

Conservative Techniques to Reduce Potential Health Hazards in the Use of Wireless Technology

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Abstract: Shortly after the public release of cell phones in 1977, there have been many questions about the potential health hazards that could result from the use of the devices for mobile communication. These mobile devices use radio waves for communication and the frequency and power of the waves is believed by some to cause danger to human beings. In some cases, links to brain tumors have been suggested. Research into the health hazards of cell phones is still ongoing. Some day a conclusion may be reached saying that cell phones are totally safe. However, while there is a lot of uncertainty in the air about their safety (no pun intended), this study attempts to show some ways in which 'potential health hazards' can be reduced.

Key words: Cell phones, mobile phones, health hazards of mobile devices, radio waves

INTRODUCTION

The research into the dangers of prolonged cell phone use is continuing (<http://www.cprnews.com/worldnews.cfm?id=195>; <http://www.sciencenews.org/articles/20020629/fob3.asp>). Some actual cases suggest that cell phones may cause some danger to individuals (<http://transcripts.cnn.com/TRANSCRIPTS/0510/15/hcs.g.01.htm>). Cocosila *et al.* (2007) have stated, based on a study, that although health concerns have some negative impact on intention to use cell phones, perceived usefulness remains the dominant factor. This study looks at some techniques that can be used to gain some of the benefits of the use of cell phones while minimizing exposure to radiation caused by high frequency waves which transmit both data and control information for cell phone communication.

REDUCING THE AMOUNT OF 'PASSIVE' RADIATION OF CELL PHONES

Even while not in use, cell phones emit radiation to cell towers indicating their locations and registration information etc. The cell tower also periodically checks to see where the mobile phone is located. This is also done by sending electromagnetic waves to the mobile phone mainly in the form of control information.

If a cell phone is used as a wake-up alarm, it is advisable that it be placed as far as possible from human beings. It should not be placed near the head. The exchange of electromagnetic waves with the cell tower during the night could potentially cause harm to the persons near the phone.

Games and music: Some of the expensive cell phones contain many games or games that can be downloaded. Many interesting music files can also be downloaded and played on phones. These phones are sometimes given to younger children who may play the games/music for some time. During this time they may be exposed to radiation. It is advisable that if very urgent calls are not expected, a special switch, say, called the CP switch, should be installed by the phone companies on the device so when pressed, the transmission circuitry of the device can be deactivated but the circuitry for the games/music can remain active. Additionally, if the main aim is to have a portable device on which to play games, devices like the iPod © Apple Inc might be a better choice.

Children and phones: Cell phones should probably not be placed near infants and used by smaller children since their brains may be affected more by radiation exposure than adults (<http://www.cbsnews.com/stories/2005/01/13/earlyshow/main666601.shtml>). Exposure may potentially harm other body parts besides the brain.

Multiple cell phones: It is envisaged that some users may keep more than one cell phone on the body in an attempt to improve their availability. Users may also be trying to phase out an old phone and phase in a new one. Phones do not multiplex signals if when more than one is in use by the same person. The use of multiple phones could potentially double the health hazard as phones passively communicate with towers. A solution to this problem is to invent a new type of mobile phone that allows multiple SIM cards. When any of the SIM cards phone numbers

is called, only one phone responds. The mobile phone company would of course need to work out a payment scheme for subscribers of such a service. A savings may also be made by the subscriber as he can improve his availability without the expense of extra handsets.

Nearby users: Since waves do not hit a single exact location, it should be noted that persons in close vicinity of a user making an active cell phone call may be exposed to the extra radiation exposure. People should try to avoid being too near to persons making phone calls, just in case.

REDUCING THE AMOUNT OF 'ACTIVE' RADIATION FROM CELL PHONES

The increased use of text messages and reduction in the frequency and duration of voice calls can also help reduce radiation risks. Replies to text messages can be done while the CP switch is off. At a later time, these messages can then be sent when the CP switch is in the 'on' position.

The use of the loudspeaker in a phone can also help direct electromagnetic waves away from the brain. Waves radiate in a manner in which they also hit the area around the phone. There may still be reduced risk of radiation exposure but the level should be quite lower.

The Specific Absorption Rate (http://reviews.cnet.com/4520-6602_7-5020355-1.html; <http://transcripts.cnn.com/TRANSCRIPTS/051015/hcsg.01.htm>) of a phone should also be considered. A phone with a low SAR is recommended since it means that the body would absorb relatively less radiation during use. Manufacturers of phones create a SAR rating for each phone model. Further guidelines on this can be found in (<http://www.fcc.gov/cgb/sar/>).

GUIDELINES FOR CELL PHONE COMPANIES

On a more technical note, the larger the size of a cell phone 'cell' which is the hexagonal area that divides a cell phone area for coverage of a region, can be made smaller so that the power required to reach a phone can be reduced. The larger the hexagon, the more power has to be transmitted from the tower and also the more power the phone has to use as well (increase in radiation). The disadvantages of the smaller cells include: more handoffs may be necessary as phones move between cells and there would be the need for more towers (although these operate at lower power). Cell phone trees

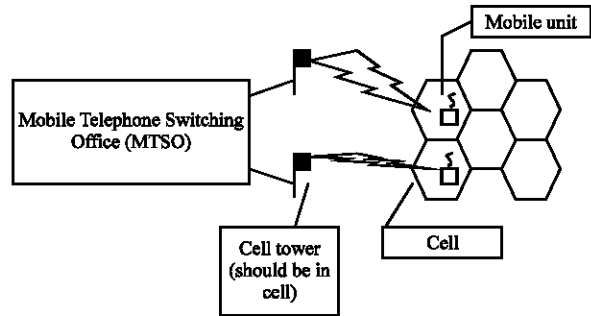


Fig. 1: Cell phone towers and communications

(<http://waynesword.palomar.edu/faketree.htm>) can help preserve the beauty of the landscape in cases where many towers are used.

Figure 1 shows how cell phone communications take place in a GSM network. The MTSO is a mobile switching centre which helps route calls to landlines or mobile units. Communication between the cell tower and the MTSO can be wired or wireless. The unit in the higher cell attempts to call the unit in the lower cell. The cell tower takes up the request and sends to the MTSO which attempts to locate the destination unit. The associated cell tower is then contacted and the call routed to the cell with the destination node. A lot of power is needed by the cell tower to cover a normal cell. By making the cells smaller as mentioned above, there would be more towers but operating at lower power, which should be safer for individuals in a cell.

CONCLUSION

Cell phones, by offering high mobility to users, together with a wide variety of electronic tools seem to be here to stay. (<http://www.geekzone.co.nz/content.asp?contentid=1245>) gives an estimate of over 2 billion users of cell phones in 2007. Given the ubiquitousness of mobile handsets etc, one needs to think about the potential health impact of the increase in electromagnetic radiation that may arise. The techniques suggested may be able to prolong good health and well-being in the case if cell phones are eventually proven to be health hazards.

It should be noted that this paper simply suggests general guidelines for moderated use of cell phones. In high-demand areas like emergency rooms and the military, cell phones may need to always be on for real time communications. The user therefore has to weigh the benefits/disadvantages of the mentioned techniques to his/her particular needs. So too must the cell phone companies.

The study also does not say that cell phones are dangerous. This is to be decided by the research. The study only proposes conservative techniques.

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