



Cordless (DECT) phone

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Cordless phones consist of a base station and one or more mobile parts (handsets). The handset and the base station communicate with each other with high-frequency electromagnetic radiation. While emissions from the handset only occur during a call, the base station can also emit in the idle state.



Modern cordless telephones offer an ECO mode. When this is activated the base station, when idle, does not emit or emits only to a much lesser extent. In addition, the range of the base station (and thus the radiation strength) can be reduced in some models. During the conversation the emission of the handset (and sometimes the base station) is dynamically reduced, depending on the quality of the connection (distance between handset and base station).

Emissions from the base station and handset are very low. They lie far below the international threshold limits. The base station emissions decline rapidly with distance from the source.

The effects on health from long-term exposure to high-frequency electromagnetic fields from mobile phones and cordless phones are uncertain. Short-term effects of high-frequency radiation from cordless phones are not expected.

The following advice can be offered to people who, taking a precautionary approach, wish to keep EMFs to a minimum in their home or at work:

- Activate the low-emission mode (ECO mode) offered by modern cordless phones. Halten Sie einen
- Ensure that DECT base units without an ECO mode are placed at least 50 cm away from relaxation places or work stations occupied for long periods

The most widely used cordless telephones utilise the DECT Standard (DECT: digital enhanced cordless communication). In recent years, analogue systems such as CT1+ (Cordless Telephone 1+) have been superseded in the marketplace by the DECT standard. The following information mainly relates to DECT phones. For information on the (less widely used) WLAN telephones, relevant information may be found in the WLAN fact sheet.



1 Technical data (DECT)

A cordless phone consists of a base station and one or more mobile parts (handsets). The base station and the handset communicate by means of high-frequency electromagnetic radiation.

The base station and the, or several, handsets transmit and receive alternately. As the device only produces emissions during transmission, the emissions are pulsed (Figure 1). The low emission and energy-saving ECO mode offered by modern devices ensures that the base station only emits when telephoning. The transmitting power of the handset and the base station is automatically matched to the reception quality, hence strongly reduced for a short distance from the base station. A base station can communicate simultaneously with up to six handsets..

Range: up to 300 m outdoors, up to 50 m in buildings

Frequency: 1,88 - 1,9 GHz (high frequency)

Wavelength: approx. 16 cm

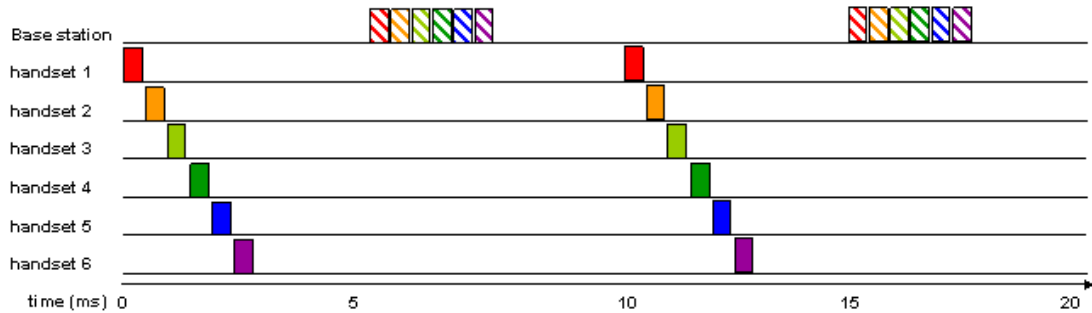
Maximum transmitting power (without ECO mode)

	Transmitting power base station (mW)	Transmitting power handset (mW)
Peak transmitting power	250	250
6 telephone calls	60	10
1 telephone call	10	10
Idle state	2,5	0

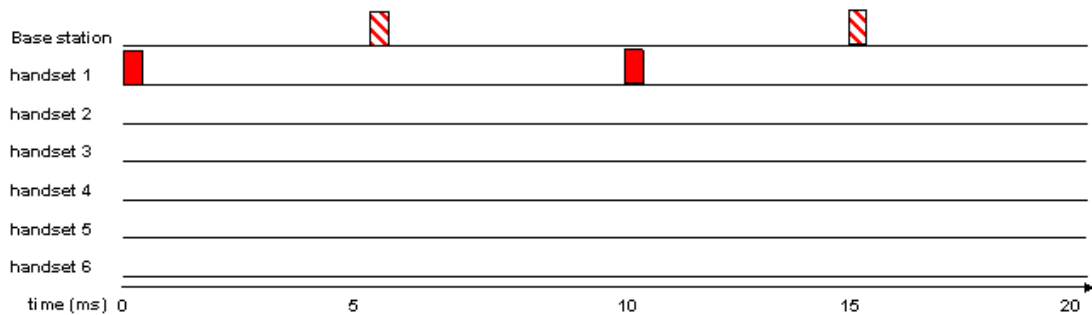


Transmission structure

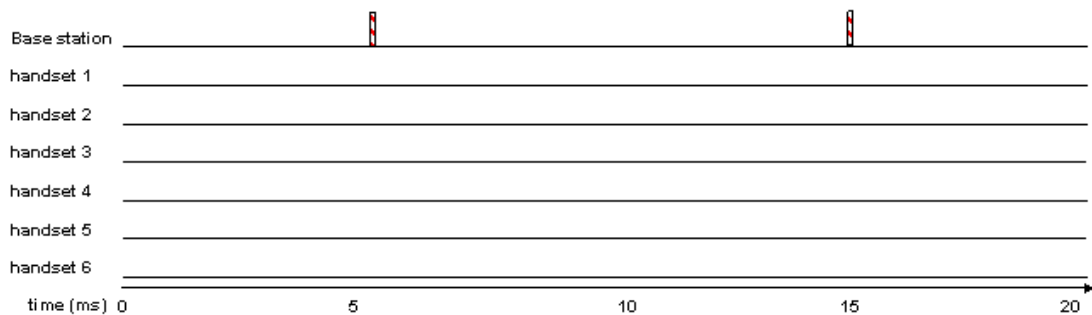
Transmission sequence for a DECT base station and 6 active handsets (6 calls)



Transmission sequence for a DECT base station and 1 active handset (1 call)



Transmission sequence for a DECT base station in an idle state (no calls)



The peak transmitting power of the base station and handset is 250 mW. Averaged over time, however, emissions are lower, since transmission is not continuous. A 10-millisecond frame is divided into 24 time-slots. When a call is in progress, a handset (e.g. the one marked in red in Figure 1) transmits during one of these time slots and receives a signal from the base station (hatched in red) during the time-slot five milliseconds later. The base station can communicate with up to six handsets simultaneously. In the idle state, when no calls are in progress, the base station transmits a brief pulse every 10 milliseconds (bottom of Figure 1). In the ECO mode, the base station emits nothing. The handset emits nothing in the idle state.



DECT CAT-iq

The DECT Standard, suitable principally for voice transmission, has been further developed. DECT CAT-iq also enables data applications such as telephoning with voice over IP, video-telephony or music streaming. The power regulation was also improved with the new standard..

2 Exposure measurements

Exposure to emissions is best described by the specific absorption rate (SAR, in watts per kilogram), which is a measurement of the electromagnetic radiation (W) absorbed by the human body (kg). In appliances operated at least one wavelength away from the body (16 cm in this case), the electric field can also be measured

Laboratory measurements



In a study carried out in 2005 by the IT'IS Foundation on behalf of the FOPH, electric fields were measured for three different DECT base stations and the SAR was determined for four different handsets [1].

SAR values were determined for the four handsets with the aid of a dummy head (Figure 2). The values measured were between 0.01 and 0.05 W/kg [1]. These values lie far below the limit of 2 W/kg [2]. One may assume, moreover, that the SAR value of modern DECT telephones in service is still somewhat smaller, as in the ECO mode the emission strength for a good connection quality (i.e. shorter distance from the base station) is correspondingly reduced.

Figure 2: Dummy head used for exposure measurements. Photo source: © <http://europa.eu.int>

The electric fields measured close to a DECT base station in the idle state and with the operation of one or more handsets are shown in Figure 3. The base station is without an ECO mode and also transmits when in the idle state. The field strength is highly distance dependent. The measured field strengths are all well below the limit of 60 V/m [2]. Even while six calls are in progress, the field strength at a distance of 20 cm is 10 times lower than this limit.

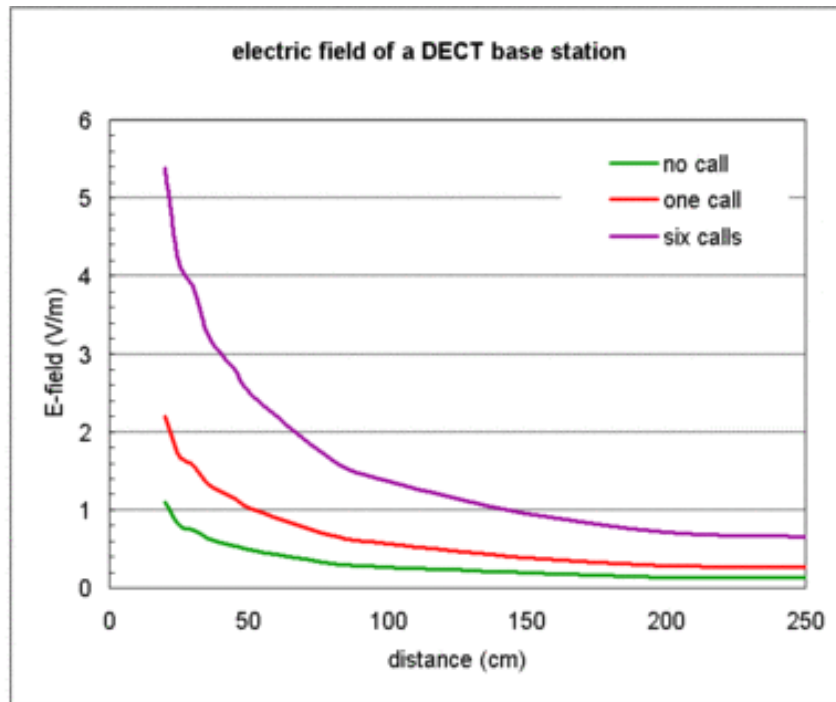


Figure 3: Electric field (E-field) over distance for different modes of operation [1]. The results are only shown for the base station for which the highest E-field values were measured.

The everyday exposure of various people to DECT telephones has been measured in various studies [3-6]. For those people who themselves own a DECT telephone, the DECT emission accounts for 25 - 50 % of the total exposure to high-frequency radiation. Exposure to DECT radiation has decreased in the last years due to the introduction of the low radiation DECT telephones [5].

3 Health effects

The limits for electromagnetic fields [2] are based on known, short-term effects of the radiation, such as heating of the tissue. The emissions from handsets and base stations are well below these limits. Accordingly, short-term health effects are not to be expected with the use of cordless telephone handsets or base stations.

The ICNIRP recommendations on limits do not, however, cover possible long-term effects of electromagnetic radiation. Such long-term effects have been investigated in a number of epidemiological studies. Although these studies mainly focused on the health effects of mobile phone emissions, several studies also include emissions from cordless phone handsets. In this regard, a German study found no association between cordless phone use - even over a period of more than 5 years - and the occurrence of brain tumours [7]. In contrast, a recent Swedish study concluded that elevated risks of brain tumours are found in particular when cordless phones have been used for many years [8]. In 2011 based on studies that saw a possible connection between telephoning with a mobile phone or a cordless telephone and the occurrence of brain tumours, the International Agency for Research on Cancer (IARC) classified high-frequency electromagnetic fields as possibly carcinogenic (Group 2B)



[9]. The overall data was found to be limited by the IARC, as these studies on brain tumours and mobile phones and cordless phones have shortcomings in regard to the study design and the estimation of the length of exposure. A connection between exposure to mobile and cordless phones and other illnesses or symptoms could not be determined. The association between unspecific symptoms of ill-health and self-reported sleep disturbances with the use of cordless phones was also investigated in some epidemiological studies. In most of the epidemiological studies, no consistent association between subjective sleep quality and cordless phone use was found [10-12].

Interference to implants: According to a study, neither base stations nor handsets cause interference with pacemakers or defibrillators [13].

4 Legal regulations

As end-user telecommunication products, cordless phones are subject to the Ordinance on Telecommunication Equipment (SR 784.101.2). This Ordinance makes reference to technical standards applicable to health protection against electromagnetic fields. These standards, issued by the European Committee for Electrotechnical Standardization (CENELEC), specify methods for measuring emissions from specific appliances. DECT handsets are covered by EN 50360 [14]. The SAR value has to be determined by the manufacturer according to the standard and must comply with the limit value. However, the SAR values do not need to be declared in the instruction manual.



5 Literature

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