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5G- FUTURE GENERATION TECHNOLOGIES OF WIRELESS COMMUNICATION "REVOLUTION 2020"

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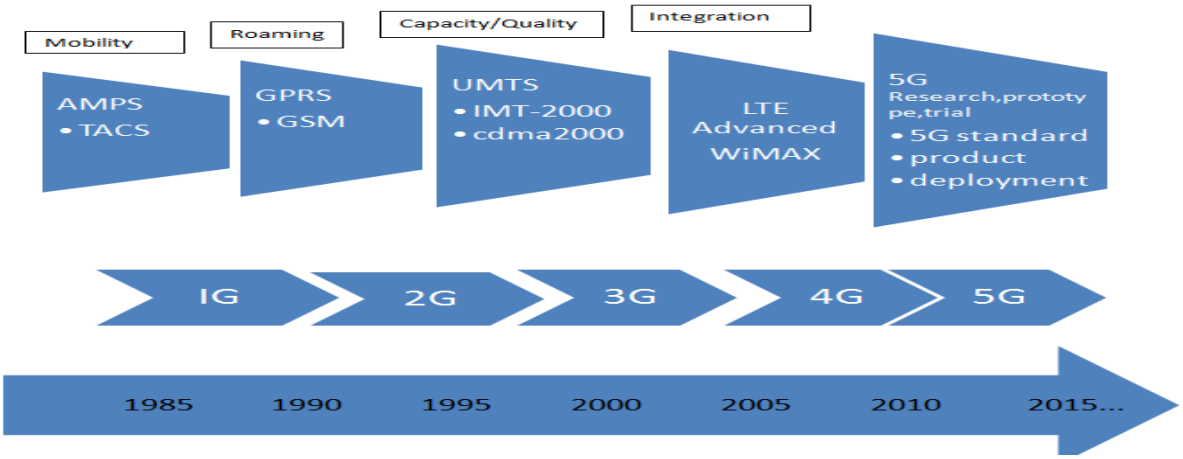
ABSTRACT: *This paper is focused on the specification of future generations of wireless mobile communication networks. The paper throws light on the evolution and development of various generations of mobile wireless technology along with their significance and advantages of one over the other. 5G technologies will change the way most high-bandwidth users access their phones. With 5G people will experience a level of call volume and data transmission never experienced before. 5G technology is offering the services in different fields like Documentation, supporting electronic transactions (e-Payments, e-transactions) etc. As the customer becomes more and more aware of the mobile phone technology, he or she will look for a decent package all together, including all the advanced features a cellular phone can have. The 5G design is based on user-centric mobile environment with many wireless and mobile technologies on the ground. WWWW that is World Wide Wireless Web allows complete wireless communication with almost no limitation, Multi-Media Newspapers, watch TV programs with the clarity as to that of an HD TV.*

Keywords: *1G, 2G, 3G, 4G, 5G, WWWW.*

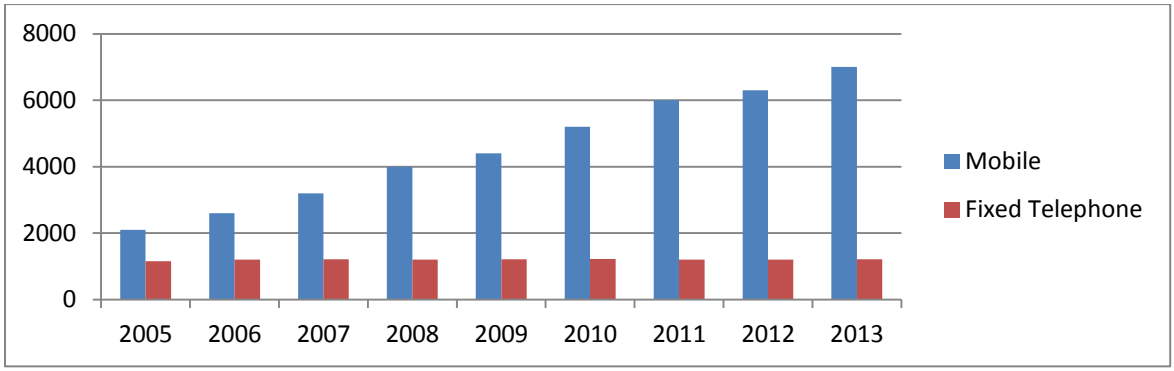
I. INTRODUCTION

Since the last few years there has been a phenomenal growth in the wireless industry. Widespread wireless technologies, increasing variety of user-friendly and multimedia-enabled terminals and wider availability of open source tools for content generation has lead encouraged user-centric networks [1]resulting in a need for efficient network design. There has been a shift from fixed to mobile cellular telephony, resulting in Network Planning and Optimization related services coming in to sharp focus. Evolution of wireless access technology is about to reach its fourth generation. Wireless access technology have formed different evolutionary path but with a common aim related to performance and efficiency. The First generation has fulfilled the basic mobile voice, while the Second generation has dealt with capacity and coverage. The third generation focused for higher data rate, multimedia support and spread spectrum followed by Fourth generation providing access to wide range of telecommunication services including advanced mobile services, along with a support for low to high mobility application. Figure 1 reflects the evolution of network technologies [2][3][4]&[5]



[Figure 1]. Mobile Cellular Network Evolution Timeline

By [4]5G should build an important role with more services, data, use and benefits to the upcoming generation over 4G. 5G will be smarter technology with no limits and to interconnect the whole world without limits. The upcoming life style will be different with uninterrupted access of information and interconnection. The use of mobile/cellular phones is increasing in the last 8 years. The growth of mobile phones or cellar phone users is compared [6] with fixed phones is shown in Figure 2. We argue that as the number of users increased then the management of mobile phone phones becomes more complex. If the complexity and requirement increases then the new technologies with models are required to manage the system. In this paper we analyzed and compare the various techniques of renowned researchers in the same field.



[Figure 2]. Growth of Mobile Users (in Billion)

The world has seen a lot of changes in the realm of communication. Today we no more use landlines. Everyone possesses a mobile phone that functions 24X7. Our handsets not only keep us connected with the world at large but also serve the purpose of entertainment gadget. From 1G to 2.5G and from 3G to 5G this world of telecommunications has seen a number of improvements along with improved performance with every passing day.[7]

II. THE EVOLUTION OF "G FROM 0 TO 5TH GENERATION

2.1 0G (Zero Generation Mobile System)

At the end of the 1940's, the first radio telephone service was introduced, and was designed to users in cars to the public land-line based telephone network. In the 1960's, a system launched by Bell Systems, called, Improved Mobile Telephone Service (IMTS), brought quite a few improvements such as direct dialing and more bandwidth. The very first analog systems were based upon IMTS and were created in the late 60s and early 70s. [8]

2.2 1G Technology

The first generation of mobile phones was analog systems that emerged in the early 1980s.More popularly known as cell phones. 1G- technology replaced 0G technology.1G wireless networks used analog radio signals. Through 1G, a voice call gets modulated to a higher frequency of about 150MHz and up as it is transmitted between radio towers. This is done using a technique called Frequency-Division Multiple Access (FDMA). But its fail in some field such as in terms of overall connection quality, 1G compares unfavorably to its successors. 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. [2]

2.3 2G Technology

Second-generation (2G) mobile systems were introduced in the end of 1980sand finished in the late 1990s, was planned mainly for voice transmission with digital signal and the speeds up to **64kbps.**. Compared to first-generation systems, second-generation (2G) systems use digital multiple access technology, such as TDMA (time division multiple access) and CDMA (code division multiple access). Consequently, compared with first-generation systems, higher spectrum efficiency, better data services, and more advanced roaming were offered by 2G systems. In the United States, there were three lines of development in second-generation digital cellular systems. The first digital system, introduced in 1991, was the IS-54 (North America TDMA Digital Cellular), of which a new version supporting additional services (IS-136) was introduced in 1996.Meanwhile, IS-95 (CDMA One) was deployed in 1993. 2G communication is generally associated with global system for mobile (GSM) services, The bandwidth of 2G is 30-200 KHz. Second Generation (2G) wireless cellular mobile services was a step ahead of First Generation(1G) services by providing the facility of short message service(SMS) unlike 1G that had its prime focus on verbal communication [10].

2.4 2.5G Technology

It is used to describe 2G-systems that have implemented a packet switched domain in addition to the circuit switched domain. 2.5 G can provide data rate, up to 144 kbps. GPRS, EDGE and CDMA 2000 were 2.5 technologies.

2.5 3G Technology

3G uses Wide Brand Wireless Network with which clarity is increased. 3G telecommunication networks support services that provide an information transfer rate of at least 2Mbps.In EDGE, high-volume movement of data was possible, but still the packet transfer on the air-interface behaves like a circuit switches call. Thus part of this packet connection efficiency is lost in the circuit switch environment. Moreover, the standards for developing the networks were different for different parts of the world. Hence, it was decided to have a network which provides services independent of the technology platform and whose network design standards are same globally. Thus, 3G was born [11]3G is not one standard; it is a family of standards which can all work together. An organization called 3rd Generation Partnership Project (3GPP) has continued the work by defining a mobile system that fulfills the IMT-2000 standard. In Europe, it was called UMTS (Universal Terrestrial Mobile System), which is ETSI-driven. IMT2000 is the ITU-T name for the third generation system, while cdma2000 is the name of the American 3G variant. WCDMA is the air-interface technology for the UMTS. The main components includes BS (Base Station) or nod B, RNC (Radio Network Controller), apart from WMSC (Wideband CDMA Mobile Switching Centre) and SGSN/GGSN. 3G networks enable network operators to offer users a wider range of more advanced services while achieving greater network capacity through improved spectral efficiency. The first commercial 3G network was launched by NTT Do Co Mo in Japan branded FOMA, based on W-CDMA technology on October 1, 2001 [12]3G operates at a range of 2100MHz and has a bandwidth of 15-20MHz. High speed internet service, video chatting are the assets of 3G.With the help of 3G, we can access many new services too. One such service is the GLOBAL ROAMING. Another thing to be noted in case of 3G is that 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. There is also a concern that in many countries 3G will never be deployed due to its cost and poor performance. Although it is possible that some of the weaknesses at physical layer will still exist in 4G systems, an integration of services at the upper layer is expected.[9]

2.6 4G Technology

The first successful field trial for 4G was conducted in Tokyo, Japan on June 23rd, 2005. NTT Do Co Mo was successful in achieving 1Gbps real time packet transmission in the downlink at a moving speed of about20km/h. To use 4G services, multimode user terminals should be able to select the target wireless systems. In current GSM systems, base stations periodically broadcast signaling messages for service subscription to mobile stations. However, this process becomes complicated in 4G heterogeneous systems because of the differences in wireless technologies and access protocols. To provide wireless services at anytime and anywhere, terminal mobility is a must in 4G infrastructure. Terminal mobility allows mobile clients to roam across geographic Boundaries of wireless networks. There are two main issues in terminal mobility: location management and handoff management. With location management, the system tracks and locates a mobile terminal for possible connection. Location management involves handling all the information about the roaming terminals, such as original and current located cells, authentication information etc. On the other hand, handoff management maintains ongoing communications when the terminal roams. Mobile IPv6 (MIPv6) is a standardized IP-based mobility protocol for IPv6 wireless systems. In this design, each terminal has an IPv6 home address. Whenever the terminal moves outside the local network, the home address becomes invalid, and the terminal obtains a new IPv6 address (called a care-of address) in the visited network [13] The design and optimization of upcoming radio access techniques and a further evolution of the existing system, the Third Generation Partnership Project (3GPP) had laid down the foundations of the future Long Term Evolution (LTE) advanced standards-the 3GPP candidate for 4G [14]. The target values of peak spectrum efficiency for LTE Advanced systems were set to 30bps/Hz and 15 Bps/Hz in downlink and uplink transmission respectively. Apart from the multiple access schemes, enhanced multiple-input multiple-output (MIMO) channel transmission techniques and extensive coordination among multiple cell sites called coordinated multipoint (CoMP) transmission/reception were accepted as the key techniques for LTE [15]

III. WHAT IS 5G TECHNOLOGY ?

Fifth generation of wireless mobile network which will begin in 2015s. It has almost no limitation which makes it isolated or completed wireless communication. Mobile users not had experience of such a highly advance technology [16]An end user can also connect their 5G mobile phones with their desktops to have internet connection. It totally supported World Wide Wireless Web (WWWW). This communication technology merges all enhanced benefits of mobile phones like dialing speed, MP3 recording, cloud storage, HD downloading in instant of seconds and much more that you had never imagined.[17]

IV. WWWW

Worldwide wireless web (WWWW), i.e. comprehensive wireless-based web applications that include full multimedia capability beyond 4G speeds[18]The wireless Web refers to use of the World Wide Web through a wireless device, such as a cellular telephone or personal digital assistant (PDA).The wireless Web refers to use of the World Wide Web through a wireless device, such as a cellular telephone or personal digital assistant (PDA). Wireless Web connection provides anytime/anywhere connection to e-mail, mobile banking, instant messaging, weather and travel information, and other services. In general, sites aiming to accommodate wireless users must provide services in a format displayable on typically small wireless devices. It is estimated that 95% of wireless Internet devices being manufactured today use the Wireless Application Protocol (WAP) developed by Ericsson, Motorola, Nokia, and Unwired Planet (now Phone.com) for presenting content. The wireless Web is not gaining in popularity as quickly as some have predicted. The low bandwidth of today's wireless service, relatively high usage charges, and small and difficult-to-use input and output devices contribute to impeding growth, a condition that has been referred to as "wapathy" (WAP apathy).[19]WWWW that is World Wide Wireless Web, allows complete wireless communication with almost no limitation, Multi-Media Newspapers, watch TV programs with the clarity as to that of an HD TV. To enjoy this technology, mobile hardware must improve and provide larger phone memory, quicker dialing speed, more clarity in audio and video etc [20].The idea of WWWW, World Wide Wireless Web, is started from 4G technologies. The following evolution will based on 4G and completed its idea to form a REAL wireless world. Thus, 5G should make an important difference and add more services and benefit to the world over 4G; 5G should be a more intelligent technology that interconnects the entire world without limits.5G will be the completed version of WWWW, World Wide Wireless Web, to form a real wireless world with no more limitation with access and zone issue.[21]

V. HARDWARE OF 5G [22]

1) UWB Networks: higher bandwidth at low energy levels. This short-range radio technology is ideal for wireless personal area networks (WPANs). UWB complements existing longer range radio technologies –such as Wi-Fi, WiMAX, and cellular wide area communications – that bring in data and communications from the outside world. UWB provides the needed cost-effective, power-efficient, high bandwidth solution for relaying data from host devices to devices in the immediate area (up to 10 meters or 30 feet).
2) Bandwidth**:** 4000 megabits per second, which is 400 times faster than today's wireless networks.
3) Smart antennas.
a. Switched Beam Antennas: Switched Beam Antennas support radio positioning via Angle of Arrival (AOA) information collected from nearby devices.
b. Adaptive Array Antennas: The use of adaptive antenna arrays is one area that shows promise for improving capacity of wireless systems and providing improved safety through position location capabilities. These arrays can be used for interference rejection through spatial _altering, position location through direction ending measurements, and developing improved channel models through angle of arrival channel sounding measurements.
4) Multiplexing: CDMA (Code Division Multiple Access) CDMA employs analog-to-digital conversion (ADC) in combination with spread spectrum technology. Audio input is first digitized into binary elements. The frequency of the transmitted signal is then made to vary according to a defined pattern (code), so it can be intercepted only by a receiver whose frequency response is programmed with the same code, so it follows exactly along with the transmitter frequency. There are trillions of possible frequency-sequencing codes, which enhance privacy and makes cloning difficult. [22]

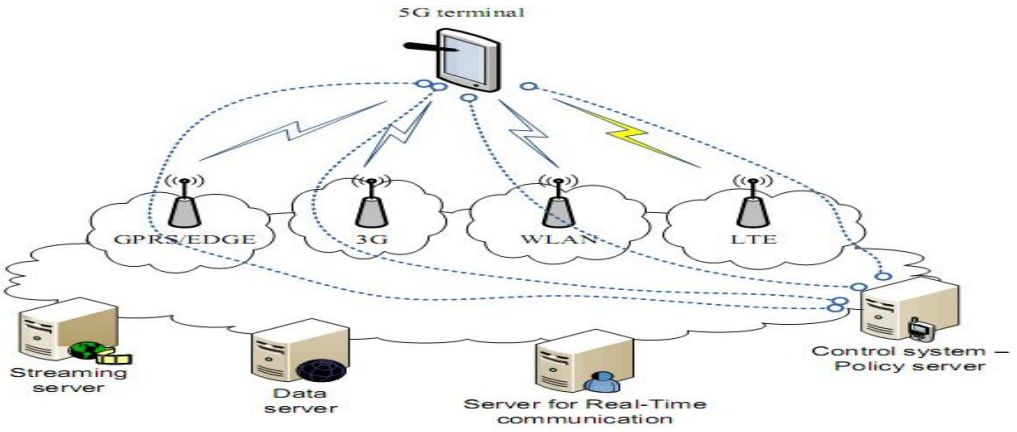
VI. SOFTWARE OF 5G [22]

1)5G will be single unified standard of different wireless networks, including LAN technologies, LAN/WAN, WWWW- World Wide Wireless Web, unified IP & seamless combination of broadband.
2) Software defined radio (SDR), Packet layer, Implementation of Packets, Encryption, Flexibility, Anti-Virus.

VII. BASIC ARCHITECTURE OF 5G TECHNOLOGY

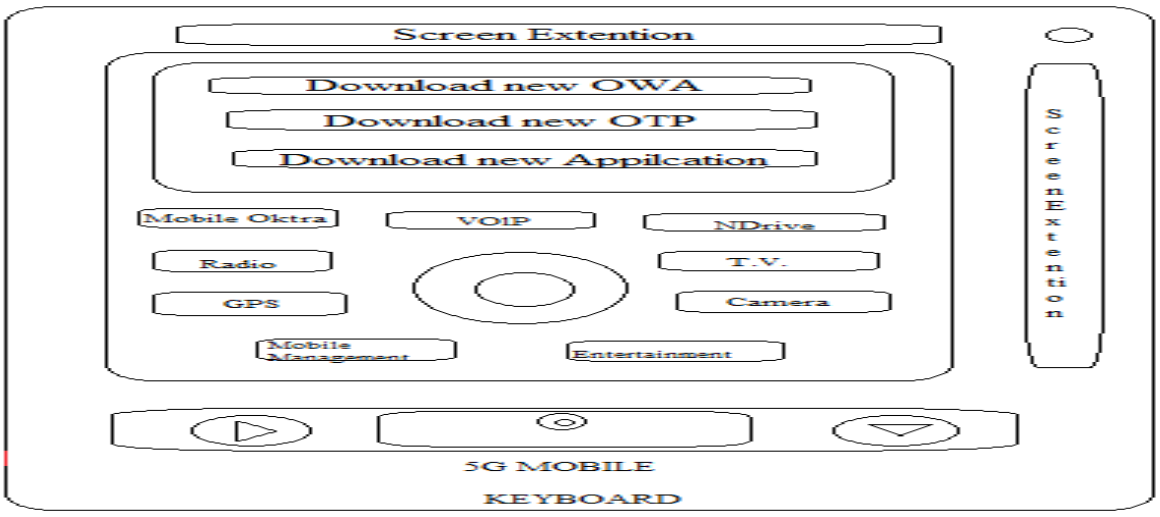
Basic functional architecture of 5G technology shows in figure 3.In figure 3, Fifth generation mobile systems model is all-IP based model for wireless and mobile networks interoperability. The All-IP Network (AIPN) is capable to fulfill increasing demands of the cellular communications market. It is 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). 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 to 3G and 4G. Interoperability process criteria and mechanisms enable both terminal and RMTC to select from heterogeneous access systems.



[Figure 3]. Functional Architecture of 5G Wireless Technology.

Below figure 4 shows the system model that proposes design of network architecture for 5G mobile systems, which is all-IP based model for wireless and mobile networks interoperability. The system consists of a user terminal (which has a crucial role in the new architecture) and a Number of independent, autonomous radio access technologies. Within 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 accesses 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. Applications and servers somewhere on the Internet. Routing of packets should be carried out in accordance with established policies of the user. Application connections are realized between clients and servers in the Internet via sockets. Internet sockets are endpoints for data communication flows. Each socket of the web is a unified and unique combination of local IP address and appropriate local transport communications port, target IP address and target appropriate communication port, and type of transport protocol.[23]



[Figure 4].5G mobile designs [24]

VIII. WORKING CONCEPTS OF 5G NETWORKS

As stated earlier, 5G will be completely user centric i.e. nothing is hidden from user. It will have new error prevention schemes that can be installed through internet anytime and have modulation methods and software defined radios.[25]5G will be a collaboration of networks and individual network handle user mobility. This network will be based on Open Wireless Architectures as it has Physical Access Control Layer i.e. OSI Layer. OSI layer are shown in table 1.

Application Layer	Application(Services)
Presentation Layer	
Session Layer	Open Transport Protocol
Transport Layer	
Network Layer	Upper Network Layer
	Lower Network Layer
Data link Layer	Open Wireless Architecture
Physical Layer	

Table 1: OSI Layers in 5G Terminal Design. [26]

IX. KEY CONCEPTS OF 5G

1. Real wireless world with no more limitation with access and zone issues. **[27]**
2. Wearable devices with AI capabilities.
3. Internet protocol version 6 (IPv6), where a visiting care-of mobile IP address is assigned according to location and connected network.
4. One unified global standard.
5. Pervasive networks providing ubiquitous computing: The user can simultaneously be connected to several wireless access technologies and seamlessly move between them (See Media independent handover or vertical handover, IEEE 802.21, also expected to be provided by future 4G releases). These access technologies can be a 2.5G, 3G, 4G or 5G mobile networks, Wi-Fi, WPAN or any other future access technology. In 5G, the concept may be further developed into multiple concurrent data transfer paths.**[27]**
6. Cognitive radio technology, also known as smart-radio: allowing different radio technologies to share the same spectrum efficiently by adaptively finding unused spectrum and adapting the transmission scheme to the requirements of the technologies currently sharing the spectrum. This dynamic radio resource management is achieved in a distributed fashion, and relies on software defined radio.**[27]**
7. High altitude stratospheric platform station (HAPS) systems.
8. World Wide wireless web (WWWW), i.e. comprehensive wireless-based web applications that include full multimedia capability beyond 4G speeds.
9. Dynamic Ad hoc Wireless Networks (DAWN), essentially identical to Mobile ad hoc network (MANET), Wireless mesh network (WMN) or wireless grids, combined with smart antennas, cooperative diversity and flexible modulation.[7]
10. Group cooperative relay:-A major issue in beyond 4G systems is to make the high bit rates available in a larger portion of the cell, especially to users in an exposed position in between several base stations. In current research, this issue is addressed by cellular repeaters and macro-diversity techniques, also known as group cooperative relay, as well as by beam division multiple access (BDMA).[7]

X. COMPARISON OF ALL GENERATION

Comparison of different Generation is shown Table-2.

Generation Features	1G	2G	3G	4G	5G
Years	1980s	1990s	2000s	2010s	2020s
Definition	Analog	Digital Narrow band circuit data, Packet	Digital Broadband Packet Data	Digital Broadband Packet All IP	Not Yet

		Data		Very high throughput	
Keywords	Analog	Digital personal	Global world standards	High data rates High mobility IP Based	High data rates High mobility IP Based
Data Bandwidth	2 kbps	64 kbps	2 Mbps	200 Mbps	1 Gbps
Standards	AMPS	TDMA, CDMA, GSM, GPRS	WCDMA	Single unified standard	Single unified standard
Technology	Analog cellular	Digital cellular	Broadband with CDMA, IP technology	Unified IP & seamless combination of broadband, LAN, WAN & WLAN	Unified IP & seamless combination of broadband, LAN, WAN, WLAN & WWWW
Services	Mobile technology (Voice)	Digital voice, SMS, Higher Capacity packetized	Integrated high quality audio, video & 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 network	Internet	Internet
Handoff	Horizontal	Horizontal	Horizontal	Horizontal & Vertical	Horizontal & Vertical
Systems	Analog cellular Analog cordless	Digital cellular Digital cordless Mobile	3G cellular Max data rate: 2 Mbps	4G cellular Broadband access Min data rate: 2-20 Mbps	5G cellular Min data rate: 20-100 Mbps

Table-2: Comparison of all Generation in Communication.

XI. ADVANTAGES OF 5G TECHNOLOGY

5G aims at providing myriad of services to the end users at high speed. The applications developed to avail these services are highly user friendly minimizing the interaction between the application and the user. For example, integration of speech recognition technology in the user interfaces would ease the use of the applications for every layman.

a**.** Mobility and Interoperability: Multiple standards of 4G restrict the user's mobility and interoperation across different networks. 5G targets at providing a unified global standard which will facilitate global mobility and service portability. In other words, end user can subscribe to different services from different service providers using the same mobile device.

b. Terminal and Network heterogeneity: Terminal heterogeneity refers to the different types of terminals in terms of the size, weight, display features, power consumption, etc. Network heterogeneity means the different types of access networks like WiMAX, Wi-Fi (Wireless Fidelity), UMTS (Universal Mobile Telecommunications System) and so forth which differ in their coverage area, data rate, latency and data loss rate. Each of these terminals and services cater to different user requirements. In 5G, all these terminals and networks will provide common services independent of their capabilities. This is also called as service personalization.

c. High Performance*:* Low transfer rates of 4G restrict the user's ability to take advantage of the rich multimedia contents across the wireless networks. 5G is expected to provide wireless download speeds of above 1Gbps in local area network (LAN) and 500 Mbps in wide area network (WAN), about 260 times greater than the 3G wireless networks.

d. Lower power consumption*:* Battery technology has not been able to keep pace with the growing telecom industry. 3G devices required one battery while 4G required two batteries. Battery drain is a persistent problem of wireless devices. 5G aims at breaking this directly proportional rule. Shorter communication links is one of the few solutions proposed to cater to this requirement.

e. User Choice: High data transfer rates and ubiquitous coverage of 5G networks would provide users access to large repository of data and services. Users would have flexibility to filter these data and services as per his preferences by configuring the operational mode of their devices, so that he can preselect the service features he wants to use. For an example, user in a mall interested in buying clothes should receive alerts about various discount offers on clothes rather than about the other accessories.

f. Network Convergence*:* Network convergence is the efficient coexistence of multimedia, voice and data communication within a single network. Currently the telecommunication environment is divided into wireless and fixed line communication. To avail these different kinds of services, the end user require different devices such as cellular phones, fixed line phones, laptops and PDA's. Once the fixed mobile convergence is in place in 5G, the distinction between these services will disappear. The current 4G technology is not able to capture the market share as done by the fixed line services partly because of its low bit rates of 384kbps and because of the high costs associated with these services. But with the emergence of 5G aiming at global integrated IP based network, the wireless sector will be able to match the fixed line sectors in terms of both costs and speed. 5G will lead to convergence in terms of both devices and services.

g.DataBandwith**:**5G provides data bandwidth of 1 Gbps or higher. It is a great service in wireless communication.

h. Smart Networking*:* 4G is based primarily on cell or base station WAN design. 5G aims at building hybrid networks utilizing both the Wireless LAN concept and WAN design. Thus, the world would have base stations everywhere providing ubiquitous network coverage to users at high speed. For example, a user walking on road is browsing internet using GPRS (General Packet Radio Service-WAN design). The moment he enters a mall with Wi-Fi (LAN design), seamless hand-over from GPRS to Wi-Fi would take place without the user's knowledge.

XII. APPLICATIONS OF 5G TECHNOLOGY

The 5G technology applications are set to evolve in a multiplatform environment. 4G applications will be available across various wireless technologies like LTE, Wi-Fi, etc. and also in devices like cell phones, laptops-readers, digital cameras, printers and so on. 4G applications are very likely to be extended and improved versions of the existing 3G services, but it is still unclear what the capacity of 4G will hold for the mobile world. Some of the applications of 5G networks are [28-31]:

a. Education: For people who are interested in lifelong education, 4G provides a good opportunity. People anywhere in the world can continue their education through online in a cost effective manner.

b. Crisis management: Natural disasters can cause breakdown in communication systems. In today's world it might take days or weeks to restore the system. But in 4G it is expected to restore such crisis issues in a few hours.

c. Virtual Presence: This means that 5G provide user services at all times, even if the user is off-site. Virtual navigation: 4G provides users with virtual navigation through which a user can access a database of the streets, buildings etc. of large cities. This requires high speed data transmission.

d. Security: This layer also branches across all the layers of the 5G network architecture which perform the function of authentication, authorization, encryption, establishment and implementation of service policy agreement between the various vendors.

e. Tele-Medicine**:** 5G will support remote health monitoring of patients. A user need not go to the hospital instead a user can get videoconference assistance for a doctor at anytime and anywhere.

f. Tele-geo processing applications: This is a combination of GIS (Geographical Information System) and GPS (Global Positioning System) in which a user can get the location by querying.

g. Artificial Intelligence**:** More applications combined with artificial intelligent (AI) as human life will be surrounded by artificial sensors which could be communicating with mobile phones.

h. Travelling**:** Introducing the launch of new mobile phone apps; the use of Bluetooth & NFC technology integrated smartphones in the passenger travel process. Technology is likely to play a role in re-ordering these phases over the next decade, allowing, for example, people to experience a destination virtually before transit, or to seek inspiration and share information live, while they are travelling and experiencing a place.

i. Economic growth: Economic growth is supported because these technology changes allow consumers and businesses to benefit from high-value wireless data and content services. This relationship had not yet been explicitly quantified yet.

XIII. THREATS OF 5G IMPLEMENTATION

The following threats are expected from the application implementation of 5G network as a future system.
i). since all the network operators and service providers would share a common core network infrastructure, compromise of a single operator will lead to the collapse of the entire network infrastructure, if not carefully guide against.
ii). Third-parties can masquerade as legitimate users resulting in theft of service and billing frauds can easily arise.
iii). since 5G is a secure IP based solution it will be vulnerable to all the security threats as the current Internet world.
iv). on the lines of email-spam, the Spam over Internet telephony (SPIT), the new spam over VoIP may become serious and become serious threats.
v). Spooling attacks can lead to misdirected communication and internet banking related frauds.
vi). Eavesdropping and interception of private communications.
vii). Phishing attacks, stealing bank account details and other secured information, are more likely.

XIV. CONCLUSIONS

Mobiles have become very essential part of our everyday life. Their current development is the outcome of various generations. In this paper we review introduction to 5G technologies, Key concepts of 5G, and advantage of 5G technology, applications, and wireless network architecture for 5G wireless technologies. The new coming 5Gtechnology is available in the market in affordable rates, high peak future and much reliability than its preceding technologies. Fifth generation technologies offers tremendous data capabilities and unrestricted call volumes and infinite data broadcast together within latest mobile operating system. Fifth generation should make an important difference and add more services and benefits to the world over 4G. Fifth generation should be more intelligent technology that interconnects the entire world without limits. This generation is expected to be released around 2020. The world of universal, uninterrupted access to information, entertainment and communication will open new dimension to our lives and change our life style significantly.

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