

A COMPARATIVE STUDY OF 4G AND 5G NETWORKS - AN OVERVIEW

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ABSTRACT

The remote innovation of 5G depends on the progression of 4G, which is currently discussed. A similar examination somewhere in the range of 4G and 5G remote innovation in connection to its speed, recurrence band, exchanging plan premise and forward mistake revision is contemplated. The 5G remote innovation tackles the issues of poor inclusion, low interconnectivity, low quality of administration and adaptability. A perfect 5G remote innovation to oblige the difficulties and deficiencies of 4G organizations is examined just as the critical framework enhancements for the previous remote advances. The importance of the thorough examination involves the delinquency of the 4G framework and favorable circumstances and weak points of 5G.

1. INTRODUCTION

The shift to the latest 5th era cellular networks, called as 5G, will influence how people utilize the advanced mobile phones and numerous other gadgets. In 2020, a noteworthy advancement is anticipated and the mobile phone users will stand to gain.[2]

In any case, this is not just about prompt cell phones. The shift to the most recent fifth generation cell systems, called as 5G, will similarly impact various sorts of devices, the present day robots, cameras and machines that communicate traffic data to one another. Soon this will replace current remote development,

called as 4G, by giving convenient web rates. It will allow people to download entire movies within seconds, and move on tremendous changes to the mechanized game, sports and promotions.

New advancements or functions like Virtual reality, independent driving, associated vehicles/multi-person videoconferencing/remote cloud office/machine to machine network and so on need the backing of 5G like innovation, improvement, meeting<1ms latency and downlink speed, which is more prominent than 1Gbps target.[9]

5G will raise the cell community to not best interconnect people, but also interconnect and manipulate machines, items, and devices. It will supply new tires of overall performance and efficiency as to empower new person experiences and join new industries. 5G will deliver Multi-Gbps high rates, ultra-low latency, huge ability and extra uniform user experience. Moreover, the new 5G mobile network will be packed up by gigabit LTE coverage foundation, which will provide ubiquitous gigabit-class connectivity.[10]

Table 1 lists the year wise growth in standards and various enhancements in generations [2][3].

1.1 Evolution of Broad band technologies

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Era	Period	Advantages	Disadvantages	Technology Used	... data
1G	1980's	Analogue phone calls, no data service	Poor spectral efficiency, security Issues	Analogue FDMA, AMPS	Upto 2.4 kbps
2G	1990's	Digital phone calling and messaging	Limited data rates, difficult to support internet/email	CDMA, TDMA	64 kbps
3G	late 2000's	Mobile calls, SMS, internet data	Real performance failed to match hype	IP technology, broad bandwidth CDMA	Upto 2 Mbps
3.5G	late 2000's	Mobile calls, SMS, broadband data	Following old mobile specific architecture, protocols	HSUPA/HSDPA	5- 30 Mbps
4G	2010	Voice, data, multimedia everytime, anywhere	High data rates and capacity for users, spectral Deficiency	OFDM, LTE advanced, WIMAX	2000 mbps to 1 Gbps
5G	2010- till date	High band width, High resolution, uninterrupted uniform connectivity	Old devices do not support and research still in progress and some places no such facilities	LAN/WAN/PAN and WLAN, unified IP, Seamless combination of bandwidth	Upto 10 Gbps

2. REVIEW OF LITERATURE

Research work [1] made 3G IP-based allowing a higher information transmission rate. To utilize OFDM innovation with QPSK and 16 QAM adjustments as opposed to straightforward QAM regulation innovation, 3G has to be incorporated with the IP-based innovation so that it can have huge information transmission and backing of VoIP also, to coordinate it with the remote LAN for a better kind of administration. Earlier, the Flash-OFDM framework was relied upon to be additionally formed into a 4G standard. No source recommends pinnacle download and transfer rates of more than the 1 Giga bit per sec to be offered by ITU-R's meaning of 4G frameworks. In the improvement that takes vicinity in destiny, which displays these predictions, the great contrast from the client's point of view between 4G and 5G ought to be really special from the wider intake.

Research work [2] says that due to increase in the mobile devices' large amount of data, it is necessary to rethink about the current generation of cellular mobile communication. The 5G networks are classified by three unique features ubiquitous connectivity, extremely high latency and high speed gigabit connection. The main advantage of 5G network is new architecture, mythology and technology.

Goals of true broadband [3] provides a Fourth Generation (4G), remote systems that were already predicted to supplant third Generation (3G). 4G is to give faster, higher limit and ease per bit IP-based services. It is a fused, overall framework that relies upon an open system approach. The target of 4G had been supersede the existing cell frameworks with a unique and large cell focus framework standard dependent on IP for control, video, parcel information and VoIP. Although 3G had not arrived exactly,

specialists were expected to contribute their plans to upgrade the high platform. The indistinct "remote world" was expected to end its operations around 2010. This paper manages the basics and issues of systems, advances, range, guidelines, terminals and administrations of 4G, and the dreams that the system administrators and specialist organizations see for the development of 4G versatile frameworks, where future research is vital from their point of view.

3. OVERVIEW OF 4G AND 5G

In the fifth era of versatile telecoms innovation by 2020, as indicated by Boris Johnson, the capital's city hall leader is 5G innovation. This ensures convenient data speeds that far surpass the fast, locally situated broadband framework still available in the UK.

With a consistent speed of up to 100 GB, 5G will be much faster than 4G, the latest cycle of cellular data technology. The increase performed by way of 4G is gift up being allowed with the aid of association whose sellers are ordinary moving.

3G cannot comply with the current flexible work request. The specialist in city sees normal uncover the results i.e. the excessive with center of the street and all, so a brand new flexible association is regularly usual in the intervals of the middle. 4G frames have a large base. This experience reduces most pressure over the years. This requires the ability to increase to recognition groups which include email and net browsing.[7]

This gives additional speed to 4G, for example, in portable video conferencing, cloud computing and Skype.

5G will enable correspondence so rapidly as to turn out to be practically perpetual, putting adaptable web benefits complying with office automation. Huawei, the Chinese telecommunication giant, talks about the

basic design of 5G. 5th Generation will allow all types of compact applications and all types of flexible organizations. They will be connected anywhere at any time, "from people and systems to physical things, frames, content, working learning, favorable fitting information and items of various sorts inflexible solid and secure ways.

Mobile facts ought to show the response for association that work behind the compass of cellular frameworks, or revel in the evil impacts of intermediate constant line corporation. Even the cost of starting up convenient data posts is far lower than presenting fiber optic connections. Overseers may well choose 5G is fast enough to reach out to rural areas as alternative to fixed lines

3.1 Benefits of 5G over 4G

The wireless technology was developed in the 1980s with 1G (1st generation), and today we are discussing 5G (5th generation), which is a tremendous achievement.

It is the fifth generation of wireless network that is relied upon to be propelled in 2020 in India and the rest of the world. 5G will be founded on the mix of the current wireless technologies like Global System for Mobile Communication, Wireless Fidelity, Long Term Evolution (LTE) and so on, and the new radio access is making advancements.[11]

5G will bring higher limit than the current 4G range. So, 5G is needed to manufacture information rates past 1gb reliably, and it will give higher mobile band thickness to the end-user. It is assessed that higher download rate of information will be of 20/Gbits and conversion scale will be of 10G/bits. There will be low dormancy and low battery utilization while utilizing 5G that proposes to build the battery life lasting upto 10 years and decay sort out requirement is 90%. An enormous number of

PCs will undoubtedly get to synchronous relationship at a high rate. Terrible adequacy will in like manner be extended in 5G network.[12]

5G system will benefit the broadcast communication are theoretically speaking. It will give better utilization of phones by extending their speed. It will introduce VR (Virtual reality) and AR (Augmented reality) in phone zone.

5G will likewise bring about the greatest change by beginning the time of driverless savvy autos and keen homes. The primary media transmission mammoths like Airtel, BSNL, Apple and Nokia have quite recently started working with 5G advancement and will in all probability bring advancement shocks.

3.2 ADVANTAGES OF 5G

5G system will profit businessmen as well as the average citizens. There are a few latest things that will develop alongside 5G system making it continuously reliable.

Some of benefits listed below:[9]

- Ø Greater speed (enough to download a film)
- Ø Higher- data capacity
- Ø Reduced delay
- Ø Provided maximum goals & bigger transmission capacity
- Ø 5G assemble organizes on one stage
- Ø Lower battery utilization
- Ø Continuous associations
- Ø Continuous network
- Ø Coextensive different administrations
- Ø Offers access to remote places
- Ø Detect catastrophic events

3.3 Limitations of 5G Technology

Since there is movement in fifth Era (5G) new ideas are examined and conceptualized to manage all radio

signal issues. For some security reason, in most of the geographical locations, there is no mechanical progress.[12]

New concepts are still under process before being put to use.

Innovation in the speed of data ensures that it may seem difficult to reach (in the future, it could) in the light of graceless mechanical help in many parts of the world.

Disadvantages

A high number of traditional contraptions would not be prepared for 5th Generation along these lines, since all of them ought to be superseded with a new expensive game plan. Privacy issue is yet to be send.

3.4 BENEFITS OF 5G

In contrast with past radio innovations, 5th Generation has the following benefits:[10]

- v For all intents and purposes conceived to be the superfast for example: 1 to 10 Gbps.
- v Idleness will be 1000 micro second (till finish round trek).
- v 1000x transfer speed zone.
- v Achievability to interface 1 to 90 number of gadgets.
- v Overall inclusion.
- v 90% decrease in system vitality utilization.
- v Anchoring time is longer.
- v The entire world will be in wifi zone.

4. COMPARTIVE EXAMINATION OF 4G AND 5G

4th Generation (4G) cell system gives broadband cell system advantages, and overcomes 3G portable systems. It gives all IP based cell interchanges. The limit deliver persist with IMT-Advanced assurance is ready somewhere around International Telecommunication Union (ITU).

(Anytime, Anywhere) The accompanying periods of remote advancement ensure more information rates which will enlarge media organizations and beready to offer fast 100Megabyte ps to 1Gigabyte ps. More Quality of Service and more secure and privacy could be provided to alltypes of organizations at any point anywhere depending on customer necessities.

Better utilization of the existing system for a better performance is more important than the need to use costly gear. This is important to give a competitive edge to any organization.

Fifth-era innovation is needed to provide different recurrence organizations (much larger than existing

ones) and even greater data transmission per recurrence channel. At present the compact advancements have demonstrated a noteworthy improvement in the expanded data transmission speed.

ADVANTAGES OF 5G TECHNOLOGY [9]

- High goals and any directional large amount of data transmission molding.
- New thoughts to accumulate different kinds of systems on a single stage.
- Progressively compelling and productive.
- New thoughts to develop supervising instruments for speedy action.

Key Points	4 th Era	5 th Era
Origin/deployment	Now	By quickly(Expected by 2020)
Input Rate	Upto 1Gbps	Upto 10 Gbps
Technology	WIMAX LTE	4G+WWWW
Multiplexing	Code-division-multiple-Access	CDMA
Type of Switching	Datagram switching	All Packet
Assistance	HD streaming	Dynamic Information with AI Capabilities
Handoff Supported	Vertical and Horizontal	Vertical and Horizontal
Frequency	2 to 8 GHz	3 to 300 GHz

Table 2.1 lists the distinction between 4th Generation and 5th Generation. [9]

CONCLUSION

In this comparative survey, we presume that every one of these remote systems has one of a kind significance in a specific field. These days, mobile has ended up being a significant part oftheeverybody's life. In this paper we have talked about the advancement of all broad band technologies and their fault. The entry of 4G has made an extraordinary impact on the field of telecommunication. We understand that there are numerous unending issues, for example, bad connectivity, poor inclusion, difficulties in administration and adaptability. The landing and usage of 5G in the upcomingyears will take wireless telecommunication to a

totally fresher and innovative dimension. It could be controlling the upcoming generations of robotic devices.

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