ISSN: 2278 – 909X
International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE)
Volume 4, Issue 5, May, 2015

Evolution of 5G Technology& Architecture

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***Abstract*—5G mobile technology is the fifth generation of mobile communication. This generation is the major phase of mobile communication compare to the upcoming 4G.Most probably this 5G should be introduced by 2020 for business and consumer purpose. In 5G includes all type of advanced feature of technologies, which will make this generation most powerful and highly demanded.**

This paper will cover on all previous generation including 5G.The evolution of all the generation technology till upcoming 5G, their architecture

Now a day mobile communication becomes inseparable part of daily life. 5G mobile generation will provide the best technologies as well as cell phones. This 5G mobile phone will maintain with multiple wireless networks but for this purpose there should be separation of network layer between two sub layers in 5G cell phones.

This 5G generation will provide the cell phone users the best features that will be large bandwidth, large broadcasting of data which will support approx. 65,000 connections , supervision tools for fast actions, reduce the power consumption and will be improvement in battery life.

***Index Terms*—About four key words or phrases in alphabetical order, separated by commas.**

I. INTRODUCTION

Mobile Communication technology is basically based on wireless technology. World's first Wireless telephone conversation was happened in 1880.The first mobile communication network is created in after 1970's.5G generation will bring the revolution in cell phones market. This technology will have great data handling capabilities and will carry latest operating systems. 5G technology will handle the best technologies and provide best mobile phones to their customers. It will just like that you carry your whole office on your fingertips. This 5G technology will have error control schemes that you can download from internet. 5G technology will cover the whole world because of its extraordinary features.

This technology will will going to give tough competition to computers and laptops so that their market value should be affected.[2]

Main features that will cover 5G generations will high revolution for mobile users with bidirectional large bandwidth, upload and download speed will be very high, large broadcast of data that will provide many connections, will provide high connectivity around the world and all types of highly advanced features will make highly demanded and powerful.

5G generation mobile technology will include camera,MP3 ,video playing ,phone memory,phone dialing speed and many more features including for childrens like blue tooth technology and Piconets.

Most Demanding wireless communication is continuously increasing demand for new wireless technology are advanced high data rates , new wireless applications ,large network capability,high spectral efficiency,high energy so that 5G technology are expected to launched beyond 2020.

II. STEPS OF WIRELESS GENERATIONS

A. The first generation (1G):

1G technology had limited capacity ie serving only for Military, government agencies and used by the special industries.1G may differ from other technologies by the use of new Cellular technology.

In cellular technology each limited area would have a base station, which was called "Cell". The frequency used by One cell could be used by another cells so that the frequencies are allowed to be used by more subscribers. So that instead of the name of Mobile phones "Cellular phones" name came out.

1G technology based on analogue and cellular came in feature during 1980s.

1G mobiles phones were working on Analogue systems. By the use of semiconductor technology and microprocessor make mobile systems in reality.1G introduced advanced mobile phone system (AMPS), Nordic mobile telephone (NMT), and total access communication system (TACS).In 1G technology still analogue voice information was generated. They offered mainly speech and related services and were highly incompatible with each other.

B. The Second Generation(2G):

2G technology is workink on GSM(Global System for mobile communication.2G technology for mobile communication was came in feature in Finland in 1991.This technology provide services like text massages, picture messages, Multimedia messages. This generation is more efficient because it is secured for receiver and sender. Digitally encrypted messages allow the transfer of data in this way that only intended receiver can receive and read that.

2G technologies include either Time division multiple access(TDMA)or Code division multiple access(CDMA).Different TDMA technologies like GSM,PDC,iDEN,iS-136 can be used.In CDMA IS-95 is used.

This generation provide short messages service.GSM technology is the first who introducedinternational roaming. This technology provide availability of international emergency number,that can be used by international mobile users at any time if they don't have their local emergency number.

2G technology consumes low power consumption in mobile phones,so that battery will be last long,

Improved voice clarity,reduce noise,environment friendly.

C. The Third Generation(3G):

3G technology give multiple Applications, Clear digital signals, transmit bundle switch data more efficiently with increased band width.
3G technology is also known as IMT-2000(International mobile telecommunication-2000). 3G technology uses TDMA and CDMA technology.
3G technology have so many application as mobile TV, GPS system, video and audio conferencing, most important facility is fast data transfer. This technology provides more coverage and growth. 3G support packet switching and circuit switched data transmission and also provide data rate up to 2Mbps with high spectral density. There are so many 3G technologies as W-CDMA,GSM EDGE,UMTS,DECT,WiMAX
And CDMA 2000.These all techniques provide fast data rate, coverage up to three times more than GSM.It is also used for packet switching system. WiMAX technology is wireless technology that transmits variety of wireless signals.Its a portable technologythat is based on wireless internet access.
This 3G generation mobile phone have high speed data rates, internet, video chating ,MMS ,SMS,blue tooth technology and video games, live TV, banking and many more applications. This 3G generation technology mobile phones are developed as a iphone and with added feature called as Smartphones.

D. The 3.5 Generation:

The main difference between 3G and 3.5G mainly the network speed and data transfer speed. It is basically aHSDPA-High Speed Downlink Packet Access. It is a developing step towards 4G.

E. The 4G technology:

This is the advanced version of 3G technology with increased bandwidth and services.4G technology also considered as LTE (Long Term Evolution). 4G technology provide high data rate that will increased new technologies in telecommunication field. By this 4 G technology with mobile phones provide built in high resolution digital camera and videos with high definition capabilities. 4G technology still in process and not set standards are defined.
This 4g technology will be able to download a data rate up to 100 mbps and less mobility of 1Gbfor local access of wireless. 4G technology include GSM, wireless LAN, Bluetooth and as well as computer, communication technology, multimedia and personal services applications.
Better Describe the 4 G technology as Mobile multimedia, Anywhere, Global mobility solutions over, integrated wireless and customized services.

F. The Fifth Generation:

5G introduces new concept of multi path datapath scheme for real wireless world. It has change meaning of use of cellphones with high band width. It simply provide highest speed than 4G, low power consumption, reduced infrastructure cost, improved spectral efficiency.

III. THE 5G GENERATION ARCHITECTURE:

This system consist a user terminal and independent radio access technology. That are GPRS,3G ,WLAN,LTE. Each terminal have their all IP based model for wireless and mobile network interoperatibility. Each of the terminals are seen as the IP link to the outside Internet World. So there should be different radio interface for each Radio Access Technology (RAT) in the mobile terminal.
In the below figure If we want to access four different Radio Access Technology, we have to make four different Access interfaces in mobile terminal and all of them have to active at the same time, main aim of this architecture is to make functional.

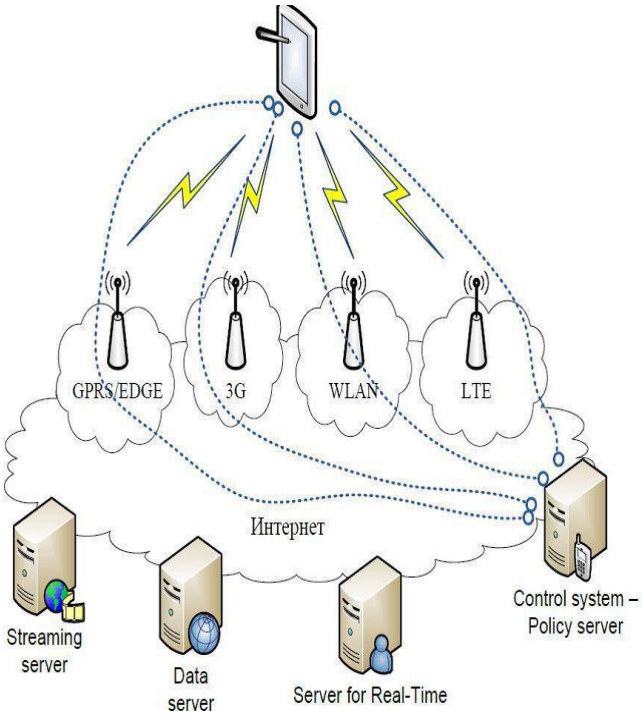

Figure 1 Functional Architecture for 5G Mobile Networks

This four technology that will make network Architecture efficient:

A. GPRS (General Packet Radio Service):

It is used to transmit data at 60 kb/sec. It consume less battery during email sending or receiving), and net surfing.
EDGE (Exchange Data Rate for GSM Evolution): It's an advanced version of GPRS so It's provide data speed up to 473kb/sec

B. 3G:

By the 3G it is possible to make video calls on mobile network. It provide to users to browse internet on mobile network more efficiently.

C. WLAN (Wireless LAN):

Wireless provides short range, high speed wireless data connections between data devices using Radio signal.

D. LTE (Long Term evolution):

LTE is a standard for mobile communication for high speed data transmission for mobile network. It has speed up to 100mb/s

Application connections realized between clients and servers in the Internet sockets. Internet sockets are end point for data communication flow. Each socket have unique combination of IP address and appropriate local transport communication port and the type of transport protocol. That means in the case for interoperability between heterogeneous networks and for the vertical handover between the respective radio technologies, the local IP address and destination IP address should be fixed and unchanged. When fix this two parameters should be ensure about handover transparency to the internet connections end to end, when there will be mobile user have at least one end to end such connection. When you preserve the proper layout of the packet and to reduce packet losses, routing to the target destination should be unique and using the same path. Each RAT is available to the user to achieve the connectivity with the relevant radio access have with appropriate IP interface. Than change of any of the parameters of the socket means and change of the socket, that is, closed the old socket and open a new one. This means, end of the connection and starting of the new one. This approach is not- flexible, and it is based on today's Internet communication. In order to solve this deficiency problem , propose a new level that will take care of the abstraction levels of network access technologies to higher layers of the protocol stack. This layer is crucial in the new architecture. To enable the functions of the applied transparency and control or direct routing of packets through the most appropriate radio access technology.

IV. REQUIRMENTS FOR 5G

A. Hardware for 5G:

It require UWB(Ultra Wide Band)networks with higher BW at low energy level, BW is of 4000 mbps, which is 400 times faster than today's wireless networks, require smart antenna .It Uses CDMA(Code Division Multiple Access).

B. Software for 5G:

5G will be single unified standard of different wireless networks, including LAN, LAN? WAN,WWWW-World Wide Wireless Web, unified IP& seamless combination of broadband. Software should be encrypted, flexible and antivirus.

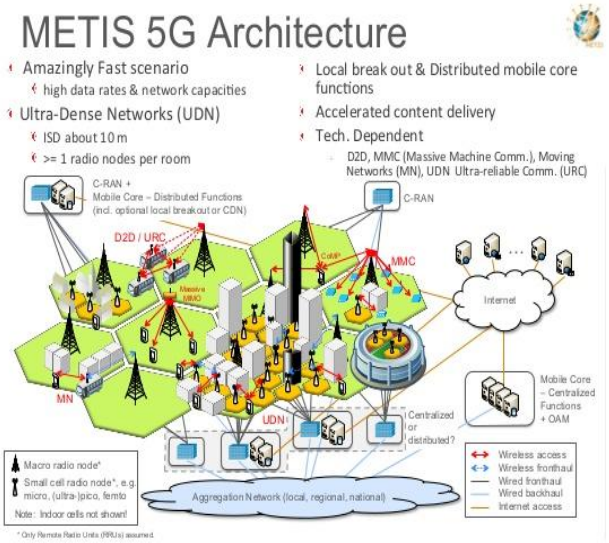

Figure 2. METIS 5G Architecture

IV. CONCLUSION

Now a days development of the cell phones and wireless networks is going to provide higher data rates and all-IP principle. Mobile terminals are year by year providing more processing power, more memory on board, and long battery life for the same applications ,long Battery Life.

5G technology will be going to be new revolutionary generation of wireless communication. May be we can say that 5 G Technology will be user centric because all the features are built by inconsideration of user. It will be available in the market at affordable price, more reliability .

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