LANCOM Systems

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LANCOM wireless LAN poses no health risk

Users of wireless technologies are frequently concerned about the possible adverse effects of electromagnetic waves on humans.

The transmission power of wireless LAN is often compared with the transmission power of mobile or cordless telephones. However, the radiation can only be compared to a limited degree since the assessment must be based on various factors such as field strength, distance, frequency and duration of exposure.

▪ What are the statutory guideline / threshold values?

The same provisions regarding possible adverse effects on health apply to wireless LAN devices as to all other wireless applications. Global threshold values relating to permissible electromagnetic radiation have been established in order to protect the general population. These are based on guidelines such as those of the International Commission on Non-Ionizing Radiation Protection (ICNIRP, 1998) and the Institute of Electrical and Electronic Engineers (IEEE, 2005) or the Council Recommendation of the European Union 1999/519/EU. The threshold value for wireless LANs in Germany is 10 W/m² at 2.4 GHz.

A number of international studies have shown that radiation caused by wireless LAN devices amounts to between 0.002% and 2% of the internationally agreed threshold values for electromagnetic radiation (depending on a number of factors such as distance from the antenna and ambient conditions). Studies conducted in Germany also demonstrate very low values. For example, the German Mobile Telecommunication Research Program initiated by the Federal Office for Radiation Protection found radiation levels from wireless LANs to be scarcely detectable at below 0.1 µW/m² to 0.2 W/m². Even the peak value of 0.2 W/m² is significantly lower than the reference value recommended by the EU.

▪ How high is the transmission power of access points?

Wireless LAN access points transmit at a maximum permissible radiated power that depends on the frequency range:

- 0.1 W in the 2400 MHz frequency range,
- 0.2 W at between 5150 and 5350 MHz when used within enclosed spaces and
- 1 W at between 5470 and 5725 MHz when used inside and outside of enclosed spaces.

According to studies conducted as part of the German Mobile Telecommunication Research Program actual measured transmission power is between 0.02 and 0.04 W in the 2.4 GHz band. Maximum values are 0.08 W and thus 20 % below the permissible maximum level.

It is also possible to reduce transmission power for all current LANCOM access points to values below 0.01 W. This contributes to a further reduction in the already very low radiated power of the wireless LAN.

What does the specific absorption rate (SAR) specify?

The specific absorption rate is the basis for assessing possible adverse health effects from wireless networks. It measures the quantity of radiated power (in watts) absorbed by the human body (in kilograms). The thresholds are

- 0.08 W/kg for the whole body and
- 2.00 W/kg for parts of the body, for example the head.

The German Mobile Telecommunication Research Program measured a local SAR value of 0.05 W/kg for direct body contact – a laptop with wireless LAN plug-in adapter in the user's lap.

How dangerous is electromagnetic radiation?

In addition to the frequency and wave length, the level of risk essentially depends on two factors:

- The field strength of the waves (radiated power and distance from the transmitter) at the place of exposure and
- The duration of exposure.

The field strength of electromagnetic radiation decreases by the square of the distance from the antenna. This means that at twice the distance from the transmitting antenna the radiated power is reduced to just one quarter. The distance from access points is generally several meters (in enclosed spaces) to several hundred meters (outside enclosed spaces). Sitting at a laptop with a wireless LAN adapter does entail greater exposure to comparatively higher electromagnetic waves, but the transmission power here of 0.1 W is significantly below that of mobile telephones with peak values of up to 2 W.

Specific effects of electromagnetic radiation are only relevant after a certain duration. Even when there is no data traffic, a wireless LAN access point continuously transmits a 0.5 ms signal every 100 ms (a beacon) so that other devices can synchronize with it. If a 0.1 W access point transmits the beacon only, the mean radiated power over time is 0.0005 W. When data is being transmitted, the radiated

power can reach 0.07 W. In contrast, mobile telephones transmit approx. 0.5 W for several seconds immediately after being switched on and approximately every 30 minutes thereafter. During a telephone call the transmission power is considerably higher, i.e. up to 2 W.

Is wireless LAN dangerous?

In today's society it is almost impossible to avoid electromagnetic waves. To completely avoid radiated power, you would have to be in a basement 30 m below ground where there is no TV, no telephone and no power cable, because these are also sources of electromagnetic radiation. The share of total radiated power contributed by wireless LANs is very low.

As a result, international scientific commissions and the WHO (World Health Organization) conclude; "Considering the very low exposure levels and research results collected to date, there is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects." (WHO, 2006)

Can wireless LAN be deployed in a medical environment?

Equipment intended for use in a medical environment must meet special requirements relating to electromagnetic compatibility. In Europe, these requirements are defined in the standard EN 60601-1-2. Here the maximum permissible radiated power is 100 mW (2.4 GHz): LANCOM wireless LAN access points meet this specification. The devices can thus be deployed in all areas of patient care, including intensive care units.

Summary

Provided the statutory thresholds are complied with, the use of wireless LANs constitute no risk to health. The radiated power from LANCOM wireless LAN access points is so low that they can even be deployed in hospitals and intensive care units, where particularly strict demands are placed on electromagnetic compatibility.

Sources:

- WHO (2006) Research Agenda for Radio Frequency Fields
  http://www.who.int/peh-emf/research/rf_research_agenda_2006.pdf
- IEEE (2006) IEEE C95.1-2005 "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz"
  ICNIRP (1998) www.icnirp.org/documents/emfgdl.pdf

- "Determination of the real field distribution of high frequency electromagnetic fields near wireless LAN installations (WLAN) in inner cities," from ARC Seibersdorf research GmbH, commissioned by the German Mobile Telecommunication Research Program, 2006
  http://www.emf-forschungsprogramm.de/forschung/dosimetrie/dosimetrie_abges/dosi_017_AB.pdf
- "Determination of human exposure caused by indoor wireless communication technologies applied in homes and offices," from ARC Seibersdorf research GmbH, commissioned by the German Mobile Telecommunication Research Program, 2004
  http://www.emf-forschungsprogramm.de/forschung/dosimetrie/dosimetrie_abges/dosi_030_AB.pdf
- "Expert report on the determination of exposure to high-frequency electromagnetic radiation from wireless networks at the University of Bremen," from nova-Institut for ecology and innovation, EMF department, commissioned by the University of Bremen, 2001
  http://www.dmn.tzi.org/wlan/wlan-emvu-gutachten-bremen.pdf
- Summary of important publications by expert committees and institutes on the subject of "Electromagnetic fields"
  http://www.bitkom.org/de/themen_gremien/38383.aspx