WIFI TECHNOLOGY AND ITS RISKS

Pedro Belmonte Espejo
(Ecologists in Action), Spain
pedrobelmonte@msn.com

The development of computer and non-computer connected devices has allowed for growth in the installation of technologies based on radio frequencies and microwaves which permit wireless connection between various computers and/or laptops. Wifi technology (Wireless Fidelity) offers the possibility of fast connections via radio frequencies without the use of cables or sockets. Bluetooth, wifi, PDAs, WiMAX (broadband Wifi) are all technologies which permit voice and data communication without the use of cables.

These technologies (*wireless* technologies) are replacing connection cables. *Bluetooth* wireless networks with a range of 100 metres, or wifi systems with a longer range, allow us to be permanently connected. All these systems emit pulsating electromagnetic waves similar to those emitted by mobile phones.

The Spanish State adopts the specified international guideline of 5 GHz frequency for wireless systems (WiFi) connected to the fixed high-speed network. It designates a frequency of 14 GHz for possible connection to Internet from aeroplanes (American Airlines is one of the companies who have planned to incorporate this service in the third semestre of this year) and it earmarks the frequency band of 2500 to 2690 megaherz for future developments in third-generation mobile phone systems, known as UMTS.

Wifi Technologies

WiFi is the abbreviation of *Wireless Fidelity*, a set of guidelines for wireless networks (networks in which communication between components takes place via electromagnetic waves); these adhere to technical specifications in compliance with protocol IEEE 802.11 or WI-FI; this is a standard communications protocol of the Institute of Electrical and Electronics Engineers IEEE. The IEEE is a global professional association which, among other things, establishes protocols and guidelines of operation for wireless communication systems. Wifi was created for use in local wireless networks of computers, or LAN (Local Area Network), in order to access the internet.

Wifi routers emit a maximum of 100mW, but despite this, they pose a risk to the school-age population when in proximity, in particular to the head, of children of pediatric age, when the brain and nervous system are still forming. Wifi technologies emit when information is transferred. However, connecting by cable gives a better connection and faster speed. Wifi should only be used as a last resort, when it is impossible to establish a connection via cable, and only when absolutely necessary. It should not be installed in children´s bedrooms nor anywhere near the same. It´s true that a wifi router emits a lower frequency (in the order of 100mW, compared with 2W which is emitted by a mobile phone) however, in many companies and educational institutions routers emit in close proximity to people, in particular to their head. People are exposed

in a continuous and extensive manner in their workplaces, and in teaching centres during school hours.

The main problem lies in **the levels of emission/absorption of pulsating microwaves to which we are exposed.** The emissions of wifi systems add to the emissions of mobile phone systems, and are a risk to vulnerable groups such the elderly and children (when these systems are installed in, for example, teaching centres); they also pose a threat to workers in companies where employees are continually exposed to these emissions. One of the emerging risks in the European workplace is electromagnetic waves, which pose physical risks identified as very dangerous in a recent report by the European Risk Observatory for the European Agency for Health and Safety at Work (1).

Media polemic about the use of wifi technologies began in the UK, after an investigation by the programme *Panorama*, on the state-owned channel BBC, revealed the dangers that this type of technology can pose for humans. The programme centred its theory on the fact that the emissions created by these radioelectric waves are three times more powerful than those emitted by mobile phone devices, and that potential adverse effects would therefore be proportional to these. The British Department of Health and Safety wants to see an end to the debate between scientists and experts, and instead conduct a systematic study into whether emissions by wifi systems can adversely affect public health; given that in the UK the majority of computers in educational centres are connected via wifi, this is obviously a source of worry for teachers and parents of students.

The International Commission for Electromagnetic Safety (ICEMS), in its international conference: *Precautionary EMF Approach: rationale, legislation and implementation*, in the city of Benevento, Italy, (22-24th February 2006) arrived at a series of conclusions, which they summarized in the "Benevento Resolution", in which they suggest: *A promotion of alternatives to wireless systems of communication, for example: the use of fibre optic and coaxial cables* (2). ICEMS proposes that all future urban wireless systems (for example WIFI, WIMAX, broadband systems which use cable or electrical wires or similar technologies) should be subjected to a public investigation of the potential exposure to electromagnetic fields (EMF) which they cause and that, in the case of already installed systems, local councils should ensure that information is available to everyone and is regularly updated.

The University of **Lakehead, in Ontario, Canada**, has eliminated wifi connections from places where internet connection via optic fibre is not possible. Fred Gilbert, President of the University, is cautious about using such technology, saying "We don´t know what impact the use of electromagnetic waves can have on people". He based this measure on recent **studies** which show a correlation between cancer cases in animals and **humans** and these type of electromagnetic fields (3).

On the 20th July 2007, the Federal Ministry of the Environment in Germany indicated that, as a precautionary measure, systems which transfer information by cable would be given precedence over wifi systems. It advised schools and teaching centres to avoid wifi systems when possible.

In September 2007 a group of scientists, researchers and public health policy professionals released a report, named the BioInitiative Report (4). The European Environment Agency (EEA) contributed to this new report with a chapter drawn from a study by the EEA itself, entitled "Late Lessons from Early Warnings: The Precautionary Principle 1896-2000", which was published in 2001. The report documents detailled scientific evidence about the health impacts of exposure to electromagnetic radiation which are hundreds or thousands of times below maximum exposure values. The authors revised more than 200 scientific studies and research findings, and concluded that existing limit values for public safety were inadequate to protect public health. From the perspective of public health policy, based on the evidence as a whole, the creation of new maximum exposure limits is justified.

The investigators indicate that the evidence suggests that the biological effects and impacts on health can, and indeed do, occur at minimal levels of exposure, levels which can be thousands of times below existing public safety limits. Radiofrequency or microwave electromagnetic fields can be considered genotoxic (they can damage the DNA of the cells) in certain exposure conditions, including at exposure levels which are below existing safety levels.

They also warn that low levels of exposure can cause cells to produce stress proteins; they believe exposure to this type of emissions is harmful and that there is substancial evidence that they can cause inflammatory and allergic reactions and alter normal immunological functions, at levels which are permitted under existing public exposure limits.

Also in Spetember of that year, the European Environment Agency (EEA) indicated that a review of current EMF exposure limits was necessary, including those emitted by wifi systems, in accordance with the findings of the BioInitiative Working Group (5).

In November 2007, The Board of Health and Safety (CHS) of the Department of Cultural Affairs in the city of **Paris** voted in favour of a proposal calling for "**a moratorium on the installation of wifi in libraries and museums** until the health affects of wifi have been confirmed". Some associations in the city were alleging that wifi frequencies can have genotoxic effects. In December the Parisian City Council deactivated wifi installations in six of the city´s public libraries after workers complained about health problems; they cited the Precautionary Principle as their reason (6).

Professor Olle Johansson, a researcher at the prestigious Institute Karolinska of Stockholm, expressed her concern about the widespread diffusion of wifi systems, and affirmed that there are thousands of scientific articles in existence which refer to the adverse effects of radiofrequencies and microwaves.

In the federal state of Salzburg in Austria, the government has for the past few months been advising schools not to install wifi technologies, and is now considering a ban.

Conclusions

Wi-Fi antennae can be bought on the internet, making the radiation they cause harder to measure than that caused by mobile phone base stations. In practice, no one is monitoring these levels nor the numbers of online users, and anyone can set up a base station in their home. The outlook for the future is truly chaotic if the risks are taken into account.

A moratorium on the installation of wifi, at least in teaching centres, public libraries, universities and public buildings, and their substitution, in workplaces also, for ADSL systems which use coaxial or fibre optic cables, is therefore necessary.

The development of stricter control over the levels of emission/absorption of wifi antennae and systems needs to be a focussed effort involving local and regional government and regional telecommunications inspections, in order to avoid the kind of unrestrained proliferation which occurred with mobile phone systems.

Notes

1. Comments by Eusebio Rial, Director of the institution. Europa Press 1/03/2207.
2. AA. VV: Benevento Resolution 2006. Electromagnetic Biology and Medicine, Volume 25, Issue 4 2006. pp. 197-200. Francesco Boella, Francesco Mozzo, Francesco Panin, Livio Giuliani: Perspectives in risk management in Italy: the impact of WiMax and Wifi **(**PP presentation) Foundations of bioelectromagnetics: towards a new rationale for risk assessment and management. 6th ICEMS Workshop, December 17, 2007, Venice, Italy
3. Lakehead University: wifi policy policies.lakeheadu.ca/policy.php?pid=178 .
4. Carl Blackman, USA, Martin Blank, USA, Michael Kundi, Austria, Cindy Sage, USA, et alii: BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF).Release Date: August 31, 2007. 610 pp. www.bioinitiative.org .
5. www.eea.europa.eu/highlights/radiation-risk-from-everyday-devices-assessed. Published: 17 Sep 2007. The Independent. 16/09/2007(UK). The New Zealand Herald 16/09/1007(NZ).
6. www.news.fr/actualite/societe/0,3800002050,39376062,00.htm