

Analyzing the Generations of Mobile Technology

B.Veeramallu, A.Raghuveer, U.Sairam

Abstract: In my research paper, I will be defining the distinguish between mobile generations basically 2G and 3G wireless. It will have some of the history for both 2G, 3G network. 2G networks were built mainly for voice data and slow transmission. Due to some changes in user expectations they do not meet today's the wireless needs. That Cellular mobile telecommunication networks are being upgraded for the use of a 3G technologies from 1999 to 2010. Japan was the first country that introduces the 3G nationally, and in Japan the transition 3G largely completed in 2006. Korea then adopted the 3G Networks soon after and the transition was done as early as 2004. 2.5G (and even 2.75G) and the technologies such as camera phones, high-speed circuit-switched data (HSCSD) and General packet radio service (GPRS) that provide some of the functionalities like 3G networks, where without the full transition to 3G network. They are taken to introduce the possibilities of wireless technology for the end consumers, so increase the demand for 3G services. When we are converting a GSM network to the UMTS network, we first new technology is General Packet Radio Service (GPRS).

Keywords: : GSM, 2G, 3G, 4G, 5G, SMART PHONES, GPRS, Mobile Wireless Communication Networks

I. INTRODUCTION

First of all, today standards are set by the International Telecommunication Union or ITU for short. There specialized agency of the United Nations, where founded in 1865, which is responsible for the communication and information technologies. The ITU co-ordinates shared the global use of radio spectrum, it work for improvement of a system tele-Communication infrastructure and established the related worldwide telecommunication standards.

1.1 2G Technology:

Second-generation(2g): Telephone technology is based on the GSM or in the other words we also called global system for the mobile communication at present. Second generation was launched in year 1991 in fin land.

1.1.1 How 2G works, Uses of 2G technology (Second Generation technology)

2G network allows for the greater penetration of intensity. 2G technology enabled the various process mobile phone networks for providing the services such as text, picture messages and MMS (multimedia messages). 2G technology is more efficient now a days. 2G technology that the holds sufficient security for both the sender and the receiver from other resources.

All text messages are digitally encrypted. This digital encryption allows for the transferring of data in the way that only the intend receiver can receive and read it easily and fastly.

1.1.2 2G Technologies (Second Generation Technologies)

Second generation technologies are either time division multiple access (TDMA) or code division multiple access (CDMA). TDMA allows for the division of signal into time slots. CDMA allocates each user to a special code for communicate over the multiplex physical channel. The different TDMA technologies are GSM, PDC, IDEN, IS-136. CDMA technology is IS-95. The GSM has its origin from the Group special that the Mobile in the Europe. GSM(Global system for a mobile communication) is the most admired standard of all the mobile technologies. Although this technology that originates from the Europe, but now those are used more than 212 countries in the world. GSM technology was the first one that help established to international roaming. That enabled the mobile subscribers to use their mobile phone connections in many different countries of the world's is based on digital signals, unlike 1G technologies which were used to transfer the analogue signals. GSM that has enabled the users to make use of the short message services (SMS) to any mobile network at any time for anywhere. SMS is a cheap and easy way to send a message to anyone, other than the voice call conference. This technology is beneficial to both the network operators and the ultimate users at same time.

1.1.3 How 2G Technology Works

Advancement in the mobile phones technology has been marked by generation (G). The Analog phones are related to the 1st generation (1G), and then come to the digital phones these are marked by second generation (2G). In the second generation mobile phones has changed the concept of mobile phones by introducing the high data transfer rate, increased by the frequency of the band and wireless connectivity.

We have three different types of technologies in the second generation these are FDMA (Frequency Division Multiple Access), TDMA (Time Division Multiple Access) and CDMA (Code Division Multiple Access). These types have one common feature of multiple access which means that many users are able to access the same number of cells. The first part of these technologies it makes differ. Because of different types of the technologies utilizes are in 2G mobiles, there are different types of the mobiles now according to the technology incorporate. Let us see the 2G technologies use in mobiles and their functions as they work.

Manuscript received on January 2013.

B.Veeramallu, department of computer science and engineering, KLUUniversity.

A.Raghuveer, department of computer science and engineering, KLUUniversity.

U.Sairam, department of computer science and engineering, KLUUniversity.

Analyzing the Generations of Mobile Technology

1.1.4 How 2G (FDMA) Works:

The Frequency Division Multiple Access (FDMA) enables calls for use the different frequency by splitting it into small cells. Each call uses the different frequencies. The phenomenon is same as in radio where the different channels are broadcast on separate the frequency. So in every radio station has been assigned a different frequency according to the specific band available. The FDMA is best in case of the analog transmission but also we support that the digital transmission. No doubt it is accommodate to the digital signals yet with poor service.

1.1.5 How 2G (TDMA) Works

The different technologies are categorized in second generation's the TDMA standard according to the different time zones in different countries for the world. These technologies are:

- GSM (Global System for Mobile Communication) is nearly used in the whole world.
- IDEN (Integrated Digital Enhanced Network) is introduced by the Motorola used in US and Canada.
- IS-136 (Interim Standard-136) is also known as the D-AMPS (Digital Advanced Mobile Phone System) prevail in the South and North America.
- PDC (Personal Digital Cellular) is used in Japan.

TDMA is the narrow band of 30 KHz wide and 6.7 millisecond of long . These are divided into the three slots of time. Using the CODEC, stands for the Compression / Decompression algorithm, which compresses the digital information and use less space leaving for the other users. The Division of this narrow band of three time slots increases the capacity of the frequency band. TDMA supports for both frequency bands IS-54 and IS-136. GSM (TDMA) is a different standard and provide basis for IDEN and PCS. Being an international standard, it may cover many countries in the world. There is only the need for changing the SIM and you can get connected no need to buy the new phone. Having two different bands

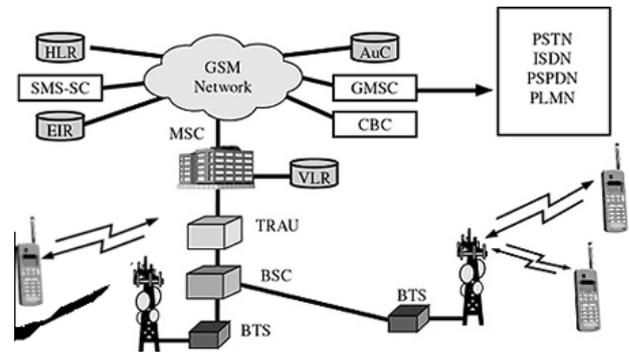
- 900 - 1800 MHz that band covers Europe and Asia
- 850 - 1900 MHz that band covers United State

First band is in sync widely but in second is limited to the United State. It is the better way to go for the first one if you need to go on extensive travelling.

1.1.6 How 2G (CDMA) Works

Contrary to TDMA, CDMA that works in the singular way that we Like TDMA, It also converts the information into a digital data and sends it. Now that information is extended upon the bandwidth. The Incoming calls are spread over the surface of channel and that code is allocated to them. As the data is spread over the surface of channel it is known as spread spectrum. It compresses the data into small packets and sends it to separate columns.

Every caller sends out the data to similar spectrum. Every caller's signals are spread over that channel having a unique code . Reaching at the receiving point, the codes are to be matched and the data delivers . CDMA it refers to the GPS standard for marking the time stamp on the broadcast signals . CDMA it supports the Interim Standard (IS-95) and operational at the frequency bands of 800 MHz and 1900 MHz



II. 3G TECHNOLOGIES

If we want augmented bandwidth, the multiple mobile applications are clarity of digital signals, and then 3G (Third Generation Technology) is a gateway. GSM technology was able to transfer the circuit the switched data over the network. The use of 3G technology is able to transmit the packet switch data efficiently at better and increased bandwidth . 3G mobile technologies proffers more advanced services into mobile users. These can help many multimedia services to function. The spectral efficiency of the 3G technology is better than 2G technologies. Spectral efficiency of the measurement in rate of information it transfers over any communication system. 3G is also known as a IMT - 2000.

2.1 3G technology and 3g Technologies characteristics

3G technologies uses TDMA and CDMA. 3G (Third Generation Technology) technologies make use of value added services like as mobile television, The GPS (global positioning system) and video conferencing. The basic features of 3G Technology (Third Generation Technology) are fast data transfer rates. However in this feature is not currently working properly because, The ITU 200 it is still making decision fix to the data rates. It is expected that 2mbit/sec for stationary users, while the 348kbits when moving or traveling. The ITU sell various frequency rates in order to make use of the broadband technologies. The Network authentication has won trust of the users, because the user can rely on its network as a reliable source of transferring the data. The 3G technology is much flexible, because it is able 5 major radio technologies. These radio technologies that operate under CDMA, TDMA and FDMA. CDMA it holds for IMT-DS (direct spread), IMT-MC (multi carrier). TDMA accounts for IMT-TC (time code), IMT-SC (single carrier). FDMA has only one radio interface known as IMT-FC or frequency code. Third generation technology it is really affordable due to the agreement of industry. This agreement took place in the order to increase its adoption by the users. 3G (Third Generation Technology) system is compatible to work within the 2G technologies. 3G (Third Generation Technology) technologies that hold the vision they should be expandable on demand. The aim of the 3G (Third Generation Technology) is to allow for more coverage and growth with minimum investment.

2.2 How 3G (CDMA 2000) Works

The Code Division Multiple Access 2000 is approved by 3GPP2 Organization. The CDMA200 hybrid with IS-95 B provides an unlimited access to the IMT-200 Band as well as CDMA 200 1x and ideal conditions that the highest data transfer rate. The CDMA 2000 1x evolves into a CDMA 200 1x EV. The CDMA 200 1x EV IS put into service in two different forms;

- CDMA 2000 1x EV-DO- 1X Evolution data only able for use 1.25 MHz
- CDMA 2000 1x EV-DV- 1x Evolution Data and Voice also for 1.25 MHz

All these versions are supposed to attained the high speed for greater efficiency of the mobile phones.

2.3 How 3G (W-CDMA / UMTS) Works

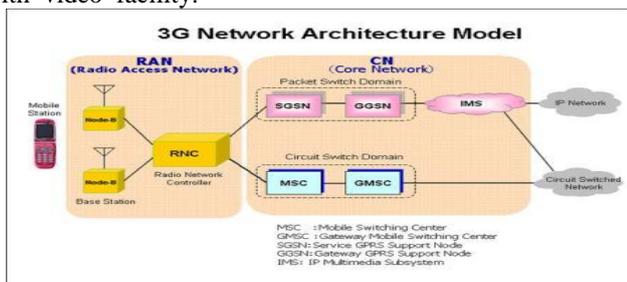
3G mobile technology has been marked by the CDMA to accomplishment. ETSI Alpha group develop this technology on radio access method. W-CDMA it offers challenges in shapes of the versatility and complexity of its design. In the multifaceted single algorithm made the complete system more difficult to the receiver becomes an more complicated device. It provides a friendly environment to the multi-users with the greater simulation and broader interface able to transfer a data with the time variations.

The UMTS network group is experimenting on the new technology to maintain a previous 2G module features and the added features as well in 3G.

2.4 How 3G (TD-SCDMA) Works

Developed by China Wireless Telecommunication Standard group TD-SCDMA it is approved by the ITU. This technology was based on the time synchronization with CDMA. This time division is based on a duplex approach where as uplink and downlink traffic transmit in the different time slots. The synchronization gives flexibility to the spectrum for uplink and downlink to transmission depending on the symmetrical or asymmetrical information. Asymmetrical information is comprises e-mail and internet applications and call the system that comes under symmetrical information. During asymmetrical applications in downlink is given preference over the uplink. Preference is given as to the uplink during telephony.

3G Mobile technology that can provided a 144 kbps connectivity speed which is the highest one in the present era. These are offering wireless broadband facility an entertainment opportunity of downloading music and videos, games with 3D effects under a conference calls with video facility.



Based on the services, the feature plans and areas within the 3G coverage there many carriers who are providing it. It is still not a fully accessible in all the countries just limitations are hinder the availability. The

real 3G technology that can be enjoyed with a new mobile phone set and the 3G service pack.

Many Technologies are appear in many different flavors and it having many diverse tags attached to them, but that does not really indicated that they are moving dissimilar tracks. The technologies that fall in the 4G categories are called UMTS, OFDM, SDR, TD-SCDMA, MIMO and WIMAX to the some extent.

III. 4G TECHONOLGY

3.1 How 4G Technology Works

As the need that of communication rather fastest communication is the foremost priority of present era also that need in a quick data transfer. Distant business it correspondence by sharing data it becomes very important and ever growing technology is the example of one such step towards the fastest transmission of data. 4G stands for Fourth Generation it is the latest technology high speed transferability of data with a security measurements. It coming with a wireless broadband for the instant download.

Talking about that the standard of 4G technology, still not be defined as set standard, two technologies are supposed to be the based features of 4G.

- Wi-MAX
- LTE

The ITU promotes that a technologies against the defragmentation and incompatibilities in the 4G technologies.

WiMAX stands for Worldwide Interoperability of an Microwave Access previously worked as the fixed wireless facility under 802.16e band. Now the modified standard on 802.16m has been developed with properties of speed, the wide spectrum, and increase band.

4G technologies is likely to enable an ubiquitous computing, that will simultaneously connects to the numerous high date speed networks offers faultless handoffs all over the geographical regions. In many network operators possibly utilize the technologies for example; wireless mesh networks and cognitive radio network to guarantee secure connection & competently allocates the equally network traffic and bandwidth. With 4G mobile technology around the corner it is difficult to imagine how we were able to go around our everyday lives without mobile communication speeds of up to 100Mbps. Now not only will 4G improve the mobile communication that will likely positively impact wireless technology for online gaming and internet browsing in the home. If you want to test the capability of a 4G technology in the online gaming industry to visit spinpalace.co.uk and download the latest software for ultimate gaming experience. Visit them on the 4G compatible mobile device and experience the 4G technology. 4G has an advantage of having the WiMAX as the product because IEEE introduces and releases it already therefore economic as no need to pay for its manufacturing the price. The 4G supports two basic equipments.

Smart phones with Wireless Access are going to be introduced in the market are the model 4G mobiles. The smart phone are equipped with the wireless internet accessibility and no fear of losing connection while travel from one tower to another tower range.

Analyzing the Generations of Mobile Technology

Based on the IP wireless connectivity, the increases the optimization for the internet. It manages a voice through packet-switching instead of circuit switching. The Internet connectivity with a specific IP not only increases the speed but also reliability of the sending and receiving of data.

During a phone call when caller send the information by connecting to WiMAX network, the information first processed to the internet home and then spread widely. Most of time this transmission happens very fast problems to arise in case of spectrum, bandwidth and data. In case of spectrum is not wide, shorten bandwidth and specific to data carries through the internet. That arrival of 4G has diminished all the fears of lower bandwidth, narrow spectrum and amount of a data that send and receive. This WiMAX technology has high speed of data transfer rate with additional capacity for the subscribers and ready to carry big amount of data that Previous generations were suffering because of low speed which ultimately covered in the 4G. The Parallel to WiMAX, LTE (Long Term Evolution) is introduced by the Verizon. LTE is considered to be promising high data transfer speed. LTE is supposed to provide the internet facility using both systems. It has the ability of a transition from one mode to another. LTE is developed on the radio waves technology. This is not only increases the speed but also the amount of data allowed through the same bandwidth and results into lower cost.

As LTE is compatible with 3G technology so it not only increases the speed but also prevents the need of new network and it can work through the same infrastructure. In LTE will not only support the functions of 3G but also incorporate some newer ones. LTE using MIMO (Multiple input multiple output) able to send and receive huge data negative in the sense that it will overload the base stations networks.

While we seeing the working methodologies of both technologies considered being the standards of 4G, the future is of mobile business.

IV. WHAT IS 5G TECHNOLOGIES

5G Technology it is stands for the 5th Generation Mobile technology. 5G mobile technology changed the use of cell phones within a very high bandwidth. The user never experienced ever before such as high value technology. Nowadays the mobile users have much awareness of cell phone (mobile) technology. 5G technologies include all of advanced features that make 5G mobile technology most powerful and huge demand in near future.

The gigantic array of an innovative technology being built into new cell phones is stunning and 5G technology which is on hand held phone offering an more power and features than at least a 1000 lunar modules. As a user can also hook their 5G technology cell phone with their Laptop to get a broadband internet access. 5G technology including the camera, MP3 recording, video player, large phone memory , dialing speed , audio player and much more you never imagine. For children rocking the fun Bluetooth technology and Pico nets has become in market.

4.1 What 5G Technology offers

5G technology going to be a new mobile revolution in the mobile market. Through 5G technology now you can use the worldwide cellular phones and this technology that also strike the china mobile market and a user being proficient to get a access to Germany phone as a local phone. With the

coming out of the cell phone alike to PDA now your whole office in your finger that tips or in your phone. 5G technology has extraordinary data capabilities and has ability to tie together unrestricted call volumes and infinite data that broadcast within a latest mobile operating system. 5G technology has bright future because it can handle the best technologies and offer the price less handset and customers. May be in coming days 5G technology takes over the world market. The 5G Technologies have an extraordinary capability to support a Software and Consultancy. The Router and switch technology that is used in 5G network providing with high connectivity. The 5G technology distributes the internet access to nodes within the building and can be deployed with union of wired or wireless network connections. The current trend of a 5G technology has glowing future.

V. CONCLUSION

Nowadays, the wireless technology is getting popular and important in the network and in Internet field. In this paper that we briefly introduced the history background of 2G to 5G, compared the differences of 2G and 3G, and illustrated how 4G may work for more convenient and powerful in the future. 4G was just right started from 2002 and there are many standards and their technologies, which are still in developing the process. Therefore no one can really sure what the future 4G will look like and what services it will offer to people. However, we can get general idea about 4G from academic research; 4G is the evolution based on 3G's limitations and it will fulfills the amount of an idea that is WWW, World Wide Wireless Web, offering more services and smooth global roaming with inexpensive cost. A new revolution of a 5G technology is about to begin because 5G technology is going to give tough competition to normal computer and laptops. There are lots of improvements from 1G, 2G, 3G, and 4G to 5G in the world of telecommunications. In the novel impending 5G technology is available in the market in affordable rates, and high peak future and much reliability than its preceding technologies.

REFERENCES

1. Vasari Bande, Mounika Marepalli, Leepika Gudur "Evolution of 4G- Research Directions Towards Fourth Generation Wireless Communication", " International Journal of Computer Science and Information Technologies", Vol. 2 (3) , 2011, 1087-1095.
2. B. G. Evans and K. Baughan, "Visions of 4G," Electronics and Communication Engineering Journal, Dec. 2002.
3. H. Huomo, Nokia, "Fourth Generation Mobile," presented at ACTS Mobile Summit99, Sorrento, Italy, June 1999.
4. J. M. Pereira, "Fourth Generation: Now, It Is Personal,"
5. Proceedings of the 11th IEEE International Symposium
6. on Personal, Indoor and Mobile Radio Communications,
7. London, UK, September 2000.
8. [http://www.4gwirelessjobs.com/pdf/5g-Wireless architecture.pdf](http://www.4gwirelessjobs.com/pdf/5g-Wireless%20architecture.pdf)
9. <http://www.5-g.co.uk/>
10. <http://5ginfo.blogspot.com/>
11. [http://www.beyond4g.org/wp-content/uploads/2011/03/5G The Nano Core. pdf](http://www.beyond4g.org/wp-content/uploads/2011/03/5G-The-Nano-Core.pdf)
12. <http://www.beyond4g.org/vision-of-5g-networks-and-architecture>.
13. <http://www.crazyengineers.com/tag/5g-network/>
14. [http://www.differencebetween.com/difference-between-4g- and-5g networks](http://www.differencebetween.com/difference-between-4g-and-5g-networks).
15. <http://vspages.com/4g-vs-5g-networks-4780/>