

A REVIEW PAPER ON WIRELESS MOBILE TECHNOLOGY

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ABSTRACT

Wireless mobile technology is developing very fast speed with advanced techniques. It is developing extremely fast in present times and deals with all the fields of mobile and wireless communications. It is an emerging technology in all the fields of mobile communication such as internet access, location based services, video conferencing system, mobile financial services, mobile entertainment services etc. The users can use these applications at anytime and anywhere through mobile communication. Wireless communication is the transfer of information over a distance without the use of "wires". The distances involved may be short or long. In the past few decades; mobile wireless technologies have experience 4 or 5 generations of technology revolution and evolution, namely from 0G to 4G. Current research in mobile wireless technology concentrates on advance implementation of 4G technology and 5G technology. In this paper I shall throw light on the evolution and development of various generations of mobile wireless technology along with their significance and advantages of one over the other. The thirst for rather new is taking the technology towards the next level with a data rate estimation of 10,000Mbps, which is to be evolved as 'The FIFTH generation-5G'. 5G should be a more smart technology that interrelates the entire world. This article provides a high level review on evolution of this new technology and next-generation mobile broadband with worldwide interoperability. 5G will emerge as an intelligent technology that will reduce the number of different technologies to a single entity of a global standard. This paper is mainly focused on the development of mobile wireless communication network from 1G to 5G and how they are different from each other and their advantages and disadvantages they possess.

Keyword: - 1G, 2G, 3G, 4G (LTE), 5G, GSM, GPRS, EDGE, WCDMA, TD-SCDMA, CDMA.

1. INTRODUCTION

Communication technology become the bloodline of the developing world. The air which we once thought to be empty has become the eyes and ears of the world. The wireless technology of data transfer has now become a major means of communication. Beginning from the push to talk systems in 1946 to the online shopping today, evolvement of technology is well evident. Keen study on this evolvement will enable the creation of an enhanced future where the world would be in our palms. The first generation 1G transmitted voice using analog signals whereas the 2G was a digital system with SMS services. 3G offered multimedia features with high data transmission rates. Increased bandwidth and reduced cost integrated with 3G resulted in the long term evolution (LTE), the 4G. Evolution occurred by the attempt to overcome the disadvantages faced during the generations 1G, 2G, 3G and 4G. In the view of providing a better communication environment to the corporates and the common people having all the advances in technology with extreme superiority in function is expected to be seen in the next generation, 5G.

2. EVOLUTION OF TECHNOLOGY

2.1. First Generation (1G)

Communication through car based telephone systems in 1946 was the preliminary step. This was then referred to as 0G. The first generation phones were deployed in 1980's with a speed limit of 2.4 kbps. The technology was first launched by the AMPS- Advanced Mobile Phone System in US which uses analog signals followed by the TACS-

Total Access Communication System and NMT-Nordic Mobile Telephone in Europe and J-TACS in Japan. These are constructed on simple FDMA-frequency division multiple access, that permitting consumers to sort the voice calls within a nation. As 1G used analog signals, the communication was less secure and no data roaming is provided. The signals were weak and hence easily prone to noise. Long distance transmission is not possible and speed are low. Reduced voice quality with deprived the phone battery life. Size of mobile phones are vast with frequent call drops and poor handoff reliability and speed up to 2.4Kbps. The frequency range is 150 MHz and above.

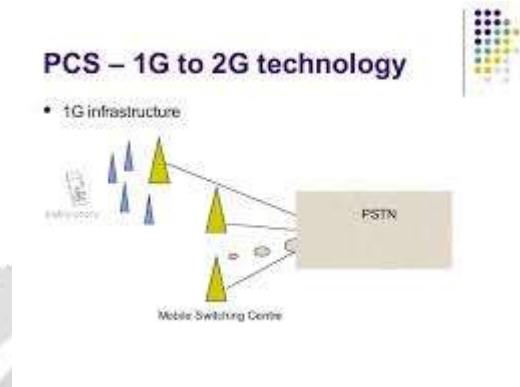


Fig-1: 1G Wireless Technology

2.2 SECOND GENERATION (2G)

In early 1990's, the second generation wireless mobile networks - 2G are created on digital skills. In 1991 2G technology have been launched in Finland and provided facilities like script message, image messages and Multimedia message. These networks are superior safety for both sender and receiver. Second Generation system practices Digital Mobile Access like Time Division Multiple Access- and Code Division Multiple Access. GSM, PDC, IS -136 are different TDMA tools. The first 2G system has originated from Europe as GSM. The utmost appreciated standard ,among the mobile technologies is GSM which used in around 212 nations, in the biosphere. In the 900 and 1800 MHZ band groups, GSM measures TDMA upto 8 calls per channel. GSM distributes circuit switching data and voice with the speed of 14.4kbps. To enhance this technology, 2.5 generation (2.5G) systems has been developed with an advanced GSM system.



Fig-2: 2G Wireless Technology

2.3 General Packet Radio Service- 2.5G GPRS

To enhance data rates, support and the volume of launching the packet based services, the early 2G network have been upgraded as General Packet Radio Service. The technologies such as HSCSD, GPRS and EDGE technologies with various databases such as HLR, VLR, EIR and AUC, offers the range data rate from 56 kbps to 384kbps. The GPRS network provides or supports services such as Wireless Application Protocol -WAP, Multimedia Messaging Service -MMS, Short Message Service -SMS, mobile games, search directory and well internet access.

3. THIRD GENERATION (3G)

3G depends on GSM and was propelled in 2000. The point of this technology was to offer high-speed data. The first technology was enhanced to permit data up to 14 Mbps and additionally utilizing packet switching. It utilizes Wide Band Wireless Network with which lucidity is enhanced. It likewise offers data services, access to TV/ video, new services like Global Roaming. It works at a range of 2100 MHz and has a bandwidth of 15-20 MHz utilized for high-speed web access, video chatting [5]. The primary highlights of 3G are: [20] Speed 2Mbps, Typically called advanced mobile phones, Increased bandwidth and data transfer rates to oblige web-based applications and furthermore, video documents, Provides quicker communication, Send/get expansive email messages, High speed web/ greater security/ video conferencing/ 3D gaming., Large capacities and broadband capabilities, TV streaming/ Mobile TV/ Phone calls, To download a 3 minute MP3 tune just 11 sec-1.5 minutes time required, Expensive charges for 3G licenses services, It was test to assemble the frame work for 3G, High bandwidth required, Expensive 3G phones, and Large cell phones. The 3G mobile system was called as UMTS (Universal Mobile Telecommunication System) in Europe, while CDMA 2000 is the name of American 3G variant. Additionally, the IMT 2000 has acknowledged another 3G standard from China, i.e. TD-SCDMA, WCDMA is the air-interface technology for UMTS [1]. The service provider has to pay the high amount for 3G licensing & agreements, the problem with the availability of handsets in few regions and their costs, 3G networks need different devices and the power consumption is high is the main disadvantages of 3G to overcome this 4G is introduced.

4. FOURTH GENERATION (4G)

4G wireless technology should put together different presently existing and prospect wireless network technologies (e.g. OFDM, MC-CDMA, LAS-CDMA and Network- LMDS) to make sure that free movement and faultless roaming from one technology to another is achieved [10]. 4G offers a downloading speed of 100 Mbps. 4G gives same features as 3G and extra services like multi-media newspapers, to watch television programs with greater clearness and send data substantially speedier than past generations[3]. LTE (Long-term evolution) is considered as 4G technology. 4G is being created to accommodate the QoS and rate requirements set by expected applications like wireless broadband access, Multi-media Messaging Service (MMS), video chat, Mobile TV, HDTV content, Digital Video Broadcasting (DVB), minimal services like voice and data and different services that use bandwidth [2]. The fundamental highlights of 4G are: [20] Capable of give 10Mbps-1Gbps speed, High quality streaming video, Combination of Wi-Fi and Wi-Max, High security, Provide any sort of service whenever according to user necessities anyplace, Expanded multi-media services, Low cost per-bit, Battery consumption is more, Hard to implement, Need convoluted hardware, and Expensive equipment required to actualize next generation network . Obtaining the information from the people illegally becomes easier, the 4G technology involves the possibility of some interference though not much, It is capable of being attacked (jamming frequencies) and the invasion of the privacy increased. The consumer is forced to buy a new device to support the 4G , New frequencies means new components in the cell towers, Higher data prices for the consumers, Your current equipment cannot be compatible with the 4G network , It has different network bands for different phones It is expensive & hard to implement .4G technology requires expensive infrastructure for operation , This is embodied in the eNodeB's (Access Points) & mainly EPC's (Gateways or Routers), 4G is optimal for data rates , but not necessarily the best for Voice services , Some of these services are offloaded (delegated) to Wi-Fi or 3G/GSM cellular technologies on your phone. To overcome the above disadvantages of 4G, 5G is coming.

5. FIFTH GENERATION -5G

Lower latency, To help gadgets in the internet of things, Higher capacity then 4G, Latency decreased fundamentally contrast with LTE, Enhanced coverage, Concurrent vast number of connections for wireless sensors, Data rates approx 100Mbps, Improved signalling efficiency, Enhanced and creative data coding techniques, Millimeter waves frequencies for wireless access and back haul utilize, Smart beam antenna systems, Bring down blackout problem, Not destructive for well being, Less expensive traffic charges, World Wide Wireless web, More secure and SDR security, Lower battery utilizations, Numerous simultaneous data exchange ways, and Accommodating being used of artificial intelligent in human life for securing communications Above examined brings up out the requirements for 5g. The fifth generation is to be another technology that will give all the available applications, by using just a single worldwide device and joining about the whole already alive communication infrastructure. Fifth generation stations will be empowered of an unlikely multimode and cognitive radio. The fifth-generation cellular networks will accentuation on the advancement of the user stations where stations will have passage to different wireless

technologies at the same time and will combine different issues from different technologies. Also, the station will make the best choice between different wireless/cellular access network providers for likely service [13]. 5G technology will be deployed by 2020. It provides the great feature to users, having higher data rate 1Gbps or higher. 5G support 4G+WWW (4th Generation +Wireless World Wide Web). It operates on IPv6 protocol. Fifth generation technology utilizes CDMA and BDMA and millimeter wireless which approves speed is higher than 100Mbps at full speed and more prominent than 1Gbps at low speed. The fifth-generation networks work on encoding type known as OFDM [11]. 5G aim to provides unlimited access and information at anywhere anytime with high speed. It is a complete wireless communication with no limitations. The fundamental highlights of 5G are:[20] Swati Yadav et al, International Journal of Computer Science and Mobile Computing, Vol.7 Issue.5, May-2018, pg. 94-100 © 2018, IJCSMC All Rights Reserved 98 It is exceptionally supportable to WWW (wireless world wide web), High speed, high capacity, Provides substantial broadcasting of data in Gbps, Multi-media newspapers, watch TV programs with the clarity (HD clarity), Faster transmission that of the previous generation, Large phone memory, dialing speed, lucidity in sound/video, Support intelligent multimedia, voice, streaming video, web and other, and More successful and appealing.

6. CONCLUSIONS

Mobile has become the essential part of our everyday life. Their current development is the outcome of various generations. In this paper we review the various generations of mobile wireless technology, their technologies use in various generations, performance, advantages, and disadvantages of one generation over other and comparison. This field is still full of research opportunities and research on upcoming technology 5G is carry on which is coming in 2020.

7. REFERENCES

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