

## How do I?

### An occasional series

### This week: Waves and Bands

The electromagnetic spectrum can be hard for some to grasp. Frequency and bands and wavelength can be equally hard to understand.

Let's start with the electromagnetic spectrum. The simplest explanation is this is all of the "rays". Visible light "sun rays", and invisible "UV rays", X-Rays, micro-waves, the wireless signal that controls your TV, the wi-fi system you may use to access the internet, GPS, radio, TV, etc all have their place.

### Wavelength

A wavelength is the physical length of a wave from the peak on 1 wave to the peak on the next wave.

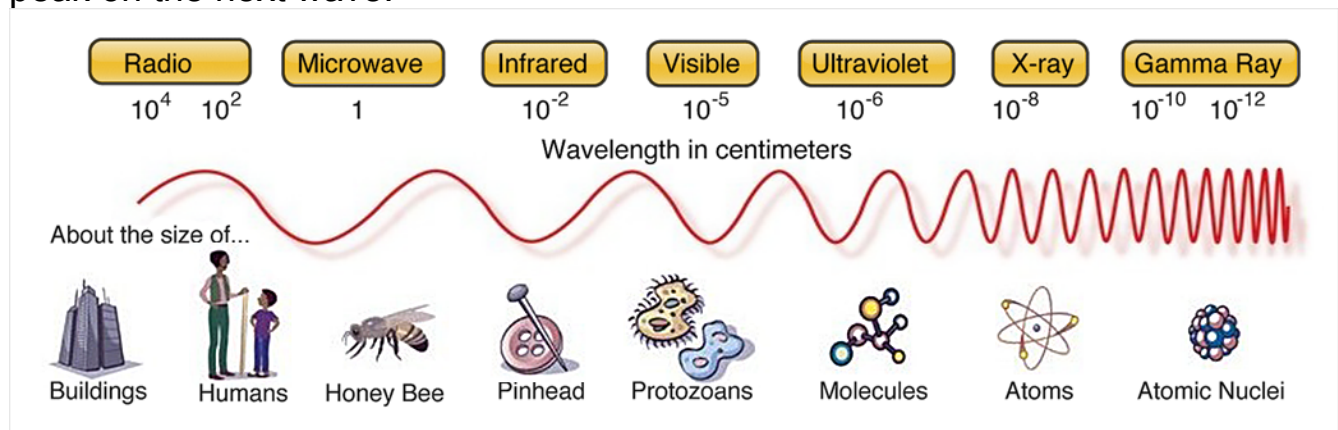


Figure 1 <https://theprepared.com/survival-skills/guides/beginners-guide-amateur-ham-radio-preppers/>

In amateur radio we typically speak of wavelength in terms of meters: 160 meters, 80 meters, 60 meters, 40 meters, 30 meters, 20 meters, 17 meters, 15 meters, 12 meters, 10 meters, 6 meters, 2 meters. 220 MHz is 1.25 meters. 0.70 meters is rather awkward so for the 440 mhz band we typically just call it "440 MHz" or "70 centimeters". In the microwave portion below 70 cm we typically speak of "# gigahertz" or the wavelength "23 cm" for example.

A single wave on 160 meters is 160 meters long, over 1 1/2 football fields. Ten

meters is around 33 feet long and 2 meters is a basketball player!

## **Bands**

A band is simply a block of frequencies sorted by wavelength.

These are defined by government, typically through international treaties as radio waves do not know about boundaries on a map. For example the 20 meter HF band begins at 14.000 MHz and ends at 14.350 MHz. Depending on your license class, and mode of operation, your segment of the 20 meter band may be a lot smaller. The ARRL has a downloadable US Amateur band plan PDF on their website and some radio manufacturers may distribute printed copies at hamfests.

The band is called 20 meters because that is how long a single wave is. The frequency is the number of wavelengths per second.

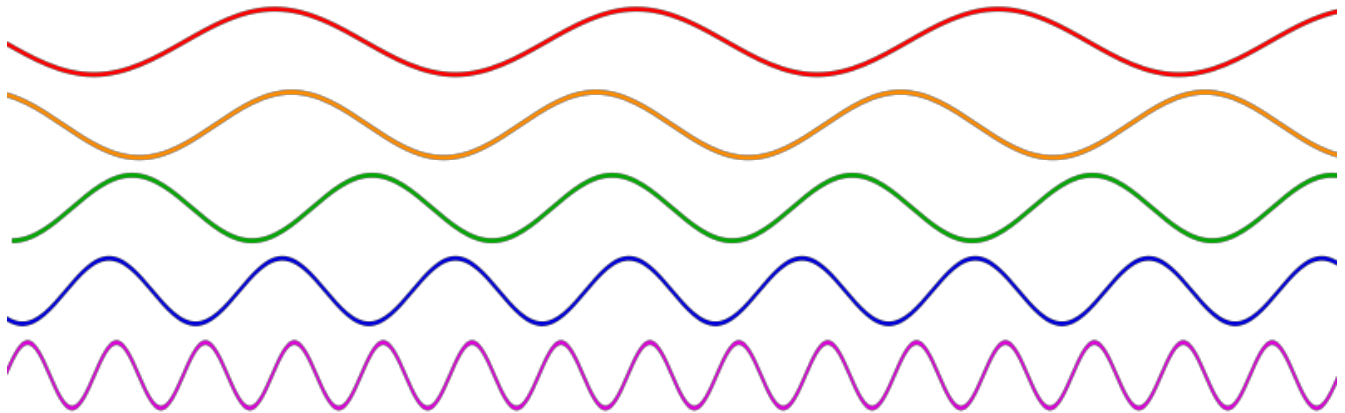


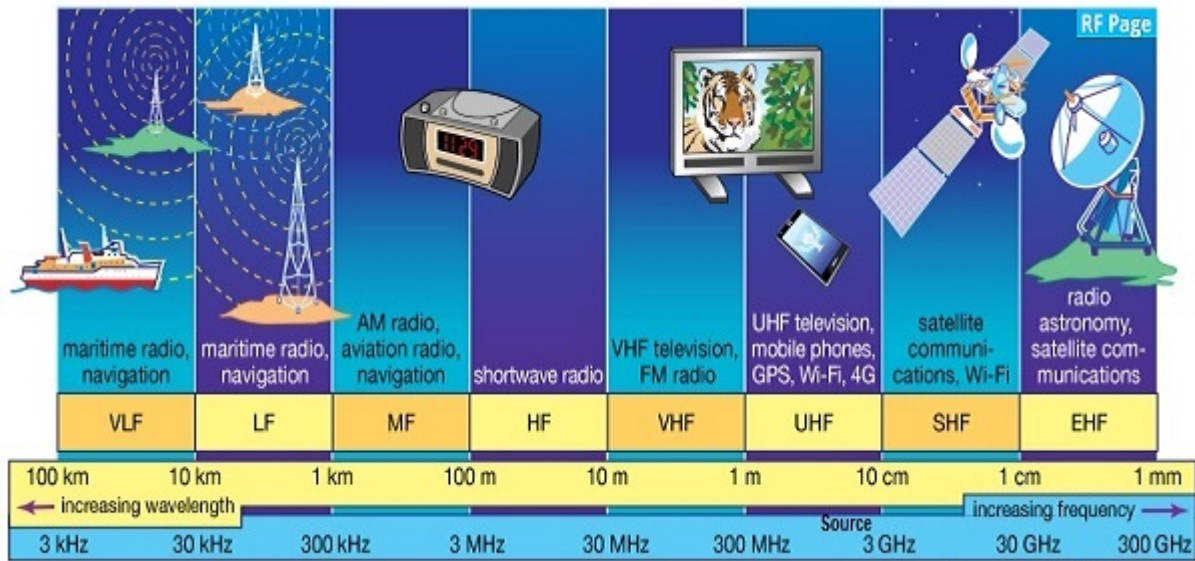
Figure 2 <https://theprepared.com/survival-skills/guides/beginners-guide-amateur-ham-radio-preppers/>

In figure 2 the red line has a much lower frequency than the purple line. A Hertz is one wave. k, M and G are kilo, Mega and Giga. One megahertz is one million waves. So 14 Megahertz is 14 million waves per second.

## **Frequency**

The frequency is the number of waves per second. The longer the length of a wave, the lower the frequency. So a 80 meter wave will be about 240 feet long and there are between 3.5 and 4 million waves per second. A two meter wave is only 2 meters long but there will be between 144 million and 148 million waves per second!

Frequency is typically defined as low, or high, with modifiers to describe how low or high: Ultra low, Medium high, Very high, etc.



Source: Encyclopaedia Britannica, Inc.

Figure 3 <https://theprepared.com/survival-skills/guides/beginners-guide-amateur-ham-radio-preppers/>

Catch ya on the air!