
WIFI
Technologies
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WiFi

is a family of wireless network protocols

Wi wireless

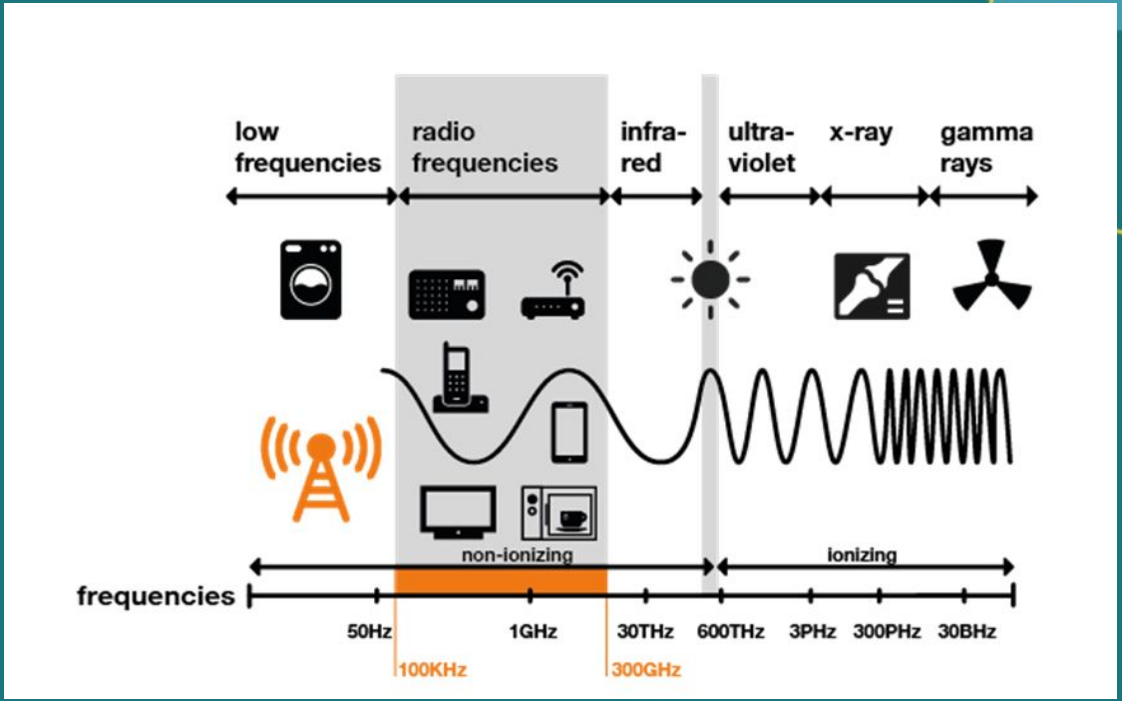
Fi has no meaning

It allows devices to exchange information with one another, creating a network

Wi-Fi = ™ *for* non-profit Wi-Fi Alliance,

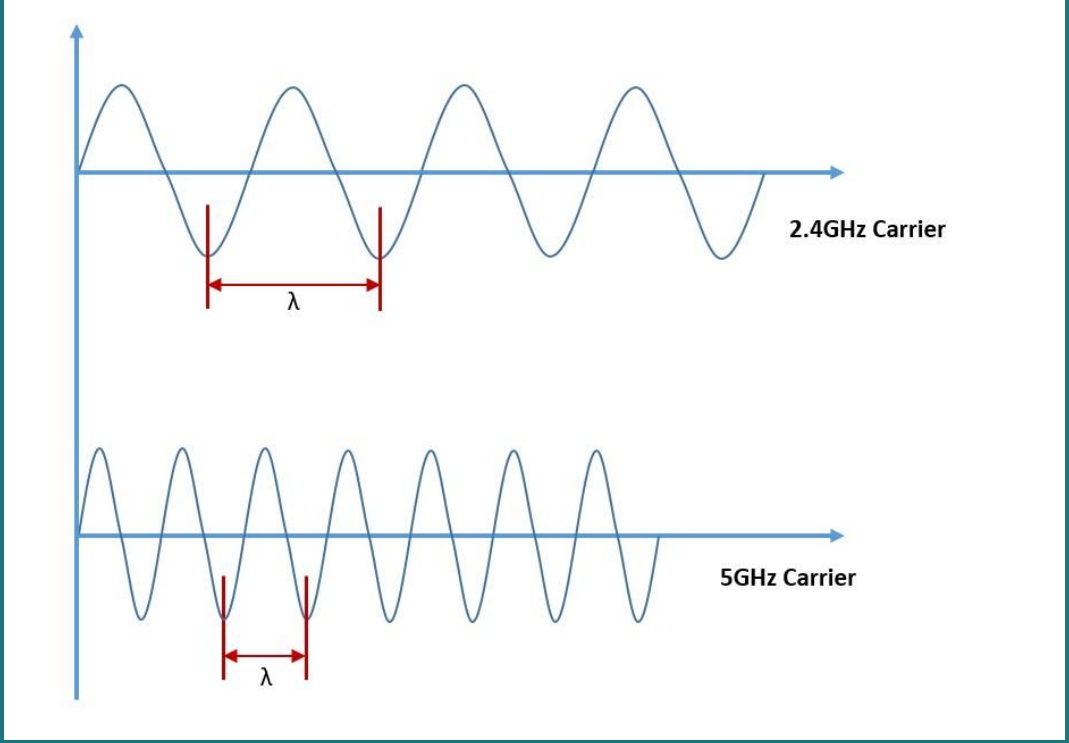
WIFI SIGNALS

WiFi signals are a type of electromagnetic (EM) wavelengths that are transmitted in the air called radio waves. For this reason, WiFi signals are also known as RF (Radio Frequency) signals.



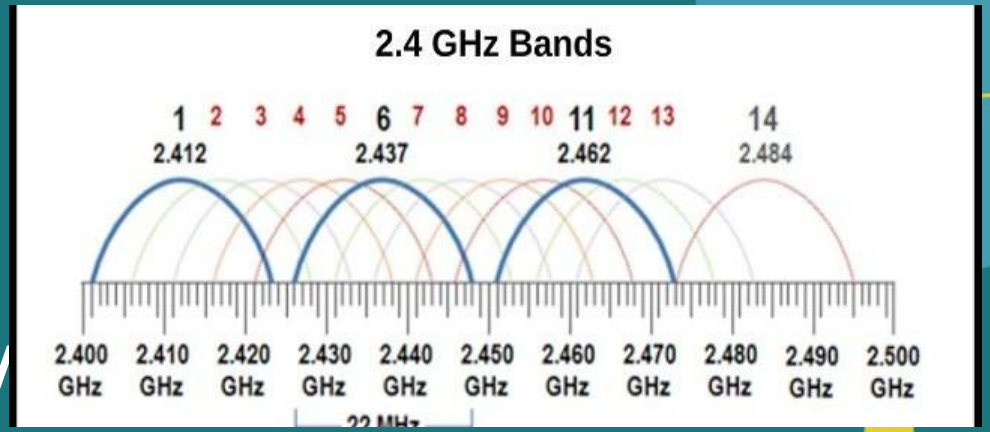
RADIO BANDS

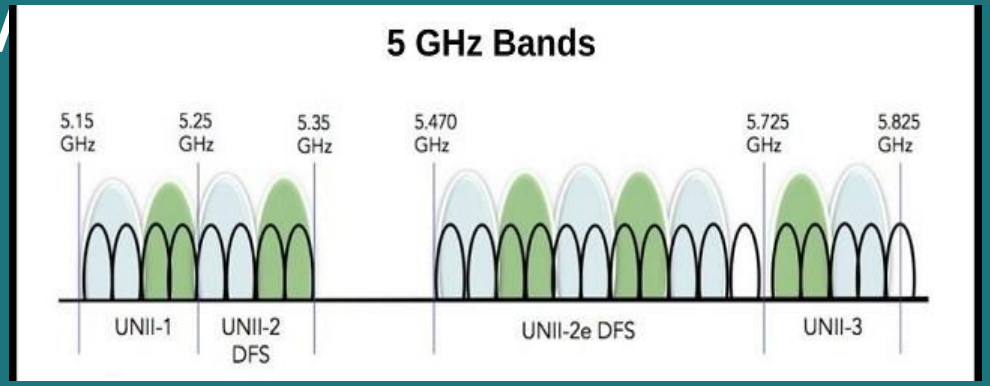
- 2.4Ghz
- 5.Ghz



Radio Bands

- 2.4Ghz
  11 **Channels**
  [3 non-overlapping] [20M
- [5.Ghz]
  24 non-overlapping [20M



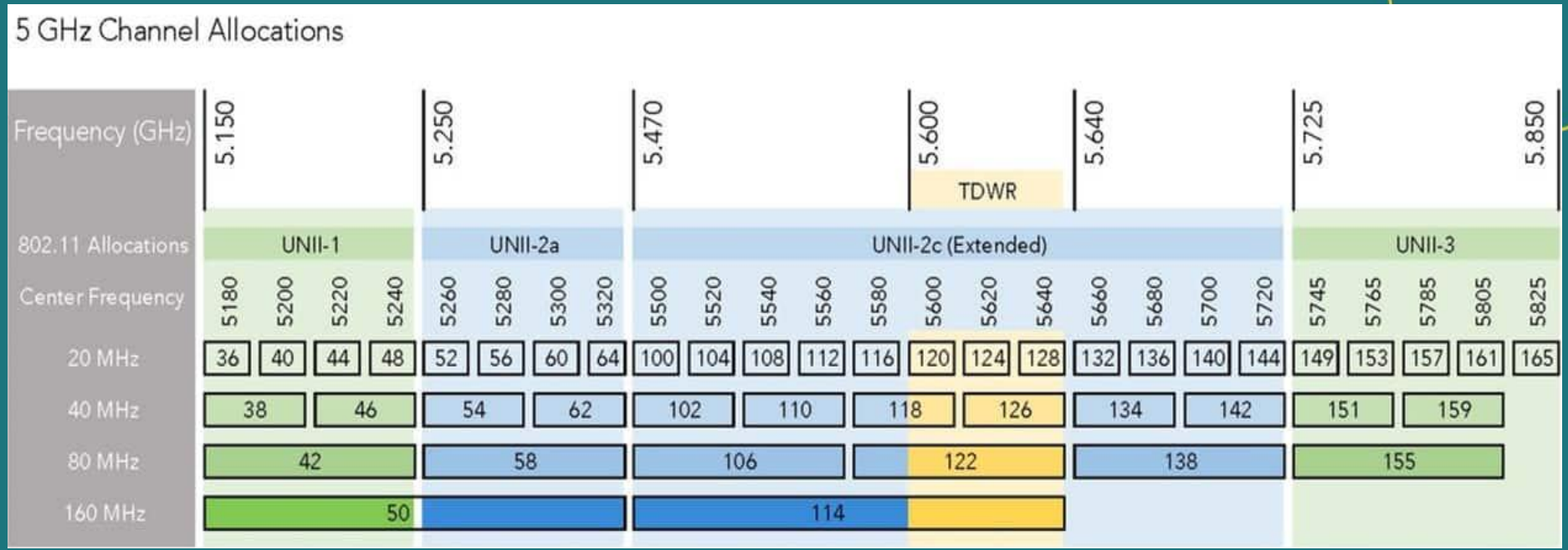


WIFI STANDARDS

Year	1997	1999	1999	2003	2009	2014	2019	2020
IEEE	802.11	802.11a	802.11b	802.11g	802.11n	802.11ac	802.11ax	802.11ax
Frequency	2.4Ghz	5Ghz	2.4Ghz	2.4Ghz	2.4Ghz 5Ghz	2.4Ghz 5Ghz	2.4Ghz 5Ghz	2.4Ghz 5Ghz 6Ghz
Max Data	1Mbps	54Mbps	11Mbps	54Mbps	600Mbps	1.3Gbps	12Gbps	12Gbps
Wi-Fi Alliance		WIFI 1	WIFI 2	WIFI 3	WIFI 4	WIFI 5	WIFI 6	WIFI 6E
	SISO	SISO	SISO	SISO	SISO	MU-MIMO	MU-MIMO OFDMA	MU-MIMO OFDMA

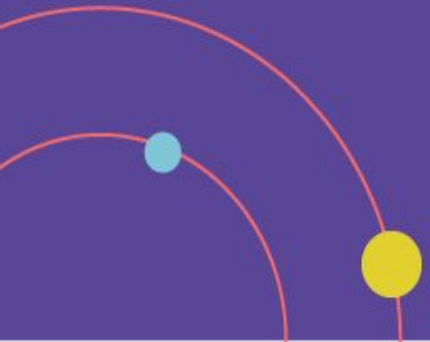
5Ghz Radio Bands

- 20, 40, 80, and 160MHz channels

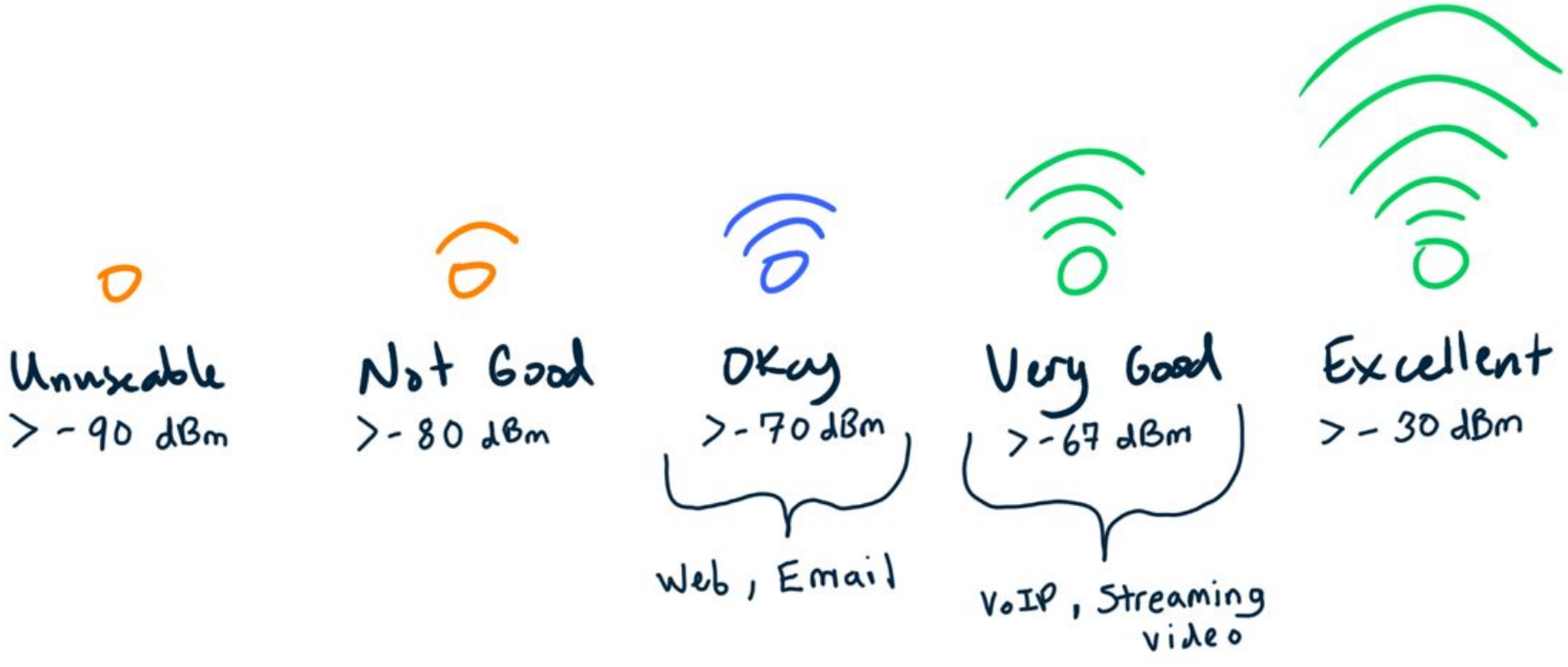


WIFI SIGNAL STRENGTH

- **mW - Milliwatts (1 mW = 0 dBm)**
  - Most accurate but hardest to measure; used by scientists and engineers
- **dBm** - Decibels in relation to milliwatts (usually -30 to -90)
  - Mid-accuracy; mid-comprehensible; most common; used by engineers
- **RSSI** - Received Signal Strength Indicator (usually 0-60 or 0-255)
  - The least accurate; most arbitrary; easiest to read; used by vendors

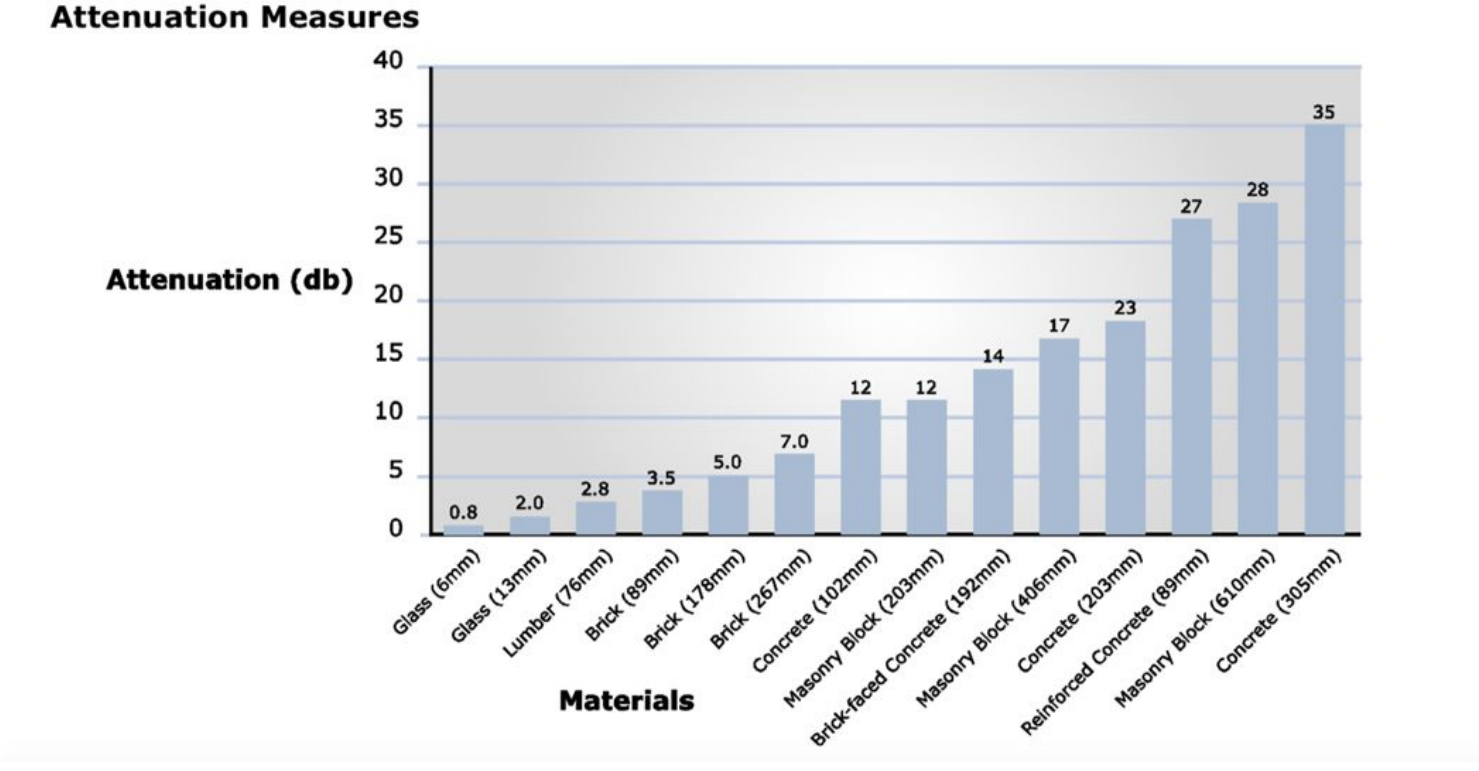


WIFI SIGNAL STRENGTH



ATTENUATION

is the reduction in power of a signal through open air or as it tries to move through materials



WHAT FACTORS AFFECT WIFI RANGE?

- **Output power:** Output power is measured in mW (milliwatts)
- **WiFi antenna(s):** All WiFi devices use at least one WiFi antenna to broadcast the WiFi signal.
- **WiFi technology:** Wireless ‘AX' radios are capable of broadcasting to a greater distance than previous WiFi generations (g, b, a,n,ac).
- **Environmental factors:** vary based on construction, layout, and interference.

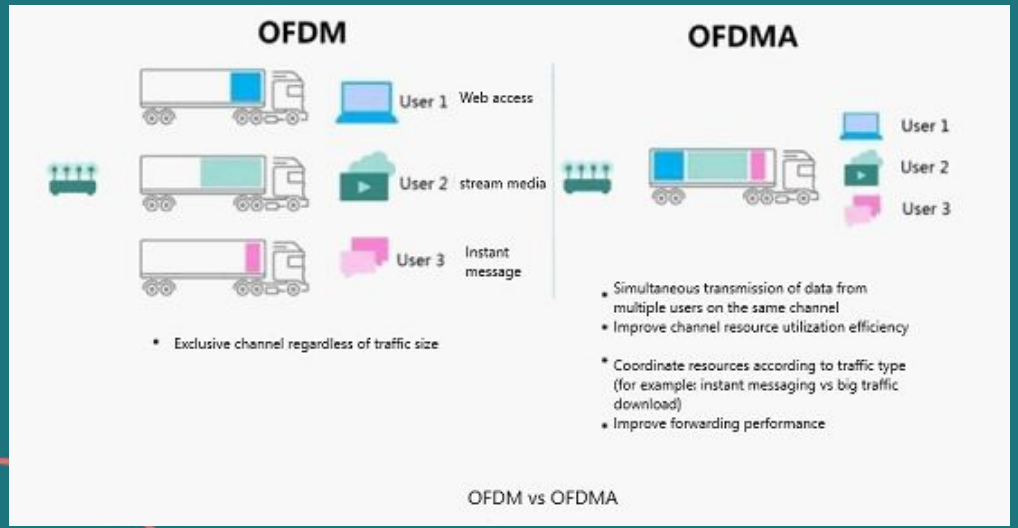
OUTPUT POWER

- Some manufacturers measure the output power in dBm instead of mW.
  To convert to mW, you can use the formula (dBm = log10 (mW)*10 mW =10^(dBm/10),

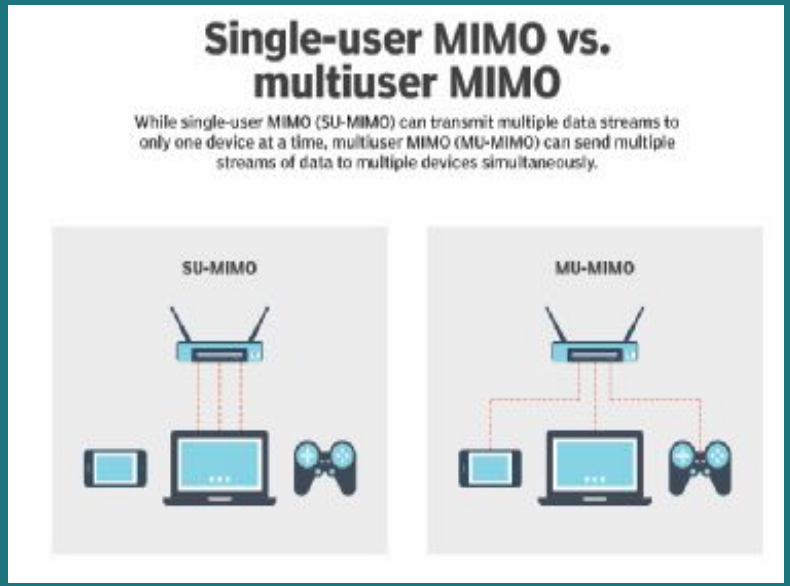
30 dBm - 1.00 Watt
27 dBm - 500 mW
26 dBm - 400 mW
25 dBm - 320 mW
24 dBm - 250 mW
23 dBm - 200 mW
22 dBm - 160 mW
21 dBm - 130 mW
20 dBm - 100 mW
15 dBm - 32 mW
10 dBm - 10 mW
5 dBm - 3.2 mW
4 dBm - 2.5 mW
3 dBm - 2.0 mW
2 dBm - 1.6 mW
1 dBm - 1.3 mW

SISO, MIMO, SU-MIMO, MU-MIMO

- multi-user, multiple-input, multiple-output. MU-MIMO



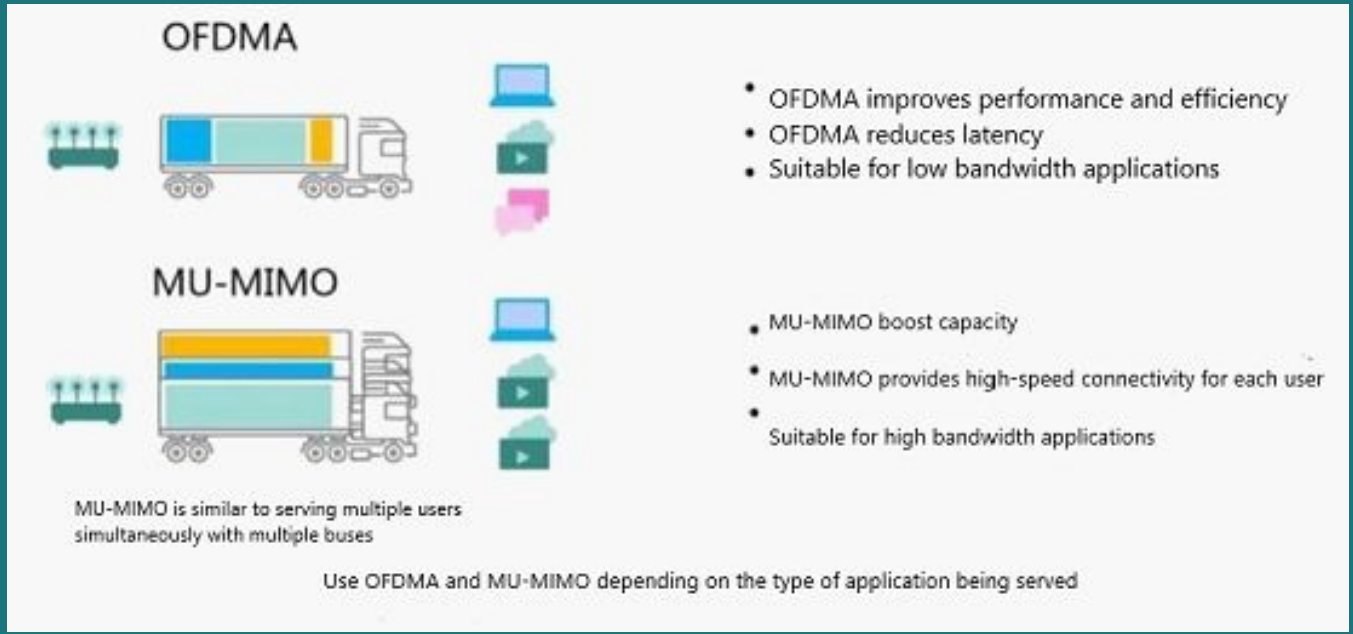
OFDM vs OFDMA



Multiplexing vs Multi Access

SISO, MIMO, SU-MIMO, MU-MIMO

- multi-user, multiple-input, multiple-output. MU-MIMO



Thanks