Spectrum Illustrated

A guide to major spectrum allocations in Australia

The spectrum is a continuous range of electromagnetic radiation extending from the longest radio waves through infra-red, visible light, ultra-violet and X-rays to gamma-rays.

The radiofrequency spectrum is that part of the total spectrum which is used for transmitting radio waves. The radiofrequency spectrum is a natural resource that is used but not consumed. It is used by being occupied by a radiocommunications device and the efficiency of its use depends on coordination among users in order to minimise interference to each other.

The use of the radiofrequency spectrum has been, and will continue to be, a key economic, social and cultural enabler for the development of Australia.

The radiofrequency spectrum is divided into several broad frequency bands as follows:

VLF	Very Low Frequency	3–30 kHz
LF	Low Frequency	30–300 kHz
MF	Medium Frequency	300–3000 kHz
HF	High Frequency	3–30 MHz
VHF	Very High Frequency	30–300 MHz
UHF	Ultra-High Frequency	300–3000 MHz
SHF	Super-High Frequency	3–30 GHz
EHF	Extremely-High Frequency	30–300 GHz

Each of these bands is divided into sub-bands which are allocated to particular services such as land mobile radio, broadcasting, aeronautical, maritime or space services.

Most sub-bands are allocated to more than one service. Illustrated on this chart are the major allocations and high profile uses for each band. Not all allocations are shown. For more details of frequency allocations reference should be made to the Australian Radiofrequency Spectrum Plan available from the ACMA website (www.acma.gov.au).

Radio waves can be described by either frequency or wavelength. Frequency and wavelength are related by the speed of light; as the frequency increases, wavelength decreases. The wavelength of a radio wave affects the physical size of antennas needed to transmit and receive it. Longer wavelengths require larger antennas than shorter ones. The approximate wavelength at each broad frequency band edge is shown on the chart. This is accompanied by a visual representation of the change in wavelength as frequency increases (note this does not correspond to the true wavelength).

Longer wavelength radio waves can also propagate further before becoming too weak for reception than radio waves with shorter wavelengths.

The interplay between frequency, wavelength, antenna size and propagation range results in certain services favouring certain frequency bands. For example, personal mobile communication services such as mobile phones or PDAs favour frequencies in the range of about 500 MHz to 3 GHz as this gives a good balance of propagation range with antenna sizes that can easily be built into a handheld or pocket sized device.

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The Australian Communications and Media Authority (ACMA) is responsible for the regulation of broadcasting, the internet, radiocommunications and telecommunications.