

# Understanding EME & Radio Communications

## Introduction

Some people are concerned about the effect that our network has on their health. This document seeks to inform you about mobile communications and health issues.

*“The weight of national and international scientific opinion is that there is no substantiated evidence that living near a mobile phone antenna causes adverse health effects.”<sup>1</sup>*

## Understanding EME & Radio Communications

CSL places high importance on effective and responsible management of EME issues.

CSL acknowledges some people are genuinely concerned about possible health effects from the EME generated by radio frequency technology and is committed to addressing these concerns responsibly.

This document offers information about EME, how mobile networks and mobile phones operate, what the safety standards are for mobile phones and network infrastructure, and how CSL operates its networks responsibly in order to minimise community impacts.

We also recommend you visit the [EMF Explained](#) web site which is an information resource for people interested in a better understanding of radio frequency electromagnetic fields (EMF) and wireless issues.

---

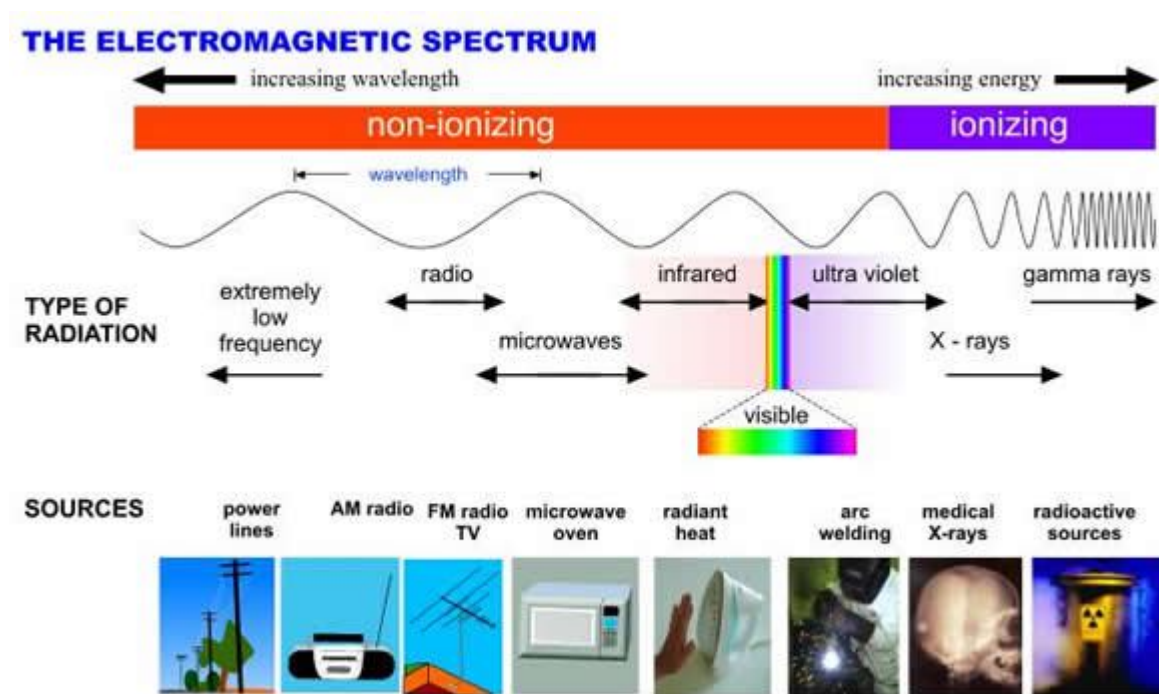
<sup>1</sup> <http://www.arpana.gov.au/pubs/eme/fact6.pdf>

## What is EME?

Electromagnetic energy (EME), also known as electromagnetic radiation (EMR), is the energy stored in an electromagnetic field. It occurs naturally - the earth, the sun, and the ionosphere are all natural sources of EME in our every day lives.

All forms of EME are collectively referred to as the electromagnetic spectrum. The properties of EME vary with wavelength or frequency and EME from different parts of the spectrum interacts with matter differently. For example, UV light interacts with matter differently to radiofrequency signals.

The electromagnetic spectrum has been harnessed to create a wide range of technologies including radio communications, television, electric power, radar, microwave ovens, magnetic resonance imaging, toasters, cameras, lasers and X-ray machines.



The word "radiation" often brings to mind radioactive materials and x-rays. However, radiofrequency EME does not behave like the radiation from radio active material or x-rays. Radiofrequency EME is transmitted by communications systems as *radio*

waves - electromagnetic waves that have the capacity to transmit sound, music, speech, pictures and other data invisibly through the air.

The World Health Organisation (WHO) makes the distinction between different types of electromagnetic energy:

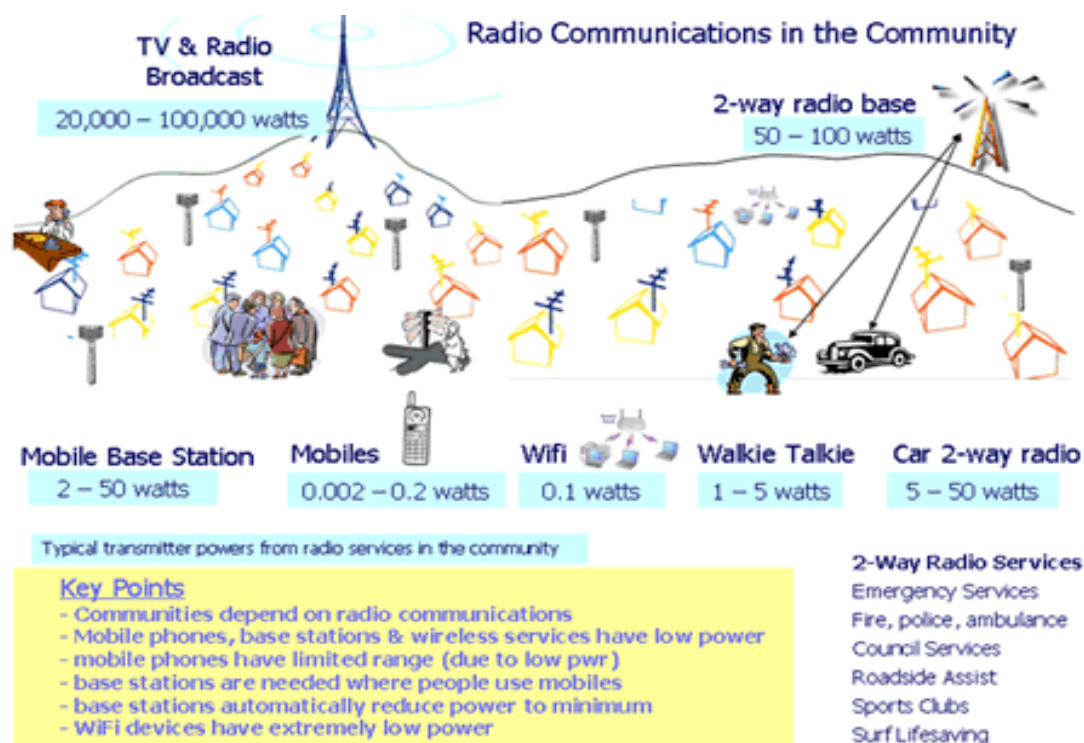
*"It is important not to confuse such RF fields with ionizing radiation, such as X-rays or gamma rays. Unlike ionizing radiation, RF fields cannot cause ionization or radioactivity in the body. Because of this, RF fields are called non-ionizing."*<sup>2</sup>

### **What is radiofrequency EME?**

All radio communications systems utilise EME in the radiofrequency (RF) part of the electromagnetic spectrum between 3 kilohertz (kHz) and 300 gigahertz (GHz). These include TV, AM & FM radio broadcasting, mobile phones and their base stations, paging services, cordless phones, baby monitors, police radio, fire and ambulance services.

---

<sup>2</sup> Source: WHO Fact Sheet: Electromagnetic Fields and Public Health - Mobile Telephones and their Base Stations, 2000.



This picture shows the typical power of the radio services in the community when transmitting.

### Common Sources of RF EME

People have been living with radiofrequency energy in the environment for generations, since the invention of "the wireless". The principles of radio communications and its first technologies date back to the 1880s.

### Radiofrequency in History

Year	Milestone
1895	Guglielmo Marconi transmits his first radio signal

<b>1906</b>	Lee De Forest invents AM radio
<b>1920s</b>	AM radio commercially broadcast to mass audiences
<b>1925</b>	John Logie Baird and Charles Jenkins experiment with television - transmitting the first live pictures
<b>1930s</b>	FM radio is commercially broadcast United States Navy pioneers military radar technology
<b>1957</b>	TV is introduced to Hong Kong Robert Adler invents the first remote control, the "Zenith Space Commander"
<b>1973</b>	Martin Cooper makes the first ever call on a hand-held mobile phone
<b>1970</b>	Colour TV is introduced to Hong Kong
<b>1983</b>	CSL introduces the first mobile telephone system to Hong Kong

You can find all licensed radio communications in Hong Kong on the website of [OFTA](#).

### **EME and Mobile Communications**

Mobile phones use a low-powered radio signal to communicate with the mobile and public telephone networks. Mobile network base stations also transmit and receive low-powered radio signals to communicate with mobile phones.

The health impact of these radio signals is assessed in two ways. Firstly, it is assessed in terms of the direct impact on the mobile phone user. Secondly, it is assessed in terms of the ambient impact of radiofrequency signals in the environment on the general public.

For a mobile phone, mandatory safety standards limit the amount of radio frequency energy that can be absorbed in a person's head or body. For a base station, mandatory safety standards limit strength of the signal (or radiofrequency EME) that people can be exposed to in accessible areas.

### **EME Safety Regulations**

In Hong Kong mobile network communications are regulated by the Office of the Telecommunications Authority (OFTA). As a safety precaution, OFTA has adopted the International Commission on Non-Ionising Radiation Protection Guidelines regarding the acceptable exposure limited to EMF.<sup>3</sup>

### **Is it safe to live and work close to radiofrequency transmitters?**

CSL is required by law to ensure that the level of EMF of our transmitters is within the limits stipulated by the Code of Practice issued by OFTA:

*“Despite densely-packed transmitters on some rooftops in residential areas the buildings are absolutely safe to live in.”<sup>4</sup>*

### **Assessment of Possible Health Impacts**

---

<sup>3</sup> Source: OFTA website.

<sup>4</sup> Source: OFTA website

Safety standards are based on careful analysis of the scientific literature (both thermal and non-thermal effects) and are designed to offer protection against identified health effects of EME with a large in-built safety margin.

The WHO (World Health Organisation) and other public health authorities advise that there is no substantiated scientific evidence that radiofrequency technologies that operate within national and international safety standards, including mobile phones and base stations, cause health effects.

### *Base Stations*

*"No adverse health effects are expected from continuous exposure to the RF radiation emitted by the antennas on mobile telephone base station towers."*<sup>5</sup>

### *Mobile Phones*

*"There is no clear evidence in the existing scientific literature that the use of mobile telephones poses a long-term public health hazard (although the possibility of a small risk cannot be ruled out)."*<sup>6</sup>

### *The WHO provides the following advice:*

*"To date, all expert reviews on the health effects of exposure to RF [radiofrequency] fields have reached the same conclusion: there have been no adverse health consequences established from exposure to RF fields at levels below the*

---

<sup>5</sup> Source: [ARPANSA](#) website

<sup>6</sup> Source: [ARPANSA](#) website

*international guidelines on exposure limits published by the International Commission on Non-Ionising Radiation Protection (ICNIRP, 1998)."*<sup>7</sup>

*The WHO also provides the following conclusions from scientific research:*

*"In the area of biological effects and medical applications of non-ionizing radiation approximately 25,000 articles have been published over the past 30 years. Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research."*<sup>8</sup>

### **Is it safe to use hand held mobile telephones?**

Because of the low power of transmission, a hand-held mobile phone generates only a small amount of power. Many studies have concluded that there is no evidence that mobile phones bring hazards to health when used under normal operating conditions. In order to assure the consumers that the mobile phones they use comply with internationally accepted safety standards on radiofrequency radiation, all models or types of mobile phones must be approved by OFTA to comply with acceptable limits.<sup>9</sup>

---

<sup>7</sup> Source: World Health Organisation Clarification Statement: Children and Mobile Phones, 2005

<sup>8</sup> Source: WHO website.

<sup>9</sup> Source: OFTA website.