



About mobile phones

Mobile phone technology

Mobile phones are low powered devices that transmit and receive radiofrequency (RF) electromagnetic energy (EME) signals from mobile phone base stations.

In Australia the frequency bands at which mobile phones transmit are 900 and 1800 MHz for the GSM (Global System for Mobile Communication) network, 850, 900 and 2100 MHz for the WCDMA (Wideband Code Division Multiple Access) and UMTS (Universal Mobile Telecommunications System) networks, 1800 for the LTE (Long Term Evolution) network, and 2400 MHz for Bluetooth.

A mobile phone base station provides coverage of one or more geographical areas, known as cells. A mobile phone network is made up of base stations operating in conjunction with the adjacent base stations. As the user of a mobile phone travels from one cell to the next, the base station will pass the call to the base station for that cell, or another depending on signal strength and the network congestion, enabling the phone call to continue uninterrupted.

Surrounding obstacles may reduce signal strength resulting in 'dead zones'. A phone user may overcome this by moving location. If a dead zone affects a large number of callers then mobile phone operators are likely to seek to adjust/relocate a base station to improve signal coverage.

Mobile phones are required to transmit signals over distances of up to 20 km. In order to minimise interference between cells and to conserve battery life, the signal strength of mobile phones is limited by the phone to the minimum required to maintain good contact with the base station. Hence, as the phone moves closer to the base station, the power emitted from the phone antenna is usually reduced.

*For further information see fact sheet 6
'About mobile phone networks'.*

Are mobile phones safe?

The weight of national and international scientific opinion is that there is no substantiated evidence that the EME emitted by mobile phone causes harmful effects. However the possibility of harm cannot be completely ruled out.

Although subtle biological effects caused by RF EME emitted from mobile phones have been reported in some scientific studies, there is no evidence that these effects lead to adverse health outcomes. The epidemiological (population studies) evidence does not give clear or consistent results that indicate mobile phone use causes disease in people. Some studies have shown an association between heavy mobile and cordless telephone use and brain cancer (most pronounced for glioma). Limitations of the methodology prevent conclusions of causality being drawn from these observations. Based on this limited evidence the International Agency for

Research on Cancer has classified RF EME as possibly carcinogenic to humans. More rigorous long-term studies are being coordinated by the World Health Organization (WHO) and Australia is taking part in this research program.

*For further information see fact sheet 1
'Electromagnetic energy and its effects'*

*See also the World Health Organization's fact sheet on
'Mobile phones', available at:
<http://www.who.int/entity/mediacentre/factsheets/fs193/en/index.html>*

Are emissions from mobile phones regulated?

Yes, all mobile phones used in Australia must comply with the Australian Communications and Media Authority (ACMA) Radiocommunications (Electromagnetic Radiation - Human Exposure) Standard 2003. The ACMA standard mandates the specific absorption rate (SAR) limit from the ARPANSA standard. The SAR is defined as the rate at which a mobile phone user absorbs energy from the handset. The ARPANSA Standard specifies exposure limits to RF EME for mobile phone handsets in terms of the SAR. In the ARPANSA Standard the SAR limit for mobile phone handsets is 2 watts per kilogram of tissue (averaged over 10 grams).

Mobile phone handset manufacturers usually include maximum SAR information in the product manuals, or in a separate brochure in the box, of new mobile phone models released in Australia. All models sold in Australia must meet the requirements set by the Australian Standard.

*For further information on the Australian standard see fact sheet 4
'The Australian RF exposure Standard'*

What can be done to minimise RF EME exposure?

Although the currently available scientific research doesn't support the claim that using a mobile phone is associated with harmful health effects there are things one can do to substantially reduce exposure.

In all mobile phones, RF EME is emitted by the handset and, particularly, the antenna. The most effective way to minimise exposure is to increase the distance between the mobile phone, or the antenna, and the user. This can be achieved by using a hands-free kit or speaker options. Users should pay attention to manufacturers' advice regarding spacing from the body if phones are to be attached to belts or placed in pockets. Other things that can be done to minimise RF EME exposure from mobile phones include:

- not using a mobile phone when a normal wired phone is available,
- sending a text message instead of making a voice call,
- limiting the duration of the calls that are made from a mobile phone, and
- using a mobile phone in an open area, not inside a vehicle, so that the phone receives a good signal and transmits at a lower level.

Currently there are a number of protective devices or "shields" available on the market which claim to protect the mobile phone user from electromagnetic radiation emissions. Scientific evidence does not indicate any need for such devices since they cannot be justified on health grounds and their effectiveness in reducing exposure in everyday use is unproven.

Mobile phones and driving

There is published evidence suggesting an increase in the risk of traffic accidents while the driver is engaging in a mobile phone conversation. This driving impairment seems to be unaffected by the mode of phone use (i.e. conventional hand-held or hands-free). It is illegal in all Australian states and territories to use a hand-held mobile phone while driving.

For further information on mobile phones and driving see fact sheet 7 'What about using a mobile phone while driving'

What about hospitals and aircraft?

RF EME emissions from mobile phone handsets can interfere with the normal operation of electronic medical equipment used for patient monitoring, diagnosis and therapy. Visitors to hospitals should follow hospital rules on mobile phone use.

For similar reasons, when travelling in an aircraft, passengers are asked to turn off mobile phones and other devices to eliminate the possibility of interference to aircraft navigational equipment.

For further information on interference see fact sheet 8 'Potential interference of mobile phones with pacemakers, hearing aids and other devices'

What about cordless phones?

Cordless phones range from low powered devices, transmitting signals over relatively short distances, to devices with power outputs similar to mobile phones. Both the handset and base station are radio transmitting devices. The weight of evidence doesn't suggest that the use of cordless phones poses a health hazard although the possibility of harm cannot be ruled out.

(Revised: November 2011)

Fact sheets in the EME series are:

- Fact sheet 1: *Electromagnetic energy and its effects*
- Fact sheet 2: *Government action on electromagnetic energy public health issues*
- Fact sheet 3: *Australian research into EME*
- Fact sheet 4: *The ARPANSA RF Exposure Standard*
- Fact sheet 5: *About mobile phones*
- Fact sheet 6: *About mobile phone networks*
- Fact sheet 7: *What about using a mobile phone while driving*
- Fact sheet 8: *Potential interference of mobile phones with pacemakers, hearing aids and other devices*
- Fact sheet 9: *What about base stations and telecommunications towers - are there any health effects?*
- Fact sheet 10: *What about broadcast towers - are there any health effects?*
- Fact sheet 11: *Mobile phones and children*

For further information you can visit the ARPANSA web site at:

<http://www.arpansa.gov.au>