



Working of 5G network compare to 4G network

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Abstract - In this paper generally we are going to propose how 5G network is work in future. Here we are using the concept of GSM architecture which will show you how actually call routing done from one end to another end as well as how we can use internet and how we are going to send messages to one network to another . Then we are comparing this standard GSM architecture with 3G,4G and future network 5G.This paper will show you how actually all this networks are working.

Keywords: MS,BTS,BSC,MSC,HLR,VLR,AUC,EIR,GMSC

I- INTRODUCTION

As we all know nowadays what is the important to use internet on demand. The easiest way to use internet on demand is having internet in your mobile device, so once you moving to anywhere you will get the internet access. This is possible through the process call Mobile Computing. In mobile computing, a group of distributed computer systems or service provider servers take a part, connect, and synchronizes via mobile communicating protocols. Mobile computing describing ability to use the technology to connect without wired network and use centrally located information and/or application software through the application of small, portable, and wireless computing and communication devices. Mobile computing also provide facility to use large number of application in single device and also provides mobility so you can use it anywhere. The future of mobile computing is call Pervasive computing in which information and communication technology is used everywhere , by everyone, and will be available at all times. Now following GSM architecture will show you how actually call routing can take place:

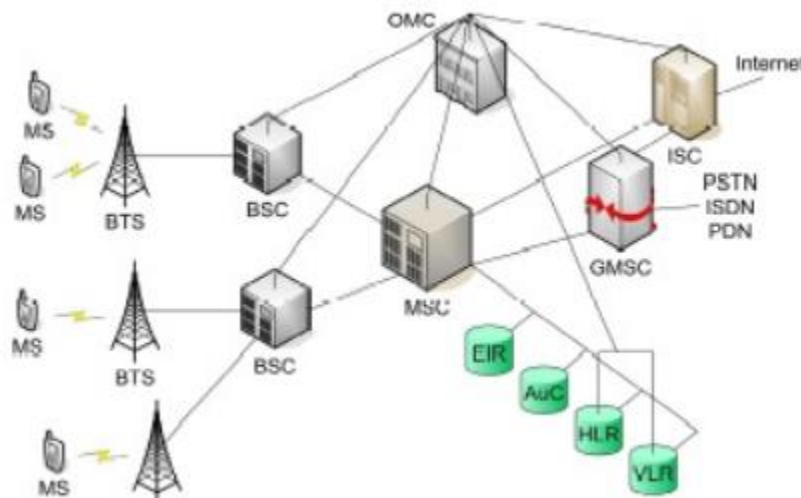


Fig1. GSM Architecture

MS : Mobile Station BTS : Base Transceiver Station BSC : Base Station Controller MSC : Mobile Switching Center EIR : Equipment Identity Register AUC : Authentication Center HLR : Home Location Register VLR :

Visitor Location Register OMC Operation and Maintenance Controller ISC: International Switching Center
GMSC : Gateway MSC

Working of GSM

Once any person call to some other person the call is first route through MS. MS basically consists of two things SIM (Subscriber Identity Module) and Handset. SIM can have uniquely identify through IMSI(International Mobile Subscriber Identity) number and Handset can be uniquely identify through IMEI (International Mobile Equipment Identity) number .This both number must have registered in EIR. Then the call is moving nearest BTS to that MS. As we all know BTS can transmit and receive the call ,so it will receive the call from MS and transmit it to the BSC. Then BSC transmit the call to MSC. MSC is the heart of GSM system, it is connected with HLR,VLR and so on. MSC is first check the caller information form database of HLR. HLR will display the permanent information of the user if it is authenticated by AUC. Then MSC transfer the call to all other MSC to check the callee. Who so ever MSC will found the callee from VLR will direct connect to MSC. Then reverse process is done from MSC to MS.

Once any caller request for downloading any image or video instead of call then the request is routing from MSC to GMSC. Same way for any text message is send to one person to another it must route through MSC to SMSC.

II- 4G network

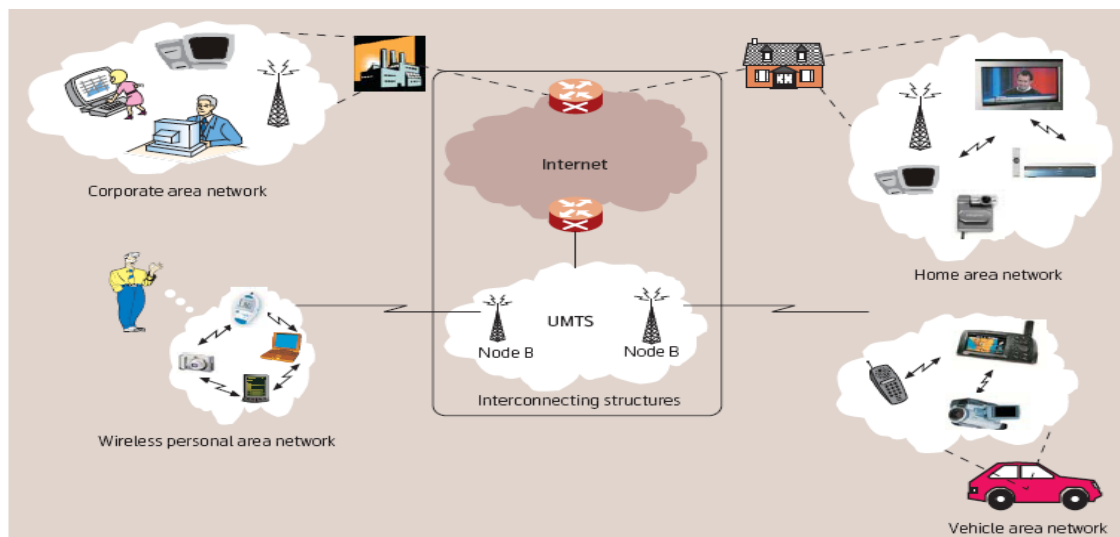


Fig 2: 4G Network architecture [1]

Above figure show you how actually 4G network is works with social network. In above The social networking process is an involved Variety of networks such of Corporate Network , Home area network , Wireless Personal area network n Internet and vehicle area network .The combinational network represented above with its possible connectivity architecture.[1]. Here you can see that WPAN is connected with node B and Home area network is also connected with node B using UTMS(Universal Mobile Telecommunications Service)

4G network will provides access via group of radio interfaces, unspoiled handoff and roaming and the best connected services .It automatically allows any mobile device to freely roam over different wireless network via best connection available for use. It will provide reliable wireless access with minimum cost.4G network also provide the services to the social network call Hardware as Service. In 4G network the single 4G device can access on various network using multiple interfaces It might also improve call routing in 4G network. In 4Gnetwork every network can easily deploy database that maintains the details like network conditions, user information and location etc.

III 5G network

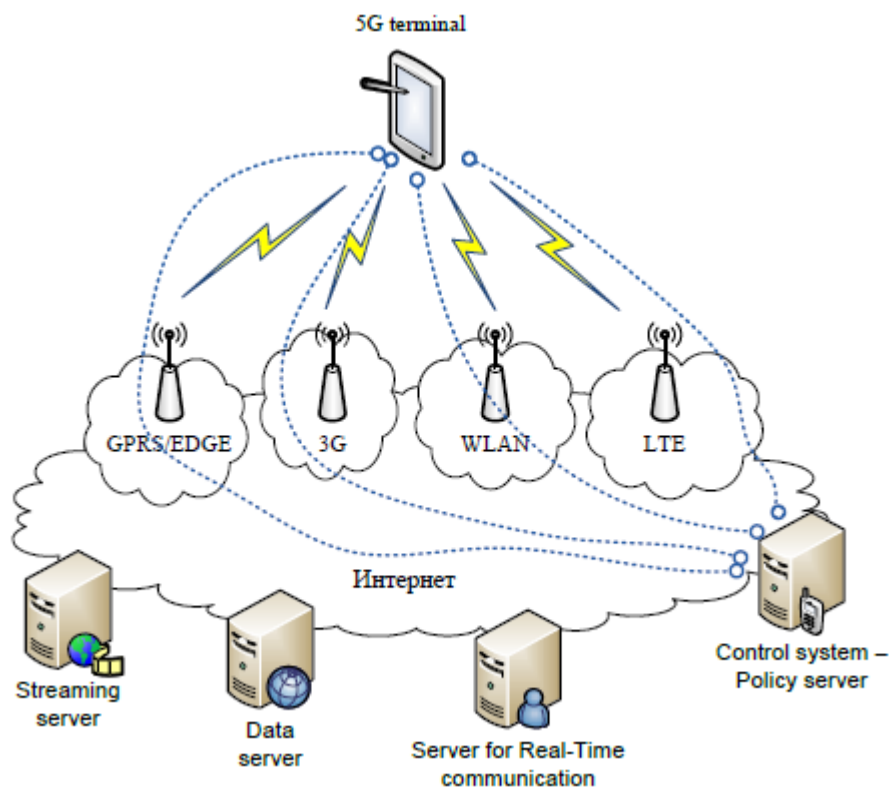


Fig 3 Functional Architecture of 5G network [2]

The above figure show how actually 5G network works. Here User terminal or device Is connected with different autonomous technologies. Inside each of the terminals, each of the radio access technologies is seen as the IP link to the outside Internet world. However, there should be different radio interface for each Radio Access Technology (RAT) in the mobile terminal. For an example, if we want to have access to four different RATs, we need to have four different access - specific interfaces in the mobile terminal, and to have all of them active at the same time, with aim to have this architecture to be functional.[2]

Physical layer and data link layer the first two OSI model are defining the radio access technologies via which is provided access to the internet with more quality of services , it might be varies sometimes depends on the technologies. For example, WiMAX has explicit QoS, same as WiFi don't have explicit QoS. The third layer Network layer uses IP either IPv4 or IPv6 without considering radio access technology. The main idea behind to use IP address is put proper control on routing IP packets to one end to another. Sending via IP address is more secure compare to other way. Apart from that through WiMAX is it is more secure and speedy. A WiMAX (Worldwide Interoperability for Microwave Access) is a family of wireless communications standards initially designed to provide 30 to 40 megabit-per-second data rates, with the 2011 update providing up to 1 Gbit/s for fixed stations.

IV Comparison between 4G and 5G network

Specification	4G	5G
Data Bandwidth	2Mbps to 1Gbps	1Gbps and higher as per need
Frequency Band	2 to 8 GHz	3 to 300 GHz
Standards	AI access convergence including OFDMA,MC-CDMA,network-LMPS	CDMA and BDMA
Technologies	Unified IP, seamless integration of broadband LAN/WAN/PAN and WLAN	Unified IP, seamless integration of broadband LAN/WAN/PAN/WLAN and advanced technologies based on OFDM modulation used in 5G
Service	Dynamic information access, wearable devices, HD streaming, global roaming	Dynamic information access, wearable devices, HD streaming, any demand of users
Multiple Access	CDMA	CDMA,BDMA
Core network	All IP network	Flatter IP network, 5G network interfacing(5G-NI)
Handoff	Horizontal and vertical	Horizontal and vertical

V Conclusion

By above we can conclude that 5G network is much more faster and secure compare to 4G network. As 5G network uses WiMAX and WiMAX uses explicit QoS which help the user to access the network form anywhere.

VI References

- [1] STUDY ON 4G COMMUNICATION ARCHITECTURE COMPONENTS FOR SOCIAL NETWORKS, A.CLEMENTKING, C. JOTHI VENKATESWARAN, International Journal of Reviews in Computing.
- [2] Functional Architecture for 5G Mobile Networks, Aleksandar Tudzarov and Toni Janevski, International Journal of Advanced Science and Technology.
- [3] M. Kassar, B. Kervella, G. Pujolle, "An overview of vertical handover decision strategies in heterogeneous wireless networks", Elsevier Computer Communications 31, p.2607-2620, 2008.
- [4] W. Luo, E. Bodanese, "Optimising Radio Access in a Heterogeneous Wireless Network Environment", IEEE International Conference on Communications, Dresden, Germany, 14-18 June 2009.
- [5] M. Ha Nguyen Tran Hasegawa, Y. Murata, H. Harada, "Representation of user satisfaction and fairness evaluation for user-centric dynamic spectrum access", Personal, Indoor and Mobile Radio Communications (PIMRC), Tokyo, Japan, 13-16 September 2009.