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An Overview of 5G Wireless Networks- Past, Present and Future

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Abstract- 5G stands for fifth generation mobiles. Fromgeneration 1G to 2.5G and from 3G to 5G this world of telecommunication got improvement along with improve performance with every passing day. Due to this rapid improvement the world become like a little village where we can interact, work, learn and spread our knowledge etc. over the world. This improvement makes our daily life so much easy.By 2020 all networks will support voice, videoand a complex range of communication services for more 9 billion users and billions of connected Around the same time the next generation 5G of telecom technology, equipment and devices will become commercially available.It is the next generation of telecom networks designed to meet a more advanced and complex set of performance requirement. It represents new way of thinking. The main purpose of 5G networks is that, user can simultaneously connect to multiple wireless technologies and can switch between them.5G will offer the service like Documentations, Supporting electronic transmissions such as e-payment-transactions.

***IndexTerms*—5G, MMS, Packet-switched networks, Telecom.**

I. INTRODUCTION:

5G has gotten through the ceaseless advancement of 1G, 2G, 2.5G, 3G and 4G. 1G was the first era of mobile technology which was only a simple framework that allowed a mobile just to get and toss the voice inside a nation. At that point 2G was acquainted where it permitted portable with have restricted information support in the scope of 9.6 kbps to 19.2 kbps and transmit the voice with advanced sign. This is utilized as a part of our advanced handsets where telephone systems are utilized basically for voice transmission and are basically circuit-exchanged systems. After that 2.5G remote System accompanied more transmission capacity yet was not ready to bring any new development. Later on 3G with more capacities like speedier correspondence, Internet, Mobile T.V, Video Conferencing, Video Calls, MMS, and 3D Gaming and so forth – advanced the mobile technology. To lower the cost of the applications of 3G system with better performance, 4G was introduced. It was able to provide cellular and broadband multimedia services everywhere and allows smooth global roaming ubiquitously with lower cost [1,2]. And, the latest comer in this race is 5G that we are going to discuss today. 5G is a packet switched wireless system with wider area coverage and high throughput.

Simply saying- 5G technologies will provide consumers with the same abilities of 4G, but with more power and features in hand held phone. 5G wireless uses OFDM and millimeter remote that empowers information rate of 20 mbps and recurrence band of 2-8 GHz. It offers: overall mobile phones, additional normal information capacities, high network and obviously, a splendid future. 5G, which is being known as the Real world remote or WWWW that is World Wide Wireless Web, permits complete remote correspondence with no constraint, Multi-Media Newspapers, sit in front of the TV programs with the clarity as to that of a HD TV. To enjoy this technology, improvement in mobile hardware must be require and should enhance the phone memory, quicker dialing speed, more clarity in audio and video etc [3-8].

II. DEFINITIONOF 5G:

Like othergenerations 5G is a set of evolved networks technologies. But the aim of 5G is to provide unlimited access to information's and ability to share data any ware, anytime by anyone and anything for the sake of human being, business and society. The exact performance level and requirements that system and equipment's will need to meet to label themselves 5G are yet to be defined. Thestandardization activities are expected to start in this year (2016), leading commercial availability of equipment's and devices sometime around 2020.But this does not means that manufacturers are waiting around [9-15].

In opposite to this, the other generations, 5G is much more than another new set of technologies that will require massive equipment'supgrades. The aim of 5G is to build on the maturity that telecom system have already reached.5G will bring the evolved versions of existing radio-access, cloud and core technologies, to cater for more devices and more type of devices with different operations requirements and thousands of different use cases [16-21].

III. EVOLUTION OF DIFFERENT WIRELESS TECHNOLOGIES

As we judge mobile communication has become very popular in last few years due to fast revolution in mobile technolgies.Due to high increase in telecom customers this revolution occurs. The revolution is from1G, 2G, 3G, 4G to 5G.

i. FIRST GENERATION (1G)

In 1980's 1G has emerged. It contained analog system and was popularly known as cell phone. It introduced mobile technologies such as Mobile TelephoneSystem (MTS), Advanced Mobile Telephone system (AMTS), improved Mobile Telephone Services (IMTS) and Push to Talk (PTT).It works under analog radio signals which have 150MHz frequency. Frequency-Division Multiple access (FDMA) is used for voice call modulation, unreliablehandoff, poor voice links, and no security due to this reason voice call were played back in radio towers, making these calls susceptible to unwanted eavesdropping by third parties.

ii. SECOND GENERATION (2G)

In late 1980's 2G was emerged. Digital signals with a speed of 64 kbps were used for voice transmission .It provide facility of SMS(Short Message Service) and use the bandwidth of 30 to 200 KHz, next to 2G,2.5G use packet switched and circuit switched domain and provides data rate op to 144kbps,E.g. GPRS,CDMA and EDGE.

iii. THIRD GENERATION (3G)

It uses Wide Brand wireless Network with whichclarity is increased. Packet switching is use for data sending. Circuit switching is use for voice calls interpreted. Along with verbal communication it includes data services, access to television/video, new services like Global Roaming.2100MHz is use for operations and has a bandwidth of 15-20MHz use for high speed internet service, videochating.It use Wide Band voice channel that is by this the world has been contracted to a little village because a person can interact with a person at any part of the world and even sent a message too [29-36].

iv. Fourth Generation (4G):

It provides 100Mbps Speed of downloading. It provides same features like3G but also provides some additional services like Multi Media Newspaper, to watch TV with more clarity and send data much faster than previous generations.LTE (Long Term Evolution)is considered as 4G technology.4G is being developed to accommodate the QoS and Rate requirement set by forthcoming applications like wireless broadband access, MultimediaMessaging Service (MMS),video chat, Mobile TV,HDTV content, Digital Broadcasting(DVB),minimal service like voice and data. And other services utilize bandwidth [22-28].

v. Fifth Generation (5G):

5G (5th generation mobile networks or fifth era remote frameworks) signifies the proposed next significant period of versatile information transfers models past the current 4G/IMT-Advanced measures. 5G arranging incorporates Internet association speeds speedier than current 4G.The Next Generation Mobile Networks Alliance characterizes the accompanying necessities for 5G systems: Data rates of several megabits for every second ought to be bolstered for a huge number of clients.

- 1 gigabit for every second to be offered all the while to numerous specialists on the same office floor
- Several a huge number of synchronous associations with be upheld for enormous sensor arrangements
- Spectral productivity ought to be altogether upgraded contrasted with 4G
- Coverage ought to be enhanced

Signaling proficiency ought to be improved Data rates of tens of megabits per second should be supported for tens of thousands of users.

IV. COMPARISON OF ALL GENERATIONS OF MOBILE TECHNOLOGIES (1G-5G)

The comparison among various technologies is shown in the Table 1 below.

Generation	*1G*	*2G*	*3G*	*4G*	*5G*
Start	9170-1980	1990-2000	2004-2005	2011-Now	2020
Data Bandwidth	2kbps	64kbps	2mbps	1gbps	More than 1gbps
Technology	analog cellular	Digital cellular	CDM (1xRT,EVDO) LIMTS,EDGE	WiMAX LTE Wi-Fi	wwww
Service	Voice	Digital voice,SMS,higher complicity size data	Integrated High quality Audio, video and data	Dynamic information access, wearable devices	Dynamic information access, wearable devices with AI capability
Multiplexing	FDMA	TDMA,CDMA	CDMA	CDMA	CDMA
Switching	Circuit	Packet, circuit	Packet	All packets	All packets
Core Network	PSTN	PSTN	Packet N/W	Internet	Internet
Handoff	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal And vertical

V. 5G ARCHITECTURE

Fifth era versatile framework model is All-IP based model for remote and portable systems. Interoperability. The All-IP Network (AIPN) is empower to satisfy expanding requests of cell correspondence marke.It is a typical stage for all radio access advances. The AIPN utilizes parcel exchanging and its ceaseless development gives advanced execution and expense. In fifth era system engineering comprise of a client terminal (which has a circuit part in the new design) and various free, self-governing radio access advancements (RAT).In 5g system design all IP based versatile applications and administrations, for example, Mobile gateways, Mobile business, Mobile human services ,Mobile goverment,Mobile managing an account and others, are offered by means of Cloud processing Resources (CCR).Cloud registering is a model for advantageous on-interest system access to configurable figuring assets (e.g, network, storage, servers, applications and services).Cloud processing permits customer to utilize

application without establishment and access their own information at any PC with web access.CCR joins the Configurable Multi Technology Core (RMTC) with remote arrangement information from RRD connected to Reconfiguration Data Model (RDM). The fundamental test for a RMTC is to manage expanding distinctive radio access innovations. The center in merging of the nanotechnology, distributed computing and radio, and taking into account All IP stage. Center changes its correspondence capacities relying upon status of system and/or client demands.RMTC is associated with various radio access advancements extending from 2G/GERAN to 3G/UTRAN notwithstanding 802.11x WLAN and 802.16x WMAN.Other guidelines are likewise empowered, for example, IS/95,EV-DO,CDMA2000.....etc. Interoperability process-criteria and components empower both terminal and RMTC to choose from heterogeneous access frameworks.

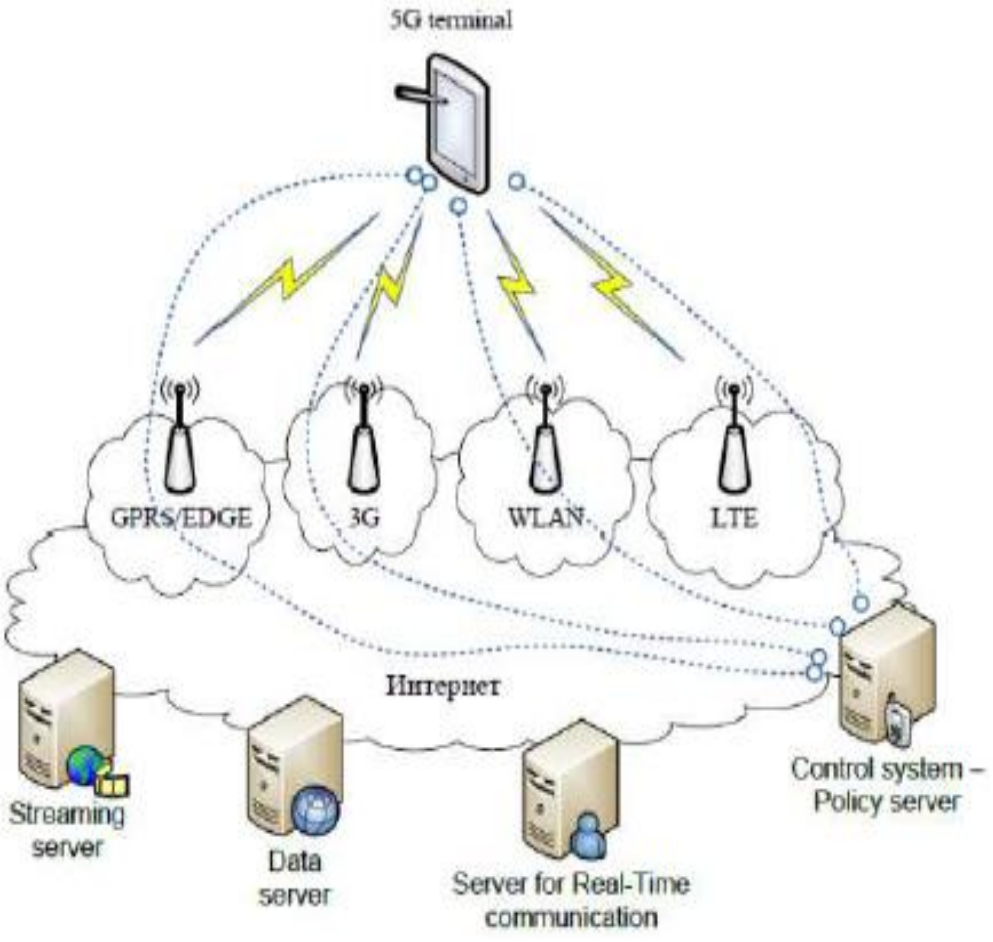


Figure 1: Communication Model of various Architectures

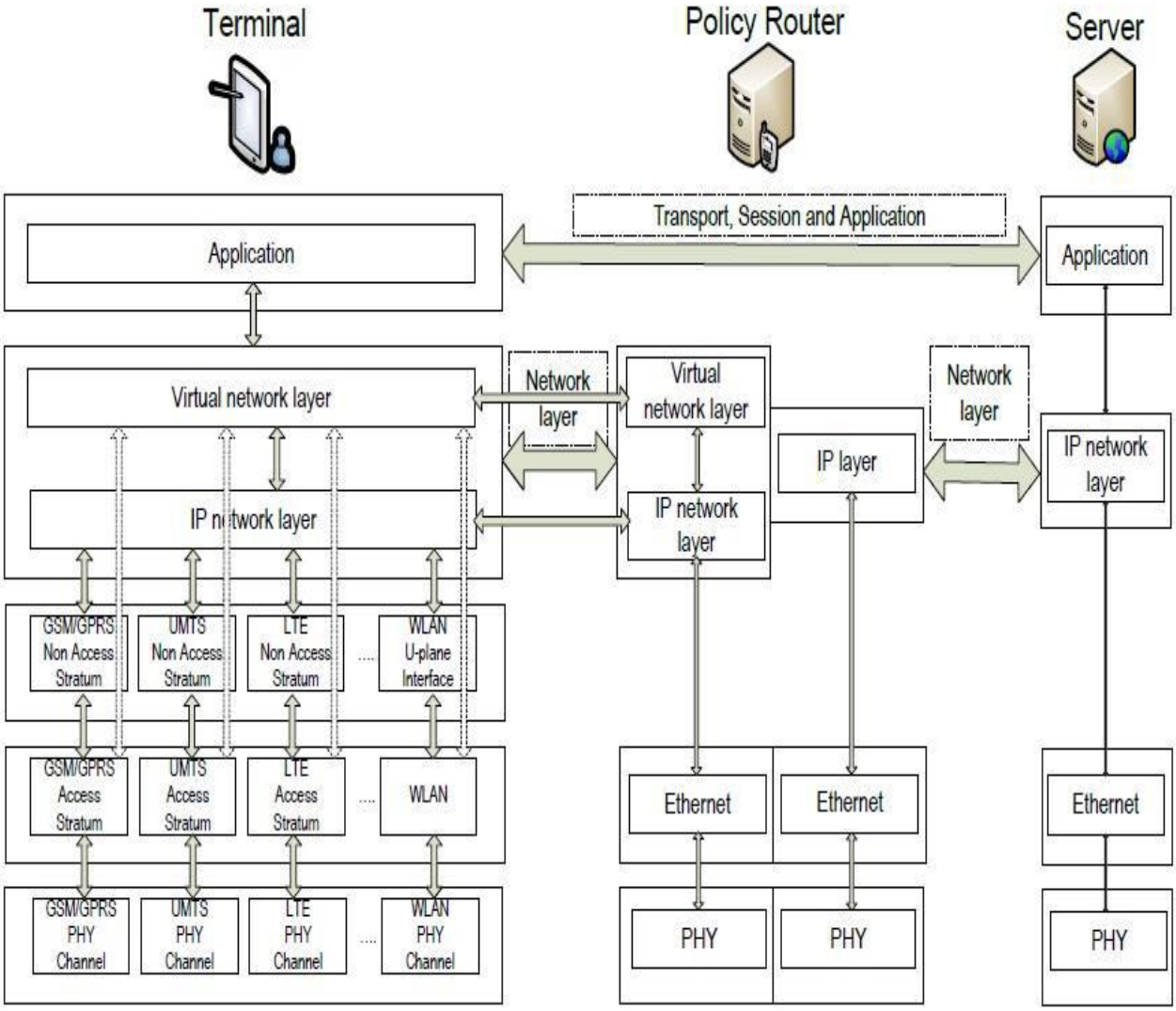


Figure 2: ProposedArchitecture of 5G

VI. CONCLUSION

The aim of this paper is to discuss the 5G.How is it works and the dependability of its work. What are the benefits of 5G for human beings. Todiscuss Evolution of different wireless technologies step by step from 1G to 5G and also to compare all Generations of mobiletechnologies with 5G.And the architecture of 5G is also mentioned. InArchitecture, it is discussed that how is it designed and how is it work.

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