Sony Ericsson Mobile Communications (USA), Inc.
T-Mobile USA
Verizon Wireless
Western Wireless Corporation

Attachment A

Status Report on Hearing Aid Compatibility		
Company Name:		
Address:		
City:	**State:**	**Zip Code:**
Phone:	**Fax:**	**Email:**
Compliant Phone Models:		
Phone Model	**ANSI C63.19 Rating**	
Product Labeling Information:		
Outreach Efforts:		
Retail Availability of Compliant Phones:		
Efforts to Incorporate Hearing Aid Compatibility into Newer Models:		
Activities Related to ANSI C63.19 or Other Standards Work :		
Total Number of Compliant Phones Offered:		
Total Number of Non-Compliant Phones Offered:		
Ongoing Efforts for Interoperability Testing with Hearing Aids:		
Information regarding differences in handset offerings among regions in service areas (For Service Providers only):		

ATTACHMENT B

	WD 1 1900 GSM	**WD 2 850 GSM**	**WD 3 850 GSM**	**WD 3 1900 GSM**	**WD 4 1900 GSM**	**WD 5 850 GSM**	**WD 5 1900 GSM**	**WD 6 850 GSM**
Lab 1	M3				M2	M2	M2	M1
Lab 2			M1	M2		M1	M2	
Lab 3								
Lab 4	M4		M3	M3	M2	M3	M3	
Lab 5		M1						
Lab 6								M3
Lab 7			M1	M1				M1
Lab 8	M1	M1						
LAB 9		M3			M1			

Table 1 WD RF Test Results

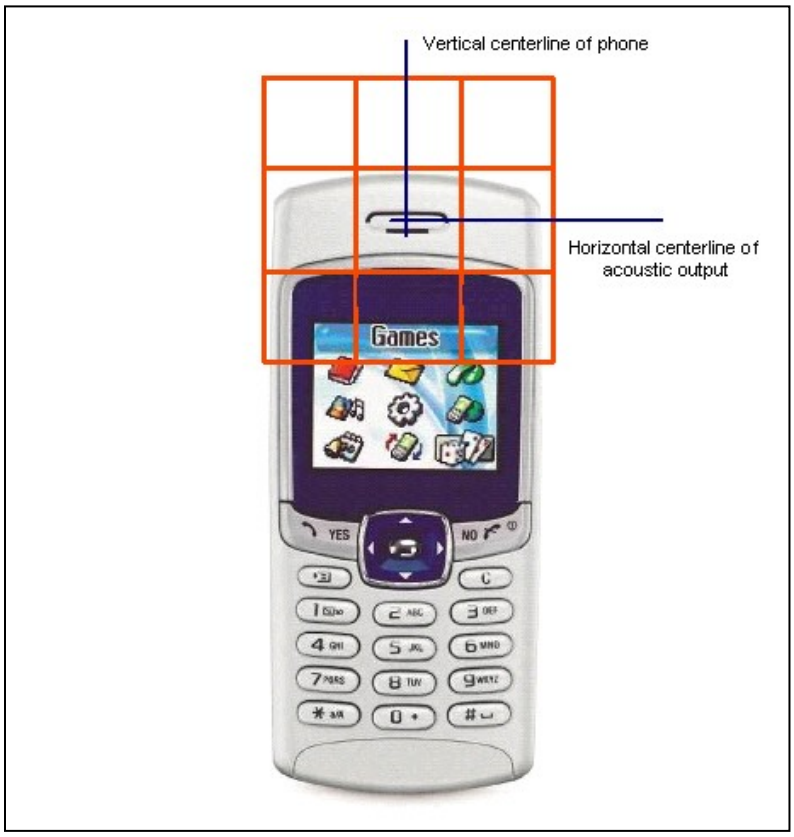
	WD 6 1900 GSM	**WD 7 850 GSM**	**WD 7 850 GSM**	**WD 9 850 CDMA**	**WD 9 1900 CDMA**	**WD 12 850 CDMA**	**WD 12 1900 CDMA**	**WD 14 1900 GSM**
Lab 1	M2	M1	M2					M3
Lab 2		M1	M2	M3	M4	M4	M4	
Lab 3						M4	M4	
Lab 4		M3	M3					M4
Lab 5				M3	M3			
Lab 6	M4							
Lab 7	M2			M2	M2			
Lab 8								
LAB 9						M3	M3	M3

Table 2 WD RF Test Results

	WD 15 813 *i*DEN	**WD 15 898 *i*DEN**	**WD18 850 CDMA**	**WD 18 1900 CDMA**	**WD 19 850 GSM**	**WD 19 1900GSM**		
Lab 1								
Lab 2	M2	M2						
Lab 3			M3	M3				
Lab 4								
Lab 5			M3	M3	M2	M3		
Lab 6					M3	M3		
Lab 7								
Lab 8	M2	M2						
LAB 9	M1	M1	M2	M2	M1	M1		

Table 3 WD RF Test Results

ATTACHMENT C



5x5cm Grid

Attachment D

Dipole H-Field per ATIS TP 4.2.2.1

Lab No.	1880 MHz	898.5 MHz	835 MHz	813.5 MHz
1	0.740		0.720	
2	0.650	0.720	0.660	0.650
3	0.716		0.665	
4	0.517		0.510	
5	0.730		0.764	
6	0.660	0.670	0.690	0.600
7	0.710		0.653	
8	0.665	0.670	0.691	0.630
9	0.651	0.673	0.673	0.629
10	0.610	0.890	0.660	0.630
Avg. (A/m)	0.6649	0.7246	0.6686	0.6278
Ref. (A/m)	0.645	0.675	0.680	0.673
Delta to Ref.	3.09%	7.35%	-1.68%	-6.72%
St. Dev. (A/m)	0.0665	0.0949	0.0652	0.0179
St. Dev.	10.01%	13.09%	9.75%	2.85%
Dev. norm	12.00%	12.00%	12.00%	12.00%
Avg. + norm	0.722	0.756	0.762	0.754
Avg. - norm	0.568	0.594	0.598	0.592

Dipole E-Field per ATIS TP 4.2.2.1

Lab No.	1880 MHz	898.5 MHz	835 MHz	813.5 MHz
1	191.1		273.6	
2	191.1	240.1	269.3	239.3
3	201.9		253.7	
4	169.8		221.8	
5	226.6		242.8	
6	205.6	251.2	248.3	267.2

7	220.0		262.0	
8	215.3	243.5	241.0	239.8
9	199.2	252.3	250.6	240.1
10	212.8	284.8	266.2	240.1
Avg. (V/m)	203.3	254.4	252.9	245.3
Ref. (V/m)	211	262	268	265
Delta to Ref.	-3.64%	-2.91%	-5.62%	-7.44%
St. Dev. (V/m)	16.67	17.77	15.62	12.26
St. Dev.	8.20%	6.98%	6.17%	5.00%
σ norm	12.00%	12.00%	12.00%	12.00%
Avg. + norm	227.7	284.9	283.3	274.7
Avg. - norm	178.9	223.9	222.6	215.8

Attachment E

Labeling Choices

Marking (rating) identification survey

A questionnaire[22] used at the SHHH convention, and on ASHA and SHHH websites asked consumers' preferences for labeling on wireless device packages. The proposed symbols are shown in Figure 2.

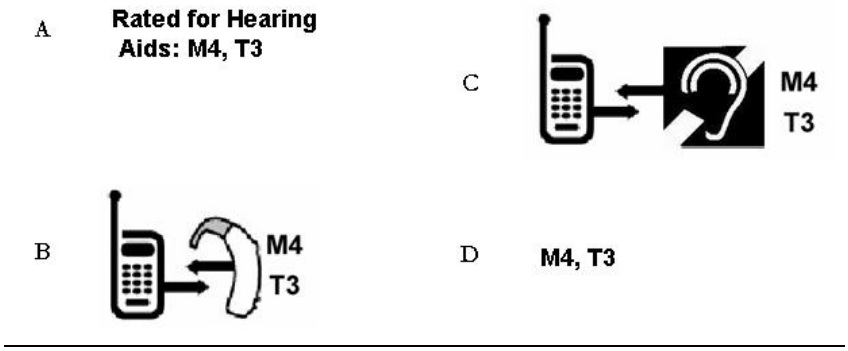


Figure 2

Proposed Symbols v1.5 for product package labeling

Respondents were asked and answered:

(1) Q. Of the four proposed labels/symbols (A, B, C, or D), which one provides the clearest message that the cellular phone is likely to work with a hearing aid?

A. 19%

B. 35%

C. 13%

D. 1%

None. 12%

(2) Q. Of the two proposals that use labels/symbols, which one (B or C) provides the clearer message that the cellular phone is likely to work with a hearing aid?

B. 65%

C. 19%

[22] Appendix F: AISP/4-HAC Working Group #6 – Labeling Survey Questions v1.1.

Neither. 16%

(3) Q. Of the two proposals that use only words, which one (A or D) provides the clearer message that the cellular phone is likely to work with a hearing aid?

A. 65%

D. 0%

Neither. 35%.

WG-6 will explore avenues to increase consumer understanding of M and T ratings for wireless devices when complementary hearing aid ratings may not be known. Additionally, WG-6 will examine best methods and graphic representation of product labeling to ensure consumers are aware of handsets meeting HAC requirements.

Attachment F

Gallaudet University HA information

Wireless phones have many features today. Are some more important than others for hearing aid users?

Yes, there are a number of features that should be taken into consideration when purchasing a wireless/cell phone. Your audiologist or hearing healthcare professional can help you chose which ones are most important for you. The degree of hearing loss and the type of hearing aid being worn will make a difference in which ones are most important. These features include but are not limited to:

1. Vibrating alert for incoming calls
2. Selectable ringer tones – different frequencies or patterns make it easier to hear
3. T-coil coupling
4. Short messaging services (SMS)
5. Increased volume control
6. Headset
7. Compatibility with accessories

Recently, there has been talk about the compatibility between hearing aids and wireless phones. What's this all about?

On August 14, 2003, the Federal Communications Commission (FCC) released a Report & Order, which modified the exemption for wireless phones under the Hearing Aid Compatibility Act of 1988. This means that wireless phone manufacturers and service providers must make digital wireless phones accessible to individuals who use hearing aids. The FCC gave the telecommunication industry two years (summer of 2005) to have the first telephones with reduced RF (Radio Frequencies) available. More information is available at FCC website: www.fcc.gov/cgb/dro/hearing.html

How do wireless phones work?

You can think of wireless phones as two-way radios. When you talk into a wireless telephone, your voice is picked up and converted into radiofrequency energy (or radio waves). These radio waves travel through the air to a tower or base station which in turn sends your call through the telephone network to a base station close to the person you are calling. The base station sends the radio waves which are detected by the receiver of the telephone and are turned back into the sound of a voice.

What causes some hearing aids to have interference when a cell phone is put up to them?

When using a wireless or digital cell phone, the conversation is transmitted using radio waves. These radio waves or RF emissions create an electromagnetic (EM) field around the phones antenna. This EM has a pulsating pattern and can be picked up by the hearing aid's microphone or tele-coil and cause a buzzing or pulsating sound. To make matters even more complicated, there are a number of transmitting technologies (CDMA, iDEN & GSM). Verizon Wireless and Sprint PCS use CDMA technology, Nextel uses iDEN technology and AT&T Wireless, Cingular Wireless and T-Mobile all use GSM technology.

Are there other issues besides RF emissions and interference that hearing aid users should be concerned about?

Yes, there is another form of interference which is referred to as baseband or magnetic interference. This is related to the backlighting, display, keypad, battery and the circuit board of wireless phones. As you can see, this is a complicated issue which makes it imperative to "test drive" a wireless phone before buying!

Is there a difference between the transmitting technologies, CDMA, iDEN & GSM and there compatibility with hearing aids?

Through anecdotal reports, clinical experience and some research, CDMA and iDEN transmission technologies seem to work better than the GSM transmission technology. However, this does not mean that the CDMA and iDEN technologies are interference free and that the GSM always has interference.

If you are going to buy a new hearing aid, are there some that have less difficulty than others when used with wireless phones?

Generally speaking, individuals who wear hearing aids that are inside their ears, such as ITE's, ITC's and CIC's experience less interference/buzzing than those wearing BTE's. Also, the newer, digital hearing aids are generally more immune than the older, conventional analog hearing aids.

How should someone who wears a hearing aid go about buying a cell phone?

First, consult with your audiologist or hearing professional. He or she will be able to give you some pointers as to what works best with your hearing aid.

Second, it is better to shop at the full retail store of service providers. They have a full selection of phones and their staff is better trained than stores that sell many types of electronics. They often have telephones that you can try while in the store

Since almost everyone has a wireless phone today, you may want to try some wireless phones of family and friends to see which carrier and handset design works best with your hearing aid. And finally, make sure when you buy a wireless/cell phone that you have a trial period, this gives you the option of bringing it back if it doesn't work.

PHOTO Ottawa

For information about hearing aids and digital wireless phones

FCC Hearing Aid Compatibility and Volume Control
http://www.fcc.gov/cgb/dro/hearing.html

Gallaudet University, RERC
http://tap.gallaudet.edu/DigWireless.KS/DigWireless.htm

Self Help for Hard of Hearing People Inc. [SHHH]
www.hearingloss.org/hat/TipsWirelessPhones.htm

The Hearing Aid Compatibility FCC Order
http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-168A1.pdf

How can I learn more about my company's responsibilities?

ATIS

ATIS Incubator Solutions Program – The Alliance for Telecommunications Industry Solutions (ATIS) is a United States organization that is committed to rapidly developing and promoting technical and operations standards for the communications and related information technologies industry worldwide using an approval by consensus approach. Over 1,100 industry professionals from more than 350 communications companies actively participate in ATIS' industry committees and incubator solutions programs where standards and solutions are developed addressing a wide range of industry issues. The industry, health care professionals and consumers with disabilities have been working together to develop solutions and meet the FCC requirements, through the ATIS Hearing Aid Compatibility - Incubator Solutions Program. This working group is an open and impartial consensus program that investigates and develops recommendations to standards for magnetic coupling and interference from wireless devices. Members of the Incubator Solutions Program include: Sony Ericsson Mobile, Research In Motion, Nokia, Motorola, Kyocera Wireless, Nextel, Audiovox, Panasonic, Siemens, Samsung Electronics, NEC America, Cingular Wireless, AT&T Wireless, Dobson Cellular Systems, Inc., Leap Wireless/Cricket Communications, Alltel, Keystone Wireless, Verizon Wireless, Sprint PCS, Carolina West Wireless, Western Wireless Corporation, Louisiana Unwired LLC, T-Mobile, Key Communications, American Cellular Systems, Inc., Nextel Partners Inc, Brookings Municipal Utilities d/b/a Swiftel Communications, and HIA. Other participants within the Incubator Solutions Program include: Self Help for Hard of Hearing People Inc. (SHHH), Gallaudet University, Siemens Hearing Aids, Etymotic, Starkey, ASHA, AAA, CTIA, ANSI ASC C63, FCA and FCC. The ATIS website, www.atis.org , has information about the ATIS Incubator Solutions Program #4 on HAC (AISP.4-HAC).

www.atis.org

CTIA
The Wireless Association™

CTIA–The Wireless Association™ is the international organization that represents all sectors of wireless communications-cellular, personal communication services and enhanced specialized mobile radio. CTIA serves the interests of service providers, manufacturers, wireless data and Internet companies and other contributors to the wireless universe. www.ctia.org. The CTIA website, www.accesswireless.org, has information for deaf and hard of hearing consumers. This site provides consumers with relevant information to help them select a wireless phone and service that best meets their needs.

www.ctia.org

www.accesswireless.org

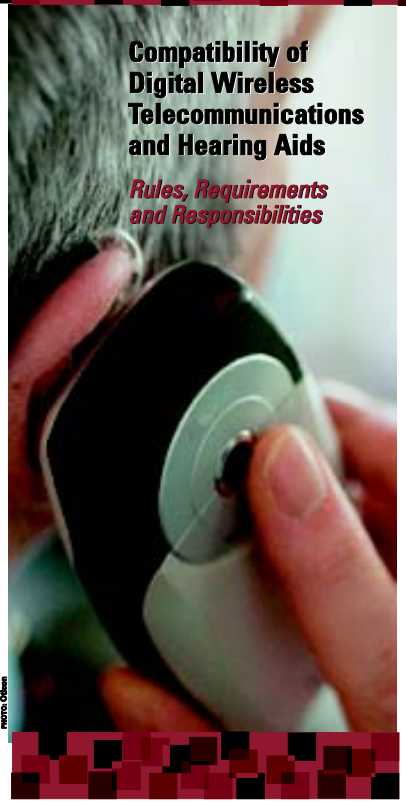


PHOTO Ottawa

Compatibility of Digital Wireless Telecommunications and Hearing Aids

Rules, Requirements and Responsibilities

Wireless telecommunications technology is increasingly important in people's everyday lives. These wireless devices are used for transacting business, staying in touch with family and friends, and for communicating during emergencies. While the digital wireless revolution has brought many benefits to consumers, including customers with disabilities, there continue to be technical challenges which limit the use of digital wireless telecommunications for some consumers who wear hearing aids.

Attachment G

CTIA Hearing Aid Compatibility Brochure

A key challenge for our industry is reducing the interference between some hearing aids and some digital wireless phones. Wireless telecommunications devices emit two types of electromagnetic (EM) fields: those necessary to connect phone calls that sometimes cause RF interference and those emitted by the circuitry and device backlighting that sometimes cause baseband interference. Some hearing aids, particularly those with low immunity levels, unintentionally pick up outside electromagnetic (EM) fields (e.g. florescent lighting, PC monitors , some digital wireless phones…etc.) creating a "buzz" heard by a hearing aid wearer that makes it difficult or impossible to hear the telephone conversation. A consumer's experience with interference to his hearing aid is dependent on the unique interaction between the digital wireless telecommunications device he's using and his hearing aids.

The Hearing Aid Compatibility Act

Effective November 17, 2003 the Federal Communications Commission (FCC) updated the Hearing Aid Compatibility Act of 1998 implementing new requirements for digital wireless phones (WT Docket No. 01-309; FCC 03-168) to enable hearing aid wearers to more effectively use these devices. The FCC adopted certain handset performance levels established by the American National Standards Institute (ANSI C63.19) that require companies to certify compliance with the ANSI C63.19 standard and indicate the appropriate device ratings for both reduced RF emissions and magnetic coupling[1]. In addition, by September 2005 digital wireless handset packaging material will be made available to clearly display the handset's performance level (M rating). Further explanations about the ANSI C63.19 M ratings will be included in the User's manual or as an insert in the handset packaging materials.

[1] *Approximately 30% of the hearing aids sold in the United States are telecoil equipped. The telecoils provide magnetic coupling which creates a direct feed of sound from the phone to the hearing aid. The magnetic coupling cuts out background noise and increases the hearing aid user's ability to better hear the phone conversation.*

What does this law mean for companies?

Which companies have to comply?

- **Service Providers** offering commercial wireless communications within the United States
- **Manufacturers** of wireless telecommunications devices used in the delivery of the abovementioned services within the United States.
- **Exemption from requirements**

  Service providers and manufacturers that offer only two or fewer digital wireless phone models for sale in the United States. are exempt from these requirements

What are the technical requirements?

For Manufacturers with more than two digital wireless phone models for sale in the United States

Reduced RF emissions

- **By September 16, 2005** - Offer to service providers at least two handset models for each air interface offered that comply with a minimum of M3 rating as set forth in the ANSI C63.19 requirements
- **By February 18, 2008** - Ensure at least 50% of handset offerings for each air interface offered comply with a minimum of M3 rating as set forth in the ANSI C63.19 standards

Telecoil / Magnetic Coupling

- **By September 18, 2006** - Offer to service providers at least two handset models for each air interface offered that comply with a minimum of T3 rating as set forth in the ANSI C63.19 standards

For Manufacturers with only three digital wireless phone models for sale in the United States

- **By September 16, 2005** – Offer to service providers at least one compliant model for each air interface offered that comply with a minimum of M3 rating as set forth in the ANSI C63.19 standards

For Tier I Carriers

Reduced RF emissions

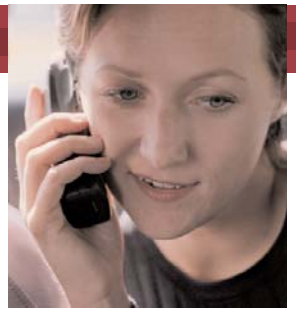
- **By September 16, 2005** - Include in handset offerings at least two handset models or 25% (whichever is greater) of the total number of unique digital wireless handset models offered by the carrier nationwide for each air interface, that comply with a minimum of M3 rating as set forth in the ANSI C63.19 standards, and make available in each retail store owned / operated by the carrier all of these handset models for consumers to test in the store
- **By February 18, 2008** – Ensure that at least 50% of handset models for each air interface comply with a minimum of M3 rating as set forth in the ANSI C63.19 standards calculated based on the total number of unique digital wireless phone models that the carrier offers nationwide

Telecoil / Magnetic Coupling

- By September 18, 2006 - Include in handset offerings at least two handset models for each air interface that comply with a minimum of T3 rating as set forth in the ANSI C63.19 standards, and make available in each retain store owned / operated by the provider all of these handset models for consumers to test in the store

For Tier I Carriers that obtain handsets only from manufacturers that offer three digital wireless phone models in the United States

- By September 16, 2005 – Offer at least one compliant model for each air interface offered that comply with a minimum of M3 rating as set forth in the ANSI C63.19 standards



What does this law mean for our customers?

Approximately one in ten people in the United States have a hearing loss, and this number is increasing especially as our population ages. Many of these individuals wear hearing aids and they want to use wireless phones for the same reasons that everyone else wants to use them. Educating company call center and retail representatives about hearing aids and digital wireless phones and encouraging customers to try the phones before they purchase them, will help to insure a successful customer experience. A company's compliance with this law will translate into new customers, extending the benefits of digital wireless technology to millions of people with a hearing loss.

Attachment H

Individual Company Filings

All subsequent attachments are individual company filings with additional information that is pertinent to those companies only and are not endorsed by AISP.4-HAC.

Company Name	Attachment
Motorola	**I**

Attachment I

Status Report on Hearing Aid Compatibility		
Company Name: Motorola		
Address: 600 north US highway 45		
City: Libertyville	**State: IL.**	**Zip Code:60048**
Phone: (954) 723-5539	**Fax:**	**Email: Al.Wieczorek@motorola.com]**
Compliant Phone Models: TBD		
Phone Model	**ANSI C63.19 Rating**	
Product Labeling Information:		
Outreach Efforts:		

Results of iDEN Telecoil Coupling Subjective Evaluation Experiment

(This information is provided as part of Motorola, Incorporated's ongoing outreach effort and effort for interoperability testing with hearing aids)

10 November 2004

Al Wieczorek, P.E.
Motorola, Inc.

Results of iDEN Telecoil Coupling Subjective Evaluation Experiment

INTRODUCTION

Users of telecoil equipped behind-the-ear (BTE) hearing aids and cochlear implants (CI) with behind-the-ear processors were recruited in the exhibit area of the Alliance for Telecommunications Industries Solutions at the Self Help for the Hard of Hearing (SHHH) 2004 convention held at the Omaha Hilton hotel in June.

Most recruits were "screened" to be candidates to subjectively evaluate the amount of interference experienced while listening to a telephone call in a quiet conference room. Subjects listened via inductive coupling to experimental models of a Motorola iDEN™ cellphone operating on the Nextel™ cellular telephone network. This screening was done to assure that recruits were not subjected to unbearable

interference and could resolve test specimen differences. Six recruits were so eliminated resulting in 28 subjects voluntarily performing the evaluation during 2 days of the convention. The data reported herein resulted from the evaluation by these 28 subjects.

Subjects were of age ranging from 38 to 81 years. Eight were male and twenty were female. Of these 92.8% had severe (71-90 dB) or profound (>90dB) hearing loss, Twenty subjects performed evaluations wearing behind-the-ear (BTE) hearing aids, and 6 had cochlear implants (CI) Most subjects had an aid for each ear, and some had both a BTE and a CI aid. In each case subjects did the ratings for the best listening ear and type of aid.

EXPERIMENT OBJECTIVES

Objectives of this experiment were:

1. Determine the amount of RF interference heard during a phone call by users of telecoil coupled hearing aids.

2. Determine the degree of interference variation between user/hearing aid manufacturer combinations

3. Determine user preference for retractable antenna position

4. Determine the degree of cellphone penetration into hearing aid user group.

5. Determine user preference between the iDEN phone experiment specimens and their personal cellphone, if they owned one and brought it to the show.

EXPERIMENTAL PROCEDURE

Prior to the evaluation each subject completed a personal information form used with the experiment conducted at the 2003 SHHH convention. During the evaluation each subject completed a rating sheet to numerically rate each phone specimen. Though both forms were adaptations of the form used at the 2003 SHHH convention, the numerical rating scale remained unchanged as follows:

Interference Rating Scale:
5 = None heard
4 = Noticeable but insignificant
3 = Somewhat disruptive
2 = Annoying
1 = Unbearable

The subjects first set their hearing aid or cochlear implant M/T switch to “T”, and then called an 800 number to listen to a recorded voice message. During the call the phones transmitted continuously at the maximum power setting (i.e. – no DTX, or power cutback).

During the first call each subject did a preliminary check to choose their best listening ear and the most

favorable position for the cellphone retractable antenna (retracted or extended)., then proceeded to rate the interference level and record it on the rating form. Subsequently they similarly rated all four model specimen units, and then ranked the four to determine that which was best for them. If a subject had a personal cellphone they did the same evaluation with their own unit and ranked it against the iDEN unit they judged best.

EXPERIMENTAL RESULTS

Photos that follow show typical usage of the cellphone during the evaluation. The design of the clamshell style cellphone is such that the telecoil is located near the top of the handset when it is open. In these photos it is evident that when the subjects positioned the phone to achieve best inductive coupling it was achieved with the cellphone telecoil aligned with the telecoil in the hearing aid.

Figure 1 – Typical handset inductive coupling positioning

Subjective evaluation numerical ratings of the four specimens were averaged for each subject to derive a single composite rating. Figure 2 contains a histogram of the composite ratings of the subjects. The two subjects that reported unbearable interference in the conference room did not undergo preliminary screening and a composite rating of 1 was used for these subjects. It is noteworthy that the composite interference rating by BTE users for the same set of phones extended over the entire range from "Unbearable" to "None heard", with a median near "Somewhat disruptive". It also is apparent that no CI subject reported "Unbearable" interference, and that the median for CI users was higher at "Acceptable, but insignificant" interference.

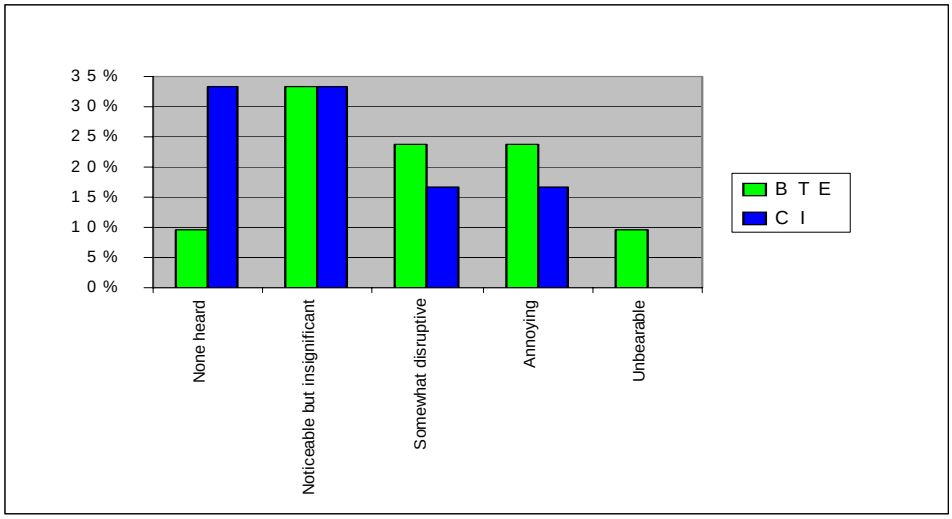


Figure 2 – Composite interference rating histogram of 28 subjects

To more accurately portray the total user group experience rather than that of just the evaluation subjects Figure 3 follows that shows the ratings histogram when those telecoil users screened out on the exhibit floor are included in the data set. This data set adds 6 users with an assigned composite rating value of 1 ("Unbearable") and drops the BTE user median rating about 0.5.

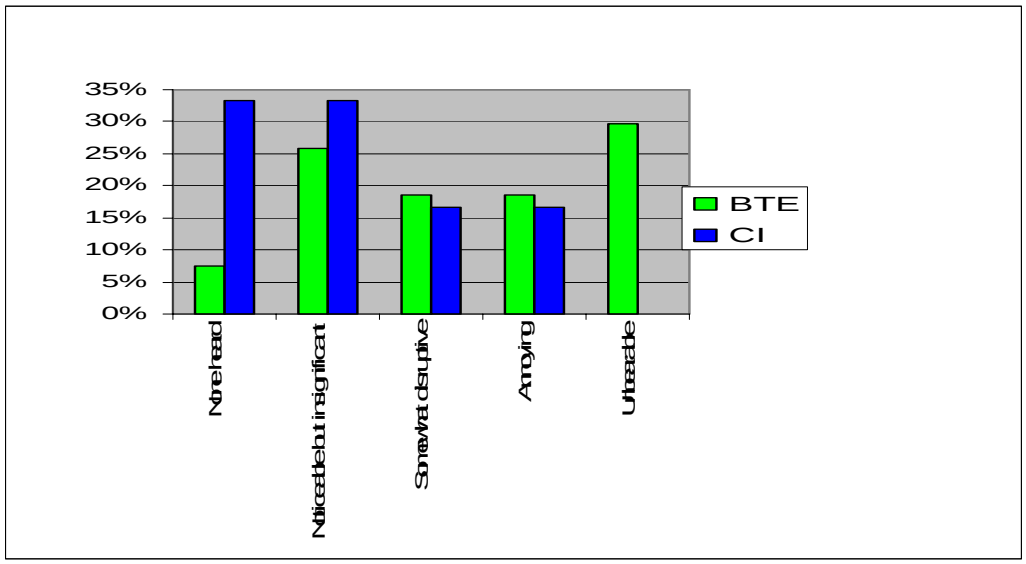


Figure 3 – Composite interference rating histogram of 34 users

This wide variation of interference susceptibility was attributed to combinations of user perception and hearing aid design. The personal data provided by the subjects showed they used products from 10 specified manufacturers plus a group of unknown manufacturers. Since manufacturers of hearing aids are known to have substantially improved the RF immunity level of hearing aids over the last few years it was decided to try to relate the handset interference composite rating to manufacturer. This is done in the plot of Figure 4 which blindly shows the highest and lowest rating for each reported manufacturer. In some cases only a single value is shown in Figure 3 because only one subject used a model from that manufacturer. A substantial variation is seen, especially for manufacturer No. 6 whose units resulted in composite interference ratings ranging from "Noticeable but insignificant" to "Unbearable".

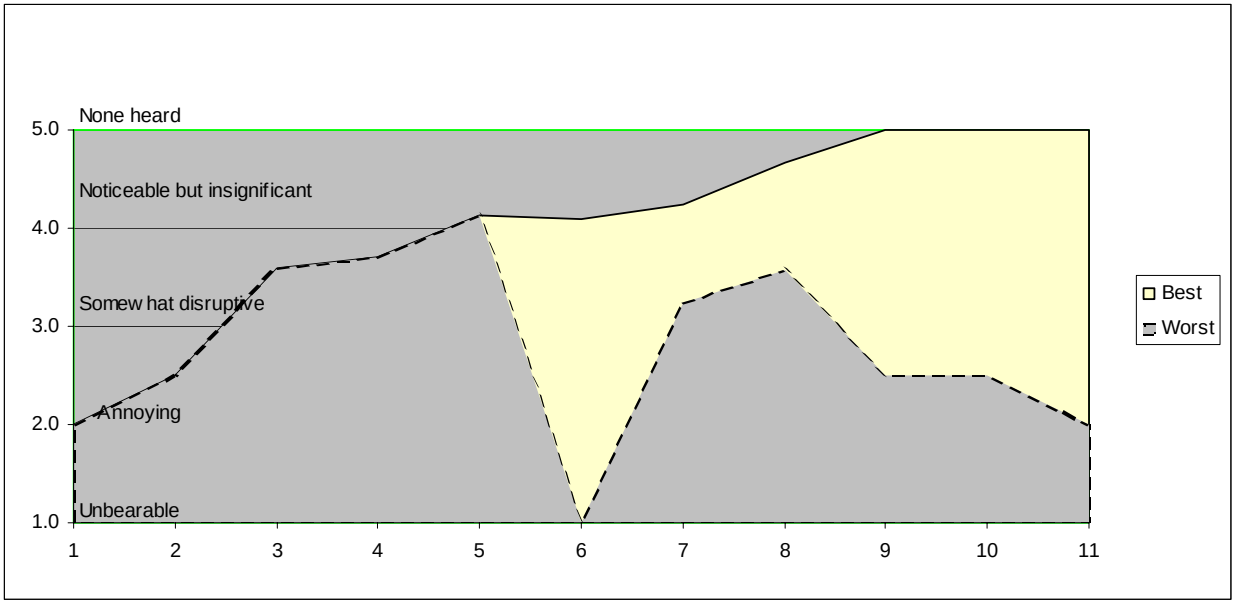


Figure 4 –Interference rating by subject's hearing aid manufacturer

During the experiment it was found that 19 subjects already were subscribers to a cellular network service and had a personal cellphone. Figure 5 shows the distribution of these subjects' known service provider.

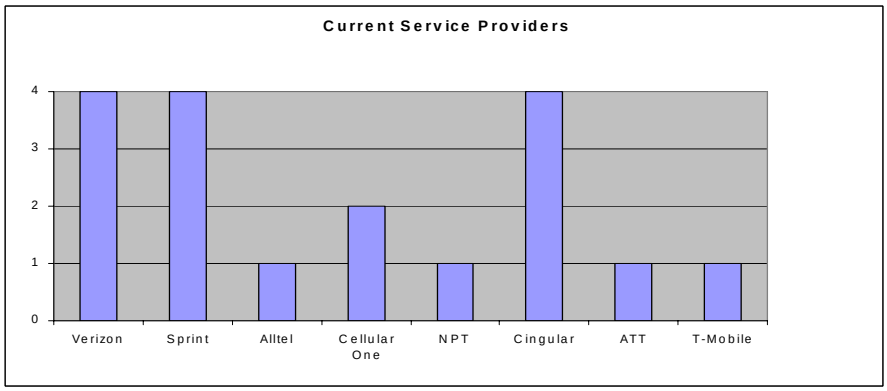


Figure 5 – Cellular service provider distribution

Phone models owned by these subjects are listed in the following table

Manufacturer	**Models (quantity, if >1)**
Ericsson	T60D
Kyocera	5135
LKG electronics	Not determined
Motorola	T120 v3620 v60 (x3) v66 (x2)

Nokia	5165 5185i 519 6150 Not determined (x2)
Samsung	SCH SPH-A660 (x2)

Sixteen subjects had their personal cellphone with them. These subjects made the same phone call and listening test using their personal phone. When the call was completed the subjects noted their preference between their personal cellphone and the experimental phones as shown in the graph of Figure 6. The transmission power used during the evaluation by these personal phones was not known.

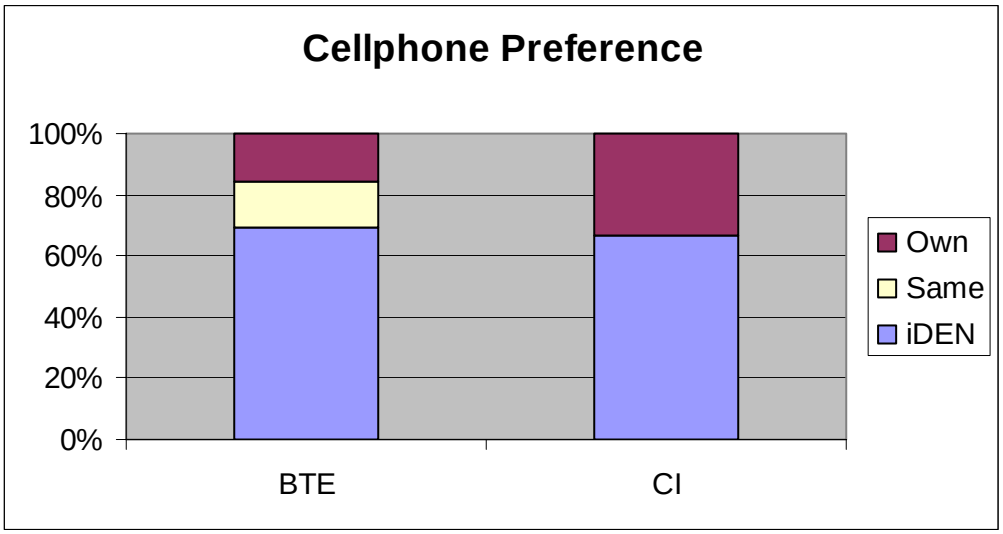


Figure 6 – Subject's choice of cellphones

CONCLUSIONS

The SHHH 2004 convention was an excellent venue for performing this subjective evaluation of the compatibility of a cellular telephone by users of telecoil equipped BTE hearing aids and cochlear implants It enabled a substantial number of those with severe or profound hearing loss to graciously provide their observations of RF interference and audio intelligibility, an effort which is sincerely appreciated.

A "None heard" interference rating of 5 was received from 12.5% of users when listening to a phone call with a Motorola iDEN cellphone. In contrast an "Unbearable" interference rating of 1 was received from 25% of those users. The median rating given by subjects with a cochlear implant was "4 – Noticeable but insignificant" whereas the median rating by subjects using BTE hearing aid was between "3 –somewhat disruptive" and "2 – Annoying".

Substantial variation (up to 3 points) was found in the interference ratings reported by different subjects using hearing aids from the same manufacturer, in some cases, even when different subjects used the

same model. A cellphone was owned by 73% of the subjects that participated in this experiment. Of those having their phones with them at the time of the experiment 69% preferred an iDEN experimental model to the phone they currently own and use.	
Retail Availability of Compliant Phones:	
Efforts to Incorporate Hearing Aid Compatibility into Newer Models:	
Activities Related to ANSI C63.19 or Other Standards Work :	
Total Number of Compliant Phones Offered:	
Total Number of Non-Compliant Phones Offered:	
Ongoing Efforts for Interoperability Testing with Hearing Aids:	
Information regarding differences in handset offerings among regions in service areas (For Service Providers only):	