

# 5G : – The Future Mobile Wireless Technology by 2020

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**Abstract**— The phases of mobile telecommunication are denoted with G (Generation) as a standard i.e. 1G,2G,3G,4G & now 5G.Hence 5G technology stands for the 5<sup>th</sup> generation mobile technology.The 5<sup>th</sup> generation wireless mobile internet network is a completed wireless communication with almost no limitation,although no official document is yet made public by the standardization bodies such as 3GPP,Wimax Forum or ITU-R except the announcement made by Samsung that it had prototyped a new wireless technology that could transmit data far faster.But 5G will change the means to use cellphones within very high bandwidth.With 5G pushed over VOIP enabled device,people will experience a new level of call volume & data transmission as never experienced before.In 5G,researches are being made on development of World Wide Wireless Networks (WWWW),Dynamic Adhoc Wireless Networks (DWAN) & Real Wireless World. IP V6 is a basic protocol for running on both 4G & 5G,which works on a single bandwidth of 4G.Forthcoming mobile technology has to support IP V6 and flat IP.This paper explains the 5G mobile network,Future mobile technologies & their deployment that will start around 2020.

**Index Terms**— 4G,5G,Communication,Connectivity, GSM ,Internet,IPV6,Mobile Communication,Mobility, Network ,Security,VOIP,Wireless.

## 1 INTRODUCTION

The world has seen a lot of changes in the realm of communication.Today we no more use landlines or use it preferably in office only.It's at the moment just over last few years since the smartphone changed the world of mobile internet and mobile connectivity is changing the way we live and work.From 1G to 2.5G & from 3G to 5G this world of telecommunication has seen a number of improvements along with improved performance with every passing day.Now we see everyday more and more people have start purchasing their products with tablet and mobile phones .People expect to have the same speeds as their tablet PC & smartphone as they get at their laptop/computer's at home.Traffic on wireless networks has been doubling annually & around 2020,data consumptions will be thirty times more.Current 4G technology will not be capable of carrying this rapid increase of data consumption.Though in reality,5G does not exist yet but the future network next to 4G we say as 5G.

5G technology is on its way to change the way most of the users access their handsets.Users will go through a level of call volume & data transmission with 5G pushed over a VOIP enabled gadget.The idea of World Wide Wireless Web (WWWW) is started from 4G technologies.The following evolution will be based on 4G and completed its idea to form a real wireless world.Thus,5G should make an important difference and add more services and benefit to the world over 4G.

5G should be more intelligent technology that interconnects the entire world without limits.It's expected that 4G standard will be concluded within next two

years.5G network will not only be more speed but will also be capable of carrying more data .We still remember the disturbance and irritation caused in transferring data but the advent of Bluetooth changed the history.It enabled us to share data between two gadgets within a range of 50 metres.With the swiftness in data sharing,the cellphone manufacturers focussed on mobile broadband that can open a new window of communication and navigation in the world of telecommunication.5G technology will change the manner in which cellular plans are offered worldwide.As we know frequency is a finite resource.In 5G, network might solve the problem of frequency licensing & spectrum management issues..The 5G terminals might have software-defined adios & it also has different modulation schemes and error control schemes.It provided hundreds of channels without streaming.

A new revolution is about to begin.This generation i.e. 5G is expected to be rolled out around 2020.

## 2 EVOLUTION FROM PREVIOUS GENERATIONS

Cell phones are used millions and billions of users worldwide. How many of us know the technology behind cell phones that is used for our communication? I have also intrigued about the type of technology used in my phone. What are 0G,1G, 2G, 3G and4Gtechnologies?

0G , 1G, 2G, 3G & 4G ("G" stands for "Generation") are the generations of wireless telecom connec-

tivity. In 1945, the zero generation (0G) of mobile telephones was introduced. Mobile Telephone Service, were not officially categorized as mobile phones, since they did not support the automatic change of channel frequency during calls. 1G (Time Division Multiple Access and Frequency Division Multiple Access) was the initial wireless telecom network system. It's out-dated now. The analog "brick phones" and "bag phones" are under 1G technology. Cell phones era began with 1G.

The next era, 2G has taken its place of 1G. Cell phones received their first major upgrade when they went from 1G to 2G. This leap effectively took cell phones from analog to digital. 2G and 2.5G were versions of the GSM and CDMA connections. And GSM is still the most popular technology, but with no internet. Fortunately, GPRS, an additional service, is provided over GSM for the purpose of internet access. GPRS has been developed and thus, EDGE was created. It's more secure and faster than GPRS.

Then 3G came, the new Wireless CDMA technology. It is the first wireless telecom technology that provides broadband-speed internet connection on mobile phones. It has been specially made for the demand of internet on smart phones. Further development led to the creation of 3.5G, which provides blazing fast internet connection on phones, up to the speed of 7.2 MBPS. A smart phone can be connected to a PC to share its internet connection and 3G and 3.5G are ideal for this. But, as this WCDMA technology is not available in all regions, it's not as popular as GSM yet. Before making the major leap from 2G to 3G wireless networks, the lesser-known 2.5G was an interim standard that bridged the gap. Following 2.5G, 3G ushered in faster data-transmission speeds so you could use your cell phone in more data-demanding ways. This has meant streaming video (i.e. movie trailers and television), audio and much more. Cell phone companies today are spending a lot of money to brand to you the importance of their 3G network. The above systems and radio interfaces are based on

"fourth-generation" cell phone technology, refers to the entirely new evolution. Developers are now going for 4G (OFDMA), which will provide internet up to the speed of 1 GBPS! It is said to be able to overcome the problems of weak network strength and should provide a much wider network, making sure that the users get high-speed connectivity anytime anywhere. No doubt, 4G will open new doors of revolutionary internet technologies, but for now, 3G and 3.5G are the best. 4G will allow for speeds of up to 100Mbps. 4G promises voice, data and high-quality multimedia in real-time form all the time and anywhere.

### 3 COMPARISON OF 3G, 4G & 5G TECHNOLOGY

Table 1 Comparison of 3G, 4G and 5G Technology

Technology/Features	3G	4G	5G
Data Bandwidth	2Mbps	2Mbps to 1Gbps	1Gbps & Higher
Standards	WCDMA CDMA-2000	Single unified standard	Single unified standard
Technology	Broad bandwidth CDMA, IP technology	Unified IP and seamless combination of broadband, LAN/WAN/PAN and WLAN	Unified IP and seamless combination of broadband, LAN/WAN/PAN/WLAN and www
Service	Integrated high quality audio, video and data	Dynamic information access, wearable devices	Dynamic information access, wearable devices with AI capabilities
Multiple Access	CDMA	CDMA	CDMA & BDMA
Core Network	PACKET NETWORK	INTERNET	INTERNET
Handoff	Horizontal	Horizontal & Vertical	Horizontal & Vertical

### 4 MAIN ASPECTS & FEATURES OF 5G

Main features of 5G Network technology are as follows :

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kindred spread spectrum radio transmission technology. While the GSM EDGE standard ("2.9G"), DECT cordless phones and Mobile Wi MAX standards formally also fulfil the IMT-2000 requirements and are approved as 3G standards by ITU, these are typically not branded 3G, and are based on completely different

te 4G, which is also known as "beyond 3G" or

(a) 5G technology offer high resolution for crazy cell phone user and bi-directional large bandwidth shaping.

(b) The advanced billing interfaces of 5G technology makes it more attractive and effective.

(c) 5G technology also providing subscriber supervision tools for fast action.

(d) The high quality services of 5G technology based on Policy to avoid error.

(e) 5G technology is providing large broadcasting of data in Gigabit which supporting almost 65,000 connections.

(f) 5G technology offer transporter class gateway with unparalleled consistency.

(g) The traffic statistics by 5G technology makes it more accurate.

(h) Through remote management offered by 5G technology a user can get better and fast solution.

(j) The remote diagnostics also a great feature of 5G technology.

(k) The 5G technology is providing up to 25 Mbps connectivity speed.

(l) The 5G technology also support virtual private network.

(m) The new 5G technology will take all delivery service out of business prospect

(n) The uploading and downloading speed of 5G

technology touching the peak.

(o) The 5G technology network offering enhanced and available connectivity just about the world.

## 5 5G MOBILE NETWORK DESIGN & ARCHITECTURE

### 5.1 5G MOBILE NETWORK DESIGN

5G networks make use of flat IP concept to make it easier for different RAN to upgrade in to a single NanoCore network. 5G network uses Nanotechnology as defensive tool for security concern that arises to flat IP. Certainly Flat IP network is the key concept to make 5G acceptable for all kind of technologies. To meet customer demand for real-time data applications delivered over mobile broadband networks, wireless operators are turning to flat IP network architectures. Flat Ip architecture provides a way to identify devices using symbolic names, unlike the hierarchical architecture such as that used in "normal" IP addresses.

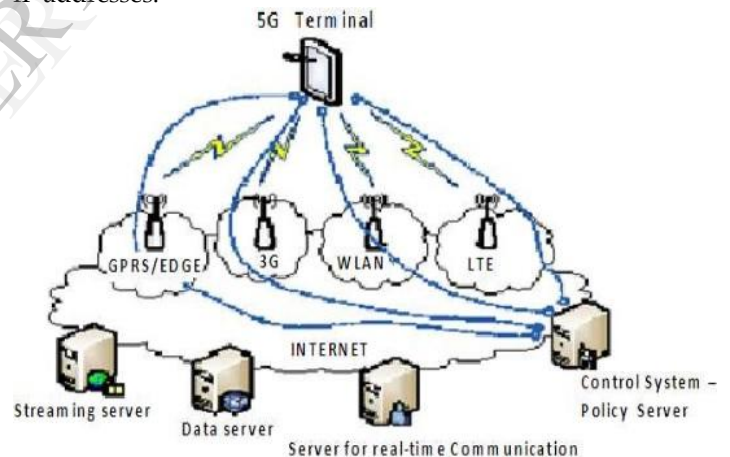


Fig.2. Design of 5G Mobile Network

Flat network architecture removes that voice-centric hierarchy from the network. Instead of overlaying a packet data core on the voice network, separate and much-simplified data architecture can be implemented that removes the multiple elements from the network chain.

### 5.2 5G MOBILE ARCHITECTURE

The 5G nano core is a convergence of below mention technologies. These technologies have their own im-

impact on existing wireless network which makes them in to 5G.

- Nanotechnology.
- Cloud Computing.
- All IP Platform

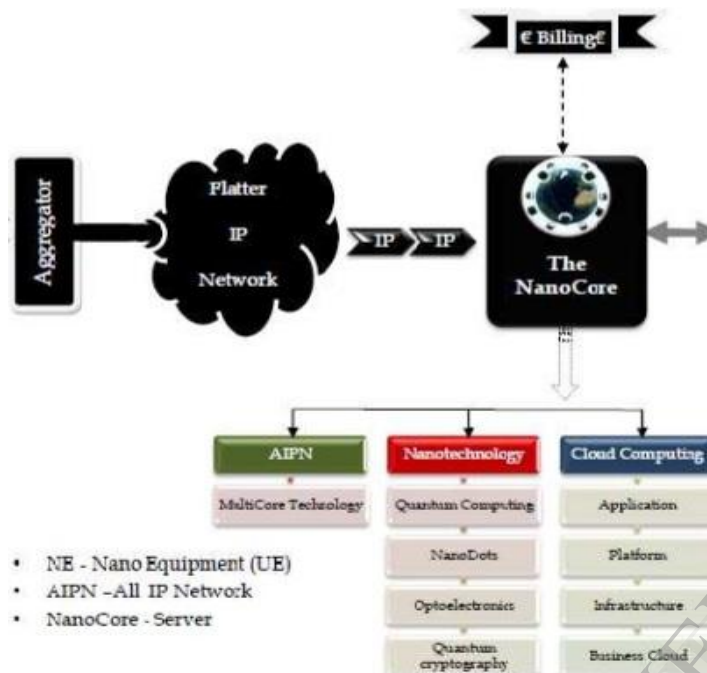


Fig.3. 5G Architecture-The Nanocore

- Nanotechnology** :- Nanotechnology is the application of nanoscience to control process on nanometer scale i.e. Between 0.1 & 100 nm. The field is also called known as molecular nanotechnology (MNT). MNT deals with control of structure of matter based on atom by atom & molecule by molecule engineering.
- Cloud Computing** :- Cloud Computing is a technology that uses the internet and central remote server to maintain data & applications. In 5G network this central remote server will be our content provider. Cloud Computing allows consumers and business to use applications without installation and access their personal files at any computer with internet access. Cloud Computing has three main segments which are Applications, Platform & Infrastructure. 5G Nanocore utilizes all the above 3 segments to satisfy his

customer demands.

- All IP Platform Network** :- The All IP Network (AIPN) is an evolution of 3GPP system to meet the increasing demands of the mobile telecommunications market. AIPN provides a continued evolution and optimization of the system concept in order to provide a competitive edge in terms of both performance & cost. The key benefits of Flat IP Architectures are:-

- Lower costs.
- Universal seamless access.
- Improved user experience.
- Reduced system latency.

### 5.3 SUPPORT IPV6

In the 5G system, IPv6 is needed for mobility because of the multiple layer of subnetting & many addresses. IPv6 addresses are 128 bit, which is four times more than 32 bit IPv4 address. The first 32 bit are defined as home address of a device, second part may use for care of address, third part for tunneling to establish a connection between wire line and wireless network & the last part of IPv6 address may be used for VPN sharing.

### 5.4 LESS POWER CONSUMPTION

With the increasing bit rates led to increased energy consumption in base situations. Main challenge for future mobile networks is to reduce power consumption. In cellular networks base stations consume more than 60 % power which has to be considerably reduced by designing in such a way that the load on decrease base station starts to cover more regions & also we can shutdown some of the base stations.

## 6 CONCLUSION

With each passing year, we should expect an accelerating pace of technological change, as a new mobile generation has appeared every 10<sup>th</sup> year since the first 1G system i.e. Nordic Mobile Telephone (NMT) was introduced in 1981, including 2G (GSM) system that started roll out in 1992, 3G (W-CDMA/FOMA) i.e. Freedom of Mobile Multimedia Access which appeared in 2001 & 4G standards i.e. IMT- Advanced requirements that were ratified in 2011 and started in 2012-13 and then 5G expected in 2020.

In this paper, I explained evolution of 5G technology

with previous generations of technology, its aspects, design, architecture & IPv6. This mobile technology will offer high data rate, efficient & reliable communication at an affordable rate in the near future. Hence this paper shows how 5G as a future technology can become more efficient and will be beneficial for society.

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