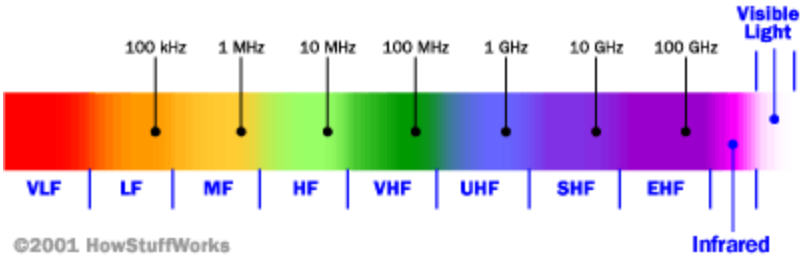
Radio Frequencies

A radio wave is an **electromagnetic wave** propagated by an **antenna**. Radio waves have different **frequencies**, and by tuning a radio receiver to a specific frequency you can pick up a specific signal.



In the United States, the FCC (Federal Communications Commission) decides who is able to use which frequencies for which purposes, and it issues licenses to stations for specific frequencies. See How Radio Works for more details on radio waves.

When you listen to a radio station and the announcer says, "You are listening to 91.5 FM WRKX The Rock!," what the announcer means is that you are listening to a radio station broadcasting an FM radio signal at a frequency of 91.5 megahertz, with FCC-assigned call letters of WRKX. **Megahertz** means "millions of cycles per second," so "91.5 megahertz" means that the transmitter at the radio station is oscillating at a frequency of 91,500,000 cycles per second. Your FM (frequency modulated) radio can tune in to that specific frequency and give you clear reception of that station. All FM radio stations transmit in a **band** of frequencies between 88 megahertz and 108 megahertz. This band of the radio spectrum is used for no other purpose but FM radio broadcasts.

In the same way, AM radio is confined to a band from 535 kilohertz to 1,700 kilohertz (kilo meaning "thousands," so 535,000 to 1,700,000 cycles per second). So an AM (amplitude modulated) radio station that says, "This is AM 680 WPTF" means that the radio station is broadcasting an AM radio signal at 680 kilohertz and its FCC-assigned call letters are WPTF.

Common frequency bands include the following:

- **AM radio** - 535 kilohertz to 1.7 megahertz
- **Short wave radio** - bands from 5.9 megahertz to 26.1 megahertz
- **Citizens band (CB) radio** - 26.96 megahertz to 27.41 megahertz
- **Television stations** - 54 to 88 megahertz for channels 2 through 6
- **FM radio** - 88 megahertz to 108 megahertz
- **Television stations** - 174 to 220 megahertz for channels 7 through 13

What is funny is that every wireless technology you can imagine has its own little band. There are hundreds of them! For example:

- Garage door openers, alarm systems, etc. - Around 40 megahertz
- Standard cordless phones: Bands from 40 to 50 megahertz
- Baby monitors: 49 megahertz
- Radio controlled airplanes: Around 72 megahertz, which is different from...
- Radio controlled cars: Around 75 megahertz
- Wildlife tracking collars: 215 to 220 megahertz
- MIR space station: 145 megahertz and 437 megahertz
- Cell phones: 824 to 849 megahertz
- New 900-MHz cordless phones: Obviously around 900 megahertz!

- Air traffic control radar: 960 to 1,215 megahertz
- Global Positioning System: 1,227 and 1,575 megahertz
- Deep space radio communications: 2290 megahertz to 2300 megahertz

Why is AM radio in a band at 550 kilohertz to 1,700 kilohertz, while FM radio is in a band at 88 to 108 megahertz? It is all completely arbitrary, and a lot of it has to do with history.

AM radio has been around a lot longer than FM radio. The first radio broadcasts occurred in 1906 or so, and frequency allocation for AM radio occurred during the 1920s (The predecessor to the FCC was established by Congress in 1927.). In the 1920s, radio and electronic capabilities were fairly limited, hence the relatively low frequencies for AM radio.

Television stations were pretty much non-existent until 1946 or so, which is when the FCC allocated commercial broadcast bands for TV. By 1949, a million people owned TV sets, and by 1951 there were 10 million TVs in America.

FM radio was invented by a man named Edwin Armstrong in order to make high-fidelity (and static-free) music broadcasting possible. He built the first station in 1939, but FM did not become really popular until the 1960s. Hence the higher frequencies for FM radio.