RM-8658

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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In the Matter of)
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RM-8658 DOCKET FILE COPY ORIGINAL
Section 68.4 of the Commission's Rules)
Hearing Aid Compatible Telephones)

Reply Comments of George DeVilbiss To
Request to Reopen the Petition for Rule Making

I am a retired Electronics Engineer with 37 years of Federal sevice, 13 years as a Civil Service emloyee and 24 years as a US Naval officer (designated Engineering Duty Only, Electronics). I hold an MSE degree from George Washington University, and am President and Chief Engineer of DeVilbiss Development Co., Ltd ,a small company dedicted to helping hearing impaired persons by installing Assistive Listening Systems,designing and manufacturing Neckloops for use with ALDs,and cochlear implant patch cords as well as modifying mass produced and inexpensive electronic devices for use by hearing impaired people. I have a bilateral hearing loss and wear two hearing aids.

I am on the SHHH Board of Trustees but am writing these comments as an individual interested in being able to use Digital Cellular Telephones without having to use expensive as well as cumbersome attachments.

Much of my Federal service was related to research in the electronics field. I might also add that I have been a licensed amateur radio operator for 70 years, having held the call signs W5FH, K6DE, K2EV and W4EV and as such I had to solve many cases of BCI (interference to electronics devices from my radio transmitter) so I am not a neophyte in this field. I also spent many years as the technical Manager at a Naval Underwater Sound Laboratory in Bermuda where part of my responsibility was to prevent interference from a 100 watt radio transmitter to microvolt sensitive hydrophone amplifiers.

I have read the comments submitted by both Verizon Wireless and the CTIA. I am hereby responding to and refuting some of their statements in regard to Section 68.4(a) of the Commissions Rules for Hearing Aid Compatible telephones and the Hear-It Now and WAC requests for Rulemaking.

Verizon Wireless comments on page 2 makes the statement that Hearing Aid Compatibility is not technilogically feasible. I do not agree with this statement as Cellular Digital Telephones and hearing aids can be modified simply and inexpensively as explained below. Verizon then goes on to say that "the acoustic connection between the audio device and the hearing

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aid is poor and causes distortions in the sound" (Verizon Comments at 2). The latter statement is true so the use of a "T" coil in the hearing aid is necessary and can be used if the telephones speaker emits a strong magnetic field. Older wired non-electronic (analog) telephones emitted a very strong magnetic field that could be picked up by the "T" coil very effectively. Later electronic telephones sometimes used speakers that did not provide the necessary magnetic field, and as a result the FCC issued a requirement that all wired telephones be hearing aid compatible but exempted wireless telephones from this requirement, which is the basis of the Hear-It Now and the WAC petitions.

Verizon Wireless also states (Verizon Comments at 4) that one way for hearing aid compatibility to be achieved for digital wireless headsets is if the hearing aid used is a hardened device that shields the "T" coil from the energy emitted by the transmitter. Neither of the comments by Verizon or CTIA discuss any technical solutions tried. Some are not only possible but inexpensive. It is not the Tcoil that must be shielded but the hearing aids electronics! There is no hardened hearing aid that will shield the T coil from the low frequency magnetic field generated in the telephone, but this can be done cheaply and effectively as will be discussed later. The above statement by Verizon indicates a lack of understanding of the nature of the interference.

The problem is two-fold, and this is not clearly discussed in either Verizon's or CTIA's comments. First, the electronics of a hearing aid demodulate the Radio Frequency energy, which is mostly of a high frequency pulsing nature. This demodulated signal is amplified and is heard as a loud buzz by the hearing aid user. This is easily solved by shielding the aids. In CTIA's comments on page 6, the statement is made that "shielding has not been the most effective means to increase the immunity level." My experiments have not found this to be true. Some years ago a local supplier of GSM Digital Cellular Telephone service loaned me a telephone to make some tests. Interference with my aid in the "m" or microphone mode was so great that none of a desired speech signal could be heard. I then wrapped my BTE aid with aluminum foil but did not notice an appreciable decrease of the interference, so I decided to run a tab from the aluminum into the battery compartment to effectively connect the shield to the HA's electronic "ground". This connection completely eliminated the interference.

It is my understanding that at least one hearing aid manufacturer has gold plated the inside of the case of one model of their most expensive aids to achieve a similar result, but I do not know how successful this shield is and have not been able to find out whether the connection, between the battery and the electronic ground, that I deem absolutely essential, was made. I am afraid that many engineers and physicists do not really understand the capacitive coupling of the high voltage present at the end of the antenna of the telephone to the hearing aid and hence do not understand the importance of the connection between the shield and the electronics.

Shielding the hearing aid IS a "one size fits all" solution to the capacitive coupling of the aid's electronics to the telephones antenna. I also do not believe that expensive gold plating a shield is necessary. Plating with any good conductor such as copper, silver,chrome, etc will do. Any one with a knowledge of capacitive coupling will understand why this connection is necessary. I am going to try painting the inside of my BTE aid's case with conducting paint such as used in repairing printed circuit board traces but I will make sure that a connection can be made to the electronic's ground". If I am successful, this would provide a very inexpensive "fix" for existing aids and would not require the user to buy new aids. Even plating the inside of the aids should not be very expensive and probably cost much less than present attachments necessary for the hearing aid user to use the digital telephones.

On page 4 of their comments Verizon states "However, since the vast majority of hearing aids in use are non-hardened, widespread compatibilty is not possible at this time". If the telephone manufacturers would eliminate the low frequency magnetic field generated by the telephone that prevents use of the T coils so important to us wearers, the hearing aid manufacturers would probably properly shield any newly designed hearing aids, but there is not at this time any incentive to do so as it would not allow the user to use the Tcoil with a digital phone.

The shielding as discussed above does not solve the problem of the pick up by the "T"coil of the magnetic field generated in the digital telephone by the pulsing battery current. This problem can be solved by the generation of an equal but opposite field. The problem in the telephone exists because the leads from the battery to the heavy current consuming electronics form a loop so that the currents generating the fields around each lead do not cancel each other out. The solution is to place a small loop in series with the battery current that generates an opposing field. Once the size and location or this loop is determined. The solution would not be affected by

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the difference in battery curent due to the location of the telephone to the cell site resulting in a change in output power of the telephone.

A demonstration of this method of magnetic field cancellation was given to some personnel at the headquarters of Self Help for Hard of Hearing People (SHHH) on January 3, 2001.

The placing of a thin piece of plastic, thin enough that it does not prevent the battery from fitting into it's place,could be inserted in the battery compartment with a small loop deposited upon it and connected in series with the battery current. Determining the exact size of this loop and its location will require some effort but this insert would only cost pennies, so this would not affect the marketabilityof the telephone and could even be backfitted in many existing models at a very low cost.

In view of the low cost of the above, I believe that the deletion of

the exemption for wireless telephone from the hearing aid compatibility act is justified and would make the telephones useable by hearing aid users. It is obvious that the telephone manufacturers need to take the initiative and start solving the problem. If the FCC deletes the exemption, and requires that the telephone manufacturers make their digital wireless telephones compatible with hearing aids, the consumers will benefit.

It is understood that the FCC has no control of hearing aids but the above information about hearing aids is considered information that might be of interest.

Much effort has been expended in developing means of measuring the interference and developing standards, but searches of literature and theinternet has revealed little effort spent on finding solutions.

Sincerely

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