

Role of 6G Technology in Mobile Communication

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Abstract - Mobile communication technology journey has been increasing from 1G, 2G, 3G, 4G to 5G in a few decades. Mobile communication technology and customer expectation has been increasing simultaneously. In this paper, to fill the gap between customer expectations and Mobile communication technology, a new technology 6G is proposed. 6G technology will integrate 5G technology with satellite networks for global coverage.

Key Words: 1G, 2G, 3G, 4G, 5G, Role of 6G

1. INTRODUCTION

Mobile communication allows without any physical link, transmitting of voice and multimedia data to destination. Mobile communication technology allows multiple tasks can be performed from anywhere and anytime like voice, data, internet, gaming, multimedia, GPS and Bluetooth. Mobile communication is the one of the latest technology in last few years. It plays prominent role in the raising of standard of human live and also faster performances of business operations. Human beings have been building up the easiest and quickest ways of communication methods for their needs. From last few decades, revolution in mobile communication is possible due to tremendous increasing in telecom customers as shown in fig 1.



Fig-1: World wide mobile customers

Current mobile communication researchers focusing on advance implementation of past technologies namely 1G, 2G, 3G, 4G and 5G

1.1 First Generation (1G)

1G communication systems were implemented in 1980s; it has analogue cellular technology, FDMA, circuit switching techniques and horizontal handoff. 1G service limited to mobile telephony only. Example of 1G cellular system is Advanced Mobile Phone Service (AMPS). Fig-2 shows the block diagram of 1G network.

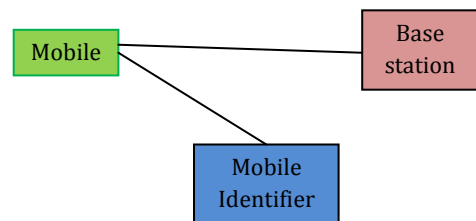


Fig-2: 1G network block diagram

1.2 Second Generation (2G)

2G technology deployed in 1990s, it has digital cellular technology, Bandwidth is limited to 64 Kbps, TDMA/CDMA multiplexing, circuit switching and air interfacing techniques and horizontal handoff. 2G service limited to digital voice and Short Message Service (SMS). Next to 2G, 2.5G technology also deployed with additional features of data rate increased to 144 Kbps and also used CDMA, GPRS and EDGE technologies. Fig-3 shows the block diagram of 2G network.



Fig-3: 2G network block diagram

1.3 Third Generation (3G)

3G technology deployed in 2000s, it has IP technology, customers get a high speed data rate better than 2G technology, data rate increased to 2 Mbps, packet switching, high security, international roaming, and horizontal handoff used, It can be applied to mobile and fixed wireless Internet access, video calls, mobile TV, wireless voice telephony. W-

CDMA, DECT, CDMA2000, UMTS and WiMAX type of 3G technologies are used. Fig-4 shows the block diagram of 3G network.

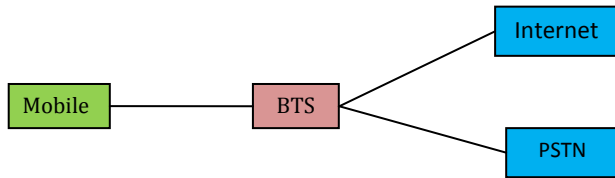


Fig-4: 3G network block diagram

1.4 Fourth Generation (4G)

4G technologies emerged in 2010s; it has unified IP technology, data rate increased to 100 Mbps, MC-CDMA and OFDM, horizontal and vertical handoff used. Seamless connectivity, High QoS, interoperability with existing wireless standards, Long Term Evolution (LTE) technologies are possible. Fig-5 shows the block diagram of 4G network.

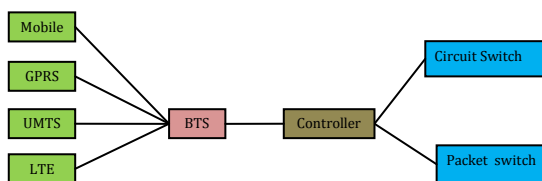


Fig-5: 4G network block diagram

1.5 Fifth Generation (5G)

5G technology is deploying from 2015 onwards. 5G system performance is better than the previous generations of mobile communication networks. 5G is rapidly developing and able to accommodate superfast speeds. It has data rate is beyond 1 Gbps, data information services with Artificial Intelligence capabilities. 4G+WWWW, WiMAX LAS, CDMA, OFDM, MC-CDMA, UWB, Network-LMDS and IPv6 standards also used. 5G provides a number of significant advantages over 4G especially in High speed data network, Multimedia and Entertainment, Internet of Things (IOT) and security. Fig-6 shows the block diagram of 5G network.

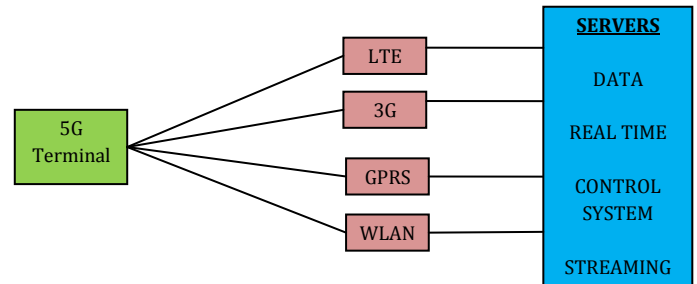


Fig-6: 5G network block diagram

Mobile communication technology has been increasing from late 1980s and also customer expectations have been increasing simultaneously as shown in fig-6. In future there is a need of advance mobile technology of 6G to fill the gap between customer expectations and technology.

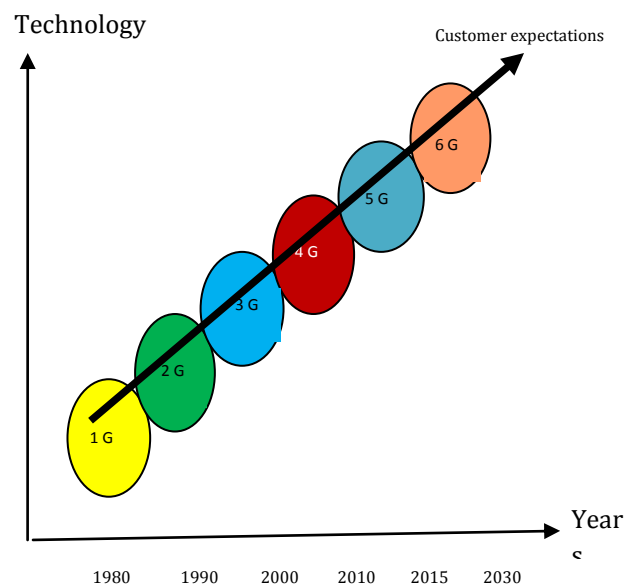


Fig 6: Technology development

2. 6G Technology

6G technology will be the future for mobile communication and will play the major role in the technology developments. Traditional technologies have the problems of reliability, security, privacy, communication failures, software and hardware complexity, high infrastructure costs, technical limitations etc. 6G technologies will integrate with 5G and satellite networks to meet the global coverage, high data rate of more than 10 Gbps, users expectations like security, better services, uninterrupted communication, meet the world class standards, cost effective etc.

6G technology proposed for a global coverage, to meet the requirements of 6G technology, it will integrate 5G technology with different satellite networks of

telecommunication, multimedia and navigational. 6G technology applications not only limited to mobile communication but also applicable in other areas like Real time applications, natural calamities, space, defense, smart home, high data network services, Home automations etc.

Researchers expecting rollout of 6G technologies will be around 2030. Schematic diagram of 6G technology is shown in Fig-7.

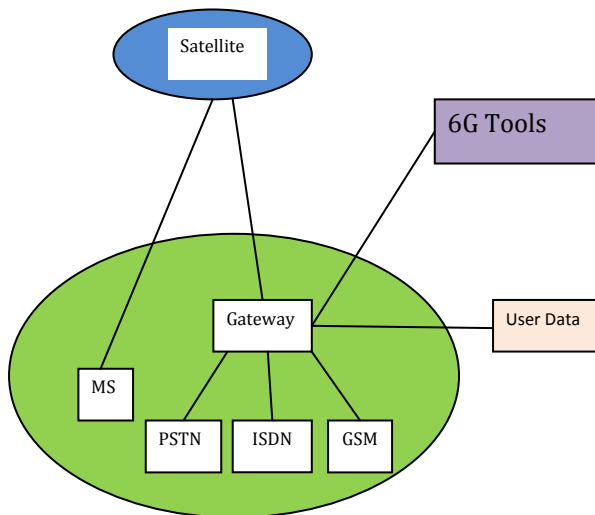


Fig 7: Schematic diagram of 6G technology

6G is the satellite based network; handoff and roaming will be the challenge because satellites are operating by different space organizations. But operating in 6G technology need to be do the hardware and software research like chip designs, materials, protocol, integration of other traditional communication devices, social economic factors to be analyzed.

3. CONCLUSION

Even though present latest technologies is meeting all the requirements of mobile communication users but human thoughts are broad in nature and expecting above the boundary levels, to meet the customer expectations, proposed a new technology 6G and it will integrate with 5G and satellite networks. It will play major role in the mobile communication system and meet the world class standards for global coverage. Role of 6G will make significant impact on every field where wireless transmission is inevitable.

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