

Public exposure levels from WiFi systems

The ICNIRP maximum public exposure Guidelines for the 2.4 GHz main current WiFi band are:

61 volts per metre (V/m) averaged over any 6 mins	10 W/m ² averaged over any 6 minute period
>1 952 V/m is allowed in short peaks	10 000 W/m ² averaged power of any short pulse

Signal levels from WiFi and similar equipment have been calculated and measured by industry during EMC compliance testing for over 10 years. The peak signals are up to about 6 volts per metre (V/m) and environmental signals that people are exposed to in rooms with WLAN hubs typically vary from about 0.1 to 3 V/m. Nobody seems to dispute this. The levels are lower in areas in the school without the Access Points and most wireless PCs can work down to reception levels well below 0.001 V/m, though the actual laptop PC transmitter will still be transmitting a signal of about 1 V/m or more to the user.

What is under dispute is whether signals as low as these can have effects on peoples' well-being. We believe that they can and that health and well-being monitoring of children and other people who are regularly exposed to WiFi signals is urgently required.

The peak signal levels users are exposed to are generally in the range 0.2 to 2 V/m, with very short duty-cycles, resulting in low average power levels and tiny SAR absorbed power values. It is possible to have higher signals if sitting very close to the equipment, especially the Wireless Access Point.

For example, most WiFi units emit a background ~10 Hz beacon signal (a brain-wave frequency) pulsing at full power in 20 to 50 microsecond bursts even when not transferring files. In our opinion, it is quite inappropriate to time-average this by a reduction factor of 2 000 to 5 000-fold (as, for example, this HPA study will do and Foster (2007) did). If you take the peak SARs from the short pulse itself, then ICNIRP allows a 1 000-fold increase in power during this pulse (see top of this page), so this still does not address the relevant non-thermal issues.

The HPA-RPD have assessed these and found average power density levels of 220 microwatts per square metre ($\mu\text{W}/\text{m}^2$) about 0.6 metres from a laptop PC and $330 \mu\text{W}/\text{m}^2$ at 2 metres from a wireless Access Point. These translate into average signal strength levels of 0.3 and 0.4 V/m respectively, with peak levels probably in the order of 0.5 to 2.5 V/m. (December 2003, carried out by Adam Lowe, HPA-RPD, Leeds.)

In June 2005, SAEFL, the Swiss Agency for Environment, Forests and Landscape, published a report "Electrosmog in the Environment". This states signal strengths at one metre from both wireless PCs and normal strength Access Points to be in the range 0.7 to 2.8 V/m. These are in good agreement with the above figures. The report DIV 5801-E is downloadable from:

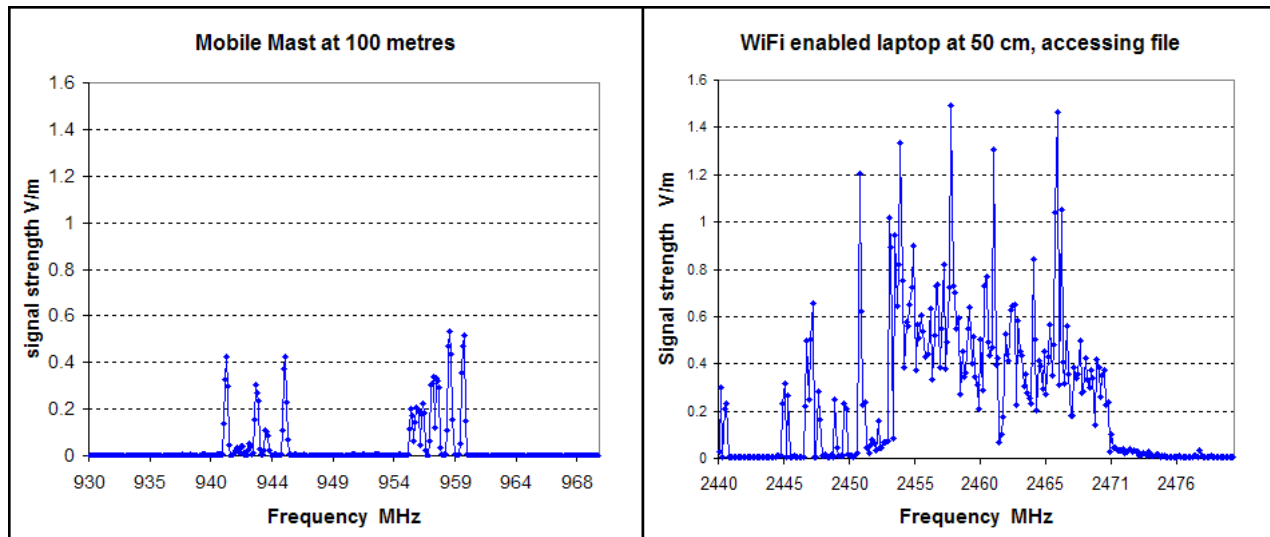
www.buwalshop.ch

An authoritative report was given by Neils Kuster, Foundation for Research on Information Technologies in Society (ITIS), Zurich, to a WHO Workshop meeting on "Base stations & wireless networks - Exposures & Health Consequences" in July 2005. ETH found that the typical peak signal strength at 1 m was about 1 V/m, rising to 2 V/m at a distance of 0.5 metres. This is in agreement with the above figures. The presentation is available at

http://www.who.int/peh-emf/meetings/archive/bsw_kuster.pdf

The UK Radiocommunications Agency commissioned a useful report (AY-4434, 2.4 GHz Monitoring Exercise) carried out by Mass Consultants Ltd in 2003. This looks in some considerable detail at microwave signals in the 2.4 GHz band and is available on the internet. www.ofcom.org.uk/static/archive/ra/topics/research/topics/other/2-4ghzbandmonitoring.pdf

The BBC1 Panorama programme asked Powerwatch to make measurements for a programme on WiFi in schools, broadcast in May 2007. Values of between 0.2 and 1.5 V/m were measured 0.5 metres in front of a laptop downloading a file over the WiFi / wLAN wireless link. This is in good agreement with the above figures. The graphs below can be found at: www.powerwatch.org.uk/news/20070529_panorama_extra.asp



The rationale behind these measurements was questioned by some people and a formal complaint made to the BBC about the Panorama programme. The BBC Editorial Complaints Unit has looked into this and has backed the programme’s radiation experiment, saying “*The programme made clear that its measurements of wi-fi and mobile phone mast radiation were taken at the points where schoolchildren were likely to be exposed to the respective signals, thus avoiding the false impression that the level of radiation from wi-fi was higher at source.*”

<http://www.bbc.co.uk/complaints/news/2007/11/30/51156.shtml>

The consistency of the measurements (typically in the range 0.1 to 2 V/m peak signal strength) made by many competent people using good quality equipment show that the levels are orders of magnitude below the ICNIRP compliance levels. The error budgets on these measurements mean that all present-day WiFi signals will be ICNIRP compliant.

That does not in any way address, or even help to address, the low-level exposure adverse health questions that are currently being asked. Powerwatch believes that we urgently need good studies looking at the health and well-being of children and other regular WiFi users.

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