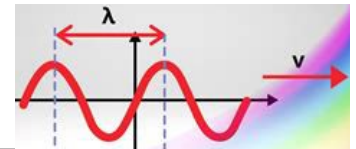


## Ham 04 - Differences in privileges

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1. History. Amateur radio is very much about tradition, trying things, and being prepared.
1. In 1873, Dr. James Clerk Maxwell, FRS, presented the theory of electromagnetic waves in Edinburgh. He was a devout, conservative Christian, who believed that science and religion are very harmonious. James was home-schooled by his mother, who encouraged him to “look up through Nature to Nature’s God.”  
According to Maxwell’s biographer, “His knowledge of Scripture, from his earliest boyhood, was extraordinarily extensive and minute....These things were not known merely by rote. They occupied his imagination, and sank deeper than anybody knew.”
2. In 1901, Guglielmo Marconi created a spark-gap radio and a huge antenna farm to transmit radio across the ocean. A Nobel physicist, he asserted “I am proud to be a Christian.” One of his radio patent numbers was 7777. “I believe not only as a Christian, but as a scientist as well.”  
“A wireless device can deliver a message through the wilderness. In prayer the human spirit can send invisible waves to eternity, waves that achieve their goal in front of God.”
3. The unknowing have tried to hijack science by rejecting the Creator that designed nature. Congress passed the Radio Act of 1912, requiring amateur licensing to prevent interference with commercial. Then in 1914, Hiram Percy Maxim started the Amateur Radio Relay League (ARRL) to coordinate transmitters.
4. Throughout the short history of radio, Amateurs have had a spectrum in each band to experiment. Not all are equally skilled, so three licenses are now available. These have a 10-year term. *Technician (T)* is the entry level and can transmit in a slice of 10 meters, 6 meters, and most higher frequencies. *General (G)* is more flexible and technical allowing transmission on parts of all bands. *Extra (E)* is more advanced, allowing any ham activity. The license is much more complex than the Commercial.
5. Let’s talk bands, which hams can use.  
*Frequency \* wavelength = speed of light* (300,000,000 meters/second).  
Based on this relationship, the radio spectrum breaks into logical segments.



Band	Spectrum	Frequencies	Wavelength	Major Users	Band Plan
LF	low frequency	30-300 kHz	10 km – 1 km	Navy	E, G
MW	medium wave	300-3000 kHz	1000 – 100 m	Commercial AM	E, G
HF	high frequency	3-30 MHz	100 – 10 m	Shortwave	E, G
VHF	very high frequency	30-300 MHz	10 – 1 m	Com'l FM, business, fixed digital	E, G, T
UHF	ultrahigh frequency	300-3000 MHz	100 – 10 cm	Gov't, cell, WiFi	E, G, T
EHF	extra high frequency	3-30 GHz	10 – 1 cm	Cell, WiFi, radar	E, G, T
	And so on			Wide data BW	E, G, T

6. Technician has limited access for CW on 80, 40, 15 meters with phone, rtty, data on 10 meters. Isn’t it amazing? Hams have privileges across the spectrum without FCC telling us how to or which channel.
7. VHF and above is open to everyone, but is primarily local communications. Communications is near line-of-sight, with higher frequency disturbed by smaller things like raindrops and dust. More-power decides if you will be able to talk or not. You can legally use 1500-Watts, but 50 is more common. A mobile/base is the most reliable in emergency communications, with 50-Watts simplex direct between radios. A Handi-Talkie operating at 5-Watts has very limited range. Cost starts at \$28. Makes a great don’t care radio. With low-power, in hilly or urban terrain, a handi- may not be able to see the repeater base.
8. To get more range, a base-repeater receives from one radio, amplifies the signal, and retransmits to another radio. All radios should be capable of battery operation, to permit emergency communications. Signal strength can come from the antenna or out of the wall. A taller, matched antenna enhances signal strength, which improves getting the signal out, even for handi-. Specialty antennas provide moon-bounce, skip, and other ideas. But in most cases, these are very limited use.
9. HF communications provides local to around the world communications. The spectrum is for General and Extra class. Elegant communications include voice, cw (continuous wave, Morse code), and digital. Many stations are a 100-Watt transceiver with band access to everything and all modes. The antenna is the biggest problem, the most opportunity to experiment, and most critical to success.
10. Radios have made fantastic electronic and computer progress, leaving Marconi’s spark gap in the dust. However, antenna technology is not far from his old antenna farm. Antennas are still bulky and high.

