

## 5G - A NOVAL ERA IN WIRELESS TECHNOLOGIES (STILL 4G IS NOT PROPERLY IMPLEMENTED IN THE MARKET, BUT TIME TO START TALKING 5G)

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### ABSTRACT

5G—“connect anytime, anywhere, anyhow” promising everywhere network access at high speed to the end users, has been a topic of great interest mainly for the wireless telecom industry. 5G seems to be the solution for the growing user necessities of wireless broadband access and the boundaries of the existing wireless communication system. The wireless industry is busy with the standardization of the 4th generation (4G) cellular networks. The 4G standards are expected to be concluded in the next year or two. 4g wireless system cannot exist in today’s market without standardization. The 4G concept have already moved to the standardization phase, we must begin to work on the structure blocks of the 5G wireless networks. The major difference, from a user point of view, between current generations and expected 5G techniques must be something else than increased maximum throughput [2]; other requirements include low battery consumption, more secure. We refer to this goal as enabling the 4A’s paradigm i.e. Any rate, Anytime, Anywhere and Affordable. In particular, this paper focuses on the features such as broadband internet in mobile phones with a possibility to provide internet facility in the computer by just connecting the mobile and with a speed of 10Gbps and more. In 5G researches are being made on development of World Wide Wireless Web (WWWW), Dynamic Adhoc Wireless Networks (DAWN) and Real Wireless World.

**Keywords:** 1G, 2G, 3G, 4G, 5G, GSM.

### 1. WHAT IS 5G NETWORKS?

5G network is very fast and trustworthy. The concept of hand held devices is going to be revolutionizing with the advent of 5G. Now all the services and applications are going to be accessed by single IP as telephony, gaming and many other multimedia applications. As it is not a new thing in market and there are millions of users all over the world who have experienced the wireless services wireless technology. It is not easy for them to shrink from using this new 5G network technology. There is only need to make it accessible so that a common man can easily afford the profitable packs offered by the companies so that 5G network could hold the genuine place. There is need to win the customer trust to build fair long term relation to make a trustworthy position in the telecommunication field. To complete with the preceding wireless technologies in the market 5G network has to tender something trustworthy something more original. All the features like telephony, camera, mp3 player, are coming in new mobile phone models. 4G is providing all these utility in mobile phone [8]. By seeing the features of 4G one can gets a rough idea about what 5G Networks could offer. There is messenger, photo gallery, and multimedia applications that are also going to be the part of 5G. There would be no difference between a PC and a mobile phone rather both would act vice versa.

WHY IS THERE A NEED FOR 5G?



Mobile Phone.

## 2. WHAT 5G TECHNOLOGY OFFERS?

5G Technology going to be a new mobile revolution in mobile market. Through 5G technology now you can use worldwide cellular phones and this technology also hit the china mobile market and a user being capable to get access to Germany phone as a local phone. With the coming out of cell phone alike to PDA now your whole office in your finger tips or in your phone. 5G technology has extra ordinary data capabilities and has ability to tie together unrestricted call volumes and infinite data broadcast within latest mobile operating system. 5G technology has a bright future because it can handle most excellent technologies and offer precious handset to their customers. May be in coming days 5G technology takes over the world market. 5G Technologies have an surprising capability to support Software and Consultancy. The Router and switch technology used in 5G network providing high connectivity.



The 5G technology distributes internet access to nodes within the building and can be deployed with union of wired or wireless network connections. The current trend of 5G technology has a glowing future [14].

The major difference, from a user point of view, between current generations and expected 5G techniques must be something else than increased greatest throughput; other requirements include:

- a. Lower out age possibility; better exposure and high data rates available at cell edge.
- b. Lower battery consumption.
- c. Multiple parallel data transfer paths.
- d. Around 1Gbps data rate in mobility.
- e. More secure; better cognitive radio/SDR Security.
- f. Higher system level spectral effectiveness.
- g. World Wide wireless web (WWW).
- h. More applications combined with artificial intelligent (AI) as human life will be surrounded by artificial sensors which could be communicating with mobile phones. Not harmful to human health.
- i. Cheaper traffic fees due to low infra structure deployment costs.

## 3. FEATURES OF 5G

According to some research papers on 5G technology, the main features the technology might have are as follows [12]:

- a. High speed, high power, and low cost per bit. It Support interactive multimedia, voice, streaming video, Internet, and other broadband services, more effective and more attractive, Bidirectional, accurate traffic statistics.
- b. Introduction of a new radio system is possible in which different radio technologies will distribute the same spectrum. This can be done by finding unused spectrum and then adapting to the technology of the radio technology with which the spectrum is being shared.

- c. Every mobile in a 5G network will have an IP address (IPV6) according to the location and network being used.
- d. The technology is likely to support virtual private networks and advanced billing interfaces.
- e. With 5G Enabled phone, you might be able to connect your phone to your laptop to get access to broadband. 5G technology is providing large broadcasting of data in Giga bit which supporting almost 65,000 connections.
- f. The traffic statistics by 5G technology makes it more accurate and it also support virtual private network.

#### 4. CHALLENGES AND REQUIREMENTS

The three fundamental requirements for building 5G wireless networks are [9]:

- a. Capabilities for supporting massive capacity and massive connectivity
- b. Support for an increasingly diverse set of services, application and users all with extremely diverging requirements for work and life
- c. Flexible and efficient use of all available non-contiguous spectrum for wildly different network deployment scenarios

Mobile networks will increasingly become the primary means of network access for person-to-person and person-to-machine connectivity. These networks will need to match advances in fixed networking in terms of delivered quality of service, reliability and security. To do so, 5G technologies will need to be capable of delivering fiber-like 10 Gb/s speeds to make possible ultra-high definition visual communications and immersive multimedia interactions. These technologies will depend on ultra-wide bandwidth with sub-millisecond latencies.

#### 5. KEY TECHNOLOGY DRIVERS IN 5G

Key 5G technology drivers are as follows [13]:

- a. While previous generations of wireless networks were characterized by fixed radio parameters and spectrum blocks, 5G will allow use of any spectrum and any access technology for the most excellent delivery of services.
- b. Air-interface and RAN systems will need to be entirely redesigned to hold a new mobile access prototype of considerable capacity, huge numbers of connections, and ultra-fast network speeds.
- c. 5G will characteristic native support for new kinds of network deployments, including ultra-dense radio networking with self-backhauling, device-to-device communications, dynamic spectrum reframing and radio access infrastructure sharing.

**The development of 5G will require several breakthroughs [4]:**

- a. New breakthroughs in multiple access and advanced waveform technologies combined with advances in coding and modulation algorithms are essential for realizing continuing improvements in spectral efficiency.
- b. New breakthroughs in the baseband and RF architecture are required to enable computationally intensive and adaptive new air interfaces. A significantly more advanced baseband computation is required to meet the complex requirements of new solutions like mass-scale MIMO. A singular, integrated design for combining an unprecedented number of RF radio and antenna elements into one unit (a “Radiotenna”) will be needed to support these new air interfaces.
- c. New breakthroughs in superior RF domain processing will bring benefits to the efficient and flexible usage of spectrum; single-frequency full-duplex radio technologies will be a foremost contributor to rising spectrum efficiency. Improvements in these areas will help drive overall network costs down while achieving improved energy efficiency.
- d. New breakthroughs in the integrated access node and backhaul design are essential to enable the very dense networking of radio nodes. Plug-and-play will become essential to deployment where such nodes will need to

access and self-organize presented spectrum blocks for both access and backhauling. This capability will be key for enabling high-frequency spectrum radio access.

e. New breakthroughs in radio technologies for mobile devices are required to support a vast range of capabilities, from ultra-low energy sensors to ultra-fast devices with long-lasting battery life. Miniaturized multi-antenna technologies will be critical for enabling Gb/s-level access speeds with less spectrum and lower power consumption. Further extending the potential of mobile devices is also of great significance to support certain base station functionalities. This will allow device-based, on-demand mobile networking for services like instant device-to-device communications [6].

## 6. GENERATIONS BEFORE 5G

The history and evolution of mobile service from the 1G (First generation) to fourth generation is discussed in this section.

### 6.1 First generation

The process began with the designs in the 1970s that have become known as 1G. Almost all of the systems from this generation were analog systems where voice was considered to be the main traffic. The first generation wireless standards used plain TDMA and FDMA. These systems could often be listened to by third parties. Some of the standards are NMT, AMPS, Hicap, CDPD, Mobitex, DataTac, TACS and ETACS [5].



### 6.2 2G (Second generation)

The 2G (second generation) systems designed in the 1980s were still used mainly for voice applications but were based on digital technology, including digital signal processing techniques. These 2G systems provided circuit switched data communication services at a low speed [3]. All the standards belonging to this generation were commercial centric and they were digital in form. The second generation of wireless mobile communication systems was a huge success story because of its revolutionary technology and the services that it brought to its users. Besides high-quality speech service, global mobility was a strong and convincing reason for users to buy 2G terminals. The second generation standards are GSM, iDEN, D-AMPS, IS-95, PDC, CSD, PHS, GPRS, HSCSD, and WiDEN [5].



### 6.3 2.5G

2.5G is the intermediate generation between 2G and 3G cellular wireless technologies. This term is used to describe 2G-systems that have implemented a packet switched domain in addition to the circuit switched domain. 2.5G is not an officially defined term rather it was invented for marketing purpose. 2.5G provides some of the benefits of 3G (e.g. it is packet-switched) and can use some of the existing 2G infrastructure in GSM and CDMA networks [5].

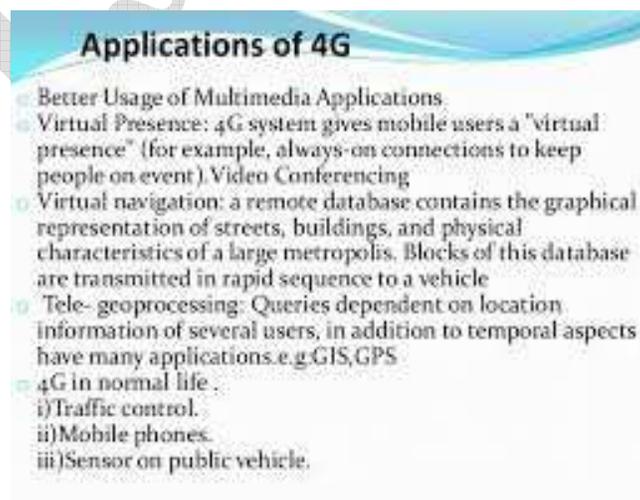
### 6.4 3G (Third generation)

To meet the growing demands in network capacity, rates required for high speed data transfer and multimedia applications, 3G standards started evolving. The systems in this standard are essentially a linear enhancement of 2G systems. They are based on two parallel backbone infrastructures, one consisting of circuit switched nodes, and one of packet oriented nodes. The third generation (3G) has been launched in several parts of the world, but the success story of 2G is hard to repeat.



### 6.5 4G (Fourth generation)

The basic feature of 3G Technology is fast data transfer rates. However this feature is not currently working properly because, ITU 200 is still making decision to fix the data rates. Network authentication has won the trust of users, because the user can rely on its network as a trustworthy source of transferring data. . 4G is a conceptual framework and a discussion point to address future needs of a high speed wireless network. It is expected to emerge around 2010 – 2015. 4G should be able to provided very smooth global roaming ubiquitously with lower cost [2].



## 7. COMPARISON CHART BETWEEN 1G TO 5G

Technology	1G	2G	3G	4G	5G
Start/Deployment	1970/1984	1980/1999	1990/2002	2000/2010	2014/2020
Data Bandwidth	2Kbps	14-64Kbps	2Mbps	200Mbps	1Gbps and higher
Technology	Analog cellular	Digital cellular	Broadbandwidth/CDMA/IP technology	Unified IP & seamless combo of LAN/WAN/WLAN/PAN	4G+WWW
Multiplexing	FDMA	TDMA/CDMA	CDMA	CDMA	CDMA
Core network	PSTN	PSTN	Packet network	Internet	Internet
Service	Mobile telephony	Digital voice, short messaging	Integrated high quality audio, video & data	Dynamic information access, variable devices	Dynamic information access, variable devices with AI capabilities



## 8. FUTURE SCOPE

The future improvement of Nano-core will be unbelievable as it combines with artificial intelligent (AI). One can able to control his intelligent Robot using his mobile phone. Your Mobile can automatically type the message what your brain thinks. We might get a circumstance where we don't require any spectrum for communication [11].

The Google hot trends have rated the term 6g as the 17th most searched word in the search engines. The iPod 6G comes in seven different colors and has an aluminum body which makes the body strong to withstand constant daily usage. It has a clip on design like iPod shuffle and it attached to shirt firmly. 6g technology haven't been fully revealed yet but search phrases like what is 6g mobile technology, 6g technology, 6g mobile, 6g network, 6g wiki, 6g technology ppt. are getting more familiar with new mobile technology getting evolved.

## 9. CONCLUSION

5G technology going to be a new mobile revolution in mobile market. Through 5G technology now you can use worldwide cellular phones and this technology also strike the china mobile market and a user being skillful to get access to Germany phone as a local phone [13]. With the coming out of cell phone alike to PDA now your whole office in your finger tips or in your phone. 5G technology has a bright future because it can handle best technologies and offer priceless handset to their customers.

As data traffic has wonderful growth potential, under 4G existing voice centric telecom hierarchies will be moving flat IP architecture where, base stations will be directly connected to media gateways. 5G will promote concept of Super Core, where all the network operators will be connected one single core and have one single infrastructure, regardless of their access technologies. 5G will bring evaluation of active infra sharing and managed services and eventually all existing network operators will be MVNOs (Mobile virtual network operators)

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