



Wireless devices

*Regulation for wireless telecommunication equipment * Wireless home telephones * Baby monitors
* Wireless on the Internet * Bluetooth * Comparison of SAR values*

Introduction

Do you wonder if the use of the wireless phone or WiFi brings you in contact with a strong electromagnetic radiation and implies a risk for that reason? Not every type of device transmits an equal amount of 'radiation' and the exposure to it depends on multiple factors, such as its transmitting power and distance.

Regulation for wireless telecommunication equipment

Just like mobile phones, wireless devices use radio waves to send information (data, sound, images). That is why they have to fulfill the European R&TTE directive 1999/5/EC of 9 March 1999 regarding radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE stands for 'Radio and Telecommunications Terminal equipment'). This directive lays down essential requirements to prevent interference and protect the health and safety of the user and other persons

The manufacturer needs to test his products to make sure that they meet all criteria. The limit values and the measurement procedures are described in the European standards that are harmonised under the R&TTE directive.

Limit values

Depending on their purpose of use, wireless devices operate on certain radio frequencies and have different maximum permissible transmitting powers. These frequencies and maximum transmitting powers were assigned at European level with the goal of preventing harmful interferences and to use the radio spectrum efficiently. The European regulation determines for instance how large the transmitting power of WiFi devices may be and which radio frequencies can be used by these devices.

Furthermore, limit values are determined for every type of device which the manufacturer must comply with to protect the health of the consumer against the thermal effect of radio waves. The scientific basis for determining the limit values is the recommendations of the ICNIRP (International Commission on Non-Ionizing Radiation Protection).

According to the ICNIRP the specific absorption rate value (SAR) may not exceed the following limit values:

- 2 W/kg for exposure of the head and trunk (average over 10 g body tissue);
- 4 W/kg for exposure of the limbs (average over 10 g body tissue);
- 0.08 W/kg for exposure of the whole body (a whole-body average is used).

The first two limit values are applicable for the wireless devices; the last one for the exposure to the radiation that originates from transmission towers of mobile telephony.

What is SAR?

Radio waves are known to be absorbed by the body. This means that the electromagnetic energy of radio waves is converted into heat in the body. This is called the thermal effect. Our body initiates its internal cooling mechanism as a reaction to this warming up so that the body temperature remains constant. This thermal effect only results in damage to our health when the intensity is too high.

The quantity that is used to assess the heat absorption is the Specific Absorption Rate (SAR) which is expressed in watt per kilogram (W/kg). In fact, the SAR value describes the speed at which the energy of radio waves is absorbed in the body.

The compliance of this regulation is checked by the [FPS Economy, SMEs, Self-employed and Energy](#).

Health risks

The existing limit values are established to protect against known short-term effects (thermal load). Most wireless devices have minor transmitting power and do not pose a risk of thermal damage.

There is less certainty about the fact whether other long-term effects are possible. That is why we are giving here some tips about how you can avoid unnecessary exposure.

Some people experience health problems in the use of wireless device or near high-voltage lines and electrical devices. This phenomenon is described in the section “Electromagnetic hypersensitivity” on this web site.

The following sections discuss in-depth the effect of wireless home telephones, baby monitors, WiFi and Bluetooth. We refer to the applicable legislation and discuss the applicable limit values. Subsequently, their SAR values are compared.

Wireless home telephones

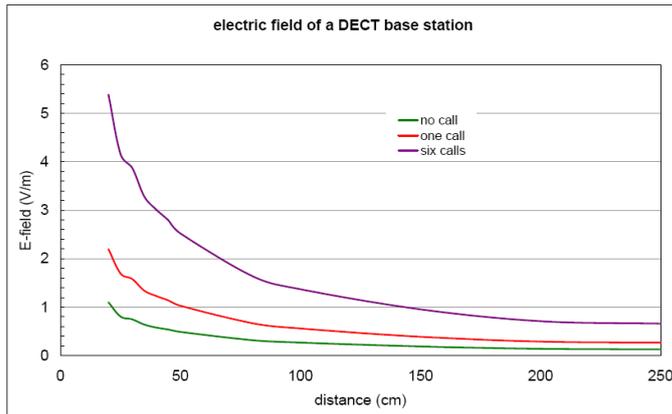
Most cordless home telephones work on the DECT system: Digital Enhanced Cordless Telecommunication. There is a wireless connection between the handset (the portable telephone) and the DECT station, the box connected to the phone network where you charge the handset.



© istockphoto

The handset only transmits a signal while calling, whereas the DECT station normally transmits a continuous signal. The signals transmitted are very weak, however. The peak capacity of both the handset and the DECT station is 250 milliwatts. The handset has an average power of 10 milliwatts. The transmission power of the DECT station depends on the number of calls: for a single call, this

is 10 mW. When 6 calls are being transmitted simultaneously, the station transmits 60 mW. If there is no call (stand-by), the station transmits 2.5 mW.



Just like mobile phones, DECT telephones must comply with the standards: the radiation may not be greater than 2 W/kg. Because the power of both the handset and the DECT station are lower than a mobile phone they easily satisfy this requirement.

Avoid unnecessary exposure

In order to avoid unnecessary exposure to electromagnetic waves, it is sufficient to place the DECT station away from resting places or work places, since the

strength of the electromagnetic field quickly decreases with distance (see abovementioned figure). You can also choose a normal telephone. Another option is to buy a cordless telephone model that doesn't transmit any signal if the handset is on the station (telephones such as Eco DECT).

Baby monitors

Most baby monitors work by means of radio waves. They are made up of a baby set and one or more parent sets. The baby set works as a transmitter, the parent set serves as receiver. In some cases both sets can function as transmitters. Most systems don't continuously transmit, but only transmit after the transmitter is activated by the baby's voice. Wireless baby monitors with video, on the other hand, continuously transmit a signal.



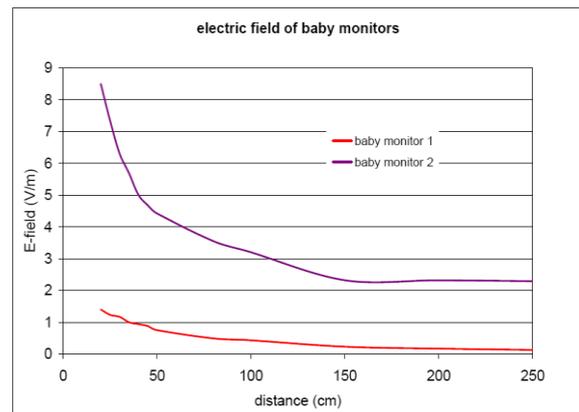
In any event, baby monitors must comply with the exposure standards: the radiation must not be more than 2 W/kg for the head and torso and 4 W/kg for the limbs.

Based on the available results from scientific research one expects no risk to the baby. However, it is still advisable to limit the child's exposure to electromagnetic fields as much as possible.

There are different types of baby monitors available on the market, with a peak capacity between 10 and 500 mW. Some work on the DECT system, but there are also others that work on other systems (wireless audio, short range radio).

On the graph, you can see the reduction of the electric field of two different baby monitors as a function of distance.

Considering that baby monitors can differ so greatly, it is advisable to carefully follow the instruction manual, to place the baby set at a sufficient distance from the crib (at least 1 m) and to use the 'voice activation' setting, among other things.



Wireless on the Internet

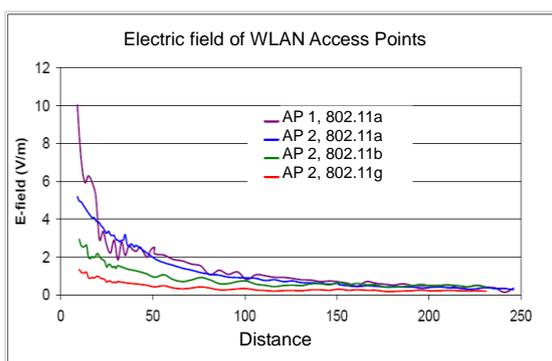
A laptop with a wifi card or a wifi adapter allows wireless internet surfing. WiFi ('Wireless Fidelity') is a popular name for technology whereby connections in a computer network are wireless within a certain range. Such a wireless network is called a WLAN or Wireless Local Area Network. Other devices can also be connected to a WLAN, such as a PDA ('personal digital assistant') or a telephone (via VoIP: 'Voice Over Internet Protocol'). The connection between all of the wireless devices is made via an 'access point.' Sometimes a wireless router (modem) serves as the access point. Devices that are connected to a WLAN can both transmit and receive



Access point
© Istockphoto

The transmitting powers of the devices and of the access point are very small and can be considered safe.

- A WiFi adapter has for instance a peak capacity of 100 or sometimes 200 mW.
- The average actual transmitting power of a WiFi adapter is always smaller than the peak capacity: the average actual transmitting power depends on the amount of data that is transmitted (the less data, the smaller the transmitting power).
- When a laptop does not transmit data, it does not send a signal. When an access point does not transmit data, a signal is still transmitted now and then (the beacon). A beacon signal has an average transmitting power of 0.5 mW.



These devices comply with the exposure standards with regard to the SAR value even for the largest possible data volume.

The electric field is used to get a good indication of the exposure because the SAR value cannot be measured just like that. Even using the maximum transmitting power and the largest possible data volume, the electric field at a distance of 20 cm is still less than 6 V/m. At a distance of one meter this has already dropped to 1.5 V/m. The graph shows how the electric field decreases with distance.

Tips to lower the exposure

In order to limit the exposure, the following simple measures can be taken:

- Only switch on your wireless network connection when it is needed. This concerns the wifi adapter in your laptop in particular. Otherwise, your laptop tries to continually connect to the network, and that leads to unnecessary exposure and decreases the life expectancy of the batteries.
- Place the access point away from places where you spend lots of time.

Bluetooth

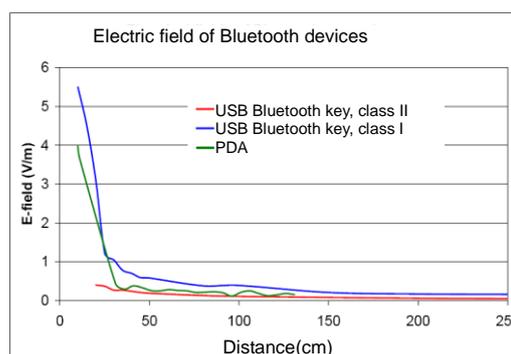


Bluetooth is used to transmit voice and data over short distances. In this way, different devices can be wirelessly connected, such as a mobile phone with a headset or a laptop with a printer or a mouse. Bluetooth is also used to monitor patients.

Bluetooth technology is divided into three power classes. Most Bluetooth applications belong to classes II and III and have a very small capacity: class II has a peak capacity of 2.6 mW, class III 1 mW. Class I is stronger (100 mW) and is used in some mobile phones to connect with the internet, for example.

It is not necessary to take precautionary measures when using Bluetooth devices in class II or III. Due to the slight radiation level, it is even advisable to use a headset in order to limit exposure to the radio waves from the mobile phone.

Bluetooth devices can also reduce their radiation levels in case of good reception. This system, called power control, is standard for class I and optional for classes II and III.



Comparison of SAR values

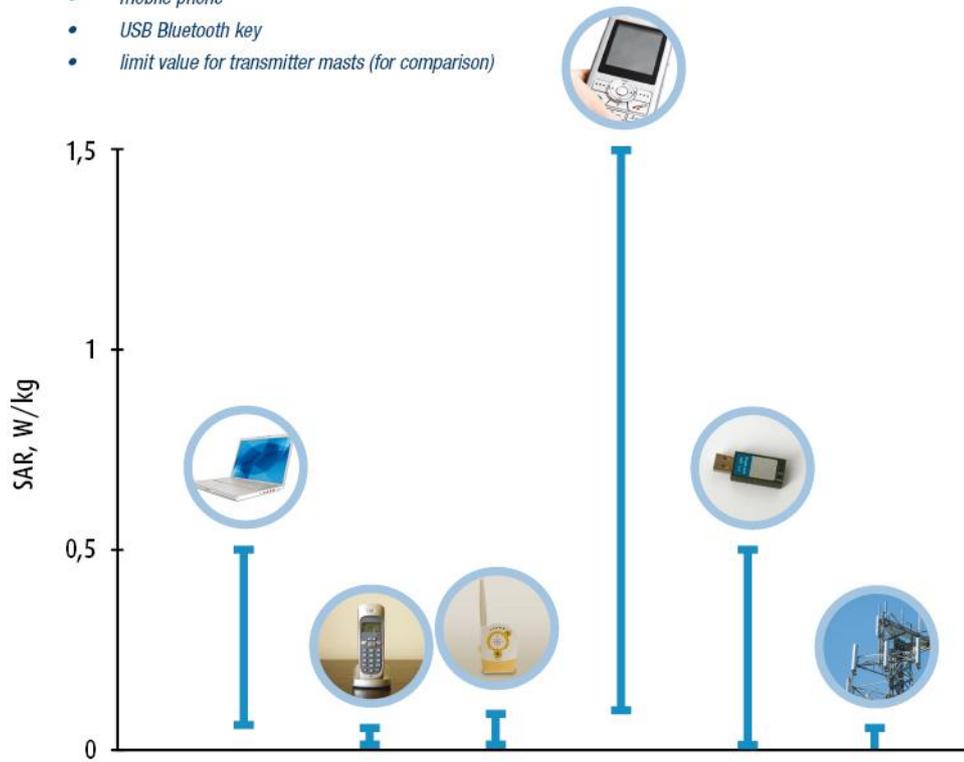
If one wants to know the level of exposure, the radiation capacity and the electrical field strength can only give an indication. One needs the SAR value to make a correct comparison.

The figure below shows the range of the SAR value for various appliances: laptops with Wi-Fi card, DECT telephones, baby monitors, mobile phones, Bluetooth adapters. On the figure you can see that the SAR of a mobile phone varies in a wide range: from 0.1 W/kg to 1.5 W/kg. The SAR value of a DECT handset is much lower than a mobile phone and varies between 0.01 and 0.05 W/kg.

The graph shows the SAR values measured in contact with the body. If a device is kept at a distance the level of exposure (the actual SAR value) is much lower than indicated on the graph. As a comparison, the graph also shows the European limit value for transmitter masts.

The SAR values for

- portable computer with Wi-Fi card
- DECT phone
- baby monitor
- mobile phone
- USB Bluetooth key
- limit value for transmitter masts (for comparison)



SAR-values for wireless devices. The bars represent the range of measured values which are frequently encountered.