Australian Government
Australian Radiation Protection and Nuclear Safety Agency

Committee on Electromagnetic Energy
Public Health Issues

Fact Sheet

EME Series No. 9

What about base stations and telecommunication towers – are there any health effects?

What does a telecommunications tower do?

Telecommunications towers support a range of services including mobile phone base stations, and single channel customer connections such as microwave links that support Airservices Australia, Police, Defence, electricity organisations, railways and telecommunications carriers.

The actual structure varies depending on its purpose. For instance a tower can be in the form of a pole, lattice tower or guyed mast. The actual tower will either act as an antenna itself or support one or more antennas on its structure, including microwave dishes.

What does a mobile phone base station look like?

A mobile phone base station is often a self supporting structure such as a robust concrete pole or a lattice tower that houses a single or multiple antennas. The majority of mobile phone base stations have a number of directional antennas, which appear as vertically elongated rectangular panels.

These antennas are often located at or near the top of the base station mounted in groups on a triangular or rectangular frame. Each group of antennas services a separate geographic area, known as a cell. The cells operate in conjunction with surrounding cells and towers to create a mobile phone network.

Base stations that service low demand areas can use omnidirectional antennas, which appear as long poles on top of the mast.

Low impact facilities are also base stations but they tend to be panel antennas on rooftops, road signs and building facades.

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

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619 Lower Plenty Road
YALLAMBIE VIC 3085
Phone +613 9433 2211
Fax +613 9432 1835

E-mail: info@arpansa.gov.au
Web: www.arpansa.gov.au
Freecall: 1800 022 333
(a free call from fixed phones in Australia)

What technical requirements do carriers have to meet when siting a mobile phone base station and telecommunications tower?

Telecommunications carriers have a number of requirements to fulfil when selecting a site for mobile phone base stations and telecommunications towers.

Since telecommunications towers transmit radio signals, which travel in straight lines, it is desirable to have a clear path between the transmitter and receiver in order to reduce interference. The higher the tower is sited, the greater the range at which the signal can be received. This is the reason why antennas are placed on hills, buildings and tall structures.

Mobile phones usually transmit to the closest mobile phone base station. Since each base station can only handle a finite number of users at any one time, a tower can become overloaded if there is a high demand for service. An overloaded tower causes users to experience 'drop-out' or poor quality signals. To overcome this problem, additional mobile phone base stations are built to service the extra load. In addition, mobile phone base stations limit their area of coverage by transmitting at lower power, to avoid interference with other mobile phone base stations.

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

Are there any potential health effects?

Mobile phone base stations and telecommunications towers produce weak radiofrequency (RF) electromagnetic energy (EME) exposure levels. The weight of national and international scientific opinion is that there is no substantiated evidence that RF emissions associated with living near a mobile phone base station or telecommunications tower poses a health risk.

Levels of RF EME from mobile phone base stations are well below the limits specified by the Australian Communications and Media Authority (ACMA). In fact, a nationwide study published in 2000 by ARPANSA found the typical exposure level from mobile phone base stations is hundreds and sometimes thousands of times below the regulated limit.

The World Health Organisation's current advice is:

> *"None of the recent reviews have concluded that exposure to RF fields from mobile phones and their base stations cause any adverse health consequences."*

Health effects that have been shown to result from exposure to high levels of RF EME relate to heating, electrostimulation, and ocular and auditory effects. The ARPANSA Radiation Protection Standard "*Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz*", which sets public and occupational limits of exposure to radiofrequency radiation, is designed to avoid any known adverse effects where people are exposed to RF EME. Compliance with these exposure limits is a condition of radiocommunications licenses issued by ACMA. Such licences authorise the operation of mobile phone base stations.

For further information on potential health effects see fact sheet 1 'Electromagnetic energy and its effects'.

(Revised: November 2003)

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

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