

# 5G & DIFFERENT GENERATION SYSTEM: OF CELLULAR COMMUNICATION: A STUDY

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**Abstract**— *The last few years there has been a phenomenal growth in cellular industry. 5G technology will change the way most high bandwidth users access their phones. 5G technology is offering the services in product engineering, Documentation, Supporting electronic transaction etc.*

**Keywords**- *In this paper, we discussed the 5G technology and different generation used in cellular communication.*

## I. INTRODUCTION

Today cell phones have everything ranging from the smallest size, largest phone memory, speed dialling, video player, music player, and camera and so on. Recently with the development of Pico nets and Blue tooth technology data sharing has become a child's play which is very easy. Earlier with the features like infrared you can share data within a line of sight that means the two devices has to be setup properly to transfer and sharing of data, but in case of blue tooth you can transfer data even when you have the mobile phone in your pocket up to a range of 50 meters. The creation and entry of 5G technology into the cell phone market will launch a new revolution in the way international cellular plans are offered. Mobile and wireless networks have made marvellous growth in the last fifteen years. Nowadays many mobile phones have also a Wireless LAN adapter. One may suppose that nearby many mobile phones will have WiMAX adapter too, besides their 3<sup>rd</sup> generation, 2<sup>nd</sup> generation, Wireless LAN, Bluetooth etc. adapters. Today 3G mobile phone systems are on the ground providing internet protocol connectivity for real-time and non-real-time services.

## II. EVALUATION

### A. FIRST GENERATION (1G)

The first generation of mobile phones was analogy systems that emerged in the early 1980s. 1G emerged in 1980s. It contains Analogy System and popularly known as cell phones. It introduces mobile technologies such as Mobile Telephone System (MTS), Advanced Mobile phone System (AMTS), Improved Mobile Telephone Service (IMTS), and Push to Talk (PTT). It uses analogy radio signal which have frequency 150 MHz, voice call modulation is done using a technique called Frequency-Division Multiple Access scheme (FDMA). It has low capacity, unreliable handoff, poor voice links, and no security at all since voice calls were played in radio towers, making these calls subject to unwanted eavesdropping by third parties.

### B. SECOND GENERATION (2G)

The second generation of digital communication related mobile phones appeared in 1990s along with the first digital mobile networks. During the 2G, the mobile telecommunications company experienced exponential growth in terms of both subscribers and VAS. Second generation networks allow limited data support in the range of 9.6 kbps to 19.2 kbps. Conventional phone networks are used mainly for voice transmission for information, and are essentially circuit-switched networks. It uses digital transmission signals for voice transmission and has speed up to 64 kbps. It provides facility of Short Message Service and it uses the bandwidth of 30 to 200 KHz. Next to 2G, 2.5 generation system uses packet switched and circuit switched field and provide data rate up to 144 kbps. E.g.GPRS, CDMA and EDGE.

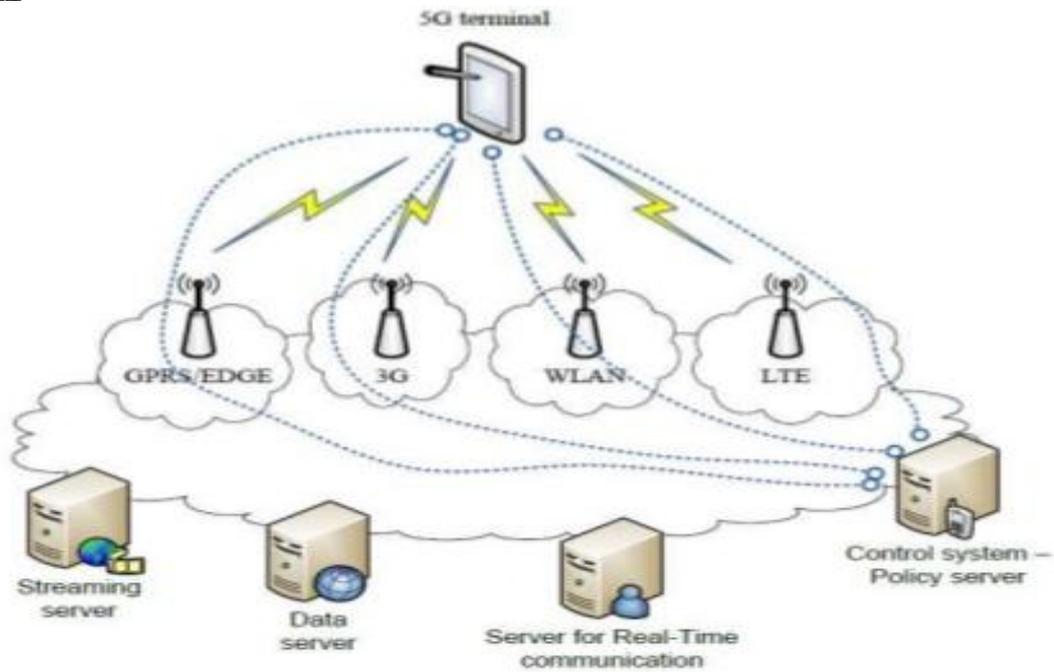
### C. THIRD GENERATION (3G)

3G networks were projected to eliminate many types of problems faced by 2G and 2.5G networks, especially the low speeds and mismatched technologies such as Time Division Multiple Access scheme (TDMA) and Code Division Multiple Access (CDMA) in different countries. It uses Wide Band Wireless Network for communication with which clarity is increased. The data are sent by the type of technology called Packet Switching. Voice calls are interpret through Circuit Switching. It operates at a array of 2100MHz and has a BW (bandwidth) of 15-20MHz used for High-speed data rate of internet service, video message chatting. 3G uses Wide Band Voice Channel for communication that is by this the world has been constricted to a little village because a person can make contact with other person located in any part of the world and can even send messages tool. Expectations for 3G included increased bandwidth of channel; 128 Kbps for mobile earth stations, and 2 Mbps for fixed applications. In theory, 3<sup>rd</sup> generation should work over North American as well as European and Asian wireless air interfaces.

### D. FOURTH GENERATION (4G)

4G offers a downloading speed for data of 100Mbps. 4G provides same feature as 3G and additional services like Multi-Media Newspapers, to watch television programs with more clarity and send Data much faster than previous generations LTE (Long Term Evolution) is consider as 4G technology. 4G is being developed to accommodate the QoS and rate requirements set by approaching applications like wireless broadband way in, Multimedia Messaging Service (MMS), video chat, mobile TV, high definition TV contented, Digital Video Broadcasting (DVB), least services like voice and data, and other services that utilize bandwidth.

III. 5G ARCHITECTURE



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IV. 5G REQUIREMENTS

TABLE I

DATA RATES	1-10 GBPS/100S OF MBPS
CAPACITY	36TB/500GB/MONTH/USER
SPECTRUM	HIGHER FREQUENCIES & FLEXIBILITY
ENERGY	~10% OF TODAY'S CONSUMPTION
LATENCY	~1MS
RELIABILITY	99.999% WITHIN TIME BUDGET
COVERAGE	>20DB OF LTE
BATTERY	~10 YEARS
DEVICE PER AREA	300.0 PER ACCESS NODE

V. FEATURES OF 5G

1. The advanced billing interfaces of 5G technology makes it more striking and effective.
2. 5G technology also providing subscriber supervision tools for fast action.
3. The high quality services of 5G technology based on Policy to avoid error.
4. 5G technology is provided that large broadcasting of data in Gigabit which supporting almost 65,000 connections.
5. The 5G technology is on condition that up to 25 Mbps connectivity speeds.
6. The 5G technology also support virtual private network.
7. The uploading and downloading speed of 5G technology touching the peak.

## VI. COMPARISON OF VARIOUS GENERATIONS

TABLE III

Technology / Features	1G	2G/2.5G	3G	4G	5G
<b>Start/Deployment</b>	1970/ 1984	1980/ 1999	1990/ 2002	2000/ 2010	2010/ 20 <sup>20</sup>
<b>Data Bandwidth</b>	2 kbps	14.4-64 kbps	2 Mbps	200 Mbps to 1 Gbps for low mobility	1 Gbps and higher
<b>Standards</b>	AMPS	2G: TDMA, CDMA, GSM 2.5G: GPRS, EDGE, 1xRTT	WCDMA, CDMA-2000	Single unified standard	Single unified standard
<b>Technology</b>	Analog cellular technology	Digital cellular technology	Broad bandwidth CDMA, IP technology	Unified IP and seamless combination of broadband, LAN/WAN/ PAN and WLAN	Unified IP and seamless combination of broadband, LAN/WAN/PAN /WLAN and www
<b>Service</b>	Mobile telephony (voice)	2G: Digital voice, short messaging 2.5G: Higher capacity packetized data	Integrated high quality audio, video and data	Dynamic information access, wearable devices	Dynamic information access, wearable devices with AI capabilities
<b>Multiplexing</b>	FDMA	TDMA, CDMA	CDMA	CDMA	CDMA
<b>Switching</b>	Circuit	2G: Circuit 2.5G: Circuit for access network & air interface; Packet for core network and data	Packet except circuit for air interface	All packet	All packet
<b>Core Network</b>	PSTN	PSTN	Packet network	Internet	Internet
<b>Handoff</b>	Horizontal	Horizontal	Horizontal	Horizontal and Vertical	Horizontal and Vertical

## VII. CONCLUSION

There are some other important projects, which are undertaken by 5G technologies. Here we want to mention that 3G & 4G mobiles are working these days, and 5G technologies are coming, but in future we are ready to face 5G technologies and some of its features we have presented in this paper.

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