5G NETWORKS:RECENT TREND IN IT

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ABSTRACT: *This paper summarizes the 5G Wireless Communication Networks. There is continuous innovation and evolution in mobile industry. As a next step, 5G will not only give faster speed but it will also consider Network Congetion, cost, reliability and quality. By using 5G Networks, We will be able to browse internet on smart phone at a speed that will reach 10 GigaBytes per second. Data provided by Statista, a provider of market and Consumer data, indicates that by 2024, 5G Network technology will be reached to more than 40% of the global population, which is about 1.5 billion users. The aim of this paper is to emphasis on what 5G is about: What are the building blocks of 5G systems, what the challenges are and how to handle them.*

Introduction: In the past time, mobile wireless technology has experienced 4 to 5 Generations of technologies. The tele communication services has evolved to a big extent during the last few years. About 6 billion people use phones. There are 4 Generations existing in the mobile industry. These are :- 1G-First Generation, 2G-Second Generation, 3G- Third Generation, 4G- Fourth Generation and now 5G-Fifth Generations. Increased internet data traffic has increased the demand of 3G and 4G wireless technology. Technical requirement over currently existing technologies are as following.

- 100 times higher mobile data volume per area
- 10 to 100 times higher user data rate
- 10 to 100 times higher number of connected devices.\
- 10 times longer battery life.
- 5 times reduced latency.

There are different mobile and wireless technologies which are present like UMTS(Universal Mobile Telecommunication System), LTE(Long Term Evoloution), Wi-Fi(Wireless Fidelity), Wi-Max, Personal Area Networks like Bluetooth and ZigBee. There are variety of interfaces like GSM which is based on circuit switching. Fifth Generation Networks can be completely wireless Networks without limitation like World Wide Wireless Web (WWWW). 5G networks shall be supported by LAS-CDMA(Large Area Synchronized -Code Division Multiple Access), OFDM(Orthognal Frequency Division Multiple Access), MCCDMA(Multi-Carrier Code Division Multiple Access) and IPV6. Fifth Generation should be more intelligent Technology than 4G. this generation is going to be released in 2020.

Review of present and previous Networks:
Evolution:- There is evolution from 1G to 2G,3G,4G and now 5G – Fifth Generation of mobile communication.

- **1G-First Generation**- 1G evolved in 1980. It was based on analog system known as cell phones. It introduced mobile technologies such as Mobile Telephone System (MTS), Advanced Mobile Telephone System(AMTS), Improved Mobile Telephone System(IMTS), FDMA(Frequency Division Multiple Access). Voice calls were transmitted usion frequency of 150MHZ.

- **2G-Second Genereation-** 2G evolved in late 1980s. It used digital system. It has speed of 64 KBPS. It provided facility of SMS(Short Messaging Service) and used the bandwidth of 30 to 200KHZ. After 2G, 2.5G system uses packet switched and circuit switching. Data rate is up to 144KBPS.

- **3G-Third Generation-** Ituses widespread wireless Network. In it clarity was increased. The data was sent by packet switching. Voice calls were interpreted through circuit switching. It includes access to television/Video. It operates at a range of 2100MHZ and has a bandwidth of 15-20MHZ used for Video, Chatting etc.

- **4G-Fourth Generation**- It gives downloading speed of 100MBPS. It gives additional services like Multi Media NewsPapers, to watch TV Programs with more clarity, send data much faster. 4G is developed to accommodate Multi Media Messaging Service (MMS), Video Chat, Mobile Chat, Mobile TV.
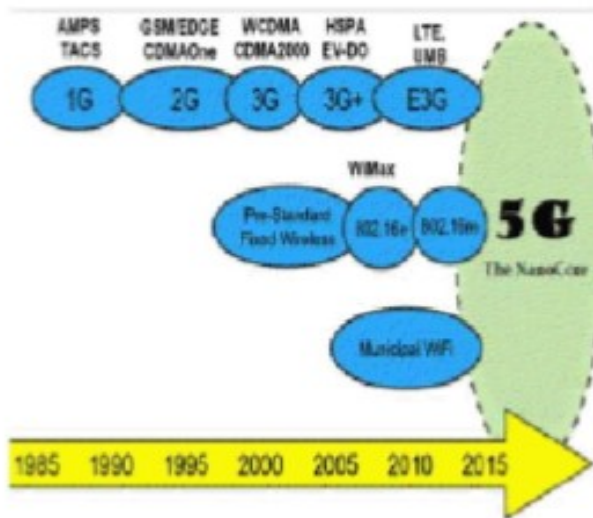
Fig : Evolutional Changes in Mobile Technologies[7]

- **5G-Fifth Generation**- 5G mobile technology will use mobile phones with very high bandwidth. It will have many advanced features which will make 5G technology most powerful and in greatdemand in near future.

Table 1: Comparative Analysis of Different Generations Attributes

Technology Features	1G	2G	3G	4G	5G
Start/ Deploy m-ent	1970-1980	1990-2004	2004-2010	Now	Soon (Proba-bly by 2020)
Data Bandwid-th	2kbps	64 kpbs	2Mbps	1Gbps	More than 1Gbps
Technology	Analog Cellular Technol-ogy	Digital Cellular Technology	CDMA 2000,U MTS,E DGE	Wimax , LTE	
Service	Mobile Technol-ogy (Voice)	Digital Voice, SMS, Higher Capacity	High Quality Audio	Dynam-ic inform at-ion Access	
Multiple-xing	FDMA	TDMA,C DMA	CDMA	CDMA	CDMA
Switchin-g	Circuit	Circuit, Packet	Packet	All Packet	All Packet
Core Network	PSTN	PSTN	Packet N/W	Internet	Intern e-t

Design of 5G Mobile Network architecture:-
The proposed design of 5G mobile systems consists of a user terminal and a number of independent, radio access technologies (RAT). Within each of the terminals, each RAT is seen as IP link to the outside world. There should be different Radio Interface for each RAT. The first two OSI Levels(Data-Link and Physical Levels) define the RAT. Then over OSI-1 and OSI-2 layer, there is Network Layer, this layer is IP(Internet Protocol).
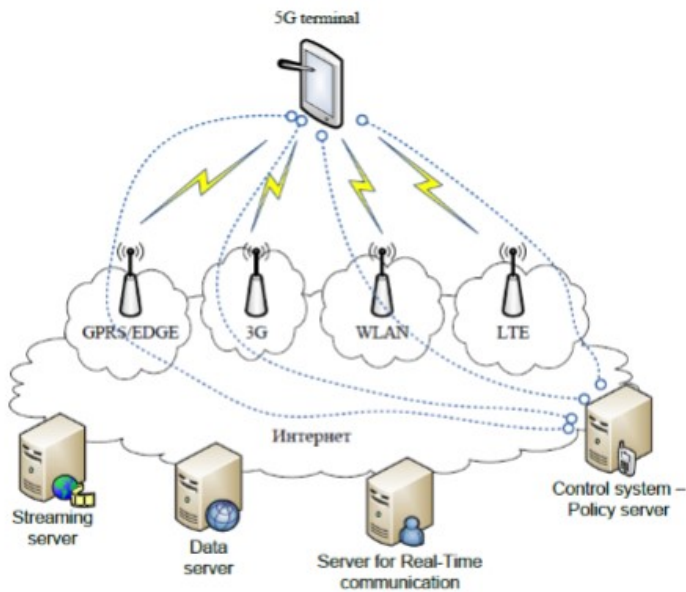
Fig : 5G Mobile Network Architecture

Traffic Challenges in 5G Networks:-

By 2020, Networks and mobile will experience significant challenges. The main issue will be to provide any type of information to any use in requested style because the capacity of device to be handled will reach from thousand devices to billions. There should be devices using minimum power. Monthly consumption of data should increase to 500GB. Flow of mobile users and 4G networks will increase in next 5 years. Total users having smart phones will generate more than 90% traffic by 2020.

5G Requirements :- Requirements of 5G are as follows:-

- Lower Battery Consumption\
- Multiple parallel data transfer ways
- Around 1GBPS data rate in mobility
- More Secure
- WWWW(World Wide Wireless Web)
- Many applications with Artificial Intelligence

Features of 5G Technology:-

- 5G will provide billing limit in advance.
- 5G will support virtual private Networks
- Uploading and Downloading speed of 5G technology will touch the peak.
- 5G will offer enhanced and available connectivity.
- 5G will be fast and reliable.

Table 2: Global Mobile Data Traffic Growth

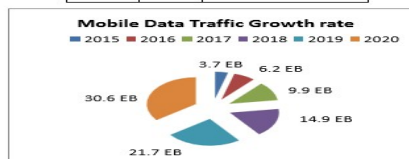| S. No.	Year	Growth rate (EB)
1	2015	3.7 EB
2	2016	6.2 EB
3	2017	9.9 EB
4	2018	14.9 EB
5	2019	21.7 EB
6	2020	30.6 EB

Fig. 4 Global Mobile Data Traffic Growth

Future Considerations:- Beyond 5G one can be able to control his intelligent Robots using his mobile phones. Your mobile can type the message automatically what your mind thinks. 6G technology has not yet been fully revealed but the Google hot trend have rated the term 6G as the 17th most searched word in the search Engine.

Conclusion:- 5G Network is very fast and reliable. 5th Generation is based on 4G Technologies. Fifth \Generation will accept more Challnges and work more efficiently as compared to previous generations. This generation will interconnect all the Networks without limits. This new revolution in cellular technology will lead to many facilities and further developments in our lives and it will change everyone's style of living.

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