Fifth Generation Wireless Technology – 5G

Shruti Saxena[1], Upasna Setia[2]
[1,2]Department of Computer Science &Engineering,
Ganga Institute of Technology and Management,
Kablana, Jhajjar, Haryana, India

Abstract: **5G Technology stands for 5th generation mobile technology. 5G denote the next major phase of mobile telecommunication standards beyond the upcoming 4G standards. 5G technology will change the way most high bandwidth users access their phones. With 5G pushed over a VOIP enabled device, people will experience a level of call volume and data transmission never experienced before. 5G technology is offering the service in Product Engineering, Documentation, supporting electronic transactions, etc. As the customer become more and more aware of the mobile phone technology, he or she will look for a decent package all together including all the advanced features a cellular phone can have. Hence the search for new technology always the main motive of the leading cell phone giants to out innovate their competitors. The goal of a 5G based telecommunication network would ideally answer the challenges that a 4G model would present once it has entered widespread use.**

I. INTRODUCTION

5G is the name currently being given to the next generation of mobile data connectivity that will come after the last drop has been wringed from 4G.

It will provide unbelievably fast broadband speeds, but more importantly it will have enough capacity wherever you go to perform every function you want it to without a drop in speed or connection, no matter how many people are connected at the same time.

Indeed, EE's principal network architect Professor Andy Sutton, believes that the aim of 5G is to become invisible. It should be a technology that's "just there", like electricity. It will enable device manufacturers to realise the Internet of Things as it will always be on and able to be tapped into without regionalisation.

II. EVOLUTION 1G to 5G

1G **:-** First Generation wireless technology (1G) is the original analog(An analog or analogue signal is any continuous signal for which the time varying feature (variable) of the signal is a representation of some other time varying quantity), voice-only cellular telephone standard, developed in the 1980s. The main difference between two succeeding mobile telephone systems, 1G and 2G,is that the radio signals that 1G networks use are analog, while 2G networks are digital. Although both systems use digital signalling to connect the radio towers (which listen to the handsets) to the rest of the telephone system, the voice itself during a call is encoded to digital signals in 2G whereas 1G is only modulated to higher frequency, typically 150 MHz and up. One such standard is NMT (Nordic Mobile Telephone), used in Nordic countries, Eastern Europe and Russia. Others include

AMPS (Advanced Mobile Phone System) used in the United States, TACS (Total Access Communications System) in the United Kingdom, JTAGS in Japan, C-Netz in West Germany, Radio com 2000 in France, and RTMI in Italy. Analog cellular service is being phased out in most places worldwide. 1G technology replaced 0Gtechnology, which featured mobile radio telephones and such technologies as Mobile Telephone System (MTS), Advanced Mobile Telephone System AMTS), Improved Mobile Telephone Service (IMTS), and Push to Talk (PTT).

- it was developed in1980s &completed in early 1990s.

- It was based on analog system.

- It has speed upto 2.4 kbps.

- AMPS(Advance Mobile Phone System) was launched by US &it was 1 G mobile system

- It allows user to make voice calls in 1 country.

Fig:1

2G **:-** 2G is short for second-generation wireless telephone technology. Second generation2G cellular telecom networks were commercially launched on the GSM standard in Finland in 1991. 2G network allows for much greater penetration intensity. 2G technologies enabled the various mobile phone networks to provide the services such as text messages, picture messages and MMS (multimedia messages). 2G technology is more efficient. 2G technology holds sufficient security for both the sender and the receiver. All text messages are digitally encrypted. This digital encryption allows for the transfer of data in such a way that only the intended receiver can receive and

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read it. Second generation technologies are either time division multiple access (TDMA) or code division multiple access (CDMA). TDMA allows for the division of signal into timeslots. CDMA allocates each user a special code to communicate over a multiplex physical channel. Different TDMA technologies are GSM, PDC, iDEN, IS-136. CDMA technology is IS-95. GSM has its origin from the Group special Mobile, in Europe. GSM (Global system for mobile communication) is the most admired standard of all the mobile technologies.

- it was developed in late 1980s & completed in late 1990s.

- It is based on digital system

- It has speed upto 64 kbps

- Services such are digital voice & SMS with more clarity

- Semi gobal facility

- 2G are the headsets we are using today,with 2.5G having more capabilities.

- 2G technologies can be divided into Time Division Multiple Access (TDMA)-based and Code Division Multiple Access (CDMA)-based standards depending on the type of multiplexing used.

Fig:2

3G **:-** Internation Mobile Telecommunication - 2000(IMT—2000), better known as 3G or 3rd Generation, is a generation of standard for mobile phones and mobile telecommunication services fulfilling specifications by the International Telecommunication union. The use of 3G technology is also able to transmit packet switch data efficiently at better and increased bandwith.3G mobile technologies proffers more advanced services to mobile users. the spectral efficiency of 3G technology is better than 2G technologies. Spectral efficiency is the measurement of rate of information transfer over any communication system.3G is also known as IMT-2000.

- it was developed between late 1990s &early 2000s until present day

- It has transmission speed from 125kbps to 2 mbps

- In 2005, 3G is ready to live up to its performance in computer networking (WCDMA,WLAN and Bluetooth) and mobile devices area (cell phone and GPS).

- Data are sent through technology called packet switching.

- It has superior voice quality

- Good clarity in vedio conference

- E-mail, PDA, information surfing, online shopping/banking, games

- Access to Global roaming

Fig:3

4G **:-** 4G refers to the fourth generation of cellular wireless standards. It is a successor to 3G and 2G families of standards. The nomenclature of the generations generally refers to change in the fundamental nature of the service, non-backwards compatible transmission technology, and new frequency bands.3G technologies make use of TDMA and CDMA. 3G technologies make use of values added services like mobile television, GPS(global positioning system) and vedio conferencing.

- It was developed in 2010

- It is faster & more reliable

- Speed up to 100 mbps

- High performance

- Easy roaming

- Low cost

Fig:4

5G :- 5G is the name currently being given to the next generation of mobile data connectivity that will come after the last drop has been wringed from 4G.

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Indeed, EE's principal network architect Professor Andy Sutton, believes that the aim of 5G is to become invisible. It should be a technology that's "just there", like electricity. It will enable device manufacturers to realise the Internet of Things as it will always be on and able to be tapped into without regionalisation.

➢ Next major phase of mobile telecommunication &wireless system

 ➢ 10 times more capacity than others

➢ Expected speed up to 1 gbps

➢ More faster & reliable than 4G

➢ Lower cost then previous generation

Fig:5

III. KEY CONCEPT

➢ Real wireless world with no more limitation with access 7 zone issues

➢ Wearable devices

➢ IPv6, where a visiting core of mobile IP address is assigned according to location & connected network

➢ One unified global standard

➢ Smart radio

➢ The user can simultaneously be connected with several wireless access technology
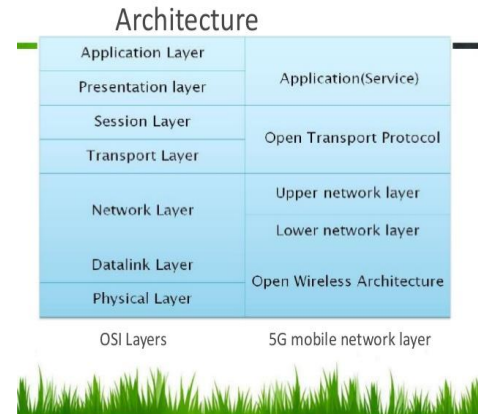
➢ Multiple concurrent data transfer path

Fig:6

Fig:7

IV. OPEN WIRELESS ARCHITECTURE (OWA)

➢ OSI layer 1 &OSI layer 2 define the wireless technology

➢ For these two layer the 5G mobile network is likely to be based on open wireless architecture (OWA)

➢ Physical layer + Data link layer = OWA

V. NETWORK LAYER

➢ All mobile network will use mobile IP

➢ Each mobile terminal will be FA (foreign Agent)

➢ A mobile can be attached to several mobiles or wireless networks at the same time

➢ The fixed IPv6 will be implemented in the mobile phones

➢ Separation of network layer into two sub layers:

1) Lower network layer (for each interface)

2) Upper network layer (for the mobile terminal)

VI. OPEN TRANSPORT PROTOCOL (OTP)

➢ Wireless network offers from wired network regarding the transport layer

➢ In all TCP versions the assumption is that lost segments are due to network congestion

➢ In wireless, the loss is due to higher bit error ratio in radio interface

➢ 5G mobile terminals have transport layer that is possible to be downloaded & installed – open Transport protocol (OTP)

➢ Transport layer + session layer = OTP

VII. APPLICATION (SERVICE) LAYER

➢ Provides intelligent QoS (Quality of sevice) management over wariety of networks

➢ Provides possibility for service quality testing & storage of measurement information database in the mobile terminals

➢ Select the best wireless connection for given services

➢ QoS parameters, such as delay, losses, BW, reliability, will be stored in DB of 5G mobile

➢ Presentation layer + Application layer = Application

➢

VIII. FEATURE OF 5G

➢ High resolution for cracy cell phone users

➢ Bi-directional large BW

➢ Less traffic

➢ 25 Mbps connectivity speed

➢ Enhanced & available connectivity just about the world

➢ Uploading & downloading speed of 5G touching the peak(up to 1 Gbps)

➢ Better & fast solution

➢ High quality service based on policy to avoid error

➢ Support virtual private networks

➢ More attractive & effective

➢ Provides subscriber supervision tools for fast action

IX. ADVANTAGE OF 5G

➢ Data BW of 1 Gbps or higher

➢ Globally accessible

➢ Dynamic information access

➢ Available at low cost

X. APPLICATION OF 5G

➢ Wearable devices with AI (artificial Intelligence) capabilities

➢ Pervasive (global) networks

➢ Media independent handover

➢ Radio resource management

➢ VoIP(voice over IP) enabled devices

➢ With 6th sense technology

XI. CONCLUSION

➢ 3G- operator centric

4G- service centric whereas

5G- user centric

➢ We have proposed 5G wireless concept designed as an open platform on different layers

➢ The new coming 5G technology will be available in the market at affordable rate , high peak future & much reliability than preceding technologies.

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