

5G Mobile Technology

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Abstract— 5G Technology stands for fifth Generation Mobile technology. From generation 1G to 2.5G and from 3G to 5G this world of telecommunication has seen a number of improvements along with improved performance with every passing day. This fast revolution in mobile computing changes our day to day life that is way we work, interact, learn etc. This paper also focuses on all preceding generations of mobile communication along with fifth generation technology. Fifth generation network provide affordable broadband wireless connectivity (very high speed). The paper throws light on network architecture of fifth generation technology. Currently 5G term is not officially used. In fifth generation researches are being made on development of World Wide Wireless Web (WWWW), Dynamic Adhoc Wireless Networks (DAWN) and Real Wireless World. Fifth generation focus on (Voice over IP) VOIP-enabled devices that user will experience a high level of call volume and data transmission. Fifth generation technology will fulfill all the requirements of customers who always want advanced features in cellular phones. The main features in 5G mobile network is that user can simultaneously connect to the multiple wireless technologies and can switch between them. This forthcoming mobile technology will support IPv6 and flat IP. Fifth generation technology will offer the services like Documentation, supporting electronic transactions (e-Payments, e-transactions) etc.

Keywords— 5 G, 5G Architecture, Evolution from 1G to 5G, Comparison of all Generations, Why 5G?

I. INTRODUCTION

Remote correspondence has begun in mid 1970s. In next four decades, a portable remote innovation has developed from 1G to 5G eras. Fifth era innovation offer high transfer speed that client never experienced. The Fifth era advances offer different new propelled highlights which makes it most capable and in enormous interest later on. Presently days diverse remote and versatile advances are available, for example, third era portable systems (UMTS-Universal Mobile Telecommunication System, cdma2000), LTE (Long Term Evolution), Wi-Fi (IEEE 802.11 remote systems), WiMax (IEEE 802.16 remote and portable systems), and also sensor systems, or individual range systems (e.g. Bluetooth, ZigBee). Portable terminals incorporate assortment of interfaces like GSM which depend on circuit exchanging. All remote and portable systems actualizes all IP rule, that implies all information and flagging will be exchanged by means of IP (Internet Protocol) on system layer. Fifth era innovation give offices like camera, MP3 recording, video player, vast telephone memory, sound player and so on that client never envision and for youngsters shaking fun with Bluetooth innovation and Pico nets. The fifth era remote portable sight and sound web systems can be totally remote correspondence without impediment, which makes flawless remote genuine – World Wide Wireless Web (WWWW). Fifth era depends on 4G innovations. The fifth remote versatile web systems are genuine remote world which might be upheld by LASCDDMA (Large Area Synchronized Code-Division Multiple Access), OFDM (Orthogonal frequency division multiplexing), MCCDDMA (Multi-Carrier Code Division Multiple Access), UWB (Ultra-wideband), Network-LMDS (Local Multipoint Distribution Service), and IPv6. Fifth era advances offers gigantic information capacities and unhindered assemble volumes and endless information telecast inside most

recent versatile working framework. Fifth era ought to have an imperative effect and add more administrations and advantages to the world more than 4G. Fifth era ought to be more smart innovation that interconnects the whole world unbounded. This era is relied upon to be discharged around 2020.

II. EVOLUTION

Portable correspondence has turned out to be more mainstream in most recent couple of years because of quick insurgency in versatile innovation. This insurgency is because of high increment in telecoms clients. This unrest is from 1G-the original, 2G-the second era, 3G-the third era, and after that the 4G-the fourth generation, 5G-the fifth second era.

A. First Generation (1G)

1G emerged in 1980s. It contains Analog System and popularly known as cell phones. It introduces mobile technologies such as Mobile Telephone System (MTS), Advanced Mobile Telephone System (AMTS), Improved Mobile Telephone Service (IMTS), and Push to Talk (PTT). It uses analog radio signal which have signal which have frequency 150 MHz, voice call modulation is done using a technique called Frequency-Division Multiple Access (FDMA). It has low capacity, unreliable handoff, poor voice links, and no security and other services that utilize bandwidth. [2]

B. Second Generation (2G)

2G rose in late 1980s. It utilizes advanced signs for voice transmission and has rate of 64 kbps. It gives office of SMS (Short Message Service) and utilize the data transmission of 30 to 200 KHz. Alongside 2G, 2.5G framework utilizes parcel exchanged and circuit exchanged space and give information rate up to 144 kbps. E.g. GPRS, CDMA and EDGE [3]

C. Third Generation (3G)

It utilizes Wide Band Wireless Network with which clarity is expanded. The information are sent through the innovation called Packet Switching. Voice calls are translated through Circuit Switching. Alongside verbal correspondence it incorporates information administrations, access to TV/video, new administrations like Global Roaming. It works at a scope of 2100MHz and has a transfer speed of 15-20MHz utilized for High-speed network access, video chatting. 3G utilizes Wide Band Voice Channel that is by this the world has been contracted to a little town in light of the fact that a man can contact with other individual situated in any part of the world and can even send messages as well [3].

D. Fourth Generation (4G)

4G offers a downloading speed of 100Mbps. 4G provides same feature as 3G and additional services like Multi-Media Newspapers, to watch T.V programs with more clarity and send Data much faster than previous generations [3]. LTE (Long Term Evolution) is considered as 4G technology. 4G is being developed to accommodate the QoS and rate requirements set by forthcoming applications like wireless broadband access, Multimedia Messaging Service (MMS), video chat, mobile TV, HDTV content, Digital Video Broadcasting (DVB), minimal services like voice and data, and other services that utilize bandwidth. [2]

III. COMPARISON OF ALL GENERATIONS OF MOBILE TECHNOLOGIES [3].

Technology → Features ↓	1G	2G	3G	4G	5G
Start/ Deployment	1970 – 1980	1990 - 2004	2004-2010	Now	Soon (probably 2020)
Data Bandwidth	2kbps	64kbps	2Mbps	1 Gbps	Higher than 1Gbps
Technology	Analog Cellular Technology	Digital Cellular Technology	CDMA 2000 (1xRTT, EVDO) UMTS, EDGE	WiMax LTE Wi-Fi	WWW(coming soon)
Service	Mobile Telephony (Voice)	Digital voice, SMS, Higher capacity packetized data	Integrated high quality audio, video and data	Dynamic Information access, Wearable devices	Dynamic Information access, Wearable devices with AI Capabilities
Multiplexing	FDMA	TDMA, CDMA	CDMA	CDMA	CDMA
Switching	Circuit	Circuit, Packet	Packet	All Packet	All Packet
Core Network	PSTN	PSTN	Packet N/W	Internet	Internet

TABLE 1
 COMPARISON OF ALL GENERATIONS OF MOBILE TECHNOLOGIES

IV. 5G NETWORK ARCHITECTURE

Fifth generation mobile systems model is all-IP based model for wireless and mobile networks interoperability. The All-IP Network (AIPN) is capable to fulfill increasing demands of the cellular communications market. It is a common platform for all radio access technologies. The AIPN uses packet switching and its continuous evolution provides optimized performance and cost. In fifth generation Network Architecture consist of a user terminal (which has a crucial role in the new architecture) and a number of independent, autonomous radio access technologies (RAT) [1]. In 5G Network Architecture all IP based mobile applications and services such as Mobile portals, Mobile commerce, Mobile health care, Mobile government, Mobile banking and others, are offered via Cloud Computing Resources (CCR). Cloud computing is a model for convenient on-demand network access to configurable computing resources (e.g., networks, servers, storage, applications,

and services). Cloud computing allows consumers to use applications without installation and access their personal data at any computer with internet access. CCR links the Reconfigurable Multi Technology Core (RMTC) with remote reconfiguration data from RRD attached to Reconfiguration Data models (RDM). The main challenge for a RMTC is to deal with increasing different radio access technologies. The core is a convergence of the nanotechnology, cloud computing and radio, and based on All IP Platform. Core changes its communication functions depending on status of the network and/or user demands. RMTC is connected to different radio access technologies ranging from 2G/GERAN to 3G/UTRAN and 4G/EUTRAN in addition to 802.11x WLAN and 802.16x WMAN. Other standards are also enabled such as IS/95, EV-DO, CDMA2000...etc. Interoperability process-criteria and mechanisms enable both terminal and RMTC to select from heterogeneous access systems [3].

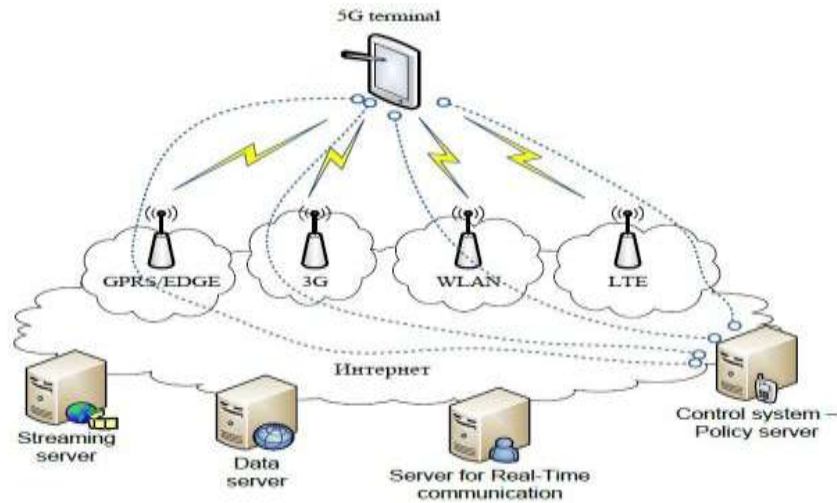


Fig 1. 5G Network Architecture

V. WHY NEED OF 5G?

- Very High speed, high limit, and ease per bit [5].
- It underpins intuitive interactive media, voice, video, Internet, and other broadband administrations, more compelling and more alluring, and have Bi-directional, precise activity measurements [5].
- 5G innovation offers Global get to and benefit convenience.
- It offers the superb administrations because of high mistake resilience.
- It is giving expansive television limit up to Gigabit which supporting very nearly 65,000 associations at once.
- More applications joined with artificial intelligent (AI) as human life will be encompassed by manufactured sensors which could speak with cellular telephones [4].
- 5G innovation use remote administration that client can show signs of improvement and quick arrangement. 5G technology offer high resolution for crazy cell phone user and bi-directional large bandwidth shaping [3].
- 5G technology offer transporter class gateway with unparalleled consistency [3].

VI. CONCLUSION

The development of the mobile and wireless networks is going towards higher data rates and all-IP principle. Mobile terminals are obtaining each year more processing power, more memory on board, and longer battery life for the same applications. 5g include latest technologies such as cognitive radio, SDR, nanotechnology, cloud computing and based on All IP Platform. It is expected that the initial Internet philosophy of keeping the network simple as possible, and giving more functionalities to the end nodes, will become reality in the future generation of mobile networks, here referred to as 5G.

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