



3. Modulation

Carrier Wave

In free space the relationship between frequency (f) and wavelength (λ) is given by:

$$v = f\lambda$$

Using this, complete the following table (assume $v = 3 \times 10^8$ m/s):

Frequency (kHz, MHz, GHz)	Wavelength (nm, μ m, mm, cm, m)	Radio wave classification (see Appendix)
1 GHz	0.3 m	UHF
10 GHz		
100 MHz		
1 MHz		

An FM radio station uses 94.3 MHz. If the antenna is half a wavelength long, what will the length of the antenna be:

BBC Radio 5 is broadcast on 909 kHz. What is the wavelength of the transmitted signal:

Appendix

The following are some classifications for radio

- Extremely low frequency. ELF 3-30 Hz. 100,000 km - 10,000 km
- Super low frequency. SLF 30-300 Hz. 10,000 km - 1000 km
- Ultra low frequency. ULF 300-3000 Hz. 1000 km - 100 km

- Very low frequency VLF 3-30 kHz. 100 km - 10 km
- Low frequency. LF 30-300 kHz. 10 km - 1 km
- Medium frequency. MF 300-3000 kHz. 1 km - 100 m
- High frequency. HF 3-30 MHz. 100 m - 10 m
- Very high frequency. VHF 30-300 MHz. 10 m - 1 m
- Ultra high frequency. UHF 300-3000 MHz. 1 m - 100 mm
- Super high frequency. SHF 3-30 GHz. 100 mm - 10 mm
- Extremely high frequency. EHF 30-300 GHz. 10 mm - 1 mm
- Tremendously high frequency. THF 300-3,000 GHz. 1 mm - 100 μ m.