



4G Mobile Network Technology (LTE)

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Abstract :- This paper fully based on the mobile network technologies . We have various mobile network technologies .Every generation has some advantages and disadvantages .Every generation improve the some feature from the previous generation. User wants to much faster mobile internet and fine qualities .User wants to everything in his mobile phone like call system, massaging, data uses (internet on mobile), e-mail, online games etc. These all are used in a fourth generation mobile network properly. 4G is the next generation of wireless networks that will totally replace 3G networks. It is supposed to provide its customers with better speed and all IP based multimedia services. It provide us everything like voice (calling system),data uses ,and other all things .Previous generations are not much faster as a compared to fourth generation mobile network technology . Although 4G wireless technology offers higher data rates and the ability to roam across multiple heterogeneous wireless networks, many Issues required to further research and development. Fourth generation solve the problem which are still remaining in third generation mobile network . One terms used to describe 4G is MAGIC—Mobile multimedia, anytime anywhere, Global mobility support, integrated wireless solution, and customized personal service. So this paper gives the overview of the various mobile network technologies.

Keyword: 4G,3G,2G(LTE),OFDMA,SDR,EDGE,HSPA+

INTRODUCTION

In a world people are changing the technologies because everyone want to new and attractive .In A networking technologies everyone want to higher data rate in a low cost .So 4G is a provide that all things .4G (Fourth generation) is mobile communication system or mobile network technology which is higher data rate for transfer the bit. It transfers the voice to other (calling system), message, Data uses etc. The approach of fourth generation solves the problems which are still remaining in previous generations. 4G provide a wide variety of new services, from high-quality voice to high-definition video to high-data-rate wireless channels. In a 4G mobile network it add the some

other feature in a third generation mobile network .4G provide the high speed mobile internet in a low cost as a compared to other previous generations .4G is fully IP based integrated system that provide the around to 200 mbps speed both indoors and outdoors, with premium quality and high security. [1] One terms used to describe 4G is MAGIC— Mobile multimedia, anytime anywhere, Global mobility support, integrated wireless solution, and customized personal service.4G has high performance and many other feature. It recover the all previous mobile network technologies. But nothing is perfect in computer world because everything has some problems which are recovered by other technology.4G also known as Long Term Evolution (LTE).

The history and evolution of mobile service from the 1G (First generation) to fourth generation

History of fourth generation is given below.

- The 1st Generation:-

1G mobile phones were based on the analogue system. It has very poor voice quality and also very large size of the phones due to analog system. It has narrow band . It is designed in 1970 and implement in 1984.It has 1.9 Kbps Bandwidth [2]

- The 2nd Generation:-

2G phones using global system for mobile communications (GSM) were first used in the early 1990s in Europe. GSM(Global System for Mobile communications) provides voice and limited data services. It is designed in 1980 and fully implement in 1991.The size of the phone is a smaller then 1G. It has 14.4 Kbps Bandwidth for data sending It support digital voice .Here TDMA/CDMA used for multiplexing .[2]

- 2.5 Genreation :-

This mobile technology is using general packet radio service (GPRS). 2.5G is based on packed switching. It sends text and graphics-rich data as packets at very fast speed. It is designed in 1985 and fully implement in 1999.It has 384 Kbps Bandwidth

for data sending It support digital voice .Here TDMA/CDMA used for multiplexing .It has provide the GPRS.

● **The 3rd Generation:-**

The 3G technology adds multimedia facilities to 2G phones by allowing video, audio, and graphics applications .It has 2 mp/s speed . It is based on Packet and circuit-switched data transmission. It is designed in 1990 and fully implement in 2002.It has 2 Mbps Bandwidth for data sending It support higher capacity broadband up to 2 Mbps voice .Here CDMA used for multiplexing .[2]

● **4th Generation:-**

In March 2008, the International Telecommunications Union-Radio communications sector (ITU-R) specified a set of requirements for 4G standards, named the International Mobile

Telecommunications Advanced (IMT-Advanced) specification, setting peak speed requirements for 4G service at 100 megabits per second (Mbit/s) for high mobility communication (such as from trains and cars) and 1 gigabit per second (Gbit/s) for low mobility communication

4G stands for fourth generation .Fourth generation for a mobile telecommunications technology, which come after the 3G. The term 4G is used broadly to include so many types of wireless network access communication systems, that is not for only cellular telephone systems.4G is a fully packet switching based networks optimizing for data transfer. 4G network want to give a 100 mb/s speed while moving. The evolution of 4G form the 3G is a better quality(e.g. video and sound). 4G mobile technologies are perceived to provide fast and high data rate or bandwidth It is designed in 2000 and fully implement in 2010?. It support digital voice .Here TDMA/CDMA used for multiplexing. [2][3][4]

Table1: Series of mobile generations and their features.

Technology	Design	Implementation	Services	Data Bandwidth	Multiplexing
1G	1970	1984	Analog voice	1.9 Kbps	FDMA
2G	1980	1991	DigitalVoice	14.4 Kbps	TDMA/CDMA
2.5G	1985	1999	Higher capacity, Packetized data	384 Kbps	TDMA/CDMA
3G	1990	2002	Higher capacity, Broadband data up to 2mbps.	2 Mbps	CDMA
4G	2000	2010	Completely IP based, speed up to hundreds of MBs	200 Mbps	CDMA?

KEY of 4G TECHNOLOGIES

Some of the key technologies required for 4G are briefly described below:

1 OFDMA

Orthogonal Frequency Division Multiplexing (OFDM) is used for improving the performance of the physical layer and also improving the performance of framework of layer 2 degree of free-dom. With the help of OFDM, it is possible to know the time domain, the space domain, the frequency domain and even the code domain to optimize radio channel usage. It uses the multiple paths for sending anything so it reduce the complexity. OFDM is a also used as a multiple

access technology (Orthogonal Frequency Division Multiple Access :OFDMA). [1][5]

2 Software Defined Radio

Software Defined Radio (SDR) used for high processing power to develop multi-band, multi-standard base stations and terminals. Several infrastructure gains are expected from SDR. Example of this is a, to increase the network capacity for specific time (like a sports time), An operator will configure again with a several modems at given Base Transceiver Station (BTS). SDR make it easy to configure the network again. In a 4G system, SDR will become an enabler for the aggregation of multi-standard pico or micro cells. [1][5]

3 Multiple-Input Multiple –Output

Multiple input multiple output is also known as a MIMO. MIMO uses the signal multiplexing between multiple transmitting antennas (space multiplex) and time or frequency. It is very well suited to the OFDM, as it is possible to work independently time sign as soon as the OFDM waveform is correctly designed for the channel. This is accepts by OFDM after the processing. The signal of transmitted and received by , m and n antennas. The performances of the calling system, is still a subject of research.

4 Handover And Mobility

This is technology is specially for the mobile IP based system and considered for a voice and data. Mobile IP based technology is a slow but it accelerated with methods. These methods are used for probably data and voice. It is necessary consider again the handover method in a single frequency network.

5 HSPA+

HSPA+ is a known as a High Speed Packet Access. HSPA+ is technical slandered for wireless network and broadband telecommunication. HSPA+ specially made for 3G LTE network. High speed Packet Access is made for end user which is a client side. This is handle the packet of the data which is come from the server on very high speed. HSPA+ provides an evolution of very High Speed Packet Access. It provides the data rates up to 168 Megabits per second (Mbit/s) to the mobile device (downlink) and 22 Mbit/s from the mobile device (uplink). So this is used for received the high speed data packet.

6 EDGE

EDGE is Enhanced Data rates for GSM Evolution or GPRS Evaluation. EDGE used for digital mobile phone. This technology allows the improve data transmission rate as backward compatible of GSM. EDGE is used in pre 3G network like GSM system. EDGE was deployed on GSM networks beginning in 2003 – initially by Cingular (now AT&T) in the United States. EDGE is standardized also by 3GPP as part of the GSM family. Peak bit-rates of up to 1Mbit/s and typical bit-rates of 400kbit/s can be expected. EDGE/EGPRS is implemented as a bolt-on enhancement for 2.5G GSM/GPRS networks, making it easier for existing GSM carriers to upgrade to it. This is implement on the core GSM or GPRS network which is not much faster.

4G Mobile Communications

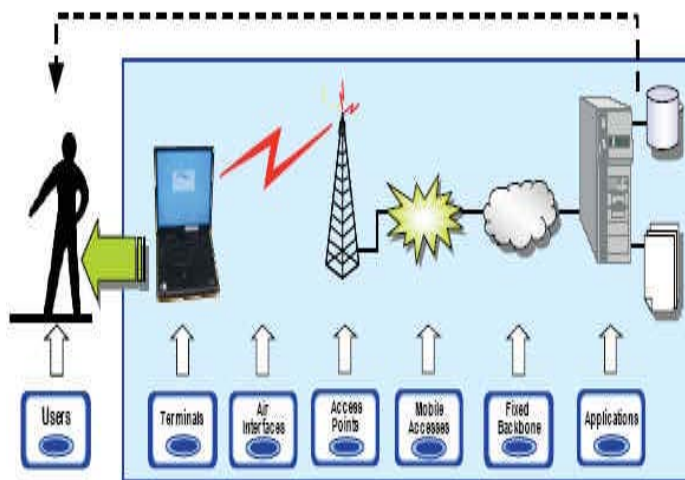


Fig.1:4G Mobile communication

Conclusions

In this paper give the information about the 4G Mobile network technology .This generation is a much faster from old generations. Previous generations have some problems which are removed by Fourth generation. 4G provide us live TV, High internet access , and so many other application like video transferring etc. This paper basically focus on Fourth generation mobile network and its protocols As the history of mobile communications shows, attempts have been made to reduce a number of technologies to a single global standard. Projected 4G systems offer this promise of a standard that can be embraced worldwide through its key concept of integration. Future wireless networks will need to support diverse IP multimedia applications to allow sharing of resources among multiple users. In other words we can say that fourth generation is a much butter as a comparer other generation like second and third generations.

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