

# Comparative Study: Future Generation of Wireless Technology (5G, 6G & 7G)

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**Abstract.** In the previous few years, mobile era makes high-quality growth. Currently, the innovation of mobile era has reached 7.5G. Future Generation cellular communications could have better records transmission costs than 6G & 7G. Wireless era is one of the freshest regions that is developing at a excessive speed, with superior techniques rising with inside the fields of WI-FI and mobile communications. Today's , there are numerous superior technology, every guide voice site visitors the use of voice over IP (VoIP), broadband records get admission to in cellular surroundings etc., however, there is a incredible want of deploying such technology that could combine most of these structures right into a unmarried unified system. 8G affords an answer of this trouble as it's miles all approximately logically incorporating the network, application and terminals. In this paper, we're offering an introductory observe of various WI-FI technologies specifically 5G, 6G, and 7G, and additionally offer specific comparisons amongst them.

Keywords. Networks, Mobile Technology, Communications, Cellular Generations

## INTRODUCTION

Wireless and mobile communication systems are advancing at a rapid pace. The transmission of data over a distance without the need of cables or sophisticated electrical conductors is known as cellular communication. Radio, cellular telephone, personal digital assistant (PDA), and wireless networking are examples of fixed, mobile, and portable two-way communication. [1] Mobile wireless technologies have seen a number of technological revolutions and improvements during the last several decades, referred to as 0G to 5G. New cellular generations, such as 5G, 6G, and 7G, are being discovered now and in the future.

Consumers today expect more complex and helpful applications. The new generation differs from previous generations in terms of technical and new features. The number of mobile customers is growing every day as a result of these new features. As a result, cellular communication capacity has to be increased. 4G wireless networks combine 3G with fixed Internet to offer mobile Internet, an innovation that addresses 3G's constraints while also improving Quality of Service (QoS), lowering resource costs, and increasing capacity. 5G will usher in a real wireless world—the Wireless World Wide Web (WWWWW)—while 6G will combine 5G with satellite networks to provide worldwide coverage. Space roaming is associated with 7G.

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The work is divided into five sections, with conclusions and references following. Sections II, III, and IV go on the specifics of 5G, 6G, and 7G wireless technology. Section V compares the wireless technologies 5G, 6G, and 7G in depth. The top ten nations with the fastest mobile and broadband internet speeds in Mega Bits Per Second '21 are listed in sections VI and VII.

## 5G CELLULAR TECHNOLOGIES

As we Know, 5G is a fifth generation of cellular technology. Its decrease latency and increase speed as well as improve the flexibility of wireless services. Theoretical peak speed of 5G is 20 GBPS, while the peak speed of 4G is now only 1 GBPS. With a focus on improving connectivity in the previous generation of cellular technology. 5G provides the next level of connectivity to the customers by delivering a connected experience from the clouds. [5]

5G network is virtualised & software-pushed and they exploited cloud technologies.

The 5G community can even simplify mobility, with seamless open roaming competencies among mobile and Wi-Fi access. Mobile customers can live linked as they circulate among out of doors WI-FI connections and WI-FI networks internal homes without consumer intervention or the want for customers to re authenticate.

The ability of the 5G is aimed to be lots higher than modern-day 4G. Better ability might permit better density of cellular customers, extremely reliability and large communications. Additionally, research that is occurring 5G pursuits at lower cut-off and low battery intake.

5G is planned for Wireless World Wide Web (WWWWW) and IPv6. It is a basic protocol used to 4G and 5G cell networks but considering the fact that IPv6 assigns any IP address to any mobile node based on location control and this will motive wastage of 5G sources .[2]

There will be three technologies in the 5G core concept:

- Cloud Computing
- All IP platform(flat)
- Nano technology

The actual wireless world will be supported by MC-CDMA, LAS-OFDM, CDMA, UWB, Network-LMDS, and IPv6 in the 5th Wireless Mobile Network. IPv6 is a fundamental protocol that may be used on both 4G and 5G networks. In addition, suggested bandwidth optimization control protocol and mixed-bandwidth data channel for the future 5G genuine wireless world to tackle the waste of 5G resources owing to IPv6 functional nature and 5G purpose. The Bandwidth Optimization Control Protocol (BDCP) is used to establish mix-bandwidth between the TCP/IP and MAC layers.

## 6G CELLULAR TECHNOLOGIES

6G follows 5G mobile technology. It will be more able to use higher frequencies than 5G and offer lower latency and higher capacity. 6G internet will support 1µs-latency communication. This is 1,000 times faster than the 1 ms throughput. [6]

The 6G generation marketplace is expected to facilitate major upgrades in imaging, presence generation and area awareness. Working in tandem with artificial intelligence (AI), 6G's computational infrastructure will set the tone for autonomous computing; It almost includes the selection of facts storage, processing and sharing. It is anticipated that 6G Wi-Fi sensing answers will selectively use varying frequencies to degree absorption and change frequencies accordingly. [6] This technique is possible due to the fact that molecules and atoms emit and absorb electromagnetic radiation at work frequencies, and the emission and absorption frequencies for any substance are the same.

6G will have major implications for many industries and government approaches for critical asset protection and public safety. These are:

- Gas and Toxicity Sensing

- Air Quality Measurement

- Decision making

- Health Monitoring

- Feature and facial recognition

- Threat Detection

Developments in these areas will benefit mobile technology as well as emerging technologies such as virtual reality and more realities, autonomous vehicles, smart cities.

## 7G CELLULAR TECHNOLOGIES

Mobile network of 7G is similar to 6G for international coverage. This would likely be the maximum boost in cellular verbal exchange, but there may be some research on stressful problems such as cell phone use during a relocating situation from the United States. For every other United States, satellite TV for PC is also operating at regular velocity and special orbit due to the fact that there are requirements for satellite TV for mobile to satellite TV for PC device and satellite TV for PC and protocol.

Defining all the standards and protocols, the 7g dream might be the simplest. Maybe it will be possible in a later generation of 7g & its name 7.5G or 8g. While the 7G will cover all its vulnerabilities, there will be no problem of fact capability coverage and hand-off. At that time the easiest demand from the consumer side might be the name of the cellular phone and the price of its offerings. This difficulty will start again fashionable and evolutionary alternatives in technology, and will also open new horizons for computing studies. This new revolution in generation can be called 7.5G or 8G for the price of cell Smartphone name and offerings.

### DETAILED COMPARISON OF 5G, 6G & 7G

S.No	5G Cellular	6G Cellular	7G Cellular
Master network	The Net	The Net	The Net
Data Rate	100+Mega bits per second	11 Gega bits per second	11+ Gega bita per second
Frequency	24–47 Gega Hz	95GHz-3THz	95GHz-3THz
Handoff	Vertical & Horizontal	Vertical & Horizontal	Vertical & Horizontal
Location of first commercialization	Not yet	Not yet	Not yet
Multiplexing	Orthogonal frequency division <b>multiplexing</b> (OFDM)	CDMA	CDMA
Service	Wireless World Wide Web(WWWW)	Secured Services & global services	Global cellular services & Secured Services
Switching type	IPv6	All packet	All packet
Time period	Possibly 2020	Possibly 2030	Possibly 2030
Advantages	<ul style="list-style-type: none"> <li>• It provides better coverage area and higher protection.</li> <li>• Low battery intake</li> <li>• It has high energy and spectral efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• It will provide global coverage system</li> </ul>	<ul style="list-style-type: none"> <li>• It will provide low cost of calls</li> <li>• No problem of data, capacity coverage and handoff left behind</li> </ul>
Disadvantages	<ul style="list-style-type: none"> <li>• Difficult to achieve due to inefficient technical</li> <li>• The issue of security and privacy remains to be resolved</li> <li>• Requires high cost for infrastructure development</li> <li>• It is still under process and its feasibility is under research</li> </ul>	<ul style="list-style-type: none"> <li>• High cost of mobile calls</li> <li>• Difficulty in space roaming</li> <li>• Similar to 5G disadvantages</li> </ul>	<ul style="list-style-type: none"> <li>• Similar to 5G and 6G disadvantages</li> </ul>

**Table 1: Detailed Comparison of 5G, 6G and 7G[3]**