

5G Wireless Technology: A Review Paper

Jasdeep Singh, Raj Kumar,
RIMT University, Mandi Gobindgarh, Punjab
Email id- jasdeepsingh@rimt.ac.in,raj.kumar@rimt.ac.in

ABSTRACT: 5G is indeed the 5G technological standard for broadband cellular networks, that cellular phone operators started installing globally in 2019, and seems to be the intended replacement to the 4G networks that link all existing smartphones. Wireless technology is the upcoming technology, which have vast features as compare to 1G, 2G, 3G, and 4G. Here G represents the generation. Earlier there are no technologies people use to talk through letter etc. after that the technologies starts generating slowly and people can contact to others using phones etc. not at present time the latest generation is generated that is 5G. This is more advance technology as compare to others. Now the world is so vast that everyone needs that kind of technology that is having high speed of internet and is accessible easily. Therefore, a new technology "5G" has all the features, which have high speed, can be access easily etc. The future scope of the technology of the fifth generation is intended to give unrestricted call, amazing and astounding data capabilities quantities, and incalculable data transmitted in the most recent operating system for mobile devices. As a result, it is cleverer technology that will allow the entire globe to be connected without the need of cables limitations.

KEYWORDS: 5G, Data, Generation, Network, Technology, Wireless.

1. INTRODUCTION

Technology began with 1G, and then in 1990s, corporations made it possible for customers to upgrade to 2G[1]. Transmit text message between two cellular smartphones, which piqued the public's interest. The globe eventually moved to the 3G, which gave people the freedom to calls, send messages, and access the net at lightning speed. Many of the capabilities that had been developed were improved by 4G[2]. Everyone goes to web browser at lightning speed, exchange the messages, make phone conversation, and even download and upload big video files without experiencing any problems or waiting extended periods. Then, in order to improve 4G connection, business introduction, LTE (Long Term Evolution)[3]. LTE became the fastest and most consist type of 4G, and it began to complete in the market with technologies such as WiMAX. Both systems produced comparable results, but it was critical to establish a standard that everyone could follow features[4]. Figure 1 shows the wireless 5G technology features.

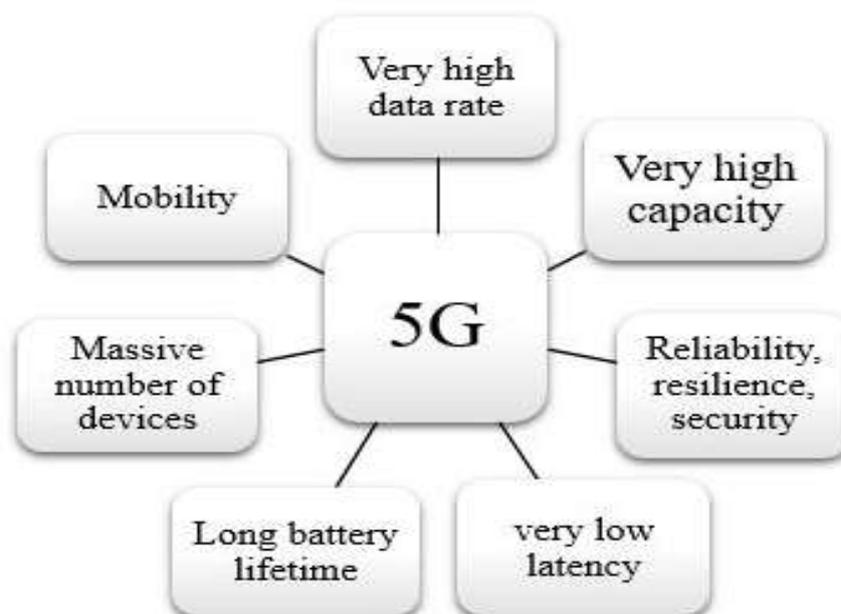


Figure 1: The above figure represents of the wireless 5G technology features.

1.1 5 Generations of Technology:

Figure 2 shows the evolution of the technologies from 1G to 5G.

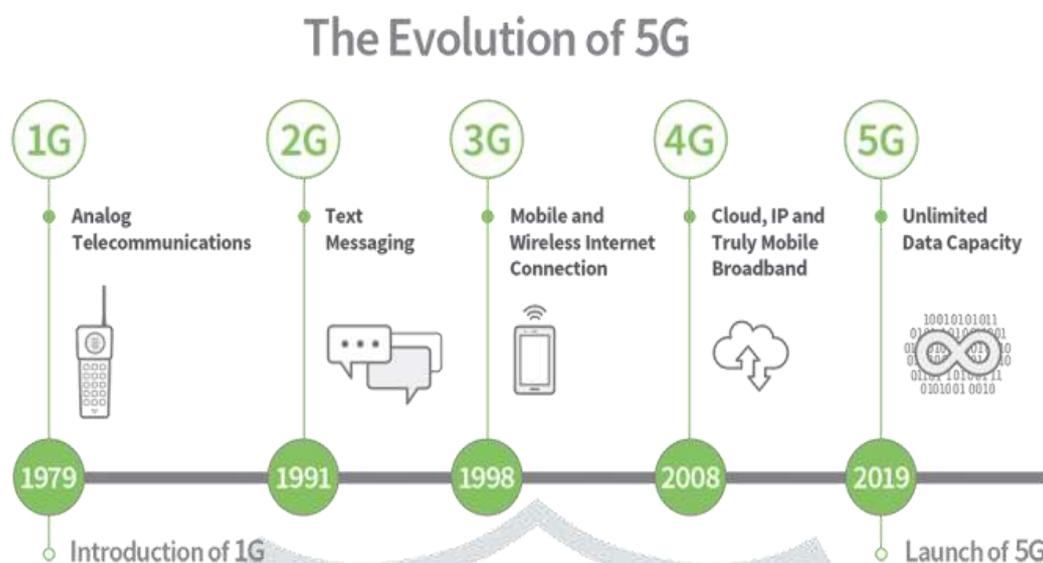


Figure 2: The above figure represents the evolution of the technologies from G to 5G [DIGI].

1.1.1 1G:

The first generation of wireless telephone technology is referred to as 1G. The disadvantages of the first generation were low capacity, rash handoff, poor accent associations, and a lack of safety, as audio calls were accumulation and played in radio towers, resulting in the weakening of these calls from non-essential connections, such as noises from the third party[5]. The major difference between the two mobile network systems is the medium of encoders, i.e., 1G networks utilize analogue radio signals, whereas 2G networks use digital radio signals. 1G has replaced over 2G.

1.1.2 2G:

In 2G generation, wireless telephone technologies are referred as 2G. The three main advantages of 2G networks are:

- Digital encryption conversation.
- 2G system were more capable. The spectrum, which allows for mobile phone usage degrees of penetration.
- 2G offered data service and paved the way for text messaging through SMS (short message service).

1.1.3 3G:

After 2G there comes 3G, which began in 2000. It transmits data rate to 2Mbps to rest of the globe. The major goal of their generation (3G) system was to combine high-speed mobile access with IP (Internet Protocol) which is based on services, which was done successful. Aside from transmission rate, innovative improvements were performed to ensure QoS (Quality of Service). Additional features like global roaming and better audio quality helped to distinguish 3G as a significant and qualitative generation[1]. The fact that 3G handsets consume more power than most 2G versions is a big nuisance. 3G communications networks support services with an information transmission rate of at least 200kb/sec.

1.1.4 4G:

4G wireless mobile technology, which succeeds 3G and is even more intriguing, is known as 4G. 4G system must have defined capabilities. Advance 4G is considered the offspring of the 3G and 2G standards. A 4G system enhanced traditional communication networks by providing a comprehensive and dependable IP (Internet Protocol)-based solution. The standardization of long-term evolution is also known as 4G, is now being done through a 3G collaboration initiative. A 4G system enhances traditional communication network by providing a comprehensive and dependable IP-based solution[6]. Voice, data and multimedia services will be available to consumers at all times and in all places, with significantly higher data charges than previous generations. Multimedia messaging services, video chat, high definition TV programming and mobile TV (Television) are all applications that require a 4G network.

1.1.5 5G:

Huge group of big global telecommunications companies are already collaborating to develop global 5G values. Despite the fact that most of those standards have most of those standards have yet to be finalized, experts believe it will be more compatible with 3G and 4G and have some global interoperability. With the exponential increase in user demand. Consider the scenario of a base station connecting with mobile stations to understand the principle underlying BDMA (Beam Division Multiple Access) methods. Each mobile station has an orthogonal beam, which we may split using the BDMA approach. The decision to go to 5G is based on current trends. Figure 3 shows the future of 5G technology.

- Increased capacity.
- Increased data rate.
- Decreased latency.
- Connection to large devices has been improved.
- Cost has been cut.
- Quality that is constant.



Figure 3: The above figure shows the future of 5G Technology [Xorlogics].

1.2 Difference between 1G, 2G, 3G, 4G, 5G:

There are major difference between G, 2G, 3G, 4G, and 5G. As in all of these technologies there is major changes which the other generation comes up with the new technologies as shown in Table 1.

Table 1: The above figure shows the difference between the technologies that is G, 2G, 3G, 4G, and 5G.

Features	1G	2G	3G	4G	5G
Start/Development	1970/1984	1980/1999	1990/2002	2000/2010	2010/2015
Technology	AMPS, NMT, TACS	GSM	WCDMA	LTE, WIMAX	MIMO, mm Waves
Frequency	30 KHz	1.8 GHz	1.6-2 GHz	2-8 GHz	3-30 GHz
Bandwidth	2 kbps	14.4-64 kbps	2 mbps	2000 mbps – 1 gbps	1 gbps and higher
Access System	FDMA	TDMA/CDMA	CDMA	CDMA	OFDM/BDMA
Core Network	PSTN	PSTN	Packet Network	Internet	Internet

1.3 Features of 5G technology:

- For crazy cell phones, 5G technology delivers excellent resolution. Large bandwidth shaping for users and bi-directionally.
- 5G technology is sophisticated billing interfaces make it possible more appealing and efficient.
- Subscriber supervision tools are also available with 5G technology for quick action.
- The 5G technology allows for large-scale data transmission. Gigabit, which can handle over 65,000 connections.
- A transporter-class gateway is available with 5G technology. Unprecedented consistency
- The traffic data provided by 5G technology make it even more appealing accurate.
- Using 5G's remote management capabilities.

1.4 Advantages of 5G technologies:

- High resolution, big bandwidth shaping on both direction.
- Single platform with multiple networks.
- Technology that is more effective and efficient in facilitating subscriber oversight tool for rapid response.
- It will deliver a massive amount of broadcasting data, supporting over 60,000 connections.
- Simple to handle.
- To support diverse services, technological soundness is required.

1.5 Disadvantages of 5G technologies:

- Technology is still in the early stages of development, and study into its feasibility is ongoing.
- Infrastructure development is expensive.
- The issue of security and privacy must be resolved.
- Many older gadgets would be incompatible with 5g, necessitating the purchase of a new, more expensive device.
- Because of poor technological assistance in most parts of the globe, the speed that this technology claims appears difficult to accomplish (in the future, it may be).

2. LITERATURE REVIEW

N. T. Le et al. has discussed about the wireless mobile communications network. The concept of the future network that is 5G. Here is an overview of the researches, which are in ongoing process on the technology 5Gs. A model for controlling network, Software Defines network etc. The objective of Nam Tuan Le et al. for

this study is to provide a lawless version of work related to technologies for next generation of networks and mobile system and they have mainly focused on 5G technologies[7].

K. Kour et al. has discussed the paper on the topic 5G wireless networks, which has been done on 5th generation on wireless communication cellular system. Have also discussed about the network architecture of massive MIMO technology, network function virtualization. Therefore, there will be cleverer technology that allows the entire world to be connected without the use of wires. People used to communicate through letters and other means before there were any technology. After that, technology gradually develops, and individuals may communicate with one another via phones and other devices. The first generation of wireless telephone technology is referred to as 1G. Some key technologies and upcoming generation technologies has also discussed to fulfill the desired routine, like Device to device communication, MIMO, MVC and cloud computing with radio network access[8].

V. Nayana et al. has discussed about the 5G technologies and said that, internet of things has evolved in the ecosystem towards the environments. As a consequences, synergistic cooperation and effective solutions. In addition, this paper has a focus on adoption. MIFaaS (mobile-IoT-Federation-as-a-service). A performance of 5G mobile telecommunication for the 5th generation environment based on long term evolution[9].

R. Kolli et al. has given an overview on the topic 5G wireless technology, which tells us about dynamic speed of the technology. Every new technology, which has come into the use, gives the faster speed as compare to the other one has also discussed here. The author of this paper has also discussed about the frequency bands, how connection loses occur, signal interface, beamforming etc. 5th generation technology going to revaluation in wireless technology as it includes some of the new technologies as of the previous one[10].

3. DISCUSSION

As a result, the new technology “5G” includes all of the qualities, such as fast speed, ease of access, and so on. In the most recent operating system for mobile devices, the future scope of fifth technology is meant to provide unconstrained call, astonishing and astounding data capability volumes, and incalculable data transmission. Therefore, there will be cleverer technology that allows the entire world to be connected without the use of wires. People used to communicate through letters and other means before there were any technology. After that, technology gradually develops, and individuals may communicate with one another via phones and other devices. The first generation of wireless telephone technology is referred to as 1G. The disadvantages of the first generation were low capacity, rash handoff, poor accent associations, and a lack of safety, as audio calls were accumulation and played in radio towers, resulting in the weakening of these calls from non-essential connections, such as noises from the third party.

At this time, the most recent generation, 5G, is not being produced. In comparison to other technologies, this one is more advanced. Now that the world is so large, everyone requires technology that provides high internet speeds and is easily accessible. As a result, the new technology “5G” includes all of the qualities, such as fast speed, ease of access, and so on. The author of this article discusses the several types of technologies from G to 5G, as well as the major aspects of the technology, as well as the benefits and drawbacks of the 5G technology. The fifth-generation technology's future scope is designed to provide unlimited calling, incredible and astonishing data capacities, and incalculable data sent in the most recent mobile operating system. Consequently, there will be cleverer technology that allows the entire world to be connected without the use of wires. The fifth-generation technology is designed to provide unlimited calling, incredible and astonishing data capacities, and incalculable data transmission in the most recent operating system for mobile devices. Therefore, it will be smarter technology that allows the entire world to be connected without the use of wires.

4. CONCLUSION

Previously, there were no technologies, so people communicated through letters and other means. As time passes, technology improves, and people may communicate with others via phones and other means. At this time, the most recent generation, 5G, is not being produced. In comparison to other technologies, this one is more advanced. Now that the world is so large, everyone requires technology that provides high internet speeds and is easily accessible. As a result, the new technology “5G” includes all of the qualities, such as fast speed, ease of access, and so on. In the most recent operating system for mobile devices, the future scope of 5th technology is meant to provide unconstrained call, astonishing and astounding data capability volumes, and incalculable data transmission. Therefore, there will be cleverer technology that allows the entire world to be connected without the use of wires. People used to communicate through letters and other means before there were any technology.

After that, technology gradually develops, and individuals may communicate with one another via phones and other devices. The first generation of wireless telephone technology is referred to as 1G. The conclusion of the paper is the impact of the new technology that is 5G wireless technology. 5G technology wireless technology is the upcoming technology, which have vast features as compare to G, 2G, 3G, and 4G. Here G represents the generation. Earlier there are no technologies people use to talk through letter etc. after that the technologies starts generating slowly and people can contact to others using phones etc. not at present time the latest generation is generated that is 5G. A detailed study of the recital requirements of 5G wireless cellular communication system has been conducted in this article. Data rate. Spectral efficient, latency, capacity requirements, energy efficiency, and service quality. The future scope of these technologies are very vast as it have all the new features, which other technologies does not have. Have the high internet speed and, high data rate, high capacity etc.

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