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January 16, 2003

Via Electronic Filing
Marlene Dortch, Secretary
Federal Communications Commission
Washington, DC 20554

Re: Written *Ex Parte* Presentation; WT Docket No. 01-309; RM-7658; Section 68.4(a) of the Commission's Rules Governing Hearing Aid Compatible Telephones

Dear Ms. Dortch:

David E. Woodbury, Director of Government Relations for the Hearing Industries Association ("HIA"), filed documents responsive to a request from Ms. Mindy Littel of the FCC's Wireless Telecommunications Bureau (WTB). Attached to this letter is a copy of the documents provided to the WTB. The report, which is labeled Attachment 1, can be found on the Internet through the web address: www.ou.edu/engineering/emc/.

Please contact me if you have any questions regarding these documents.

Sincerely,

Loretta J. Garcia

Attachment

cc: (by electronic mail)
Mindy Littel, WTB
Qualex International

Executive Summary

Background

In April 1996, ANSI ASC C63 established a task group under its subcommittee on medical devices (SC 8) to develop a standard documenting the methods of measurement and defining the limits for electromagnetic compatibility between wireless phones and hearing aids. In 1999, the committee provided a draft document C63.19-xxxx, *American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids*. In previous work, the University of Oklahoma Center for the Study of Wireless Electromagnetic Compatibility conducted an acoustic measurement-based evaluation of the standard (commonly referred to as the *objective study*). The purpose of the objective study was to determine correspondence of hearing aid immunity and wireless phone emission levels measured according to the standard with actual interference obtained with specific combinations of hearing aids and phones.

The overall objective of the current research was to relate subjective ratings of speech intelligibility, usability, and annoyance to acoustic measurements of the interference between wireless phones and hearing aids. The C63.19 subjective validation study is subdivided into two parts: (1) subjective ratings of speech intelligibility, annoyance, and usability, and (2) objective acoustic measurements of hearing aid response.

Methodology

Hearing aids were custom manufactured for eighteen hearing-impaired participants. The aids spanned a range of immunity levels from no interference to severe interference. The participants rated the effects of the interference experienced when using five digital wireless phone technologies (CDMA at 800 and 1900 MHz, TDMA-50 Hz at 800 and 1900 MHz, and TDMA-217 Hz at 1900 MHz) at five transmission power levels (0, 6, 12, 18, and 24 dBm).

Conclusions

Based on acoustic measurements with three wireless phones, the aids for six participants demonstrated little or no interference at either 800 MHz or 1900 MHz. The data for one of these participants was not usable due to a moderately severe hearing loss coupled with major feedback from the hearing aid making the phones unusable. Unrelated to wireless phone RF interference, this person had difficulty understanding any speech through the phone. The remaining five of these six participants appropriately reported no annoying interference and 100% speech intelligibility.

For the remaining twelve aids, there was often a difference in the level of immunity between the two RF carrier frequency bands. The aids showing interference were categorized as producing either moderate or severe interference in each band. In general, the level of correspondence between the subjective ratings and the measured interference was primarily a function of the immunity of the aid. Seven participants demonstrated high

correspondence between the ratings and the interference as a function of changes in phone power level. These participants experienced moderate to severe interference in their aids at either 800 MHz or 1900 MHz or both. Three of these aids had telecoil capability. In this mode, interference was greater and seriously affected speech intelligibility and annoyance. Another participant, whose aid produced minimal interference in microphone mode and substantial interference in telecoil mode, provided constant ratings across power levels when tested in microphone mode and appropriately poor ratings when in telecoil mode. Another participant, whose aid produced significant interference in both modes at 1900 MHz, had a severe hearing loss and was not able to provide usable data due to poor speech intelligibility and high feedback with all phones.

The final three participants demonstrated little or no change in rating response as a function of power level. This was believed to be due to low levels of interference at 800 MHz or 1900 MHz (but not both) or high levels of feedback as the phone is coupled to the ear.

Thus, thirteen of the eighteen participants responded as predicted by the acoustic measurements made with actual wireless phones. The remaining participants experienced difficulties unrelated to wireless phone interference (severe hearing loss or excessive feedback). While all aids having a high immunity classification based on the C63.19 standard (TUV data) were included in this group, it is important to point out that other aids with a lower TUV immunity classification also performed well. This points to the need for further refinement of the immunity measurement and classification procedures.

A proposed alternative to the existing C63.19 performance criteria and categories is presented in the following table.

Category	Hearing Aid ILM 55		WD Emissions	
	E-Field CW dB V/m	H-Field CW dB A/m	E-Field CW dB V/m	H-Field CW dB A/m
C0	< 30	< -25	> 45	> -10
C1	30 to 40	-25 to -15	35 to 45	-20 to -10
C2	> 40	> -15	< 35	< -20

Although the resulting summation of assigned category values will range from 0 through 4, scores can be combined with the interpretation shown below.

Sum	System Classification
0,1	Bad Performance
2	Intermediate Performance
3,4	Good Performance

There are three primary advantages to the use of the proposed categorization scheme:

- There are fewer classification categories for hearing aids and for wireless devices. This simplifies the assignment process and the system performance classification for manufacturers and consumers.

- The proposed split points, which employ a 10 dB spread rather than 5 dB, more accurately reflect the precision that is readily achievable in both the acoustic and subjective measurements (in the absence of any reliability data to the contrary).

- The proposed categories provide no worse agreement (and in some cases better agreement) among the C63.19 measurements (TUV data), the measured acoustic data from our laboratory measurements, and the subjective data on annoyance, speech intelligibility, and usability. In other words, there is no loss in predictive accuracy by moving to the proposed categorization scheme using only three categories. Details of the comparisons are provided in the body of the report.

In summary, the results of this study support the use of acoustic measurements of immunity as the basis for the ANSI C63.19 standard. The results also demonstrate the existence of hearing aids that can be used with success with a number of digital phones. Six of the eighteen aids demonstrated no interference or very slight interference at the highest power level when used with both 800 MHz and 1900 MHz phones. These conclusions provide an encouraging forecast of substantially improved access to digital wireless service by those individuals with impaired hearing.

HIA

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The Hearing Review

May 14, 1996

STATEMENT OF THE HEARING INDUSTRIES ASSOCIATION

BACKGROUND

On July 17, 1995, the Hearing Industries Association (HIA) submitted comments to the Federal Communications Commission regarding HEAR-IT NOW's Petition for Rule Making to amend Section 68.4(A) of the Commission's rules concerning hearing aid compatible telephones. In those comments, it was HIA's position that there indeed was an interference problem caused by digital cellular technology and that studies should be undertaken to ascertain the level of interference, and to develop solutions to the problem.

For the balance of 1995, HIA met on numerous occasions with representatives of the wireless industry (Cellular Telephone Industry Association, Personal Communications Industry Association and the PCS 1900 Group), representatives of people with hearing loss (Self Help for Hard of Hearing People, Inc., the Alexander Graham Bell Association) and experts in audiology (American Academy of Audiology) to begin the process of studying the interference problem and working toward solutions that incorporated both technologies, and met the needs of users of both telephones and hearing aids.

Those meetings culminated in the Hearing Aid Compatibility (HAC) Summit held on January 3-4, 1996, two meetings held at the University of Oklahoma, and a number of meetings of three sub-groups developed to focus on long-term solutions, short-term solutions and hearing aid compatibility. HIA was represented at all meetings and also participated as a member of the HAC Steering Committee.

Hearing aid manufacturers came to the table with little experience in dealing with RF interference in general and emissions from digital cellular phones in particular. The first useful body of information that assisted hearing industry engineers was the Australian National Acoustics Laboratory (NAL) report on GSM interference, published in May 1995. In June 1995, the EMC group at the University of Oklahoma began the first in a series of studies focusing on digital cellular phone interference with hearing aids. To aid in the Oklahoma studies, hearing aid manufacturers built aids with experimental modifications using ideas extracted from the NAL report. Manufacturers also sent modified aids based on their initial research as well as a group of baseline, off-the-shelf models. It is understood that the University of Oklahoma will begin testing these aids in Phase II of their study to begin June 1996.

HIA member companies are currently experimenting with PCS 1900 and TDMA phones at 20 sites around the country. HIA also continues efforts to acquire CDMA phones. The intent is to gather practical experience and evaluate methods of interference reduction. Also, valuable information on methods of RF control has been contributed by engineers from cellular digital phone manufacturers. Groups of engineers from both the hearing aid and cellular digital industries are working together in small groups on different aspects of the interference problem and continue to exchange data.

Additionally, Mead Killion of Etymotic Research, an HIA member, along with Harry Teder, HIA's Technical Representative were asked, and have agreed, to investigate what constitutes negligible, tolerable and intolerable interference in aids caused by digital cellular technology. Practical benchmarks for use by industry are expected to result from this effort. The project will also test a low-cost, practical RF probe for future use by the hearing aid industry. Work will begin in early June 1996. The study is being jointly financed by Etymotic Research, HIA and several digital cellular phone manufacturers. It should be noted that the digital cellular industry is providing vital assistance to this project, notably in calibrating RF probes to be used.

INTERMEDIATE DETERMINATIONS AND AREAS OF CONCERN

- Results of experimentation to date show that there is no "quick fix" to the interference problem. Different types and brands of hearing aids react in no predictable way to RF interference. While some modifications seemed highly promising, experiments using the same modifications in modestly different circumstances failed. Initial results of Phase I of the University of Oklahoma study suggest that completely-in-the-canal (CIC) hearing aids maybe as susceptible to interference as behind-the-ear (BTE) hearing aids. If correct, these results do confirm that the hearing aid industry still does not know exactly how digital cellular RF interference interacts with hearing aids.

- While we realize that it will be a number of years before digital cellular technology is in widespread use throughout the United States, we are still extremely concerned about access for the installed base of hearing aid wearers. Recent advances in hearing aid technology insure that hearing aids will continue to be appropriate for an individual's changing hearing requirements over a much longer period of time thus prolonging the useful life of aids currently in the marketplace. More sophisticated hearing aids require a larger investment by consumers, again decreasing the likelihood that they will replace the device quickly, especially given the age and demographics of hearing aid purchasers.

  The RF signal produced by digital cellular phones must be reduced to a level where bystander interference is negated. While we understand that digital phone manufacturers are experiencing a similar lack of scientific data on the interference problem, digital cellular phones and/or devices that allow for unencumbered use by hearing aid wearers must be available to the impaired community in a reasonable amount of time. There are currently 5.8 million Americans with hearing aids who should not be excluded from the benefits of digital cellular technology.

- We must ensure that the education/information component of this effort is comprehensive. Potential digital cellular phone customers must be aware of the possible interference problem. HIA suggests an effort aimed at the hearing aid dispensing community and digital cellular phone points-of-sale. HIA supports the communications plan developed by the short term working group.

CONCLUSION

As results of initial testing of RF interference with hearing aids are just becoming available, and hearing aid manufacturers have just begun experimentation with digital cellular phones, HIA believes it is premature to establish timelines for introduction of a new generation of immune hearing aids, or to establish immunity levels. The focus of efforts to date has been driven more by artificial deadlines than any rational scientific or engineering process. Hearing aid manufacturers realize the importance of an expeditious solution to the interference problem, are aware of the timeline developed by digital cellular phone manufacturers, and will continue to devote all available resources to a successful conclusion.

HIA has initiated standard-making on increased immunity levels for hearing aids through the ANSI standards process. Hearing aid manufacturers are also involved in Phase II of studies being conducted at the University of Oklahoma as well as the aforementioned Teder-Killion study. While hearing aids were in no way the cause of the interference problem, HIA is committed to providing increased immunity to the extent it is technically feasible.

HIA member companies have established a strong and positive working relationship with digital cellular phone manufacturers who share the same goal of reducing interference to hearing aids to an acceptable level for consumers. We anticipate a continued close relationship as the two industries progress with their work. HIA is committed to providing increased immunity in hearing aids in a manner that each manufacturer deems appropriate.

HIA appreciates the concern and involvement of both the Federal Communications Commission and the Food and Drug Administration. We hope to continue a close and fruitful relationship as work continues to resolve the interference problem.

May 15, 1996

Chairman Reed Hundt
Federal Communications Commission
1919 M Street, N.W.
Room 814
Washington, D.C. 20554

Dear Chairman Hundt:

The consumer organizations listed below submit the attached workplan with regard to making digital wireless telephones usable by and accessible to individuals with hearing loss. The attached proposal is the product of a process which was put in motion nearly one year ago when two consumer organizations and an industry group submitted a petition to the Federal Communications Commission (Commission) requesting that the Commission re-evaluate the need for an exemption for wireless telephones from the Hearing Aid Compatibility Act (HAC Act) of 1988. Although the HAC Act provides for such review, this has never been done. Consumers also began a process of education and advocacy to increase understanding of the interference problems associated with digital wireless telephones and medical devices, particularly hearing aids.

At the time the above petition was filed on June 5, 1995, generally, the wireless industry lacked an understanding of the problems with these telephones and they were reluctant to acknowledge the need to address the problems experienced by hearing aid wearers. In short, they viewed this as a problem affecting "old outdated hearing aids."

Upon conducting independent demonstrations, the Commission confirmed that serious problems of interference and accessibility existed with digital wireless telephones, and directed the wireless industry to work with consumers to develop mutually acceptable solutions. Our efforts together have stimulated research efforts and numerous informal relationships between technical experts in the wireless and hearing aid industries. In addition, one wireless provider and its equipment manufacturer--Pacific Bell Mobile Services and Ericsson--has begun working closely with consumers to ensure (1) that appropriate modifications are made in their equipment prior to deployment and (2) that further improvements meeting consumer needs will be made over time.

Notwithstanding the commitment of Pacific Bell and Ericsson, we remain without a

specific commitment from the wireless industry as a whole that long-term changes in wireless telephone equipment will take place. This is so, despite the fact that the Pacific Bell commitment has clearly demonstrated that it is technologically feasible to make changes to digital wireless phones which are acceptable to organizations representing people with hearing loss.

Over the past six weeks, negotiations to resolve this issue have taken place among the interests represented in the Summit process. During these negotiations, it has been the position of consumers that long-term changes must involve solutions that are integral to the design of the telephone. Further, the consumer position is that external devices and other "add-ons" are short-term solutions that do not constitute equivalent access and should not be viewed as long-term solutions to interference and access. At the same time, consumers have indicated that solutions must be technologically feasible and not be unduly burdensome to industry. Indeed, we have drafted our proposal in accordance with 47 C.F.R. §68.4(a)(4), which governs the revocation of the HAC exemptions and which recognizes that the costs of providing access cannot be increased to a level that would prevent the successful marketing of such telephones. Unfortunately, it remains unclear whether the wireless industry will guarantee acceptable long-term solutions to achieve accessibility and reduce interference -- even if the requirement to do so is linked to these technological and economic standards.

Background on the Attached Proposal

Section I–Education

Consensus was reached among all of the various interests on the need to conduct educational programs for consumers, audiologists, hearing aid manufacturers, and the wireless telephone industry. Much has been accomplished already; these efforts should be expanded and continued.

Section II–Interference Studies

Efforts now underway will help define an acceptable level of interference that will: (1) allow hearing aid users to utilize digital wireless telephones and (2) avoid annoying bystander interference. Agreement was reached on the need for such studies and the fact that the results of such work should be analyzed by technical experts representing consumer interests and the industries representing digital wireless and hearing aids.

Section III–Interim Solutions

By the end of March, 1997, all providers of digital wireless services must offer a representative cross-section of telephones that have features that are integral to the design of the telephone and which allow consumers to utilize the telephones as defined by the acceptable level of interference (as determined by the interference studies

referred to in Section II). We have used the term "integral to", rather than "built in" because we have been informed that some models of wireless phones may be available for general sale in two parts. Our intent is, nevertheless, to ensure that hearing aid wearers do not have to endure the inconvenience and/or expense of external devices for these telephones.

Consumers have noted that in this interim period not every telephone need have changes incorporated but that every provider of services must make available models of telephones which can be utilized by hearing aid wearers. Further, because some hearing aid wearers can only utilize the telephone if they have linkage to their telecoils, such telephones must provide effective coupling to hearing aids. Note that these changes are couched in terms of technological feasibility.

Section IV–Long-Term Solutions

If technologically feasible, by March 31, 1998, further changes should be made in a cross section of digital wireless telephones that are manufactured and distributed. The requirements of this section will extend to all telephones by the end of March, 1999. The changes required by this section, in combination with increased immunity in hearing aids, will ensure access and avoid problems of bystander interference to hearing aid wearers. Industry-sponsored work at the University of Oklahoma found annoying bystander interference at distances of up to five feet for certain combinations of hearing aids and digital wireless telephones. These potential problems, in combination with the fact that digital wireless telephones will become commonplace in the near future, necessitate that changes be incorporated in all digital wireless technology.

Section V–Improved Hearing Aid Immunity

The hearing aid industry's representatives in the Summit process would not commit to a specific time frame or specific percentages for changes in hearing aids. Consumers believe that reasonable targets must be established. Consumers recognize that some small percentage of hearing aids (perhaps up to 10 percent) are re-designed infrequently, if at all. However, the vast majority of hearing aids do undergo periodic redesign, and immunity changes should be part of that process. Consumers note that, in any event, they will end up bearing the cost of purchasing new aids with higher immunity standards and that such costs are substantial and generally not covered by health insurance benefits.

Section VI - Additional Provisions

Consistent with 47 C.F.R. §68.4(a)(4), the requirements to make telephones accessible without interference are not intended to increase costs in a manner that would prevent such telephones from being successfully marketed. At the same time, the wireless industry cannot be permitted to separate out the costs of achieving access and pass those costs only on to consumers with hearing loss. The prohibition against

imposing access costs on individuals with disabilities is consistent with other nondiscrimination laws, including Title IV of the ADA (see 47 U.S.C. §225(d)(1)(D) which protects users of relay services from having to pay higher rates for those services), as well as Titles II and III of the ADA (see e.g. 28 C.F.R. §36.301(c), which prohibits imposing charges for auxiliary aids provided to individuals with disabilities).

Eleven months have passed since the problems with digital wireless telephones were formally brought to the attention of the Commission. We have appreciated the Commission's willingness to work with both industry and consumers on this issue during this time. However, at this point, we cannot state strongly enough the need for the Commission to take action expeditiously on this issue. PCS equipment and technology are rapidly being developed and wireless telephones continue to proliferate. The longer formal action is postponed on this matter, the more difficult it will become to reverse the consequences of failing to address the accessibility and interference issues.

In closing, consumers note that present standards based on today's best technology and a blueprint for strengthening those standards over the next few years will structure the shape of digital wireless telephone equipment of the future. The goal of our workplan proposes a timeline for phasing in the needed changes to ensure access for people with hearing loss. We stand ready to assist the Commission in whatever ways are necessary to accomplish this goal.

Agreed to by:

Susan Coffman

Susan Coffman, Director
Professional Programs and Services
Alexander Graham Bell Association for the Deaf

Donna L. Sorkin

Donna L. Sorkin
Executive Director
Self Help for Hard of Hearing People, Inc.

Assisted by:

Alfonso C. Fuller, Jr.
Legal Counsel
American Academy of Audiology

Karen Peltz Strauss
Legal Counsel on Telecommunications Policy
National Association of the Deaf

WORKPLAN - CONSUMER PROPOSAL
ACCESSIBILITY AND REDUCTION OF INTERFERENCE
DIGITAL WIRELESS TELECOMMUNICATIONS
MAY 15, 1996

Implementation of following workplan should be pursued in a manner that encourages the use of currently available technology but which does not discourage or impair the development of improved technology.

I. EDUCATION (ongoing)

A. Consumer support groups will initiate or continue technical assistance and education programs on interference and accessibility issues relating to hearing aids and digital wireless telephones. These programs will be coordinated with the digital wireless industry as appropriate.

B. The digital wireless industry will initiate or continue consumer education activities and other outreach efforts to facilitate access to digital wireless telephones by persons with hearing loss. The digital wireless industry also would like to engage in an ongoing dialogue with hearing aid consumers, hearing aid manufacturers, and audiologists to enable the industry to continue to improve accessibility to digital wireless phones for people with hearing loss throughout the product design and manufacturing process.

C. The American Academy of Audiology will educate audiologists and consumers about electromagnetic interference and accessibility considerations for hearing aids, digital wireless phones and other RF devices.

D. In conducting these educational activities, the parties will take into account information drawn from the reports of the working groups created at the Hearing Aid Compatibility and Accessibility to Digital Wireless Telecommunications Summit Meeting on January 3-4, 1996."

II. INTERFERENCE STUDIES

A. Technical experts identified by the parties will compile the results of studies undertaken to identify an objective level of user and bystander interference that hearing aid wearers can experience comfortably with digital wireless telephones. Specifically, test results will be compiled from the studies conducted by Mead Killion, Harry Levitt/Judy Harkins, and the University of Oklahoma Center for the Study of Wireless Electromagnetic Compatibility.[1]

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[1] The consumers anticipate that the studies referred to in paragraph A will be completed by July 31, 1996.

B. Based on the results of the interference studies, technical experts identified by individuals representing consumer interests and the digital wireless telephone and hearing aid manufacturing industries, and operating in accordance with principles of representative and balanced decisionmaking, will reach a preliminary consensus on the objective level of interference that hearing aid wearers can experience comfortably with digital wireless telephones and that will enable the use of the service.

C. Based on the level of acceptable interference identified in studies reviewed and vetted, technical experts identified by individuals representing consumer interests and the digital wireless telephone and hearing aid manufacturing industries, and operating in accordance with principles of representative and balanced decisionmaking, will develop a preliminary matrix with recommended performance targets for hearing aid immunity and electromagnetic emission levels. This preliminary matrix will be developed within two months of the completion of the studies and will establish a preliminary objective measure of user and bystander interference that will serve as the interim benchmark until a standard is complete.

D. Thereafter, the preliminary matrix will be submitted to the appropriate standards bodies (for example, ANSI) at such bodies' next regularly scheduled meetings. The industry will take such actions as may be necessary to ensure expeditious review of the matrix for incorporation in applicable standards.

III. <u>INTERIM DIGITAL WIRELESS TELEPHONE SOLUTIONS</u> (Within 8 months of completion of studies, but no later than March 31, 1997)

To the extent it is technologically feasible, every provider of digital wireless telecommunications equipment in the United States will offer a representative cross section of digital wireless telephones that have characteristics which are integral to the design of the telephones that may include, but will not be limited to, circuitry changes, changed antenna positions, and/or reduced magnetic emissions, as individual manufacturers deem appropriate and which consumers deem effective. The intent of this section is to avoid requiring individuals with hearing loss, including hearing aid wearers, to be required to use external devices that are not needed by the general public for the usability of the telephones. Interim or permanent solutions may be used for the purpose of achieving this goal. During this interim period, the effectiveness of the reduction in interference will be dependent upon, in part, the hearing aid wearer's degree of hearing loss and the varying degrees of immunity in hearing aids.

Telephones covered by this section will:

(1) enable hearing aid wearers to use digital wireless telephones effectively and comfortably without excessive annoyance from interference as defined by the objective level of interference determined by the preliminary matrix set forth in Section II, and

(2) provide accessibility, within the definition of accessibility provided in Section VII below, to digital wireless telephones for people with hearing loss, including hearing aid wearers.

IV. LONG-TERM DIGITAL WIRELESS TELEPHONE SOLUTIONS

To the extent that it is technologically feasible, through a combination of further changes to digital wireless telephones made in the manner deemed appropriate by individual manufacturers and through increased hearing aid immunity, the following will be accomplished:

A. Within 20 months of completion of the studies, but no later than March 31, 1998, manufacturers of digital wireless telephones will manufacture, and providers of digital wireless telephone services will offer, a representative cross-section of digital wireless telephones which are sold in the United States that meet the requirements of subsections (C)(1) and (2) below.

B. Within 32 months of completion of the studies, but no later than March 31, 1999, manufacturers of digital wireless telephones will manufacture, and providers of digital wireless telephone services will ensure that all digital wireless telephones which are sold in the United States meet the requirements of subsections (C)(1) and (2) below.

C. Manufacturers and providers who are subject to the requirements of this Section will ensure that digital wireless telephones, in accordance with the schedule set forth above, will:

(1) limit user and bystander interference to no greater than the objective level (as determined by the studies referenced in Section II) that hearing aid wearers can experience comfortably with digital wireless telephones, and

(2) provide accessibility, within the definition of accessibility provided in Section VII below, to digital wireless telephones for people with hearing loss, including hearing aid wearers.

(3) Subsections (1) and (2) above must be accomplished through characteristics which are integral to the design of the telephones. The intent of this section is to avoid requiring individuals with hearing loss, including hearing aid wearers, to be required to use external devices that are not needed by the general public for the usability of the telephones.

V. IMPROVED HEARING AID IMMUNITY

A. To the extent that it is technologically feasible, hearing aids sold in the United States will be available with built-in immunity to electromagnetic interference in conformance with the performance targets for increased immunity established by the preliminary matrix of recommended performance targets for hearing aid immunity and electromagnetic emission levels and through the standards process, according to the following schedule:

(1) Within two years of the completion of the studies referred to in Section II, but no later than March 31, 1998, a representative cross-section of fifty percent of all hearing aids sold in the United States will achieve the required hearing aid immunity.

(2) Within three years of the completion of the studies referred to in Section II, but no later than March 31, 1999, ninety percent of all hearing aids sold in the United States will achieve the required hearing aid immunity.

B. Hearing aids sold in the United States containing telecoils must satisfy minimum performance standards for telecoils operation.

VI. ADDITIONAL PROVISIONS

A. Throughout this process and beyond the completion date of this workplan, the digital wireless industry will continue to conduct research with the goal of ensuring increased accessibility to digital wireless telephones for people with hearing loss, including hearing aid wearers. The research will include continuing to investigate the feasibility of achieving compatibility through internal coupling of digital wireless telephones to the hearing aid telecoil, and testing proposed accessibility solutions against a wide range of hearing aids of various immunity levels.

B. Compliance with the requirements of Sections III and IV above will not increase costs to such an extent that the telephones to which these sections apply could not be successfully marketed.

C. Digital wireless telephones with varying levels of features and capabilities are and will be increasingly available to American consumers. People with hearing loss, like all consumers, desire access to the broadest possible range of digital wireless telephones, and they should not be limited to only the most expensive and feature-rich, or the most basic and inexpensive, units.

D. Each digital wireless telephone sold in the U.S. will have a standard jack to allow the effective use of assistive devices such as TTYs, direct audio input, and other external devices by January 31, 1998.

E. Extra charges will not be imposed for accessibility or mitigation of interference in otherwise identical wireless telephones.

VII. DEFINITIONS

A. Accessibility - A digital wireless telephone is accessible if it is usable by people with hearing loss, including hearing aid wearers. To be usable, the telephone must provide audibility and intelligibility through

(1) internal coupling of the digital wireless telephone to the hearing aid either through magnetic coupling with the telecoil or other internal coupling equal to or superior to the telecoil, and

(2) acoustic coupling designed to minimize feedback and with adjustable volume control.

B. Hearing Aid - A professionally dispensed, wearable air-conduction, sound-amplifying device that is intended to compensate for impaired hearing.

C. User Interference - An objective level of noise caused by a digital wireless telephone that interferes with a person's ability to use a digital wireless telephone and a hearing aid effectively and comfortably at the same time, as defined by the process referred to in Section II above.

D. Bystander interference - An objective level of noise, caused by a digital wireless communications device that interferes with the use of a hearing aid worn by a person who is not using the communications device, as defined by the process referred to in Section II above. Bystander interference is caused when the device is being used at a distance which is 18-20 inches or more away from a hearing aid wearer.

VIII. Hearing Aid Replacement Fund

If changes to telephone equipment do not enable hearing aid wearers to avoid problems with user or bystander interference by March 31, 1999, as set forth in Section IV above, all wireless interests doing business in the United States will establish and finance through contributions, a fund for the purpose of replacing or retrofitting hearing aids. Individuals will be eligible to receive monies from the fund according to the following schedule:

(1) for newer hearing aids (purchased within three years): full funding will be available for replacement or retrofitting of the existing hearing aid,

(2) for older hearing aids (purchased more than three years earlier), partial funding will be available for replacement or retrofitting of the existing hearing aid.

(3) The fund created by this Section will sunset after five years.