International Journal of Advance Research in Science and Engineering
Vol. No.4, Special Issue (01), Spetember 2015
www.ijarse.com
IJARSE
ISSN 2319 - 8354

JOURNEY OF 5G FROM 1G WIRELESS NETWORK: A STUDY

Aditi Gupta

Dept. of Computer Science and Engineering, North India Institute of Technology, Najibabad (U.P.), (India)

ABSTRACT

Today wireless industry is busy in welcoming 4G technology. The 4G technology in our country will be introduced in full swing in coming few years but lots of companies are still working on developing 5G technology. The cellular concept was introduced in 5G Technology stands for 5th Generation Mobile technology. 5G technology has changed the means to use cell phones within very high bandwidth. User never experienced ever before such a high value technology. Where a 5G family of standards to be implemented, it would likely be around the year 2020 according to some resources. The revolution of 5G technology is about to begin because 5G technology going to give tough competition to normal computer and laptops whose marketplace value will be effected. There are lots of improvements from 1G, 2G, 3G, and 4G to 5G in the world of telecommunications. The new coming 5G technology is available in the market in affordable rates, high peak future and much reliability than its preceding technologies. As we are in 4G world the major difference from a user point of view between 4G and 5G techniques must be something else than increased maximum throughput; for example lower battery consumption, lower outage probability (better coverage), high bit rates in larger portions of the coverage area, cheaper or no traffic fees due to low infrastructure deployment costs, or higher aggregate capacity for many simultaneous users.

Keywords*: *1G, 2G, 3G, 4G, LTE, WiMax

I. INTRODUCTION

The continuing growth in demand from subscribers for better mobile broadband experiences is encouraging the industry to look ahead at how networks can be readied to meet future extreme capacity and performance demands. Although the path towards 2020 has already been set out in our Technology Vision 2020, the growth in the demand will not stop here. We believe that communications and control beyond 2020 will involve a combination of existing and evolving systems this includes existing systems like LTE-Advanced and Wi-Fi, coupled with new revolutionary technology. 5G technology will change the manner in which cellular plans are offered worldwide. The creation and entry of 5G technology into the mobile market place will launch a new revolution in the way international cellular plans are offered. The global mobile phone is upon the cell phone market. Just around the corner, the newest 5G technologies will hit the mobile market with phones used in China being able to access and call locally phones in Germany. Thus one can say that with the current trends, the industry has a real bright future if it can handle the best technologies and can produce affordable handsets

for its customers. Thus you will get all your desires unleashed in the near future when these smart phones take over the market. 5G Network's router and switch technology delivers last yard Connectivity between the Internet access provider and building occupants. 5G's technology intelligently distributes Internet access to individual nodes within the building.

II. JOURNEY FROM 1G TO 5G

2.11G Wireless Technology

First Generation wireless technology (1G) developed in 1980's and completed in early 1990's it 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.

Fig (a):1G Mobiles

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. The 1G mobile are shown in Figure (a)

Although both systems use digital signaling 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 0G technology, 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 allows user to talk with in a country. It also contains few draw backs listed below:

(a) It contains poor voice quality & battery life.

(b) The size of phone is very large.

(c) Very limited capacity of Memory.

(d) No security features are available in 1G.

2.2 2G Wireless Technology

2G is short for second-generation wireless telephone technology. Second generation 2G cellular telecom networks were commercially launched on the GSM standard in Finland in 1991. The 2G mobile phones are shown in figure (b) .2G network allows for much greater penetration intensity and 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.

Fig (b): 2G Mobiles.

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 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.

Although this technology originates from the Europe, but now it is used in more than 212 countries in the world. GSM technology was the first one to help establish international roaming. This 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 Analogue signals. GSM has enabled the users to make use of the short message services (SMS) to any mobile network at any time. SMS is a cheap and easy way to send a message to anyone, other than the voice call or conference. This technology is beneficial to both the network operators and the ultimate users at the same time. In comparison to 1G's analog signals, 2G's digital signals are very reliant on location and proximity. If a 2G handset made a call far away from a cell tower, the digital signal may not be enough to reach it. While a call made from a 1G handset had generally poor quality than that of a 2G handset, it survived longer distances. This is due to the analog signal having a smooth curve compared to the digital signal, which had a jagged, angular curve. As conditions worsen, the quality of a call made from a 1G handset would gradually worsen, but a call made from a 2Ghandset would fail completely. Data transfer in speeds is up to 64kbps.

There are few drawbacks of 2G network:

(a) Some areas which are less populated, if the digital signals are weak, they will not be sufficient enough to reach a cell tower.

(b) The digital calls, although are free of static and background noise, You may hear less of the tonality of someone's voice conversing on a digital cell phone, which is one of the drawbacks of 2G technology.

(c) The pulse nature of TDMA transmission used here often interferes with some electronics, like certain audio amplifiers. Moreover, as the intellectual property is concerted among a few industry members, it creates obstacles for new entrants. This in turn limits the competition among phone manufacturers. Another

disadvantage of 2G technology is that GSM has a fixed maximum cell site range of 35 km, which is imposed by technical limitations.

2.3 3G Wireless Technology

3G stands for Third generation, and is a wireless industry term for a collection of international standards and technologies aimed at increasing efficiency and improving the performance of mobile wireless networks. With rapidly evolving mobile technology, phone developers are constantly looking for improved and faster voice and data connections. As of October 2010, most mobile phones are 3G .This technology allows for the transfer of data through mobile broad band. The use of 3G technology is also able to transmit packet switch data efficiently at better and increased bandwidth. 3G mobile technologies proffers more advanced services to mobile users. The 3G mobiles are shown in Figure(c) .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.

Fig (c): 3G Mobiles

3G is also known as IMT-2000.The transmission speed of 3G is range from 125kbps to 2Mbps. 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). 3G devices can provide data transmission speed up to 2Mbits/s when used in stationary mode. It is available for global roaming with high voice clarity. It also provides Fast communication Internet, Mobile T.V, Video Conferencing, Video Calls, Multi Media Messaging Service (MMS), 3D gaming, Multi-Gaming, etc. are also available with 3G phones .

There are few drawbacks of 3G network:

(a) Expensive fees for 3G Licenses Services.

(b) Building Infrastructure for 3G was a big challenge.

(c) High bandwidth required for operating 3G services.

(d**)** High consumption power is the main issue with 3G mobile sets.

2.4 4G Wireless Technology

4G refers to the fourth generation of cellular wireless standards. It works on LTE (Long Term Evaluation) and WiMax(Worldwide Interoperability for Microwave Access) successor to 3G and 2G families of standards. In a nutshell, 4g mobile broadband will enable mobile phones to act as efficiently and effectively as laptop computers, while remaining wireless. This will allow mobile phone users to access the full internet as they

would on a computer without any decrease in speed or dropping any data. The 4g network will be the fastest mobile broadband network to date. The 4G mobiles are shown in Figure (d).

The technology behind the 4G network has not been defined, although experts say it will either be WiMax or LTE. Verizon, AT&T and T-Mobile have either done trials using LTE, or are anticipating trials in the next year. Sprint, is already unveiling the new 4G network in major cities such as Atlanta, New York and Boston. Basically, the difference in these networks has to do with how data is transferred. WiMax users a broadband network over a wireless connection. LTE, on the other hand, transfers data using IP connections. Basically, it will create an IP address for every mobile device. The big advantage to this kind of network is that it can work with preexisting architectures such as 3G whereas WiMax will force a restructuring of mobile communication networks. No matter the type of technology used, the advantage to the mobile user will be the same. Data transfer to and from the internet will become almost limitless.

Fig (d): 4G Mobiles

Users will be able to do the same things on their mobile devices that they can do on their computers at home including updating blogs and uploading videos. The current technology makes these kinds of tasks cumbersome or even expensive since it can use so much of the users data transfer minutes. With the 4G technology, users will most likely see many new broadband deals that will mean lower prices and more utility. Mobile applications will also benefit from the 4G network. Many apps that are being created are too robust for the current 3G network. They are either slow to download and run, or are totally unusable. With 4g technology and its increased data transfer rates, these applications will be able to run to their full potential. Again, this benefit will most likely be passed on to the consumer as mobile communication companies offer better and better broadband deals consumers that will use these applications. Companies such as Motorola and Apple are beginning to roll out devices that are capable of using the 4G network, with many communication companies anticipating using it by the end of 2011. These devices are hotly anticipated and there are many rumors as to the release date, cost and availability. One thing is certain, though, as technology moves forward and becomes bigger and faster, the consumer will find more and more broadband deals to entice them to use it for business as well as personal use.

There are few drawbacks of 4G network:

(a) Though the concept of 4G mobile networks is steadily gaining popularity, connectivity is still limited to certain specified carriers and regions. Of course, the number of cities that have 4G coverage is increasing by the day. However, it would take its own time for this network to be available in all the major cities of the world.

(b) Though the hardware compatible with 4G networks is available at much cheaper rates today than earlier, the fact remains that this new equipment would necessarily have to be installed in order to supply these services. This would prove to be a cumbersome process for most mobile carriers planning to launch these services.

(c) 4G mobile networks use multiple antennae and transmitters and hence, users would experience much poorer battery life on their mobile devices, while on this network. This would mean that they would have to use larger mobile devices with more battery power, in order to be able to stay online for longer periods of time.

(d) 4G mobile technology is still fairly new it will most likely have its initial glitches and bugs, which could be quite annoying for the user. Needless to say, these teething troubles would be sorted out in due course of time, as well as with increase in network coverage.

2.5 5G Wireless Technology

5G Technology stands for 5th Generation Mobile technology. It is the most upcoming technology and 5G standards may be introduced approximately in the early 2020s. 5G technology has changed the means to use cell phones within very high bandwidth. User never experienced ever before such a high value technology. The 5G technologies include all type of advanced features which makes 5G technology most powerful and in huge demand in near future.

The 5G mobile phone is shown in *Figure (e).* As per the present status all over the world WCDMA is commercially launched .Some nations has planned to launch LTE within next quarter. Operator is looking ahead for wide-scale deployment of LTE in 2012. Operators will also find that the timing is right to make the switch because much of the first generation of 3G equipment will need to be upgraded soon. LTE networking equipment and handsets, already developed, will become available in 2015, and should be rolled out in large quantities in Europe by 2015-16. Clearly how that is within 2020 LTE will become the latest trend for wireless communication all over the world. But yet our question remains unanswered. Why there is a need for 5G.

Fig (e): 5G Mobile

5G Technology going to be a new mobile revolution in mobile market. Through 5G technology now you can use worldwide cellular phones and this technology also strike the china mobile market and a user being proficient to get access to Germany phone as a local phone. With the coming out of cell phone alike to PDA now your whole office in your finger tips or in your phone.

5G technology has extraordinary data capabilities and has ability to tie together unrestricted call volumes and infinite data broadcast within latest mobile operating system. 5G technology has a bright future because it can handle best technologies and offer priceless handset to their customers. May be in coming days 5G technology takes over the world market and have an extraordinary capability to support Software and Consultancy. The

Router and switch technology used in 5G network providing high connectivity. The 5G technology distributes internet access to nodes within the building and can be deployed with union of wired or wireless network connections. The current trend of 5G technology has a glowing future

2.5.1 What 5g Will Offer?

(a) If you can able to pay all your bills in a single payment with your mobile.

(b) If you can able to sense Tsunami/earthquake before it occurs.

(c) If you can able to visualize lively all planets and Universe.

(d) We can lock our Laptop, car, Bike using our mobile when you forgot to do so.

(d) Our mobile can share your work load.

(e) If your mobile can intimate you before the call drops.

(f) Mobile phone gets cleaned by its own. Can able to fold your mobile as per your desire.

(g) If you can able to expand your coverage using your mobile phones.

(h) If you can able identify your stolen mobile with nanoseconds.

(i) If you can able to access your office desktop by being at your bedroom.

(j) Mobile can able to suggest you possible medicine as per your healthiness.

2.5.2 Benefits of 5g

(a) High speed, high capacity, and low cost per bit.

(b) Support interactive multimedia, voice, streaming video, Internet, and other broadband services, more effective and more attractive and Bi directional, accurate traffic statistics.

(c) Global access, service portability, and scalable mobile services.

(d) The high quality services of 5G technology based on Policy to avoid error.

(e) 5G technology is providing large broadcasting of data in Gigabit which supporting almost 65,000 connections.

(f) 5G technology offer transporter class gateway with unparalleled consistency.

(g) Through remote management offered by 5G technology a user can get better and fast solution.

III. CONCLUSION

While the future is becoming more difficult to predict with each passing year, we should expect an accelerating pace of technological change. 5G is not a term officially used for any particular specification or in any official document yet made public by telecommunication companies but it can the expected that it as a reliable source of transferring data and provides lots of features which is beyond the expectations and not available in current technologies.

The main idea is today world is started 4G technology and evolution of 5G is based on 4G. 5G technology should be more intelligent and interconnects the entire world without limit and provide features beyond the expectations.

REFERENCES

[1] Xichun Li, Rosli Salleh, (2007), ―Handoff techniques for 4G wireless mobile Internet‖, information Technology Journal 6 (5), pp. 745-750.

[2] Aleksandar Tudzarov and Toni Janevski Functional Architecture for 5g Mobile Network International Journal of Advanced Science and Technology Vol. 32, July, 2011.

[3] Toni Janevski, 5G Mobile Phone Concept, Consumer Communications and Networking Conference, 2009 6th IEEE.

[4] B.G.Evans , K.Baughan, "Visions of 4G," Electronics and Communication Engineering Journal, Dec. 2002.