5G TECHNOLOGY

INTRODUCTION

The time has come when we can connect various wireless technologies, networks, and applications simultaneously.

The latest technology is called 5G. The fifth-generation wireless system (or 5G for short) is now the next generation of wireless communication systems

PREVIOUS GENERATIONS

1G: analog telecommunications standard introduced in the 1970s for voice communications with a data rate up to 2.4 kps. It used FM and FDMA and a bandwidth of 30 kHz. The major problems with 1G are poor voice quality, poor battery quality, and large phone size.

2G: digital standard, circuit switched technology introduced in 1980s. It used CDMA, GSM, and TDMA technologies. It could only transmit digital voice at 64 kbps, and not data such as email.

2.5G and 2.75G: 2.5G introduced a new packet-switching technique that was more efficient than 2G technology. This led to 2.75G, which provided a theoretical threefold speed increase. 2.5G and 2.75G were not defined formally as wireless standards. They served mostly as marketing tools to promote new cell phone features to the public.

3G: used Code Division Multiple Access Technique (CDMA). It introduced high-speed Internet access. It used technologies such as W-CDMA and HSPA (high speed packet access). It provided IP connectivity for real-time and non-real-time services. Speed: 2000 Kbps.

4G: works the same as 3G and may be regarded as the extension of 3G but with a faster Internet connection, more bandwidth, and a lower latency. 4G technologies such as WiMAX and LTE (Long-Term Evolution), claim to be about five times faster than 3G services. Speed: 100,000 Kbps

5G

5G promises a smarter, faster and efficient network.

Every mobile phone will have an IPv6 address depending on the location and network being used.

5G utilizes user-centric network concept World Wide Wireless Web instead of operator- centric as in 3G or service-centric as in 4G.

Architecture will be device-centric, distributed, programmable, and cloud-based.

There will be High data rates, One to 10 Gbps connections to end points, One millisecond end-to-end round trip delay, Low battery consumption, Better connectivity irrespective of location, Larger number of supporting devices, Lower cost of infrastructure development, high throughput, improved spectrum efficiency, reduced latency, better mobility support, and high connection density.

Major technologies enabling 5G include device-to-device (D2D) technology, machine-to-machine communication, Multiple-input-multiple-output technology. Other enabling technologies of 5G include mmWave communication, ultra-dense network (UDN), all-spectrum access (ASA), OFDM (orthogonal frequency division multiplexing), and Internet of things.

POTENTIAL APPLICATIONS

Virtual reality/augmented reality/tactile Internet, Autonomous driving/connected cars, Wireless cloud-based office/multiple-person videoconferencing, Unified global standard for all, Network availability anywhere anytime, Blockchain, 3D and ultra HD videos , Smart gird, Smart surgery and remote medical examination, Mobile security

BENEFITS

Faster speed: Data transfer speeds with 5G are projected to be about 10 times higher with 4G. That means significantly faster transmission of images and videos.

Shorter delays: 5G should reduce latency, <1 ms latency as compared to 10 ms in 4G (the time between cause and effect). This will make it possible, for example, to watch high-speed virtual reality video with no delays.

Besides these benefits, 5G has excellent capability to support both software and consultancy. It has high data rate and better coverage area (20 Gbps as compared to 1 Gbps in 4G).

Increased connectivity: 5G technology would will bring faster, more reliable connections for users than 4G/LTE. Connection density is 1 million/Km2 compared to 100 thousand/Km2 in 4G.

It is beneficial for the government, as it can make governance easier, and for the citizen, as it can provide Internet connectivity anytime anywhere. Available spectrum here is 30 GHz (3 GHz in 4G).

CHALLENGES

There are challenges faced with the new technologies enabling 5G.

There are also challenges with the integration of this technology to provide services in different application scenarios.

Some have criticized 5G for its high projected cost and that it is incompatible with the previous generations.

Just as 2G phones could not connect to 3G or 4G networks, 3G and 4G phones will not connect to a 5G network. One is forced to buy a new phone which is likely to be more expensive than 4G/LTE service.

More towers are needed to support a comprehensive network.

One remaining hurdle is the usage and popularization of 5G-capable phones and devices.

5G IN INDIA

The first experimental wireless telegraphy links were demonstrated as early as 1902.

Department of Wireless Telegraph was created soon thereafter, and wireless telegraphy came into routine use in Calcutta at Diamond Harbour in 1908.

The first mobile phone service was launched in 1985 on a non-commercial basis, but it was only in 1995 that commercial service was started.

Cellular Operators Association of India (COAI) has formed the 5G India Forum (5GIF).

Early deployment of mobile networks was based on 2G technology, with 3G technology entering service in 2010 and 4G in 2016.

Government has launched a program titled 'Building an End-to-End 5G Test Bed' to advance innovation and research in 5G.

Ericsson has installed the first public access 5G test bed at IIT Delhi in July 2018.

5G High Level Forum was set up by the Government in 2017 to articulate the Vision for 5G in India and to recommend policy initiatives and action plans to realize this vision.

National Digital Communication Policy-2018 lays out objectives with respect to 5G services in India: Enabling Hi-speed internet, Internet of Things and Machine to machine by rollout of several 5G technologies etc.

5G is expected to create a cumulative economic impact of $1 trillion in India by 2035, according to a report by a government-appointed panel. According to a separate report by Ericsson, 5G-enabled digitalisation revenue potential in India will be above $27 billion by 2026. Additionally, global telecom industry GSMA has forecast that India will have about 70 million 5G connections by 2025.

CONCLUSION

The 5G wireless technology is a multipurpose wireless network for mobile, fixed and enterprise wireless applications. It incorporates all type of advanced features that makes it powerful and in huge demand in near future. It has a bright future and will be a revolution in the mobile market.