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A Survey on: 5G Technology

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Abstract: It is basically a latest cellular technology that provides 3 main features: It provides greater speed, lower latency and provides ability to connect a lot more devices simultaneously, technologies, network and applications.

5G networks is expected to be deployed by 2020. The Fifth generation technology also provides the major features of E-Payments, E-Transactions etc so that it could be very useful to the user to perform the fast access by the mobile communication.

Keywords: 5G networks.

I. INTRODUCTION

5G technology or fifth generation technology will be the latest technology that will be introduced in 2020. The 5G will provide the efficient data rate and latency to the user so that the people could perform their task or work at any time and at anywhere. 5G network is very fast and reliable.

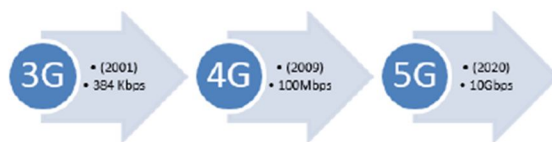


Fig. 1: 5G Networks is faster than the 3G and 4G networks.[2]

The fig 1 shows the 5G efficiency, energy efficiency and the data rate. The 5G will significantly improve the QoS (Quality of service) [2] to the customers from the point of view of data and the smart devices. The 5G will provide the initiative for downloading speed i.e; 10 to 20 Gbps that will be good enough speed for downloading and streaming. As there are many users of mobile technologies and they took daily access of downloading, education, travelling etc. that requires the high speed for performing the multitask in the efficient way.

II. ARCHITECTURE OF 5G

Architecture for 5G Mobile Networks

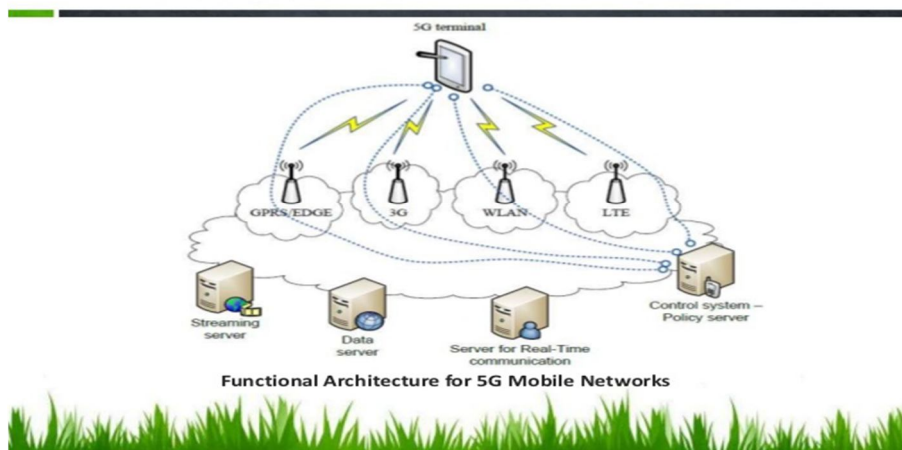


Fig. 2: Architecture of 5G.[5]

Architecture of 5G technology is very highly advanced. It requires an integration of networks.

5G aims to design a Multi-Bandwidth data path by integrating the current and future networks. It has extra data capabilities and has ability to tie together unrestricted call volumes and infinite data broadcast within latest mobile operating system. The 5G wireless internet networks are real wireless world which shall be supported by CDMA, OFDM, MCCDMA, UWB and IPv6.

A. GPRS(General Packet Radio Service)

- 1) Transmit data at 60 kb/sec.
- 2) It consumes less battery during sending and receiving message.

B. EDGE(Exchange Data Rate for GSM Evolution)

- 1) It is Advanced version of GPRS.
- 2) Provides a data speed of 473kb/sec.
- 3) It can be used in Packet Switched application.

C. 3G

- a) 3G makes it possible to do a video call.
- b) Provides efficient way to browse internet on mobile network.
- c) 3G networks provides an information transfer rate of at least 0.2 Mbit/s.

D. WLAN (Wireless LAN)

It provides short range,high speed wireless data connection between mobile data device using radio signal.

E. LTE (Long Term Evolution)

- a) It is a Standard for mobile communication for ahigh speed data transmission for mobile network.
- b) Provides speed upto 100mbps.
- c) It is also known as **3.95G**.

III. HARDWARE OF 5G

- A. It uses UWB(Ultra Wide Band) networks with higher BW at low energy levels.
- B. BW is of 4000 Mbps, Which is 400 times faster than today’s wireless networks.
- C. It uses smart antenna.
- D. It uses CDMA(Code Division Multiple Access).
- E. It uses multiplexing.

IV. SOFTWARE OF 5G

- A. 5G will be single unified standard of different wireless networks, including LAN/WAN,WWW(World Wide Wireless Web),Unified IP and combination of broadband.
- B. Software defined radio, flexibility, Packet layer,encryption and Ant-virus.

V. LITERATURE SURVEY

A. Graph shows the change in the Data Rate on The Yearly Basis

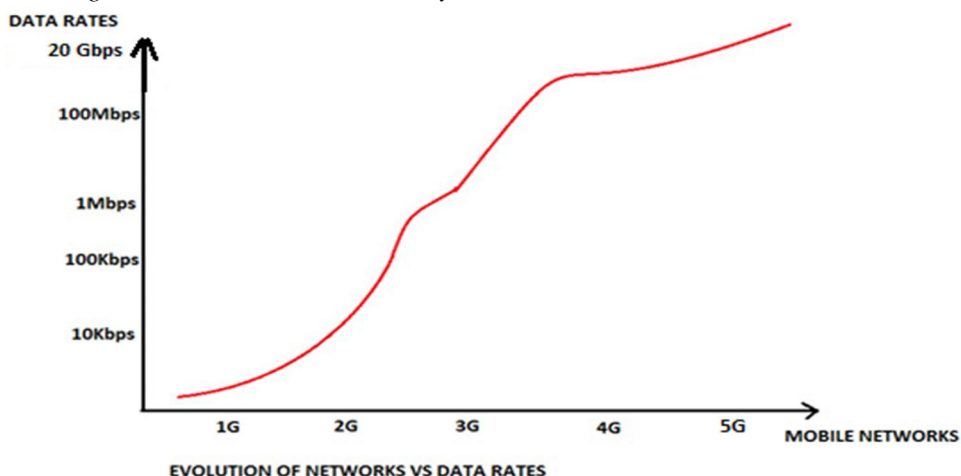


Fig. 3: Graph shows the change in the Data Rate on The Yearly Basis

5G will be a good and efficient technology that will provide the high data rate transfer and will lead to perform the task in less time and in efficient way. 5G is the new generation of mobile networks it is expected to appear on the market by 2020. When it will be appeared in the market it will introduce High Quality Of Service like Increased Speed, Capacity of mobile networks and Growth of wireless devices technology.

The Quality of service of 5G technologies Manages the data traffic by reducing latency, packet loss on the Network.

VI. FEATURES OF 5G TECHNOLOGY

5G Provides Up to 10Gbps data rate for performing different task, it provides 1-millisecond latency and provides 1000x bandwidth per unit area, it allows 100x number of connected devices per unit area (compared with 4G LTE), Low Latency, 100% coverage, 90% reduction in network energy usage.

VII. GENERATIONS FROM 1G- 5G.

Technology / Features	1G	2/2.5G	3G	4G	5G
Start/ Deployment	1970/ 1984	1980/ 1999	1990/ 2002	2000/ 2010	2010/ 2015
Data Bandwidth	2 kbps	14.4-64 kbps	2 Mbps	200 Mbps to 1 Gbps for low mobility	1 Gbps and higher
Standards	AMPS	2G: TDMA, CDMA, GSM 2.5G: GPRS, EDGE, 1xRTT	WCDMA, CDMA-2000	Single unified standard	Single unified standard
Technology	Analog cellular technology	Digital cellular technology	Broad bandwidth CDMA, IP technology	Unified IP and seamless combination of broadband, LAN/WAN/	Unified IP and seamless combination of broadband,

TABLE 2: Difference table for generation of Technologies.

VIII. WORKING OF 5G NETWORKS

As it was stated earlier, 5G will be Completely know to the user i.e; nothing is hidden from user. The 5G will have new error prevention features that will be installed through internet anytime & have modulation methods and software defined radios. 5G will be an interconnected collection of networks and that of individual network handle the user mobility. The main part is this network will be based on Wireless technology architecture as it has a OSI layer. [1]

Application Layer	Application (Services)
Presentation Layer	
Session Layer	Open Transport Protocol
Transport Layer	
Network Layer	Upper Network Layer
	Lower Network Layer
Data link Layer	Open Wireless Architecture
Physical Layer	

TABLE 1: OSI layers in 5G terminal design

IX. APPLICATIONS OF 5G

- 1) It will make unique global standard.
- 2) *Education*: The 5G will provide the people that are interested in education can lead to study at any time anywhere by using their mobiles in cost effective manner.
- 3) It uses artificial intelligence and artificial sensors.
- 4) Entertainment and multimedia.
- 5) *High Speed Mobile Networks*: As we know that most of the people uses mobile daily for streaming and downloading that requires high speed. It will be easily done by 5G because it provides downloading speed up to 10-20 Gbps, which is equivalent to fiber optic internet connection.
- 6) *IOT (Internet of Things)*: Smart homes, Logistics and shipping Smart cities, Industrial IOT, Smart Farming, Fleet management, HealthCare Application, Autonomous Driving, Security and Surveillance.

X. CONCLUSION

The 5G wireless technology provides a multipurpose wireless network for mobile. It surrounds all type of advanced features that makes it powerful and in huge demand in near future. Many tests and trials need to be conducted before implementing 5G. 5G technology is still in development stage. It has a bright future and will be a revolution in the mobile market.

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