

WiFi Spectrum



- WiFi services operate in the 2.4 GHz and 5 GHz frequency spectrum.
- This is allocated for ISM industrial, scientific, and medical use
- A radio operator's license is not required.
- ISM devices do not have regulatory protection against interference from other users of the band.

IEEE 802.11 Standards



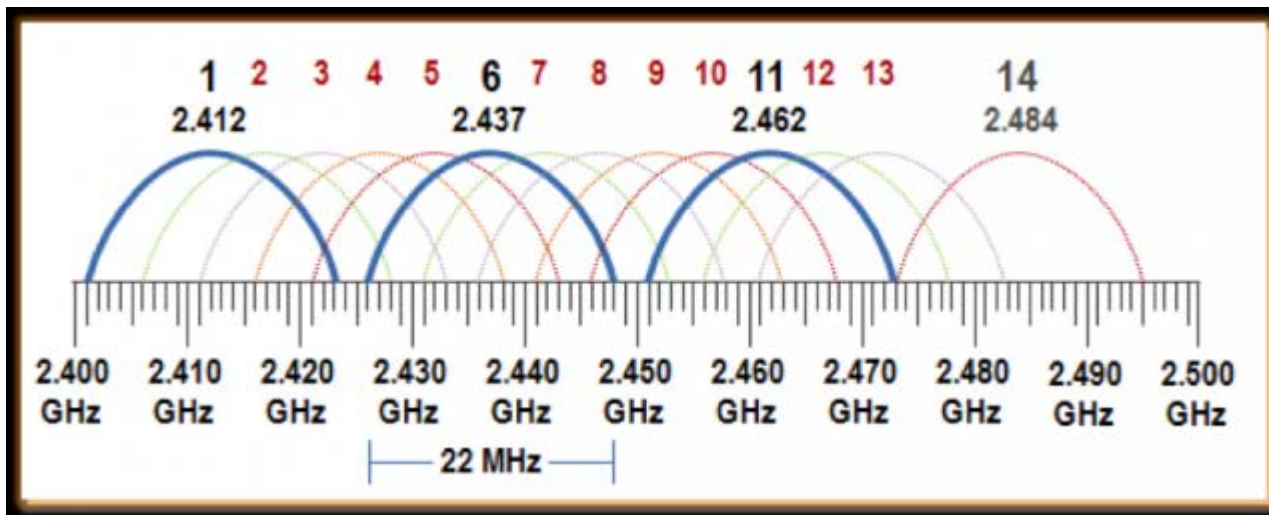
	802.11	802.11a	802.11b	802.11g	802.11n	802.11ac
Year	1997	1999	1999	2003	2009	2013
Frequency	2.4 GHz	5 GHz	2.4 GHz	2.4 GHz	2.4 & 5 GHz	5 GHz
Data Rate in Mbps & Backwards Compatibility	1, 2	6, 9, 12, 18, 24, 36, 48, 54	1, 2, 5.5, 11	1, 2, 5.5, 11 for backward compatibility with b. 6, 9, 12, 18, 24, 36, 48, 54	Up to 600 Backward compatible with a, b, g	Up to 3500 Backward compatible with a and n

Cisco Access Points support all standards

You can choose which you want to enable per WLAN

2.4 GHz Spectrum

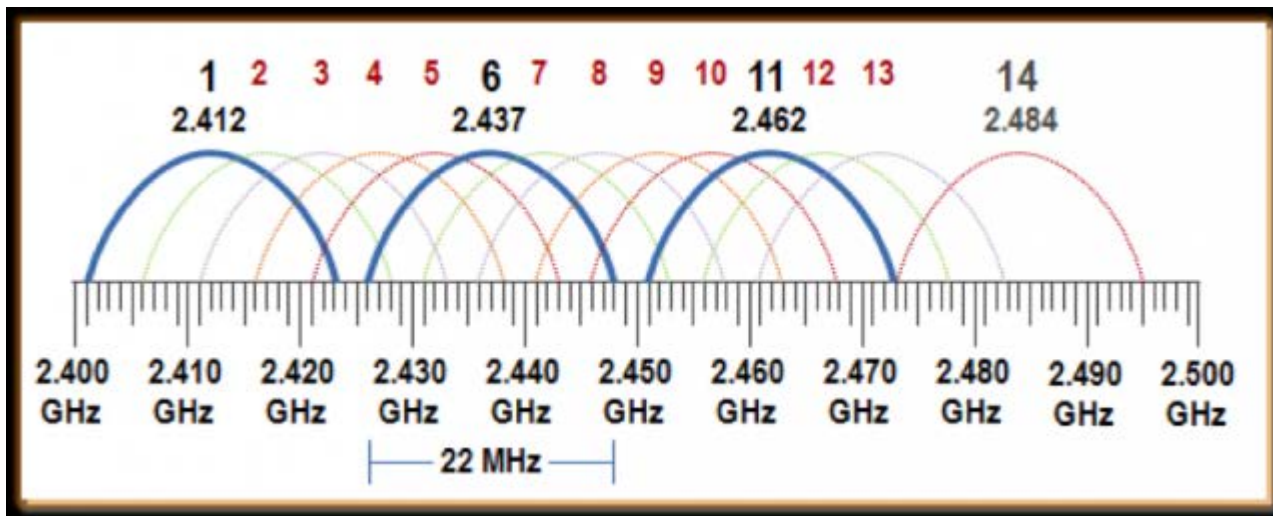
- The 2.4 GHz ISM spectrum ranges from 2.4 to 2.4835 GHz
- (2.4 to 2.497 GHz in Japan)
- The spectrum is divided into smaller (22 MHz) ranges of frequencies called channels



2.4 GHz Spectrum



- Each AP operates in one channel
- Some channels overlap and can cause interference with each other
- Access Points with overlapping service areas should use non-overlapping channels

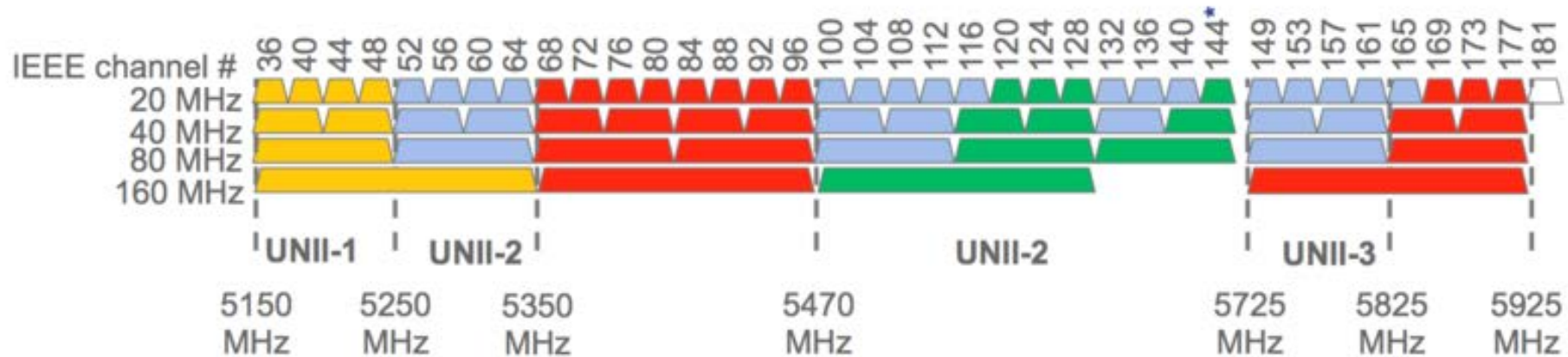


5 GHz Spectrum



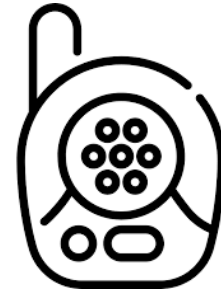
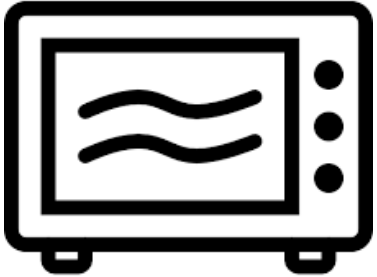
- 2.4 GHz channels are 22 MHz wide
- 5 GHz channels are 20 MHz wide
- They have less overlap than 2.4 GHz channels
- Neighboring APs should be separated by at least one channel
- Channels can be bonded (40, 80 or 160 MHz wide) to multiply data rates by 2, 4 or 8x

5 GHz Spectrum



2.4 GHz Interference

- The ISM band is unlicensed
- Many devices can cause interference in the 2.4 GHz range



2.4 vs 5 GHz



- 2.4 GHz has greater range and better propagation through obstacles
- 2.4 GHz is more crowded
- 5 GHz 802.11ac has higher throughput than is available with 2.4 GHz
- Your client stations may only be compatible with 2.4 GHz

Site Surveys



- Site surveys should be carried out for WiFi networks
- The purpose is to find the best placement of Access Points for maximum coverage of the required area, and minimum leakage outside it
- It should also discover potential sources of interference
- A WLC can manage channel allocation and power levels of APs

