

A Tale of Two Countries

Wired vs. Wireless Internet in Schools

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Switzerland gives free Fiber Optics to Schools – WiFi is OUT

The World Wide Web was invented and developed in Switzerland and made its debut in 1994. Swiss students discovered the value of this technology long ago, as they were early adapters. Today, in Switzerland this technology brings unique learning experiences into the classroom such as video on demand (VOD) via FREE fiber optic technology.

As responsible educators we certainly want the best for our students. We want to help them become well informed, successful, contributing members in society. The Internet is definitely a technology we want students to master, so providing them with fast, secure, health effect-free access in the classroom is the future of education.

There are several ways of providing Internet access. Two common ones are LAN (Local Area Networks that are connected by wires) and WLAN (wireless Local Area Networks) also referred to as WiFi.

In Canada, wireless networks are preferred presumably because they are more convenient to use (no need for wires) and are less expensive to install. However, WLAN transmitters generate constant, pulse, digital, microwave radiation, which has been shown to have adverse biological effects at levels well below Health Canada's Safety Code 6.

Switzerland has one of the most stringent standards for microwave radiation and actively promotes low emission devices. For this reason, the Federal Department of Public Health in Switzerland prefers LAN (wired connections) to wireless. Indeed Switzerland has a much different view on the safety of wireless technology than Canada. The question is . . . Why?

Switzerland has stricter guidelines than Canada for Microwave Radiation

Switzerland is home to the World Health Organization and the Red Cross. They are also home to CERN where scientists have won Noble prizes for their research in high-energy physics. Obviously health care and high quality science and technology are valued in this country. As a result they maintain high standards to protect public health.

For example, the Swiss limits for exposure to microwave radiation—the radiation emitted by WLAN—are much more protective than those in Canada. While Health Canada allows the general population to be exposed to a power density of **1000 microW/cm²** (intensity of the radiation), in Switzerland the guideline is **10 microW/cm²** (or 1% of Canada's exposure limit).

The Canadian guidelines established by Health Canada and described in Safety Code 6 are based on a **thermal effect** and were established originally to protect soldiers working with radar. The guidelines in Switzerland are based on minimizing **biological effects** that occur whether or not there is a heating effect on the body. These biological effects occur well below the thermal guidelines.

Switzerland also identifies *Places of Sensitive Use* (German acronym is OMEN). These places include: living rooms; classrooms and kindergartens; hospitals and nursing homes; permanent jobs (where people spend more than 2.5 days per week); and playgrounds.

For these OMEN sites, the Swiss government is recommending that greater precaution be taken for long-term exposure to weak radiation. In these places, radiation from wireless microwave base stations (such as cordless phones or WLAN/WiFi) within the home, work or school environment may exceed radiation from nearby cell phone base stations and hence these devices must generate emissions as low as possible. Schools fit into this OMEN classification.

The Swiss government and the World Health Organization share the latest microwave research studies, and some of these studies are showing adverse effects. The Swiss Government and Swisscom—the government telecommunications provider—have decided to use the Precautionary Approach given our incomplete knowledge about the potential health effects to children associated with long-term, low level exposure to microwave radiation generated by a growing number of WiFi devices.

Long-term, low-level exposure to 2.4 GHz promotes cancers in rats

In North America the WiFi base station (and cordless phone base station) transmitters constantly pulse a microwave beacon signal, 10 times per second using 2.4 or 5.8 GHz frequencies. This rapid pulsed frequency is much more biologically harmful to the human body than continuous waves such as used in microwave ovens.

To date there have been no long-term, low-levels studies of 2.4 GHz radiation except on rats. In laboratory studies, rats exposed for long periods to low-level 2.4 GHz microwave radiation had an impaired immune system and developed more cancers than sham-exposed rats (Chou et al. 1992). Is this what will happen to students in the classroom exposed for long periods (6 hours daily) to low-levels of microwave radiation? The answer is we don't know for certain. Do we want to take that chance?

Swiss Government takes action

Swisscom was so concerned about the effects from long-term exposure to pulsed WiFi radiation from their Internet service provider that they filed a patent with the World Patent

Office that demonstrates a method to **eliminate the radiation that constantly broadcasts from WiFi base stations when not in use**. These methods have now been implemented into Swisscom's home portable phone system that they offer their customers. Their low radiation portable DECT phones (Digital Enhanced Cordless Telephone) may be the safest wireless portable phones in the world. Unfortunately, their WiFi solution could not be implemented because Swisscom has no control over the computer companies—such as Apple and Cisco—that produce the WiFi devices.

To introduce you to their concerns about WiFi, a copy of the patent is included in this document. Note that the patent provides information about studies that found genetic damage from constant low-level microwave radiation and they document the methods that Swisscom used to remove that radiation.

As a consequence of the Precautionary Approach, the Swiss government's telecommunication provider, Swisscom, now offers FREE fiber optic connections to schools, with the provision that the computers are hard wired via Ethernet (LAN) to connect the computers to the Internet.

Read about it on Swisscom's Web site:

<http://www.swisscom.com/GHQ/content/SAI/Internetanschluss/Anforderungen/?lang=en>

Pros and Cons – Wireless vs. Wired

IT departments often complain that wiring a classroom is **cost prohibitive** and difficult to accomplish. They are not correct in that statement. Even portable computers need to be plugged in from time to time to recharge the battery; therefore an Ethernet port can be installed with the electrical outlet to provide connectivity.

There are three benefits to wired systems:

1. Wired connections are more **secure** than wireless because they are more difficult “to hack into”.
2. Wired systems are **faster** than wireless if high-speed gigabit Ethernet connections are used.
3. Wired systems don't expose students to **microwave radiation**.

Swisscom has considerable experience with faster systems using fiber optics, as does Lakehead University in Thunder Bay, Ontario. The data rate of the Internet connection becomes critical with multiple, simultaneous users sharing large files such as videos. WiFi base stations are NOT designed to provide simultaneous high-speed connections to hundreds of computers and hand-held WiFi devices. The wireless agenda that Canadian schools are now adopting will result in a future that becomes so congested that the initial broadband bandwidth delivered to the school will eventually devolve, slowing to a crawl as with dial-up connections.

To provide the highest bandwidth possible via WiFi, some Canadian schools currently installing WiFi are using industrial-strength base stations that are radiating all the time even when no wireless devices are accessing the Internet. These base stations are more powerful and have a greater range than WiFi systems in homes.

Additionally, even higher levels of radiation are transmitted when these base stations are streaming data—such as video—to the computer or hand-held WiFi device. Students, faculty, staff and volunteers in the classroom are going to be exposed to this constant “unnatural” level of radiation, and those closest to the base station transmitters are going to be exposed to higher levels.

Furthermore, this radiation can be blocked or reflected by metal objects and absorbed or reflected by human bodies. This causes “hot” and “cold” spots in the classroom. It is virtually impossible to accurately calculate exposure levels with multiple users in a classroom. The best way to determine exposure is to measure it during peak use.

Students will also be exposed to an even greater level of constant radiation generated by their WiFi-enabled device—such as an iPad, smart phone, or laptop computer when they are downloading and uploading information. The closer students (and others) are to these devices, the higher their exposure. Indeed, the microwave transmitter may be hand-held (iPad or smart phone) or placed on their lap (portable computer) with this radiation being directly absorbed into the body. It is this direct contact that worries the Swiss government, and I will quote from their health department website:

"caution should be exercised primarily when using devices held close to the body, such as laptops, PDAs and Internet telephones."

You might read that WiFi radiation has been measured and found to be 50 times lower than cell phones. These studies did not measure the radiation from the hand-held WiFi devices nor did they measure them near the portable computers. Switzerland commissioned a detailed report on WiFi, which measured the hand-held devices and found that a PDA had a peak spatial SAR (specific absorption rate) value above the 2 W/kg limit (very similar to cell phone SAR limits).

How much is too much?

What level of pulsed microwave radiation is safe? This is the crux of the controversy. The truth is we don't know.

With this “uncertainty” in mind why is Canada rushing ahead to install WiFi in schools, even in school that currently have wired Ethernet connections?

Students in some schools with WiFi have already started to complain about headaches, difficulty concentrating, weakness and heart problems. Two students in the Barrie area are taking heart medication. One student in a Toronto school collapsed when she was standing near a WiFi transmitter. These complaints need to be taken seriously.

Obviously, parents are concerned and have asked that levels of radiation in the classroom be lowered and that the WiFi units be turned off when not in use or deactivated in rooms where computers are not used (kindergarten, for example). So far their concerns have been ignored. Why?

Schools take health issues seriously. Asbestos was removed from schools across Canada at great expense years after it was recognized to be a carcinogen. It is quite likely that WiFi will experience the same fate unless precautions are taken.

Schools protect students against second-hand smoke and those with peanut allergies by making schools “smoke-free” and “nut-free”. Schools should also be “radiation-free” to protect staff who may be pregnant and those students and teachers who may have electrohypersensitivity (i.e., adverse reaction to electromagnetic energy)?

According to the Swiss government, 5% of the Swiss population is extremely sensitive to wireless technology, and that number is growing exponentially with the addition of new wireless products.

In Canada, with approximately 5.2 millions students in elementary and secondary schools as many as 260,000 students (5%) across Canada may be adversely affected by this radiation—without even knowing it. Do we want to gamble with the health of so many students?

Health Canada maintains that thermal guidelines are sufficient to protect the public. What if they are wrong? Is this a chance we are willing to take with the health of millions of students and their teachers?

Explore Switzerland's Federal Department of Public Health web page that is devoted to WLAN (WiFi), and view their concerns and safe practices regarding WiFi. They were among the first countries to use the Internet and, judging by their conservative approach to WiFi, they may have learned from this experience. Here is the link:

<http://www.bag.admin.ch/themen/strahlung/00053/00673/03570/index.html?lang=en>

I ask you to reconsider the rapid deployment of WiFi and this is based on 15 years of my own research in this field and after having read thousands of documents showing this radiation may be harmful at low levels, substantially below the limits established by Health Canada in Safety Code 6.

Please note that I am not alone in these concerns. Scientists and Medical Doctors have signed **Resolutions** and **Appeals** asking International Agencies (ICNIRP) to reduce guidelines due to both biological and health effects. These include: The Salzburg Resolution (2000), Catania Resolution (2002), Freiburger Appeal (2002), Irish Doctors' Environmental Associate Appeal (2005), Helsinki Appeal (2005), Benevento Resolution (2006), BioInitiative Report (2007), Venice Appeal (2008) and the Porto Alegre Resolutions (2009).

Health officials in various countries have issued **warnings for children** to limit their use of **mobile phones** (cell and cordless): United Kingdom (2000), Germany (2007), France

(2008), Russia (2008), India (2008), Toronto Public Health (2008), Pittsburgh Cancer Institute (2008), Belgium (2008), Israel (2008), Japan (2008), Finland (2009), Seoul Korea (2009), and the most recent being the U.S. Federal Communication Commission (2009).

Warnings vary but generally they recommend that children under the age of 12 not use mobile phones and those under the age of 16 limit their use of these phones. If health officials in these countries are limiting children's exposure to microwave radiation from mobile phones, how can schools in Canada expose students, ages 5 to 18, to microwave radiation for hours each day?

What can you do?

While setting guidelines for radio frequency radiation is a federal issue, it does not exempt provincial, municipal, and regional health authorities from protecting the people under their jurisdiction. Nor does it exempt schools from protecting their staff and students. We look to Health Canada for guidance but we need to question the guidelines when the evidence so strongly indicates this form of radiation is harmful. In the long-term, the health cost of WiFi may far outweigh its convenience.

We often state that the life of a child is priceless and that our health is priceless. Let's act as though we genuinely believe this to be true.

See also, Supporting Material.