

EDMONTON PUBLIC SCHOOLS

January 11, 2011

TO: Board of Trustees

FROM: E. Schmidt, Superintendent of Schools

SUBJECT: Response to Trustee Request for Information

ORIGINATOR: D. Fraser, Executive Director, Corporate Services

RESOURCE

STAFF: Glenn Johnson, Mark Strembicke

INFORMATION

TRUSTEE REQUEST #031, NOVEMBER 30, 2010, (TRUSTEE CLEARY), PROVIDE THE FOLLOWING INFORMATION REGARDING WI-FI IN SCHOOLS.

1. Do we have information available about the real and demonstrated non-thermal effects resulting from radiation related to Wi-Fi in our schools? And if so, can I receive a summary of this information?
2. I'm aware of the Health Canada Regulation published in 1999, are there any other studies conducted over the last decade that address long term effects of Wi-Fi technology in Canadian schools?
3. What are the Canadian safety standard measurements in regard to high frequency standard measurements in regard to high frequency waves from Wi-Fi? What are alternatives to using Wi-Fi in schools and what are the pros and cons?
4. What is EPSB's position and policy on use of Wi-Fi technology in schools?
 - a. Where can the community, including parents, find the District Technology Handbook?
 - b. With the increasing awareness in the community about Wi-Fi safety, what communication has gone to parents related to the safety of Wi-Fi in our schools?

Question #1 - Do we have information available about the real and demonstrated non-thermal effects resulting from radiation related to Wi-Fi in our schools? And if so, can I receive a summary of this information? Radiofrequency (RF) Electromagnetic Energy at the frequency range of Wi-Fi transmissions has no real or demonstrated non-thermal radiation effects. The Health Canada guideline takes into account all biological effects, whether they are related to heating of the tissue (thermal) or exposure levels too low to cause tissue heating (non-thermal). For very low frequencies from 3 kHz to 100 kHz, there are biological effects of nerve and muscle stimulation, which are non-thermal in nature. At higher frequencies from 100 kHz up to 300 GHz, non-thermal effects are not well established and currently do not form a scientifically acceptable basis for restricting human exposure to RF energy. Wi-Fi frequencies range from 1.8 to 5.0 GHz.

Electromagnetic radiation is defined as waves of electric and magnetic energy that are transmitted through space and travelling at the speed of light. Electromagnetic fields are

present everywhere in our environment and are produced by both man-made and natural sources. For example, the main source of electromagnetic radiation is the sun, while other man-made items—such as hairdryers, electrical ovens, fluorescent lights, microwave ovens, stereos, wireless phones and computers—all produce electromagnetic fields of varying intensities. Electromagnetic radiation is measured in units of wavelength and frequency.

The electromagnetic spectrum arranges electromagnetic radiation according to its frequencies and impact on the human body. The electromagnetic spectrum is divided into two main categories: ionizing and non-ionizing frequencies. Electromagnetic radiation with low frequencies ranging up to 300 gigahertz (GHz) are called non-ionizing, meaning they do not breakdown chemical bonds in biological tissue, including DNA, which is the building block of genetic material in the body.

Electromagnetic radiation with very high frequencies and short wavelengths is able to produce enough energy to cause ionization, that is, it is able to breakdown chemical bonds in biological tissue, including DNA. The boundary between ionizing and non-ionizing electromagnetic radiation is the frequency of visible light, which ranges between 430 and 750 terahertz (THz). Once electromagnetic radiation reaches a frequency higher than 750THz, it is then capable of breaking chemical bonds in biological tissue. Sources of ionizing electromagnetic radiation include ultraviolet light, X-rays and gamma rays.

Based upon their scientific review process, Health Canada has determined that human exposure to RF electromagnetic radiation in the frequency range from 3 kHz to 300 GHz is safe.

Further information about low level radiofrequency and electromagnetic fields and the impact on public health is available from:

- World Health Organization
<http://www.who.int/mediacentre/factsheets/fs304/en/index.html>
- Canada Health <http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/envIRON/magnet-eng.php>
 - http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/wireless_safe-securit_sansfil-eng.php
 - <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08792.html>

Question #2 - I'm aware of the Health Canada Regulation published in 1999, are there any other studies conducted over the last decade that address long term effects of Wi-Fi technology in Canadian schools? The Government of Canada is responsible for setting the limits for safe human exposure to electromagnetic radiation from radiofrequency emitting devices in order to protect the health and safety of Canadians. The limits specified in Health Canada's RF guideline document were established from the results of hundreds of studies over the past several decades. Canada was one of the first countries to recognize the need for an RF exposure guideline document and first developed it in 1979. Since then, it has been regularly updated. The guidelines for RF exposure are based on peer-reviewed literature from reputable scientific journals, whose peer review panels are experts in this subject area. It should be noted that no single study is used as a basis for establishing the limits in Health Canada's guideline document. Rather, they are based on the bulk of scientific evidence contained in the literature.

Health Canada set limits after reviewing the results of hundreds of studies on the biological effects of RF energy. These limits are similar to those in other science-based international guidelines. The typical levels of RF energy coming from base stations, including cell phone towers, are thousands of times below the limits for public exposure. The specified limits for public exposure apply to everyone—including the elderly, individuals with health concerns, children and pregnant women—and allow for continuous, 24/7 exposure. Based on information to date and the weight of evidence from ongoing scientific literature reviewed by Health Canada scientists, the Department is confident that Canada's RF exposure limits remain current and valid.

Health Canada regularly updates its guideline document entitled *Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz*, commonly known as Safety Code 6. RF energy is used in providing radio communication services to the public, industry and government. Radio and television broadcasting, cell phones, radio communications for emergency services, weather radar and satellite communications are examples of important applications. Non-communication uses of RF energy include industrial heating and microwave ovens. Some consumer uses include baby monitors, garage door openers, cordless telephones, Wi-Fi, remote keyless car entry devices and various medical devices. As well, certain non-radio devices, including computers and other digital devices, also emit RF energy.

Health Canada re-affirmed its position in August 2010 on the safety of Wi-Fi and applicability of Safety Code 6 - http://www.hc-sc.gc.ca/ahc-asc/media/ftp/ati/2010/2010_142-eng.php, and again in October 2010 at the House of Commons Standing Committee on Health. A newly released video from Health Canada on the safety of Wi-Fi is also available - <http://www.hc-sc.gc.ca/ahc-asc/media/video/index-eng.php>.

We are not aware of studies conducted over the last decade that examine the long term effects of Wi-Fi technology in Canadian schools. In the development of Safety Code 6, models of children's bodies and brains were used to examine the potential effects of radiation exposure on tissue similar to that of a child's, as studies cannot be directly conducted on children due to ethical reasons.

Canada Health FAQ <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08792.html>

Question #3 - What are the Canadian safety standard measurements in regard to high frequency standard measurements in regard to high frequency waves from Wi-Fi? What are alternatives to using Wi-Fi in schools and what are the pros and cons? In Canada, the maximum allowable electromagnetic field density that any RF device may emit is 1,000 microwatts per square centimetre (1,000 $\mu\text{W}/\text{cm}^2$). Related to this, the maximum allowable RF power transmission for Wi-Fi equipment is $1/10^{\text{th}}$ of a watt. To put these numbers in perspective, the typical RF leakage from a microwave is 800-1,000 microwatts. Cell phone users are exposed to 500 microwatts. At a distance of 10 feet from an Aruba wireless access point (base station) used in Edmonton Public Schools, the RF emissions would be 0.045 microwatts. The RF signal strength and emissions are the same regardless of the information (beacon signal or data traffic) being transmitted. RF emissions further diminish very rapidly as distance increases from an access point.

The RF limits set by Health Canada are consistent with the methodology used in other international standards, the World Health Organization, North America and most of Europe. The wireless equipment used at EPSB operates far below the Health Canada limits and well within the limits of countries with more stringent guidelines.

Alternatives to using Wi-Fi to connect laptops and other wireless devices in a classroom would include cellular coverage or hard wired cabled connections. Neither one are good options.

In Edmonton, numerous cellular carriers are transmitting continuously, which can be detected in nearly every classroom and used for network access instead of Wi-Fi technology. Using cellular data service requires expensive data plans, and is less dependable in terms of variable speed and coverage in all parts of the city and depending on the construction materials of the building. There would be no ability to increase coverage for higher numbers of concurrent users in one location. It would also preclude our ability to provide filtered Internet access to students and to monitor usage.

Cabling every classroom (similar to a lab environment) has a number of educational and costing drawbacks. Safety standards require that connections are permanently installed, as above-floor or temporary cabling is an obvious hazard for students to trip over or damage equipment. To provide full connection coverage for every student would conservatively cost \$30,000 per classroom, when all cabling installation and infrastructure costs are included. The fixed or permanent location of cable outlets would prevent classroom configuration flexibility to re-arrange desks for group work or projects. Cabled access would not be possible in open areas, hallways, cafeterias or other gathering locations. Many “wireless only” devices such as smart phones or tablets that students own would have no network access. It would also be difficult to provide visitors or community users to the school with Internet-only access.

Question # 4 - What is EPSB’s position and policy on use of Wi-Fi technology in schools?

- a. Where can the community, including parents, find the District Technology Handbook?**
- b. With the increasing awareness in the community about Wi-Fi safety, what communication has gone to parents related to the safety of Wi-Fi in our schools?**

We believe Wi-Fi is an important part of the infrastructure to enable the use of 21st century technologies in education. Today, wireless Internet is becoming ubiquitous in homes, hotels, coffee shops, airports and public institutions such as schools, libraries and city recreation facilities. Although Wi-Fi is a relatively new communication technology, use of radiofrequency for communications and other applications is not new and widespread public exposure to these frequencies has occurred for decades. In addition to Wi-Fi, numerous other technologies also employ the RF band, including cellular phones and their base tower infrastructure, conventional television and radio signals, home cordless phones, and various consumer devices. Of these technologies, the bulk of research in RF has been on cellular phones, which have been in use longer and have much higher field strengths than Wi-Fi.

As with any equipment, service, product or supplies, Edmonton Public Schools follows all applicable Alberta and Canadian health and safety standards. With respect to Wi-Fi

technology, we are governed by and operate well below the safety guidelines set by Health Canada.

Alberta Education endorses this position for all school districts in Alberta: <http://education.alberta.ca/media/5916207/wifi%20safety%20sheet%202010-10-18.pdf>.

Health Canada provides the following regarding wireless device safety: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/wireless_safe-securit_sansfil-eng.php.

This is also supported by the fact sheet available from the World Health Organization: <http://www.who.int/mediacentre/factsheets/fs304/en/index.html>.

The District Technology Wireless Handbook is an internal district Share site <https://sites.google.com/a/share.epsb.ca/wireless-handbook/Home> for sharing technical information, best practices and ideas for the implementation of wireless in EPSB. It is intended as a planning tool for schools, not a public information handbook about the safety of wireless technologies. District Technology will create and place information about Wi-Fi use and safety for parents on a public site that schools can reference in communications with their parent communities.

In addition to the handbook for schools, District Technology has distributed two Need-To-Know News items this fall about the safety of wireless technology. Depending on the school and if any parents have inquired, schools have provided parents with information about the safety of Wi-Fi based on those materials. There have been very few inquiries to District Technology.

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