

## MEMORANDUM

**DATE:** June 3, 2014  
**TO:** Whom It May Concern  
**FROM:** Keith McIsaac, Network Administrator  
**SUBJECT:** Position Statement on WiFi Radiation Concerns

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### **Radiation Emitted by Wireless Networks**

Wireless networks use radio waves to transmit information between wired router stations and the wireless adapter cards in laptop computers. The radio waves emitted by WiFi networks are typically at frequencies of 2.4 Gigahertz (GHz) or 5.8 GHz - well within that portion of the electromagnetic spectrum defined to be radiofrequency radiation. This radiation is much lower in energy than ionizing radiation (e.g. the type of radiation emitted by x-ray machines), and the biological effects associated with exposure are much different.

### **Potential Hazards**

The long-recognized and well understood adverse biological effect resulting from exposure to high levels of RF exposure is tissue and cell heating. More recently concerns have been raised about whether there may be effects, including carcinogenicity, at RF levels below those levels that produce detectably harmful heating. Many studies have been conducted to determine whether there is a causal relationship between low-level radiofrequency exposure and harmful effects such as cancer and adverse pregnancy outcomes.

Most of the studies conducted to date have been on RF emissions from mobile phones. Due to the close distance between the mobile phone and the head and because of the higher power levels involved with mobile phone use, the level of exposure for frequent mobile phone users is considerably higher than the potential exposure to those persons working in areas in which WiFi systems exist. Epidemiological studies by reputable scientists have consistently failed to demonstrate convincing evidence of any adverse health effects from RF exposure below the regulatory limits and guidelines cited below. The references cited at the end of this discussion provide more detailed information regarding these studies and their conclusions.

### **Regulations and guidelines**

Exposure limits for radiofrequency radiation have been established by the Federal Communications Commission (FCC), the Occupational Health & Safety Agency (OSHA), and various states, including the New Jersey Department of Environmental Protection (NJDEP).

Additionally, the Institute of Electrical and Electronics Engineers (IEEE) and the International Commission on Non Ionizing Radiation Protection (ICNIRP) have established guidelines for exposure to RF radiation.

Click here to go to a [summary of RF field exposure guidelines](#) established by these various national and international commissions, bodies and regulatory agencies.

### **RF Field Levels due to Wireless Networks**

Various references are available to provide information about surveys of RF field levels associated with wireless networks. For example, a newly published paper entitled "Radiofrequency Exposure from Wireless LANS Utilizing Wi-Fi Technology" discusses a study in which measurements were conducted at 55 sites in four countries, and measurements were conducted under conditions that would result in the higher end of exposures from such systems. An excerpt from the abstract states "...In all cases, the measured Wi-Fi signal levels were very far below international exposure limits (IEEE C95.1-2005 and ICNIRP) and in nearly all cases far below other RF signals in the same environments." Details of this survey can be found in the references at the end of this statement.

Another survey report is available online which provides the results of a survey performed at a school in Australia. The survey included RF field measurements of 22 Wireless Access Points with various transmit power levels and access mode configurations and in classrooms, meeting rooms and other open areas to measure ambient RF levels in the environment. The Hazard Survey concluded that "All measurements were found to be well below the general public reference level with the maximum reading measured from the wireless network of only 5% of the general public reference level. The maximum environmental reading was 0.0049% of the general public reference levels and the maximum reading when 10 cm from the school notebook computers was only 1% of the general public reference level." Details of this survey can be found in the references at the end of this statement.

### **Firestone Survey Results**

In February 2007, at the University's request, a nonionizing radiation staff specialist from the New Jersey Department of Environmental Protection performed a survey of the RF levels associated with the wireless network at Firestone Library.

Most of the Access Point antennae at Firestone Library are located within ceilings and walls and are not easily accessible. Only two antennae are located in the open, and both antennae are located at distances of about 8 feet above the floor. 'Spot' RF levels in direct contact with the antennae were made in addition to spatially-averaged levels in the vicinity of the antennae. NJDEP limits for RF radiation exposure are defined specifically in terms of spatially averaged values, averaged over the dimensions of the human body, rather than for 'spot' measurements.

Measurements were also made within an OIT closet, a student carrel (because cable runs overhead and a map indicated that an antenna was located overhead), and at the ceiling in the vicinity of radiating ('leaky') cable.

One of the most noteworthy points is that the RF levels present in all locations were so low that the levels were close to the lower limit of detection of the RF survey equipment. The maximum spatially-averaged level measured was 10.9 Volts<sup>2</sup>/meter<sup>2</sup>, directly below an access point antenna. This measurement should be compared to NJDEP's allowable limit of 20,000

Volts<sup>2</sup>/meter<sup>2</sup>, spatially averaged over the dimensions of the human body. The NJDEP limit does not differentiate between exposure of the general public and occupational exposure.

## Conclusion and General Recommendations

It is the general consensus of the scientific community that the level of RF exposure due to wireless networks is so low compared to the many other RF sources in the modern environment that health concerns from WiFi exposure are not an issue. The results of the survey of Firestone Library support the data and conclusions from other WiFi surveys. We can reasonably say that the wireless networks present at Cameron University do not present a hazard to persons working or otherwise spending time in University buildings.

## References and Resources

The following references provide additional information regarding the effects and hazards of exposure to RF fields and provide information about RF exposure guidelines, standards, regulations and surveys:

Princeton University Environmental Health and Safety, [Position Statement on WiFi Radiation Concerns](#)

Foster, KR, Radiofrequency Exposure from Wireless LANS Utilizing Wi-Fi Technology, Health Physics 92: 280-289; 2007.

Lin, J, [Update of IEEE Radio Frequency Exposure Guidelines](#), IEEE Microwave Magazine; 2006.

Lin, J, [Safety Standards for Human Exposure to Radio Frequency Radiation and Their Biological Rationale](#), IEEE Microwave Magazine; 2003.

Osepchuk, JM, and Petersen, RC, [Safety Standards for Exposure to RF Electromagnetic Fields](#), Microwave; 2001

World Health Organization. [Electromagnetic Fields and Public Health: Base Stations and Wireless Technologies](#). Fact Sheet No. 304; 2006

Australian Radiation Protection and Nuclear Safety Agency. [Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz](#). Radiation Protection Series Publication No. 3; 2002.

International Commission for Non-Ionizing Radiation Protection. [Epidemiology of Health Effects of Radiofrequency Exposure](#). Environmental Health Perspectives; 2004