REVIEW PAPER ON THE EVOLUTION OF MOBILE TECHNOLOGIES

Ritu Kumari
Electronics & Communication, DPGITM, Gurgaon, MDU, Rohtak.
Email - ritutewatia823@gmail.com

Abstract: *Mobile communication plays a great role in telecommunication world. The technologies plays a huge role in growing demand of mobile internet access and as well as in wireless applications. WIMAX and LTE are used for convergence of mobile and fixed broadband services. In 4G mobile technology, there is high data speed and high capacity IP based services and wireless applications. The paper describes the 4G wireless system, its features, architecture and various technologies used in wireless communication.*

Key Words: 4 G Technology, WiMAX, LTE.

1. INTRODUCTION:

The mobile communication and wireless communication technologies have been increasing very fast day by day. Because with each passing day, consumers are demanding for more useful and advanced technology. The evolution of mobile and wireless technology begin from 1st generation to 4th generation.

2. MOBILE COMMUNICATION TECHNOLOGIES:

The generations of mobile communication are given as follows:

1G TECHNOLOGY:

1st generation mobile systems are basically a wireless network with analog cellular system. It uses circuit switched network architecture. It only does support basic voice telephony. It consists very small coverage area and with limited channel capacity.

For fulfilling the requirements of consumers, mobile communication goes to the requirement of high frequency ranges.

Thus analog transmission based telecommunication is taken by digital transmission of telecommunication.

2G TECHNOLOGY:

In 1990, 1G replaced by 2G (2nd generation), with better voice telephony and better performance. It supports larger area as comparision to 1G.

2G includes global mobile based standard i.e. known as GSM.

2.5G TECHNOLOGY:

2.5 Generation is launched as a enhance version of 2G and lower version then 3G.

This technology provides enhance RF communication then 2G RF (Radio frequency) channels. In this wireless technology speed is higher than 2G and 1G.

3G TECHNOLOGY:

3rd Generation wireless communication technology plays role of medium between 2.5G and 4G, In 3G wireless communication we can connect a call or terminate the call from anywhere, anytime. It has higher data speed as compared to 2G. In 2001(May) 1st 3G commercial service was launched by Docomo.

4G TECHNOLOGIES:

4G is enhanced mode wireless technology and better than 3G, it has higher speed and higher bandwidth than other generation. Now days it is most widely used, it is used for business purposes. It is a better combo of video and audio data.

It is depends on IP based protocol on network layer.

Now 4G is available only in limited region area. We use WiMax technology for instance Sprint for its 4G services, whereas Verizon Wireless employs Long Term Evolution, or LTE. On an average, 4G wireless technology is expected to provide data rates speed from five to ten times higher speed than today's conventional 3G networks.

3. 4TH GENERATION NETWORKS:

Fourth generation (4G) technology offers many advance theories to the wireless market, downlink data rate over 100 megabits per second (Mbps), low latency, very efficient use of spectrum and low-cost investment on implementations. With impressive network capabilities, 4G enhancements are used to bring the wireless experience to a new level with user applications, such as graphical user interfaces, high-end gaming, high definition video and high-performance. It has wide range of services, receiving greater amounts of information, pictures, data, video, and so on. The future 4G network infrastructures networks employing the use of IP (Internet protocol) as a common protocol to

make sure that every user will be able to access for every application and task. In the field of mobile and wireless communications, 4G is providing a flawless service, larger bandwidth, higher data rates in mbps, and very smooth and creating very fast handoff across a wide range of wireless networks. 4G with the existing mobile technologies by doing use of enhanced technologies is the important factor in 4G wireless technology. Effective and very efficient connections with respect to the network applications can be achieved in huge condition. It gives a wide range of services to their consumer, receiving large amounts of information, pictures, data, video, and so on. It has larger bandwidth, higher data rates, and smoother and faster handoff across a wide range of wireless networks and systems. Incorporating the 4G potentials with the existing mobile technologies by the use of enhanced technologies is the major concept.It provides error free services to their consumers. Effective connection with the network applications can be achieved in at all different levels [1].

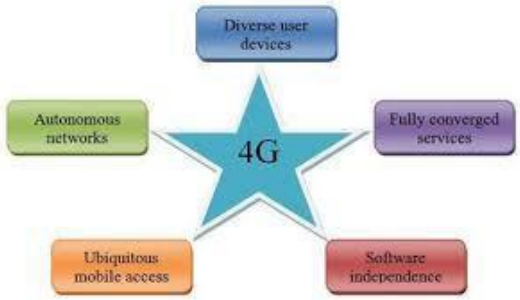

Fig. 1: Features of 4 G networks

3.1 Features of 4G Wireless Technologies are as follows:

- Wide range of mobile coverage region.
- It has larger bandwidth and higher data rates.
- 4G wireless technology consists Terminal Heterogeneity and Network Heterogeneity.
- It has smoother and quicker handoff.
- It plays role of Wireless LAN for hot spots, an extension of 2G and 3G.
- It has better scheduling of data bits and call making and call terminating techniques.
- It also includes global roaming and interrelated working among various other access technologies.
- It do supports interactive multimedia, video, wireless internet, voice, TCP protocol and various other super broadband services.

3.2 Architecture of 4G:

Figure given below, shows the widely accepted 4G network structure with IP as the core network used for communication purpose.

Fig. 2: Wireless Network

It has feature of integrating the 2G, 3G and 4G technologies in one [2]. LTE and WiMAX is basic architecture of 4G wireless technology:

WiMAX:

Mobile WiMAX has playing very important role in today's modern and digitized world. As a result, people are extremely showing more dependency on mobile telecom. The demand for downloading and transporting the data on mobile devices are very much in demand nowadays. In the field of wireless networks our world has numerous

revolutionary changes from the last some years. Today wireless network has become an essential part of our life. Now, new emerging technologies are being introduced in the field of wireless communication which have high speed broadband wireless access. Mobile WiMAX stands for Worldwide Interoperability for Microwave Access [3].

It is 4th generation mobile broadband wireless network based on IEEE 802.16 which supports 4G.It works on MAN topology.WirelessMAN-OFDMA specification providing fast 4G services. Nowadays user wants to remain online every time. User also wants transmission of data at low price without any data loss with high speed. Presently a large number of PDAs (Personal Digital Assistance) are used to support 4G wireless networks [4].

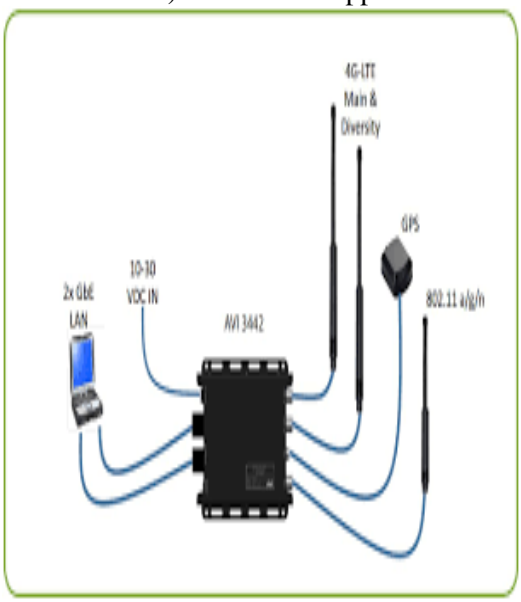

Fig. 3: WiMAX interconnections

LTE:

LTE stands for Long Term Evolution and it was started as a project in 2004 by telecommunication department that is known as the Third Generation Partnership Project (3GPP). SAE (System Architecture Evolution) is the corresponding new version evolution of the GPRS/3G packet core network .The term LTE is typically used to represent both LTE and SAE both [8].

LTE introduced from an earlier 3GPP system known as the Universal Mobile Telecommunication System (UMTS), which is introduced on the behalf of the Global System for Mobile Communications (GSM) [7].

The main goal of LTE is to provide a high data rate speed, low latency, packet optimized radio-access technology and for supporting flexible bandwidth .Its network architecture has been designed with the goal to support packet-switched traffic with seamless mobility and great quality of service.

LTE also has IP based architecture .It is very differ from WiMAX in security mechanism. It cannot meet the security requirement and authenticate only identity (IMSI) and key in SIM card [7].

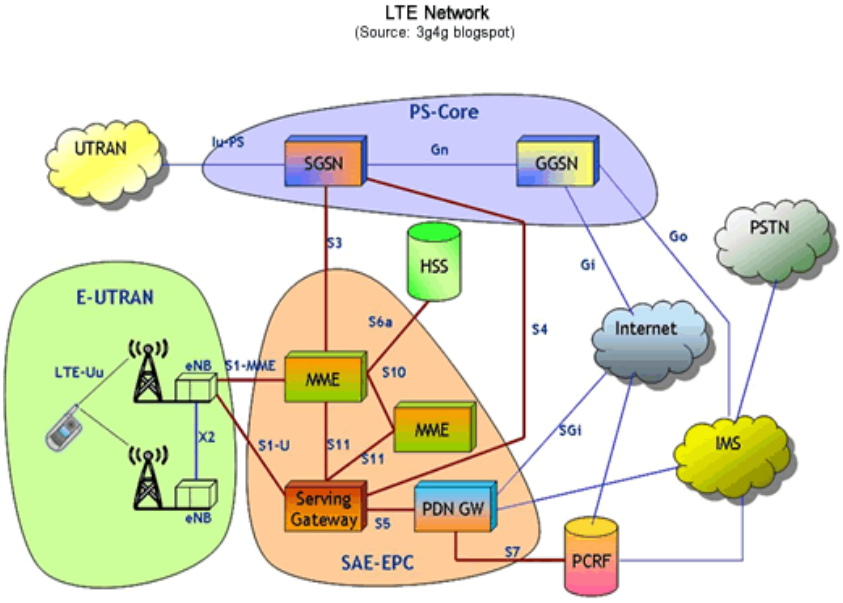

Fig. 4: LTE Networks

3.3 APPLICATIONS:

- 4G Ultra high speed internet access, E-mail or general web browsing is available.
- 4G Data interactive user services - Services are as online satellite mapping will load instantly.
- 4G Multiple User Video conferencing.
- 4G Location based services are provided.
- It also supports HDTV and video games.
- It also helps us in navigating.
- It also used for business purpose [6].

4. CONCLUSION:

This paper presents a description about 4G networks, WiMAX and LTE Network architecture. It has been observed that the number of wireless broadband subscribers have passed the number of fixed broadband subscribers. So in a world of wireless, the technologies with higher bandwidth and data bit speed getting useful day by day. In 4G network, higher coverage area and higher channel capacity are essential parts. LTE and WiMax 4 G wireless technologies are more frequently used technologies. So, we can say that this technology is, affordable in cost and with high data speed in throughput, higher coverage area and higher channel capacity [9].

REFERENCES:

1. Bill Krenik: (2014) “4G Wireless Technology: When will it happen? What does it offer?” IEEE.
2. J. Ibrahim.(December 2000) 4G Features. Bechtel Telecommunications and Technical Journal, Volume 1,.
3. Leo yi, Kai Miao, Adrian Liu “A Comparative Study of WiMAX and LTE and applications of wireless.
4. Alam, Zahangir, Chowdhury Sajadul Islam, and M. Abdus Sobhan. (2008) "A Novel idea to combat 4G challenges to establish all wireless internet services." In *Broadband Multimedia Systems and Broadcasting, IEEE International Symposium on*, pp. 1-6. IEEE,.
5. Xiuhua, Qing, Cheng Chuanhui, and Wang Li.(2008) "A study of some key technologies of 4G system." In *Industrial Electronics and Applications, ICIEA 2008. 3rd IEEE Conference on*, pp. 2292-2295. IEEE,
6. Chang, Ben-Jye, Jun-Fu Chen, Cheng-Hsiung Hsieh, and Ying-Hsin Liang.(2009) "Markov decision process-based adaptive vertical handoff with RSS prediction in heterogeneous wireless networks." In *Wireless Communications and Networking Conference, WCNC 2009. IEEE*, pp. 1-6. IEEE,
7. Janevski, Toni, and Kire Jakimoski.(2012) "Mobility sensitive algorithm for vertical handovers from WiMAX to WLAN." In *Telecommunications Forum (TELFOR), 2012 20th*, pp. 91-94. IEEE,.
8. Gao, Feng.(2009) "A Technical and Market study for WiMAX." PhD diss., Helsinki University of Technology,.