802.11/802.16

	IEEE 802.11	IEEE 802.16a
Max Speed	54 Mbps (11a & g)	70 Mbps
Range	100 m	40 km
QoS	None	Yes
Coverage	Indoor Opt.	Outdoor Opt.
Users	Hundreds	Thousands
Service Levels	None	Yes

Comparisons: 3G vs. WiFi

	3G	WiFi
Standard	WCDMA,CDMA2000	IEEE 802.11
Max Speed	2 Mbps	54 Mbps
Operations	Cell phone companies	Individuals, WISP
License	Yes	No
Coverage Area	Several km	About 100m
Advantages	Range, mobility	Speed, cheap
Disadvantages	Relatively slow Expensive	Short range

Comparisons: 3G vs. Wi-Max

	3G	Wi-Max (Wider-Fi)
Standard	WCDMA,CDMA2000	IEEE 802.16
Max Speed	2 Mbps	10 to 100 Mbps
Operations	Cell phone companies	Individuals, WISP
License	Yes	Yes/No
Coverage Area	Several km	Several km
Advantages	Range, mobility	Speed, long range
Disadvantages	Relatively slow Expensive	Interference issues?

The history and differences of 1G, 2G, 3G and 4G cellular networks:

The 1980s brought the first generation—or 1G—of networks with voice-only, analog service. The top speed of data transmission on a 1G network reached around 2.4kbps.

2G Networks

The 2G network began in Finland in 1991, allowing cell phones to move into the digital world. 2G allowed for call and text encryption as well as SMS, picture messaging and MMS. The maximum speed for 2G was about 50kbps.

3G Networks

The advent of a 3G network with more data, video calling and mobile internet began in 1998. What we may now consider a “slow” network in many large municipalities was the height of technology until 4G came along. 3G networks reach 2mbps on stationary or non-moving devices and 384kbps on devices in moving vehicles.

4G Networks

4G, or the current standard of cellular networks, was released in the late 2000s and is 500 times faster than 3G. It has been able to support high-definition mobile TV, video conferencing and much more. When a device is moving, as when you are walking with your phone or are in a car, the top speed can be 10s of mbps, and when

the device is stationary, it can be 100s of mbps. The 20MHz bandwidth sector has peak capacity of 400Mbps. However, since users are sharing available sector capacity among others, observable speed experiences by users are typically in 10s -100s of mbps.

As more people get access to mobile devices and the Internet of Things expands, as many as 24 billion devices are expected to need cellular network support by 2024. That's where 5G comes in.

Key differences between 4G and 5G

One of the biggest differences between 4G and 5G will be peak capacity and latency. For example, peak capacity of 5G UWB sector is in gbps compared to 4G in mbps. Also, the latency, or the time that passes from the moment information is sent from a device until it is used by a receiver, will be greatly reduced on 5G networks, allowing for faster upload and download speeds. Another big difference between 4G and 5G is bandwidth size. 5G should be able to support many more devices of the future, in addition to the network demands of connected vehicles and other devices in the Internet of Things.

What does all of this mean for you as a user and consumer? Greater amounts of information can transfer between devices faster than ever before, so high-density areas like airports and urban areas should experience fast speeds. Thanks to reduced latency and wider bandwidth, you should be able to stream a 4K video in seconds. 5G should be the network that will provide the speed and efficiency that everyone needs.

Comparison chart

3G versus 4G comparison chart

	3G	4G
Introduction	3G, the 3rd generation of wireless mobile telecommunications tech, offers faster internet speed than 2G and 2.5G GPRS networks. 3G networks comply with the IMT-2000 specifications; uses include voice telephony, mobile TV, video calls and web access.	4G is the 4th generation of broadband cellular network technology, succeeding 3G. A 4G system must provide capabilities defined by ITU in IMT Advanced. 4G applications include mobile web access, IP telephony, gaming, HDTV and video conferencing.
Data Throughput	Up to 3.1Mbps with an average speed range between 0.5 to 1.5 Mbps	Practically speaking, 2 to 12 Mbps (Telstra in Australia claims up to 40 Mbps) but potential estimated at a range of 100 to 300 Mbps.
Peak Upload Rate	5 Mbps	500 Mbps

3G versus 4G comparison chart

	3G	4G
Switching Technique	packet switching	packet switching, message switching
Peak Download Rate	100 Mbps	1 Gbps
Network Architecture	Wide Area Cell Based	Integration of wireless LAN and Wide area.
Frequency Band	1.8 – 2.5 GHz	2 – 8 GHz
Services And Applications	CDMA 2000, UMTS, EDGE etc	Wimax2 and LTE-Advance
Forward error correction (FEC)	3G uses Turbo codes for error correction.	Concatenated codes are used for error corrections in 4G.

Comparison	2G	3G	4G	5G
Introduced in year	1993	2001	2009	2018
Technology	GSM	WCDMA	LTE, WiMAX	MIMO, mm Waves
Access system	TDMA, CDMA	CDMA	CDMA	OFDM, BDMA
Switching type	Circuit switching for voice and packet switching for data	Packet switching except for air interference	Packet switching	Packet switching
Internet service	Narrowband	Broadband	Ultra broadband	Wireless World Wide Web
Bandwidth	25 MHz	25 MHz	100 MHz	30 GHz to 300 GHz
Advantage	Multimedia features (SMS, MMS), internet access and SIM introduced	High security, international roaming	Speed, high speed handoffs, global mobility	Extremely high speeds, low latency
Applications	Voice calls, short messages	Video conferencing, mobile TV, GPS	High speed applications, mobile TV, wearable devices	High resolution video streaming, remote control of vehicles, robots, and medical procedures