

Wi-Fi® and Health/Safety



Wi-Fi® is at the center of today's connected experience. Used in 25 percent of homes around the world¹, Wi-Fi continues to expand as the technology of choice for traditional home, government, schools, and business networks, as well as in industries such as smart energy, transportation, healthcare, and entertainment sectors. Today there are more than four billion Wi-Fi devices in use², and the technology is increasingly a part of people's everyday lives, allowing users to connect with each other where they want, when they want. Due to the ubiquity of Wi-Fi technology, questions about the safety of radio waves and Wi-Fi devices tend to arise from time to time. The wireless industry takes these concerns very seriously. This brochure is designed to answer questions about the health and safety aspects of Wi-Fi technology, and to share the opinions of respected, public health institutions on this topic.





What is Wi-Fi?

Wi-Fi is a flexible, short-range data communications technology used to connect devices as diverse as notebooks, tablets, handsets, consumer electronics, smart utility meters and much more.

Wi-Fi technology is widely used to provide wireless internet access in public places like airports, hotels and shopping centers, and is also used in the home and office to allow a wide range of devices to access the internet and network with each other without the need for special cables.

Wi-Fi devices use low-power radio waves in the 2.4 and 5 GHz range to transmit and receive data over the air.



Radio waves provide the benefits and enjoyment of television, radio and the increasing array of mobile communications services. Wi-Fi uses the same radio waves that are a common part of our everyday lives. The safe use of radio waves has been extensively studied for more than 60 years. This large body of scientific research is regularly reviewed by numerous independent, scientific expert panels, government agencies, standard-setting organizations and health authorities from around the world. These organizations have reached the same general scientific conclusion—to date there is no established evidence of adverse health effects from exposure to radio waves at or below the recommended limits. In recent years, several studies have specifically focused on measuring radio frequency (RF) exposure levels used by Wi-Fi networks. Scientists and governments conducted on-site studies which measured Wi-Fi networks in places where they are commonly used such as schools, home, public places and offices. For example, Public Health England (formally U.K. Health Protection Agency) completed research to assess exposure

What does the research about Wi-Fi safety say?

to children from wireless computer networking equipment used in schools. Findings from the research showed that exposures from Wi-Fi devices are small in relation to international exposure standards.³ This result is consistent with other studies about Wi-Fi that show, without exception, the levels of radio waves used by Wi-Fi are substantially below the international exposure limits.⁴ This was further demonstrated by a 2013 comprehensive review “Wi-Fi and health: Review of current status of research”, which enumerated the large number of high quality engineering studies indicate Wi-Fi signals fall well below international exposure limits.⁵ Further ICNIRP issued a 2014 statement on Wi-Fi and confirmed that “a large number of studies have been undertaken on both acute and long-term effects from HF (high frequency) exposure, such as Wi-Fi, without showing any conclusive evidence of adverse health effects. Much of this research is inferred from the mobile phone and base station literature, as it refers to a similar exposure.^{5”}

Is Wi-Fi safe to use in schools and around children?



The health, safety and protection of children are of paramount importance. Wi-Fi devices and other wireless products are subject to international exposure standards endorsed by the World Health Organization (WHO) and other health agencies from around the world. The standards are science-based, developed to protect the public and include a substantial margin of safety built into the limits. The WHO affirms that the safety margin takes into account all members of the population, including the elderly, ill, pregnant and children. In response to questions raised in Canada about using Wi-Fi in schools, Health Canada stated that Wi-Fi exposure levels are typically well below Canadian and international exposure limits

and there is no convincing evidence that they are a health hazard.⁶ Health Canada's conclusions are consistent with the findings of other international bodies and regulators including the World Health Organization, the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the Institute of Electrical and Electronics Engineers (IEEE) and Public Health England.



Who develops the limits for exposure to radio waves?

Wi-Fi is subject to the same safety requirements applied to all radio products. The standards establish exposure limits based on scientific studies, which include substantial margins of safety to protect both users and the general public. The exposure limits are developed by independent scientific organizations, such as the International Commission on Non-Ionizing Radiation Protection and the International Committee on Electromagnetic Safety of the Institute of Electrical and Electronics Engineers.

Are Wi-Fi devices in compliance with RF exposure requirements?

Regulatory agencies around the world have enacted policies and guidelines establishing RF exposure limits based on available scientific studies. Manufacturers of Wi-Fi products are required by those regulators to obtain certification from an authorized testing laboratory indicating that their products conform to those limits.

These evaluations are done in accordance with the various regulations and guidelines adopted or recommended by regulatory agencies around the world, such as the Federal Communications Commission⁷ in the United States.

What is the wireless industry doing to ensure the continued safety of Wi-Fi products?

The wireless industry continually monitors information about RF health and related regulatory or policy changes to stay informed of up-to-date research and to be sure that the public can continue to have confidence in the safety of its products. In addition, Wi-Fi Alliance[®] supported two independent research studies both published in *Health Physics*, a peer-reviewed scientific journal. The first was an independent exposure study that conducted 356 measurements at 55 sites (including schools and hospitals) in four countries around the world. This study concluded that 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.⁴ The second study, undertaken in conjunction with the Mobile Manufacturers Forum (MMF) and published in 2013, reviewed the current status of research and concluded that a significant number of high quality engineering studies confirm exposure to RF signals from Wi-Fi fall well below the international limits. The study also noted that although the studies specific to Wi-Fi signals that looked at biological endpoints are limited in number and quality, “The larger bioeffects literature and mechanistic considerations provide no basis to anticipate any biological effects from Wi-Fi exposures in users.⁵”

In addition to these efforts, the Mobile Manufacturers Forum (MMF) and the GSM Association (GSMA) also support a wide variety of international research into RF safety, with many of the research projects having been undertaken with the involvement of national and international health agencies.

What is the MMF?

The Mobile Manufacturers Forum is an international association of telecommunications equipment manufacturers. The MMF was established specifically to support ongoing international research into the safety of wireless technology in conjunction with national and international health agencies around the world.

What is the GSMA?

The GSM Association represents the interests of mobile operators worldwide. Spanning 220 countries, the GSMA unites nearly 800 of the world's mobile operators with 250 companies in the broader mobile ecosystem, including handset makers and device makers, software companies, equipment providers and Internet companies, as well as organizations in industry sectors such as financial services, healthcare, media, transport and utilities. The GSMA also produces industry-leading events such as Mobile World Congress and Mobile Asia Congress.

What is the Wi-Fi Alliance?

Wi-Fi Alliance® is a global non-profit industry association — our members are the worldwide network of companies that brings you Wi-Fi®. The members of our collaboration forum come from across the Wi-Fi ecosystem and share a common vision of connecting everyone and everything, everywhere. Since 2000, the Wi-Fi CERTIFIED™ seal of approval designates products with proven interoperability, industry-standard security protections, and the latest technology. Wi-Fi Alliance has certified more than 23,000 products, delivering the best user experience and encouraging the expanded use of Wi-Fi products and services in new and established markets. Today, billions of Wi-Fi products carry a significant portion of the world's data traffic in an ever-expanding variety of applications.

Where can I obtain more information on this topic?

To find out more information, visit any of the following websites:

Australian Mobile Telecommunications Association (AMTA), Wi-Fi and Health

www.emfexplained.info/?ID=24502

Australian Radiation Protection And Nuclear Protection Agency (APANSA), Wi-Fi and Health

www.arpansa.gov.au/radiationprotection/FactSheets/is_wifi.cfm

GSM Association

www.gsma.com/health

Health Canada, Wi-Fi Equipment

www.hc-sc.gc.ca/ewh-semt/radiation/cons/wifi/index-eng.php

International Commission on Non-Ionizing Radiation Protection (ICNIRP), Wireless Local Area Network (Wi-Fi)

www.icnirp.org/en/applications/wi-fi/index.html

New Zealand Ministry of Health, Study of Wi-Fi in Schools (2014)

www.health.govt.nz/publication/snapshot-study-wifi-in-schools

Mobile Manufacturers Forum

www.mmfai.org

Public Health England, Radio Waves and Health, Wi-Fi

www.gov.uk/government/collections/electromagnetic-fields

U.S. Federal Communications Commission

www.fcc.gov/oet/rfsafety/rf-faqs.html

Wi-Fi Alliance

www.wi-fi.org/wi-fi-and-health

World Health Organization, Base Stations and Wireless Technologies

www.who.int/peh-emf/publications/facts/fs304/en

¹Strategy Analytics, 2012

²ABI Research, August 2014

³Peyman A, Khalid M, Calderon C, Addison D, Mee T, Maslanyj M and Mann S (2011). Assessment of exposure to electromagnetic fields from wireless computer networks (Wi-Fi) in schools; results of laboratory measurements. *Health Phys*, 100(6), 594–612

⁴Foster KR, "Radiofrequency Exposure from Wireless LANs," *Health Physics* 92:280-289 (2007)

⁵Foster KR, Moulder J. "Wi-Fi and health: Review of current status of research," *Health Physics* 105(6):561-575 (2013)

⁶Health Canada, Safety of Wi-Fi Equipment, <http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/prod/wifi-eng.php> (December 2010)

⁷Federal Communications Commission, Radio Frequency Safety, <http://www.fcc.gov/encyclopedia/radio-frequency-safety>

