5G Mobile Technology: A Review
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Abstract — 5G technology stands for mobile technologies fifth generation from starting generation 1G to 2G and from 3G to 5G the globe of telecommunication has seen a number of improvements along with improved performance every single day. This fast revolution in the era of mobile computing hinges our daily life which is how we work, interact and learn. This paper also shows all receding generations of mobile communication along with fifth-generation technology which provides affordable broadband wireless connectivity. The paper also looks at the network architecture of fifth-generation technology, which mainly focuses on voice over IP (VoIP) enabled devices that enables users to experience a high level of call volume and data transmission. 5G network seems to fulfill all the requirements of its users through which they can simultaneously connect to the multiple wireless technologies and can switch between them.

Keywords—5G, 5G Architecture, 1G to 5G, Improvement in generations

I. INTRODUCTION

Communication is typically an important offer of life wireless communication has begun at intervals the first Seventies. At intervals consequent forty years, mobile wireless technology has evolved from 1G to 5G generations. 5G technology provides an extremely high system of measurement that users practiced before from 1G to 4G. The 5G technologies offer varied new advanced choices that build it most powerful and in giant demand at intervals the long run. Recently all totally different wireless and mobile technologies unit of measurement gift like third-generation mobile networks 5G is that the fifth-generation mobile network. It is a fresh world wireless commonplace once 1G, 2G, 3G, and 4G networks. 5G permits a fresh quiet network that is designed to connect nearly everyone and everything on in addition as machines, objects, and devices. 5G wireless technology is meant to deliver higher multi-Gbps peak data speeds, ultra-low latency, further liableness, giant network capability, hyperbolic accessibility, uniform user experience to additional users. Higher performance and improved efficiency empower new user experiences and connect new industries. 5G architectures in addition software-defined platforms, at intervals that networking utility is managed through software package packages rather than hardware. Advancements in virtualization, cloud-based technologies, and IT and business methodology automation amendment 5G style to be agile and versatile and to provide anytime, anywhere user access. 5G networks can turn out software-defined subnetwork constructs stated as network slices. These slices enable network administrators to dictate network functionality based on users and devices.

II. BACKGROUND

A. Requirement of 5G system

Mobile communication has become more popular in last few years due to fast revolution in mobile technology. 5G is the next-generation wireless cellular network to fulfill the needs of next generation users with effective features. 5G possesses some characteristics unused in 1G to 4G network technologies. A massive amount of data is generated. According to the International Telecommunication Union (ITU), there are more than 7.5 billion mobile devices around the world in 2017 [1], and the number of mobile devices is expected to increase to 25 billion by 2020 [2], contributing to ultradense networks. Consequently, there is an explosive growth in the amount of data from 16.5 exabytes in 2014 to an estimate of 500 exabytes in 2020 [3], contributing to a growth rate of 30 times.

B. How fast is 5G

5G technology network is designed to provide peak data rates up to 20 Gbps based on IMT-2020 requirements. Qualcomm Technologies’ flagship 5G solutions, the Qualcomm Snapdragon X55 and Snapdragon X60 Modem-RF Systems, are designed to achieve up to 7.5 Gbps in downlink peak data rates. But the 5G is about more than just how fast it is. In addition to higher peak data rates, 5G is designed to provide much more network capacity by expanding into new spectra, such as mmWave. 5G can also deliver much lower latency for a more immediate response and can provide an overall more uniform user experience so that the data rates stay consistently high—even when users are moving around. And the new 5G NR mobile network is backed up by a Gigabit LTE coverage foundation, which can provide ubiquitous Gigabit-class connectivity [4].

III. EVOLUTION

A. First Generation (1G)

1G emerged in the 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 an analog radio signal which has a frequency of 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 at all since voice calls were played back in radio towers, making these calls susceptible to unwanted eavesdropping by third parties [5].
B. Second Generation (2G)

2G emerged in the late 1980s. It uses digital signals for voice transmission and has a speed of 64 kbps. It provides the facility of SMS (Short Message Service) and uses the bandwidth of 30 to 200 kHz. Next to 2G, 2.5G system uses the packet-switched and circuit switched domain and provides data rate up to 144 kbps. E.g. GPRS, CDMA, and EDGE [5].

C. Third Generation (3G)

It uses Wide Brand Wireless Network with which clarity is increased. The data are sent through the technology called Packet Switching. Voice calls are interpreted through Circuit Switching. Along with verbal communication it includes data services, access to television/video, new services like Global Roaming. It operates at a range of 2100MHz and has a bandwidth of 15-20MHz used for High-speed internet service, video chatting.3G uses Wide Band Voice Channel that is by this the world has been contracted to a little village because a person can contact with other person located in any part of the world and can even send messages too[5].

D. Fourth Generation (4G)

4G offers a downloading speed of 100Mbps.4G provides some 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 [5]. LTE (Long Term Evolution) is considered as 4G technology. 4G is being developed to accommodate the QoS and rate needs set by forthcoming applications like wireless broadband access, Multimedia Messaging Service (MMS), video chat, mobile TV, Digital Video Broadcasting (DVB), minimal services like voice and data, and other services that utilize bandwidth. [6]

E. 5G NETWORK ARCHITECTURE

The fifth-generation mobile systems model is all-IP based mostly model for wireless and mobile network ability. The IP Network (AIPN) is capable to meet the increasing demands of the cellular communications market. It’s a typical platform for all radio access technologies. AIPN uses packet shift and its continuous evolution provides optimized performance and price. In the fifth generation, spec carries with it a user terminal (which contains a crucial role within the new architecture) and a variety of freelance, autonomous radio access technologies (RAT). In 5G spec, all informatics based mostly mobile applications and services like Mobile portals, Mobile commerce, Mobile health care, Mobile government, Mobile banking et al., area unit offered via Cloud Computing Resources (CCR). Cloud computing could be a model for convenient on-demand network access to configurable computing resources (e.g., networks, servers, storage, applications, and services). Cloud computing permits customers to use applications while not installation and access their personal knowledge at any laptop with net access. CCR links the Reconfigurable Multi-Technology Core (RMTC) with remote reconfiguration knowledge from RRD hooked up to Reconfiguration knowledge models (RDM), the most challenge for Associate in Nursing RMTC is to modify increasing completely different radio access technologies. The core could be a convergence of engineering, cloud computing, and radio, and supported All informatics Platform. Core changes its communication functions counting on the standing of the network and/or user demands. RMTC is connected to completely different radio access technologies starting from 2G/GERAN to 3G/UTRAN and 4G/EUTRAN additionally to 802.11x WiFi and 802.16x WMAN. Different standards are enabled like IS-95, EVDO, CDMA2000…etc. ability process-criteria and mechanisms modify each terminal and RMTC to pick from heterogeneous access systems [7].

IV. CONCLUSION

The development of mobile and wireless networks goes towards higher information rates and all-IP principles. Mobile terminals are getting annually a lot of process power, a lot of memory aboard, and longer battery life for constant applications. 5G includes the newest technologies like psychological feature radio, SDR, engineering, cloud computing, and supported all scientific discipline Platform. It’s expected that the initial net philosophy of keeping the network easy as potential and giving a lot of functionalities to the tip nodes, can become reality within the future generation of mobile networks, here said as 5G.

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REFERENCES

[7] “Prospective of Fifth Generation Mobile Communications” by Dr. Anwar M. Mousa of University of Palestine, Gaza- Palestine published in International Journal of Next-Generation Networks (IJNGN)