

FUTURE OF 5G WIRELESS SYSTEM

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ABSTARCT

Everyone loves speed, especially fast internet, and it's no wonder that every major telecommunications industry in the world is looking for ways to make it even faster. Smart phones, watches, homes, and automobiles are all requiring more stable internet connections. To survive in a world where speed keeps changing every second and we seek more and more technology, here comes the fifth generation technology. Some of the primary goals that must be met in the future, i.e., in a world beyond 4G, are increased capacity, improved data rate, decreased latency, and quality service. Future 5G wireless networks will face new challenges, as well as increased demand for network capacity to support a large number of devices running applications that require high data rates and always-on connectivity. The main objective of 5G is to create the best wireless world possible, free of the limitations and obstacles of previous generations. This paper presents evaluations in the field of mobile communication technology. Multiple challenges were encountered during each evolution, which were captured with the support of next-generation mobile networks. And also we will discuss some statistics of 5G network and technology.

I. INTRODUCTION

The first wireless phone technology was 1G, which was updated to 2G in the early 1990s when firms enabled consumers to transmit text messages between two portable handsets, which captured the world. The world eventually moved on to 3G, which gave people the freedom to make phone calls, send text messages, and access the internet at lightning speed. Many of the capabilities that were only possible with the 3rd generation of wireless technology were improved with 4G. People could browse the web at lightning speed, send text messages, make phone conversations, and even download and upload big video files without experiencing any problems or waiting extended periods of time. Then, in order to improve 4G connectivity, firms added LTE, which stands for "long term evolution." LTE became the most reliable and speedy network.

Beyond the current 4G standards, 5G is the next important phase of mobile telecommunication ethics. 5G technology is helping to improve product manufacturing, documentation, and electronic communications, among other things. As the buyer becomes more knowledgeable about mobile phone technology, he or she will search out a good package which includes all of the advanced features that a cell phones can offer.

II. 5G AND ITS CAPABILITIES

The introduction of 5G technology has resulted in advancements in network design. The 5G New Radio, hailed as the worldwide standard for a better 5G wireless air interface, includes spectrums that were previously unutilized in 4G. Massive MIMO (multiple inputs, multiple outputs) technologies are used for the new antennas, allowing many receivers and transmitters to transfer massive amounts of data at the same time. However, 5G technology is not limited to New Radio. It strengthens a convergent and heterogeneous network that combines unlicensed and licensed wireless technologies. This increases the level of bandwidth available to users. 5G enhances digital experiences through machine-learning (ML)-aided automation. The requirement for fractions of second response times (for example, self-driving vehicles) pushes 5G networks to create automation with ML and, in the long run, artificial intelligence (AI) and deep learning (DL). Active management and automated service and traffic provisioning improve the connected experience while also reducing infrastructure expenses

III.EVOLUTION OF 5G

1G (or 1-G) refers to the very first generation of wireless telephone technology (mobile telecommunication). The 1st generation was announced in initial 1980s. With data rate up to 2.4kbps. The subscribers were Advanced Mobile Phone System (AMPS), Nordic Mobile Telephone (NMT), and Total Access Communication System (TACS). The setbacks of first generation was below par capacity, reckless handoff, inferior accent associations, and with no safety measures, since audio calls were accumulated and played in radio towers due to which weakness of these calls from not so needed connections i.e. noises from the third party increases. The main difference between the two mobile network system (1G and 2G), is the medium of encoders i.e. The radio signals which 1G networks uses are basically analog, while 2G networks are digital. We are aware of the fact that both the systems use digital signaling to connect the radio towers (which pay attention to the handsets) to the rest of the telephonic networks, the tone of voice itself during a call is programmed to digital signals in 2G whereas when we are talking about 1G, its modulation is done and that to on higher frequency, classically 150 MHz and up. This inherited advantage of digital over that of analog resulted in the replacement of 1G over 2G.

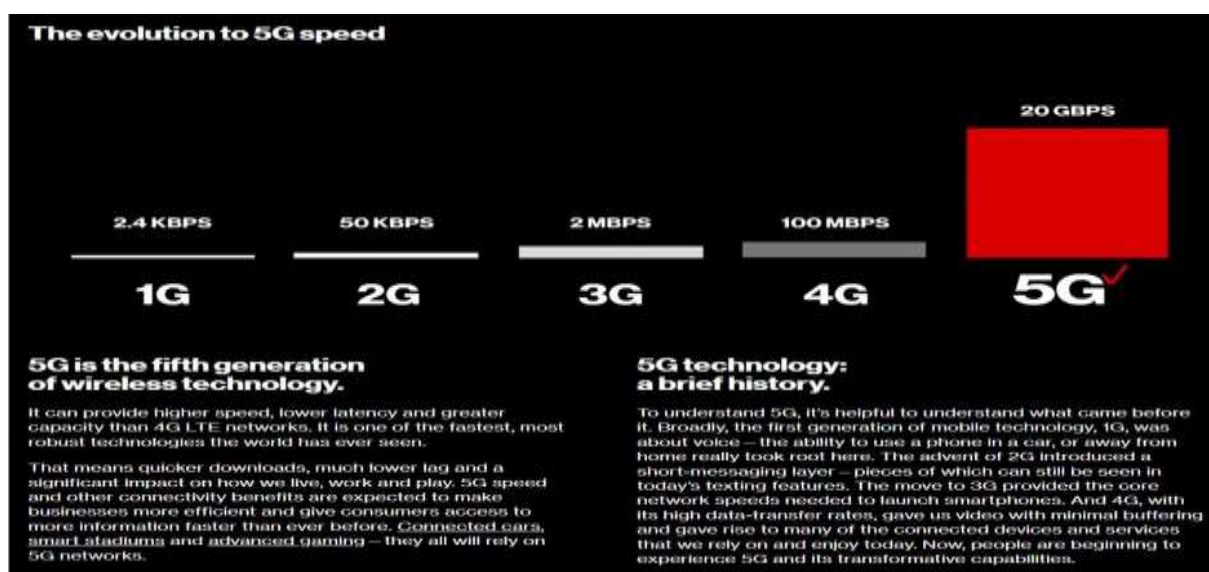
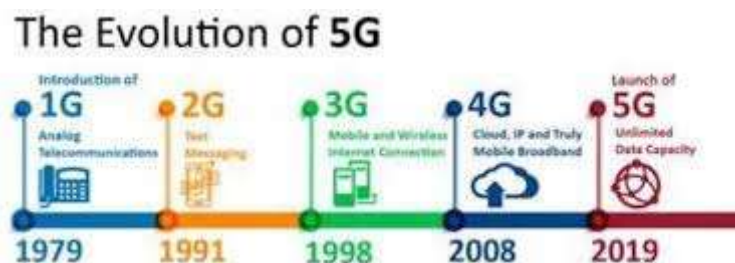


Figure 1: Evolution of 5G

3G Then, came the introduction of 3rd generation which was established in late 2000. It imparts the world with transmission rate up to 2Mbps. The main purpose of Third generation (3G) system was to merge high speed mobile access to services based on Internet Protocol (IP) and it was successfully accomplished. Aside from transmission rate, avant-garde improvement was made for maintaining QoS. Supplementary facilities like global roaming and improved audio quality made 3G as a noteworthy and qualitative generation. The major annoyance for 3G handsets is that, they grab more power than most 2G models. Looking from the market point of view, 3G network plans are more expensive than 2G. 3G involves the utilization of Wideband Code Division Multiple Access i.e., WCDMA, Universal Mobile Telecommunications Systems (UMTS) and Code Division Multiple Access (CDMA) 2000 technologies, along with the introduction of the evolving technologies like High-Speed Uplink/Downlink Packet Access (HSUPA/HSDPA) and Evolution-Data Optimized (EVDO) which has made an intermediate wireless. 3G telecommunication networks prop up

services that offer an information transfer rate of at least 200 kb/sec. Generation between 3G and 4G named as 3.5G provides an improved data rate of 5-30 Mbps

IV. 5G CELLULAR NETWORK ARCHITECTURE

Designers of 5G networks face a number of challenges. The physical scarcity of radio frequency (RF) bands required for cellular communications is one of the most pressing issues. Furthermore, these frequency spectra have been extensively utilized, and the present cellular bands no longer include any supplemental information. Another issue is that the functioning of modern wireless technology is associated with excessive energy consumption. In terms of environmental considerations, cellular operators have observed and reported that the energy utilized by base stations accounts for more than 70% of their electricity expenditure. When looking at the current 5G network on the market, it is apparent that the network's various access mechanisms are nearly at a standstill and require immediate upgrade. Current technology, such as OFDMA, are expected to last at least 50 years. Furthermore, no technological changes are required. The wireless connection had progressed from 1G to 4G. Alternatively, the inclusion of an application, or better yet, an improvement made to the basic network to meet user needs, is prompting package providers to migrate to a 5G network as soon as 4G is commercially available. However, there was wide spread consensus that,

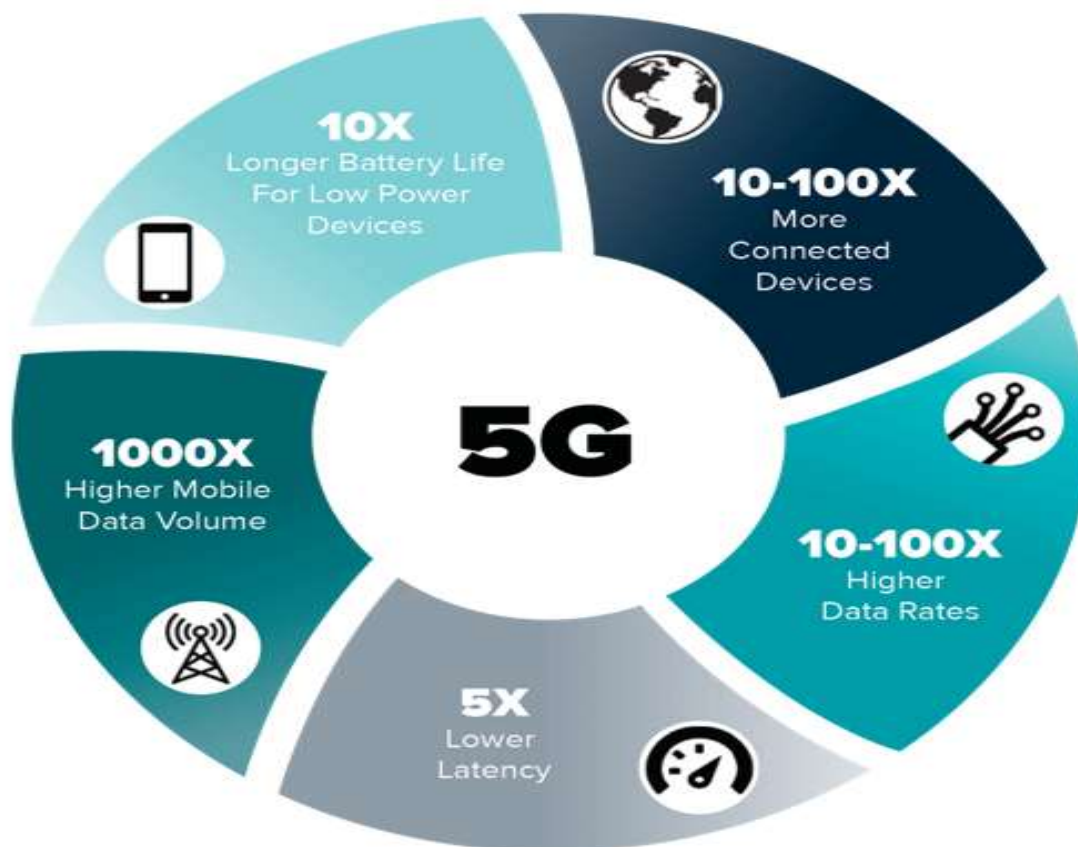


Figure : 2 5G Cellular network architecture

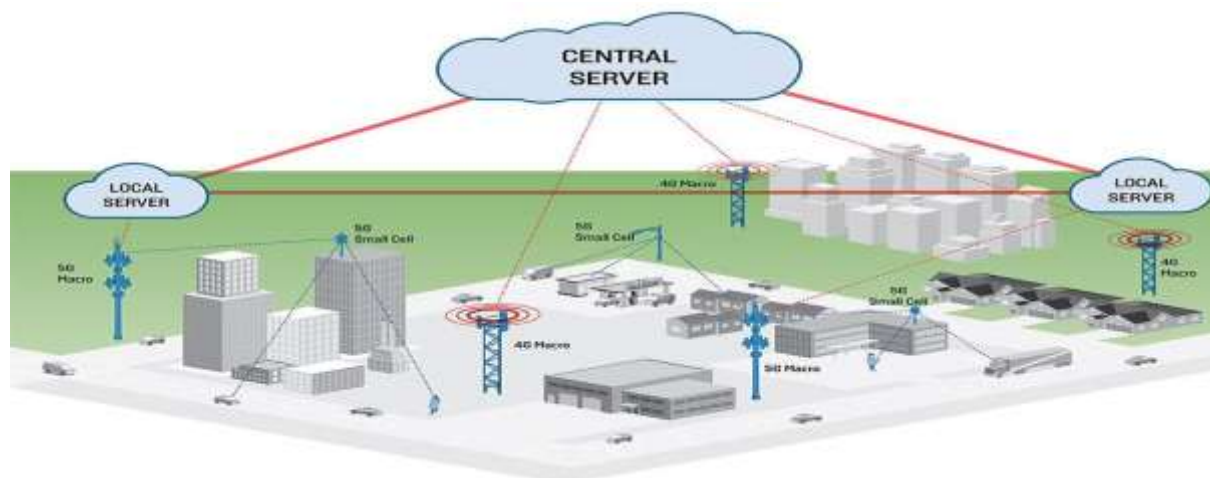


Figure : 2.1 5G Cellular network architecture

1. 1000 times the system capacity
2. 10 times the spectral efficiency
3. energy efficiency
4. Data rate.
5. 25 times the average cell throughput.

To meet the difficulty of the user and overcome the obstacles posed by the 5G system, drastic changes in the policy of constructing the 5G wireless cellular architecture are required. An outside base station is always present in the midst of a cell in the wireless cellular architecture for a mobile user to get connected or to communicate whether inside or outside. The signals must pass through the walls of the interior to provide connection between the inside and outside base stations, resulting in significant penetration loss and accompanying costs due to reduced spectrum efficacy, data rate, and energy competency of wireless communications. To overcome this challenge, a new concept for constructing 5G cellular architecture has emerged: separating the outside and interior settings. The loss due to penetration through the building's walls will be decreased to some amount with the help of this designing strategy.

V.

STATISTICS AND NEWS

More than half of North East Asia, Western Europe and North America will be on 5G by 2025, according to Ericsson's latest Mobility Report.

But in India, 5G will only account for 11% of total mobile subscriptions. The Indian region — which also includes Nepal and Bhutan — will be the slowest to adopt 5G, second only to the Middle East and Africa, where 5G penetration forecasted to be at 7%.

NEWS:

- India is likely to launch 5G services by the end of this month (May 2022).
- The DoT also announced that 5G services will be offered in 13 Indian cities at first. The DoT has earlier stated that the 5G project would be conducted by December 31, 2021. The government plans to auction off 5G spectrum, including airwaves, in early June, according to Telecom

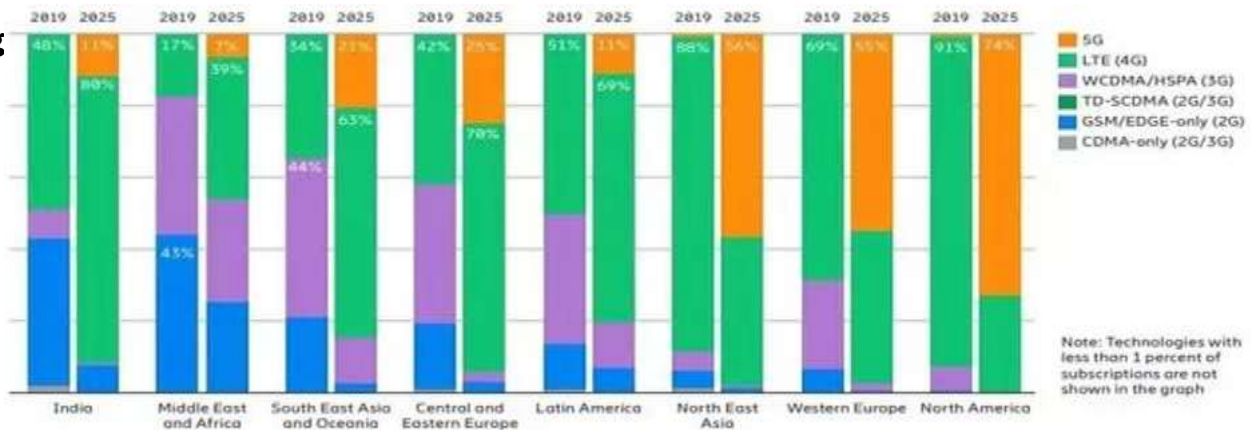


Figure: 3 Statistics and news

Minister Ashwini Vaishnaw. Following the auction, the government may begin providing 5G services to residents in the 13 cities in August and September of this year.

Ahmedabad, Bengaluru, Chandigarh, Gandhinagar, Gurugram, Hyderabad, Jamnagar, Kolkata, Chennai, Lucknow, Pune, Delhi, and Mumbai are among the 13 cities that will receive 5G services, according to the telecommunications department.

Bharti Mittal, Airtel's CEO, said that the company's 5G network is ready for deployment and will begin shortly once the auction is finalized.

Airtel Showcases India's First 5G Hologram Interaction, Recreates Kapil Dev's 175 run From 1983 World Cup (March 25, 2022)

For an immersive video entertainment experience, Bharti Airtel demonstrated 5G speed and low latency capabilities. In 4K format, the brand recreated Kapil Dev's memorable 175 runs from the 1983 World Cup. According to the business, it achieved speeds of over 1Gbps with a latency of less than 20ms. On 5G cellphones, there were more than 50 concurrent users watching the 4K video. Multiple camera angles, 360-degree in-stadia view, shot analysis, and analytics were all available in real time during the contest. With Kapil Dev, the business also demonstrated India's first 5G-powered hologram interaction. Kapil Dev's virtual avatar came on stage to engage with fans in real-time utilizing airtel 5G networks, according to the business. The demonstration was carried out at Ericsson's Network Experience Center in Manesar (Gurugram) with Ericsson 5G Radios in NSA and SA modes on 3500 MHz band test spectrum allotted by the Department of Telecom, Government of India.

CONCLUSION

5G Technology stands for 5th Generation Mobile technology. 5G mobile technology has altered the means to use cell phones within very high bandwidth. Users never experienced continually before such a high value technology. Nowadays mobile users have much awareness of the cell phones (mobile) technology. The 5G technologies include all the types of innovative structures which makes 5G mobile technology most powerful and in a huge demand in near future. A user can also catch their 5G technology cell phone with their laptop to get broadband internet access. 5G technology with camera, MP3, video play-actor, large phone memory, audio player and much more you never imagine. For children astounding fun Bluetooth technology and Piconets has become in market. In terms of better quality in future and increased data rate for the inside users and at the corresponding time reduces the pressure from the outside base station, certain short range communication technologies, like Wi-Fi, Small cell, Visible light communication (VLC) and millimetre wave communication (MVC) technologies, has been explained. Some key promising technologies and the upcoming generation step by step have also been discussed full the credible routine desires, like huge MIMO and Device to Device communication (D2D) in fastidious and intervention management, multi radio access technology ultra-dense networks, full duplex radios, millimeter wave communication (MVC) and Cloud Technologies in general with radio access networks, spectrum allocation with cognitive radio and software new

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