Comparison chart

Bluetooth versus Wi-Fi comparison chart

Edit	Bluetooth	Wi-Fi
Frequency	2.4 GHz	2.4, 3.6, 5 GHz
Cost	Low	High
Bandwidth	Low (800 Kbps)	High (11 Mbps)
Specifications authority	Bluetooth SIG	IEEE, WECA
Security	It is less secure	Security issues are already being debated.
Year of development	1994	1991
Primary Devices	Mobile phones, mouse, keyboards, office and industrial automation devices. Activity trackers, such as Fitbit and Jawbone.	Notebook computers, desktop computers, servers, TV, Latest mobiles.
Hardware requirement	Bluetooth adaptor on all the devices connecting with each other	Wireless adaptors on all the devices of the network, a wireless router and/or wireless access points
Range	5-30 meters	With 802.11b/g the typical range is 32 meters indoors and 95 meters (300 ft) outdoors. 802.11n has greater range. 2.5GHz Wi-Fi communication has greater range than 5GHz. Antennas can also increase range.
Power Consumption	Low	High
Ease of Use	Fairly simple to use. Can be used to connect upto seven devices at a time. It is easy to switch between devices or find and connect to any device.	It is more complex and requires configuration of hardware and software.
Latency	200ms	150ms
Bit-rate	2.1Mbps	600 Mbps

Table 1. IEEE 802.11 technology evolution, from [6].

Standard	Release date	Band (GHz)	Bandwidth (MHz)	Max Data Rate	Advanced Antenna Technologies
802.11	1997	2.4	20	2 Mbps	N/A
802.11b	1999	2.4	20	11 Mbps	N/A
802.11a	1999	5	20	54 Mbps	N/A
802.11g	2003	2.4	20	54 Mbps	N/A
802.11n	2009	2.4, 5	20, 40	600 Mbps	MIMO, up to four spatial streams
802.11ac	2013	5	40, 80, 160	6.93 Gbps	MIMO, MU-MIMO, up to eight spatial streams

Table 2. 802.11ac theoretical link rates, from [6].

Channel Bandwidth	Transmit–Receive Antennas	Modulation and Coding	Throughput
40 MHz	1x1	256-QAM 5/6	200 Mbps
40 MHz	3x3	256-QAM 5/6	600 Mbps
80 MHz	1x1	256-QAM 5/6	433 Mbps
80 MHz	2x2	256-QAM 5/6	867 Mbps
80 MHz	3x3	256-QAM 5/6	1.3 Gbps

PERFORMANCE OF WIRELESS NETWORKS IN HIGHLY REFLECTIVE ROOMS WITH VARIABLE ABSORPTION

by

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Modes

At different frequencies, radio waves travel through the atmosphere by different mechanisms or modes:[4]

Radio frequencies and their primary mode of propagation

Band		Frequency	Wavelength	Propagation via
ELF	Extremely Low Frequency	3–30 Hz	100,000–10,000 km	Guided between the Earth and the D layer of the ionosphere.
SLF	Super Low Frequency	30–300 Hz	10,000–1,000 km	Guided between the Earth and the ionosphere.
ULF	Ultra Low Frequency	0.3–3 kHz (300–3,000 Hz)	1,000–100 km	Guided between the Earth and the ionosphere.
VLF	Very Low Frequency	3–30 kHz (3,000–30,000 Hz)	100–10 km	Guided between the Earth and the ionosphere.
LF	Low Frequency	30–300 kHz (30,000–300,000 Hz)	10–1 km	Guided between the Earth and the ionosphere. Ground waves.
MF	Medium Frequency	300–3000 kHz (300,000–3,000,000 Hz)	1000–100 m	Ground waves. E, F layer ionospheric refraction at night, when D layer absorption weakens.
HF	High Frequency (Short Wave)	3–30 MHz (3,000,000–30,000,000 Hz)	100–10 m	E layer ionospheric refraction. F1, F2 layer ionospheric refraction.
VHF	Very High Frequency	30–300 MHz (30,000,000–300,000,000 Hz)	10–1 m	Line-of-sight propagation. Infrequent E ionospheric (E_s) refraction. Uncommonly F2 layer ionospheric refraction during high sunspot activity up to 50 MHz and rarely to 80 MHz. Sometimes tropospheric ducting or meteor scatter

UHF	Ultra High Frequency	300–3000 MHz (300,000,000–3,000,000,000 Hz)	100–10 cm	Line-of-sight propagation. Sometimes tropospheric ducting.
SHF	Super High Frequency	3–30 GHz (3,000,000,000–30,000,000,000 Hz)	10–1 cm	Line-of-sight propagation. Sometimes rain scatter.
EHF	Extremely High Frequency	30–300 GHz (30,000,000,000–300,000,000,000 Hz)	10–1 mm	Line-of-sight propagation, limited by atmospheric absorption to a few kilometers
THF	Tremendously High frequency	0.3–3 THz (300,000,000,000–3,000,000,000,000 Hz)	1–0.1 mm	Line-of-sight propagation.

Absorption

Low-frequency radio waves travel easily through brick and stone and VLF even penetrates sea-water. As the frequency rises, absorption effects become more important. At microwave or higher frequencies, absorption by molecular resonances in the atmosphere (mostly from water, H_2O and oxygen, O_2) is a major factor in radio propagation. For example, in the 58–60 GHz band, there is a major absorption peak which makes this band useless for long-distance use. This phenomenon was first discovered during radar research in World War II. Above about 400 GHz, the Earth's atmosphere blocks most of the spectrum while still passing some - up to UV light, which is blocked by ozone - but visible light and some of the near-infrared is transmitted. Heavy rain and falling snow also affect microwave absorption.