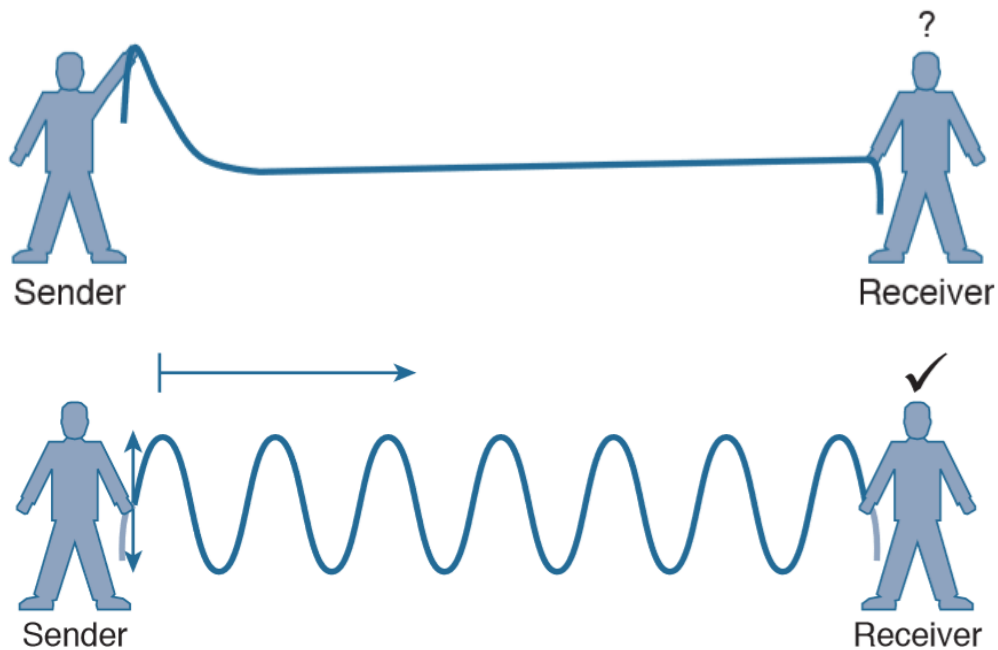


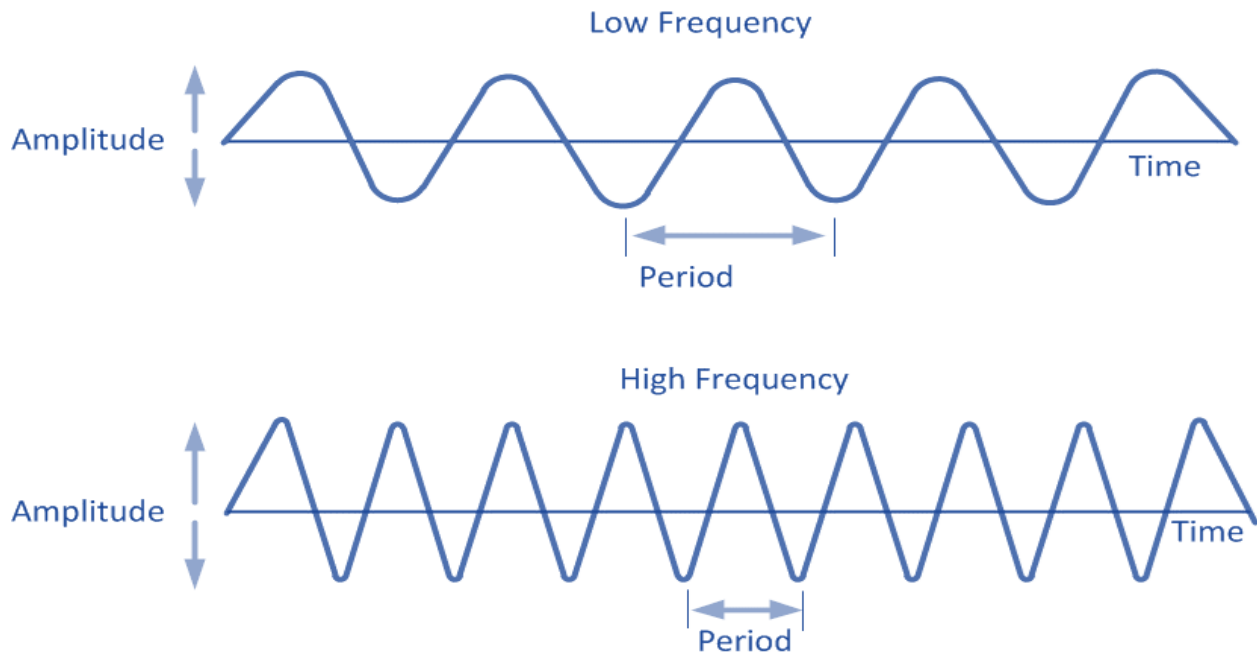
## Wireless:

- o Wi-Fi is a popular wireless networking technology; Wi-Fi stands for Wireless Fidelity.
- o The Wireless Wi-Fi was invented by NCR corporation/AT&T in Netherlands in 1991.
- o By using this technology, we can exchange the information between two or more devices.
- o Wireless (Wi-Fi) has been developed for mobile computing devices, such as laptops etc.
- o But it is now extensively using for mobile applications and consumer electronics like TV etc.
- o Computer's wireless adaptor transfers data into radio signal & transfers data into antenna.
- o Wireless signals are important because they can transfer information audio, video & voices.
- o Wireless signal transfers data without the use of wires, and that makes them very useful.
- o Wireless networks are computer networks that are not connected by cables of any kind.
- o Wireless network is a network set up by using radio signal frequency to communicate other.
- o Wireless networking is the easiest and most affordable way to set up an Internet network.
- o It is term to refer to various types of networks that communicate without need of wire line.
- o Wireless Fidelity Wireless signals are the **electromagnetic waves** travelling through the air.
- o There are many, many types of Wireless Fidelity wireless technologies some of them are.
- o Example are AM and FM radio, TV, Cellular phones, Wi-Fi, Satellite, radio, and Bluetooth.
- o Wi-Fi is a high-speed internet connection and network connection without use of any wires.
- o Wireless network is operating three essential element, radio signals, antenna and router.
- o Basically, the radio waves are keys which make the Wireless (Wi-Fi) networking possible.
- o The computers, Laptop, TV, and cellular phones, other device are ready with Wi-Fi cards.
- o Radio signals are transmitted from antennas & routers that are picked up by Wi-Fi receivers.



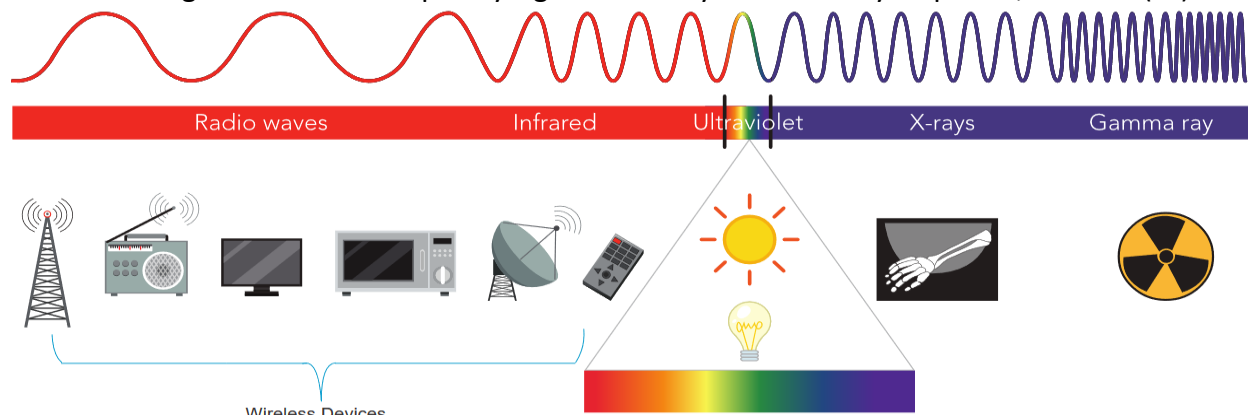
## Frequency:

- o Wireless signals occupy spectrum/wide range, of frequencies: rate at which signal vibrates.
- o If signal vibrates slowly, it has low frequency, if vibrates very quickly, it has high frequency.
- o Frequency is measured in Hertz, which is count of how quickly signal changes every second.
- o Higher frequencies give higher data rates, higher frequency more waves in given time cycle.
- o The Wireless technology uses the unlicensed radio spectrum/range to send & receive data.
- o Unlicensed spectrum is accessible to anyone who has wireless router & wireless technology.
- o Frequency is number of times signal makes one complete up and down cycle in 1 second.



## Radio Frequencies:

- o All wireless devices operate in the radio waves range of the electromagnetic spectrum.
- o The Wireless LAN networks operate in the 2.4 GHz frequency band and the 5 GHz band.
- o WLAN devices have transmitters & receivers tuned to specific frequencies of waves range.
- o Specifically, the following frequency bands are allocated to the 802.11 wireless LANs.
- o Wireless LAN 2.4 GHz (UHF) - 802.11b/g/n/ax and WLAN 5 GHz (SHF) - 802.11a/n/ac/ax.
- o The strength of an Radio Frequency signal is usually measured by its power, in watts (W).



## Terminologies:

### Cycle:

- o Cycle can begin signal **rises from center line, falls through center line & rises again.**
- o Cycle can be measured from the center of one peak to the center of the next peak.
- o In below image, during that 1 second, signal progressed through four complete cycles.

### Hertz:

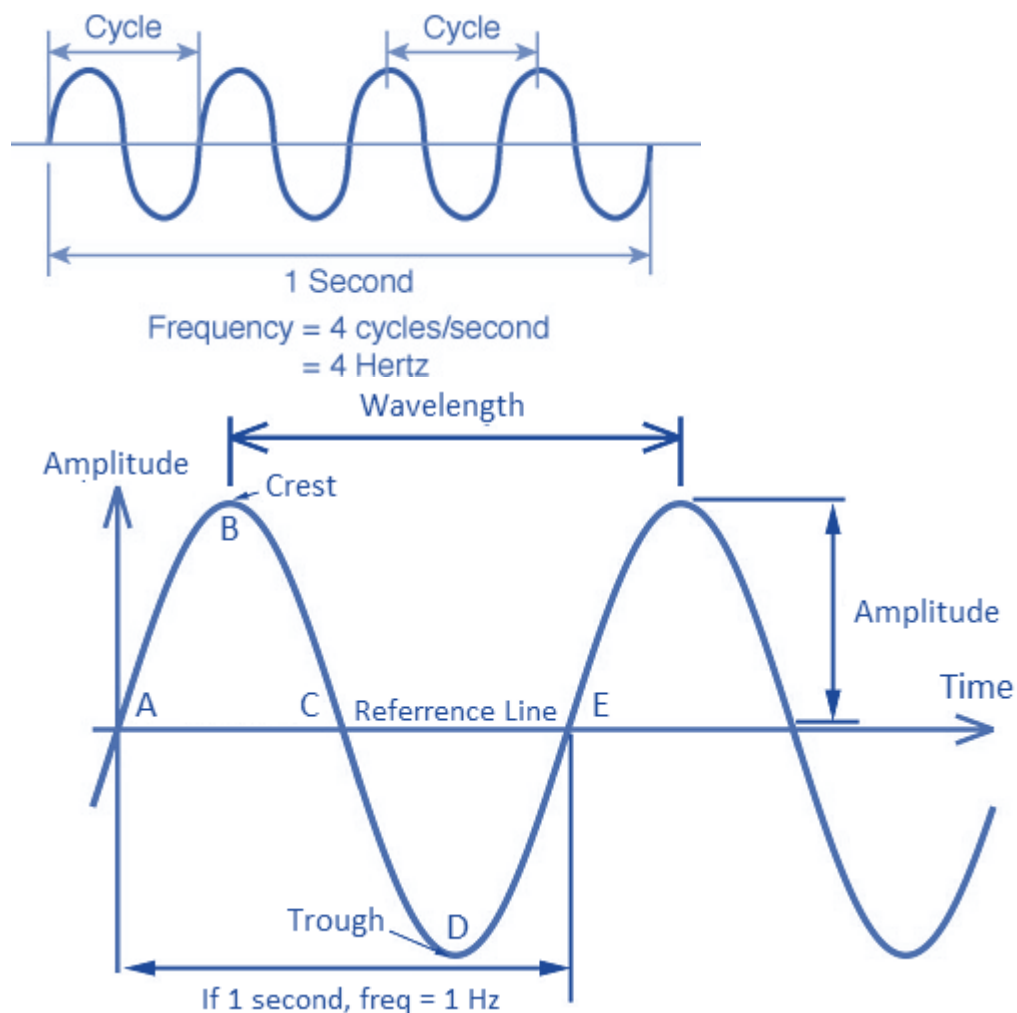
- o Therefore, in blow image example its frequency is 4 cycles or 4 second or 4 hertz.
- o Hertz is most commonly used frequency unit & is nothing than **one cycle per second.**

### Amplitude:

- o Amplitude the **height from the top peak to the bottom peak** of the signal's waveform.
- o It is power or intensity of signal, the frequency is how often the signal repeated itself.
- o Higher the amplitude it will produce the higher range, lower amplitude lower range.

### Wavelength:

- o In wavelength they are the **crest**, which is the high point, the trough which is low point.
- o The wavelength is the **distance from one crest or higher point, or trough, to another.**

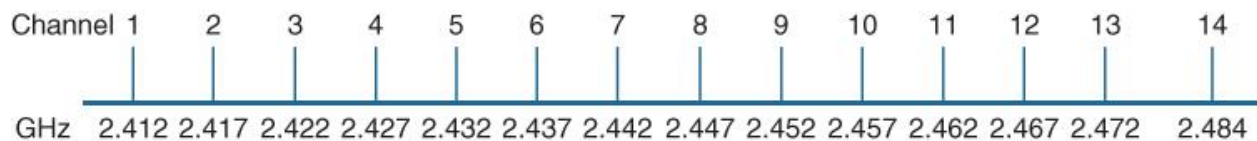


### Bands:

- o Wireless routers use one of the two Wi-Fi frequency bands for signal: **2.4 GHz or 5 GHz**.
- o Some routers are dual-band routers, so you can choose which frequency band to use.
- o Main difference between these two frequency bands are range and bandwidth provide.
- o In case, you are looking for more WIFI coverage, you want to be using the 2.4 GHz band.
- o In case, if you are looking for the faster speeds, you want to be using the 5 GHz band.
- o Within these WIFI frequency bands, have smaller bands which are referred to channels.
- o Bands are ranges of radio wave frequencies used to transmit data in wireless spectrum.
- o Bands are frequency ranges within wireless spectrum that are designated to carry WIFI.
- o Bands is usually understood as a range of frequencies with a certain upper and lower limit.

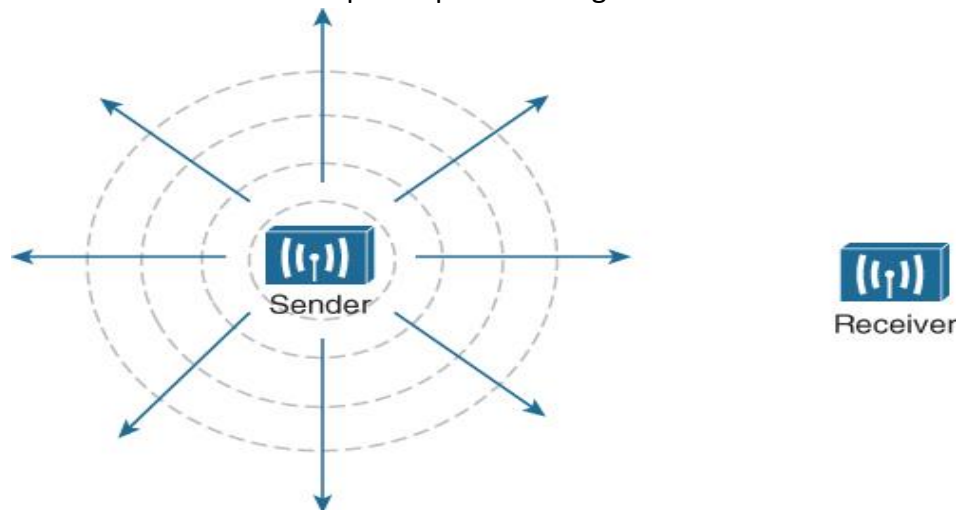
### Channel:

- o WIFI channel is medium through which our wireless networks can **send and receive data**.
- o In Wireless frequency bands are usually divided up into a number of distinct channels.
- o Each channel is known by a channel number and is assigned to a specific wireless frequency.
- o The channel assignment for the 2.4 GHz band that is used for wireless LAN communication.
- o The band contains 14 channels numbered **1 through 14**, each assigned a specific frequency.
- o Each channel is like rooms at party if one room is crowded it's hard to carry conversation.
- o Move to the next room, but that might get crowded as well As soon as the building is full.



### Receivers and Transmitters:

- o In Wireless Network when a device sends out a wireless signal, it is called a transmitter.
- o When another device picks up wireless signal & understands information called receiver.



## IEEE Wireless Standard:

IEEE: Institute of Electrical and Electronic Engineers: These are the people that create all the standards we use today. Wireless is documented in the 802.11 standard.

IEEE WLAN Standard	Radio Frequency	Description
802.11	2.4 GHz	Speeds of up to 2 Mbps
802.11a	5 GHz	Speeds of up to 54 Mbps Small coverage area Less effective at penetrating building structures Not interoperable with the 802.11b and 802.11g
802.11b	2.4 GHz	Speeds of up to 11 Mbps Longer range than 802.11a Better able to penetrate building structures
802.11g	2.4 GHz	Speeds of up to 54 Mbps Backward compatible with 802.11b with reduced Bandwidth capacity
802.11n	2.4 GHz 5 GHz	Data rates range from 150 Mbps to 600 Mbps with a Distance range of up to 70 m (230 feet) APs and wireless clients require multiple antennas Backward compatible with 802.11a/b/g devices
802.11ac	5 GHz	Provides data rates ranging from 450 Mbps to 1.3 Gbps Up to eight antennas can be supported Backwards compatible with 802.11a/n devices
802.11ax	2.4 GHz 5 GHz	Released in 2019 - latest standard Also known as High-Efficiency Wireless (HEW) Higher data rates Increased capacity Handles many connected devices Improved power efficiency 1 GHz and 7 GHz capable when those frequencies

