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CHANGING PERSPECTIVES OF MOBILE INFORMATION COMMUNICATION TECHNOLOGIES TOWARDS CUSTOMIZED AND SECURED SERVICES THROUGH 5G & 6G

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Abstract:

The developments in Information Communication Technology (ICT) made the interpersonal and intra-computer communications ideal in terms of distance and time and made online-ubiquitous communication a reality. Advents in electronic communication technology with an affinity of enhancing the bandwidth and speed through wireless channel supported in development of 3G technologies and further advents in data mining, online analytical techniques further supported in customization of services to the user through 4G technologies at further high speed. In this paper, we discuss the changing perspectives of 4G, 5G and further anticipated 6G wireless technologies. The 4G technology allows downloading speed of 100Mbps and features such as Multi-Media Newspapers, T.V. programs with the clarity as to that of an ordinary T.V. The demand of higher security and authentication of users for secured transaction of financial data demanded further development in ICT through 5G technologies. 5G technology also provides inter-working between different technologies like LTE, bluetooth, WiFi, LoWPan and others, to cross layer design in wireless technology. 5G is not a simple evolution of 4G technology and is overall wireless solution and expected to be implemented between 2020 and 2030. This paper also contains the information and discussion on what is the possible 6G in mobile information communication technology? What are its features, functions, benefits and time-scale? Which are the new technologies will support the development of this most anticipated technology which is going to revolutionize the society as most developed civilian society.

Index Terms: Advents in Communication Technology, 4G Mobile Technology, 5G Mobile Technology & 6G Mobile Technology

1. Introduction:

Information and communication technology includes wide range of devices like radio, television, cellular phones, computer hardware, software, network and all applications associated with them such as videoconferencing, teleconferencing, e-commerce and distance learning. The telecommunications industry all over the world has focussed to bring all the services and facilities available to networked computers to mobile devices using advanced wireless communication technologies. 3G technology offers different services to customers like high bandwidth, packet-based transmission of text, voice, video, audio and multimedia needed support through Wide code division multiple access (W-CDMA) and time division-code division multiple access (TD-CDMA). The existence 4G technology is a valid testimony for the massive and explosive growth of wireless mobile communication technology which is propagated through its predecessors 3G, 2G, and 1G [1-2].The main objective4G network is customization of a flexible and ubiquitous service provision enhancing the bandwidth and speed in the middle of 2012 based on the digital broadband packet and all IP. 4G technology can be effectively used to provide the customized and ubiquitous knowledge to the learners of distance education students through smart mobile phones. The challenges of 4G

wireless networks like 4G global roaming across multiple wireless and mobile networks, accessibility, handoff, coordination of location, wireless security and authentication, network failure and backup and pricing and billing demanded further development in mobile wireless communication technology and gave birth to 5G technologies [3-4]. When 5G is implemented in near future between 2020 and 2030, it is expected that it will change the world of World Wide Web (WWW) and cell phone with unified global standard, worldwide roaming, high bandwidth and all time connectivity.

In this paper, we discuss the challenges in ICT with respect to wireless mobile communication technology, the present status of 3G and 4G technology and its changing perspective, an overview of future 5G technology and its features and functions, challenges to realize features of 5G technology and ABCD listing of 5G technology. We also discuss further anticipated 6G wireless technology including its overview, expected functions and features, challenges to realize these features, ABCD listing of 6G technology and anticipated time-line of this wire-less ICT Generations.

2. Challenges in ICT:

The challenges of ICT with respect to wireless mobile communication technology are discussed by considering different factors which include security, backhaul, multiple frequencies, personalization and customization, energy saving, availability and advanced access technology, cost and affordability, global roaming, high performance streaming video.

Security: 4G Provides worldwide interoperability and global roaming between different operators leads to different security challenges. There is a need for enhanced and sophisticated security features and mechanism for advanced video streaming and online financial transactions applications [5-7].

Backhaul: High bandwidth hungry applications requires the maximum amount of data transfer between server and user applications. In order to meet the user's needs ubiquitously, there is a need for update or improvement in existing backhaul or bandwidth capacity by the service providers.

Multiple Frequencies: All over the world, 4G LTE network utilizes multiple frequency spectrums. This will arise some problems while switching between different operators in global roaming. As and when mobile wireless communication technology upgrades operators need to add more radio/spectrum other than existing spectrum band in their old or existing spectrum band, which will incur more and cost and complexity.

Personalisation and Customisation: Existing mobile wireless communication technology supports services based on user's requirements or user centric approach. There is a higher need and requirement to users taste and preferences while considering a variety of customer pool with varied interest and liking all over the world.

Energy Saving: A mobile network is formed by three main elements as the core network, base stations, and mobile terminals. Nearly three fourth of the energy is consumed by base stations compare to the energy consumption of the whole network. So there is a need for reduction of energy consumptions in base stations and thereby reduce the overall energy consumption of wireless mobile network.

Availability: The existing wireless mobile communication technology having the speed of more than 800MHz frequencies can penetrate to any extent with walls and any other solid objects to ensure wider coverage, still faces problems to reach some rural areas or while moving with very high speed in car or flights.

Advanced Access Technologies*:* The ever demanding services should be accessible by the user all over the world, anywhere, anytime without restriction in terms of location

or place and time or while on move or stationary requires implementation of some sophisticated and advanced access technologies.

Cost and Affordability: The mobile service providers should focus more on introducing new tariff plans to attract more customers. Cost and affordability are major challenges or hindrances for the usage of new mobile wireless access technologies, especially in some developing and under-developed countries.

Global Roaming: User should able to use mobile all over the world when he is roaming in different countries without any barrier to locations. Even though it is supported in ICT, its facing some challenges or not effectively implemented all over the world.

High Performance Streaming Video: Video content sent through wireless mobile communication technology displayed by the user real time without taking any extra time is not implemented effectively. So there is a need for enhancement or change in this aspect.

3. Present Status & Changing Perspectives in ICT:

All over the world 3G technologies are effectively implemented by different service providers, which uses universal mobile communication technology (UMTS) by incorporating a different range of services, which includes text, voice, video, audio and multimedia needed support. 3G telecommunication services fulfil some of the standard specified by international telecommunication-2000 (IMT-200). The different multimedia service mainly includes video calls and mobile TV.3G technology uses Wireless Code Division Multiple Access (W-CDMA) radio interface standard, which is most widespread. 3G technology has some advantages over 2G technologies which includes,

- ✓ Overcrowding can reduce in the existing system with the help of radio spectrum.
- ✓ Bandwidth, security, reliability and interoperability between service providers are improved in a better scale.
- ✓ Availability of services all locations either in the urban or rural area is effectively improved.
- ✓ Hardware or software system's interfaces and data are compatible with existing networks or supports backward compatibility.
- ✓ Packet-based IP connectivity helps to improve the devices always online.
- ✓ Multimedia services are effectively improved compared to early generations.

3G technology faces some challenges, which are,

- ✓ The service providers are facing challenges in building cellular infrastructure and upgrading base stations.
- ✓ While upgrading from 2G to 3G technology customer needs new handset is one of the challenges faced by the customers
- ✓ While roaming data and voice work together has not been implemented effectively
- ✓ More power consumption
- ✓ Requires closer base stations in order to increase signal strength is more expensive.

The changing perspective of smart mobile phone users demanded high data transfer rate, better real time streaming video and personalised and customised services, which is considered to be foundation requirement for development of 4G mobile wireless communication technologies. With the invention of 4G technology, terminals used for user interfaces also changed from the keyboard, display, and tablet to new interfaces based on speech, vision, biometrics, touch and soft buttons. International Telecommunication Union-Radio communication Sector (ITU-R) specified set of

requirements for the 4G technology which includes remarkable improvement in speed and access technology with speed up to 100 megabits per second (Mbit/s)for high mobility communications and 1gigabits per second (Gbit/s) for low mobility communications. 4G technology is based on all IP-based and uses only packet switching network unlike 3G technology, which uses both circuit and packet switching network. 4G wireless systems deliver efficient multimedia services in two types as bursting and streaming video. When a user requires real-time video, the video is played in user's display system without any buffering and delay is called streaming. One of the drawbacks of streaming video is, it does not take the full advantage of high bandwidth and played at a playback rate. Streaming has little memory requirement compared bursting video. While user downloading a file using buffer bursting concept is used at the highest data rate, which utilises full available bandwidth capacity. The virtual presence and virtual navigation are the two greatest applications of 4G technology, which are facilities available to user at all time, even when the user is at off-site and can navigate and access database of the LAN, WAN and MAN networks with the high-speed data transmission rate. 4G has applications in different areas like telemedicine, tele-geoprocessing, crisis management and education [8-9]. Through Telemedicine user gets videoconferencing assistance and consultation of a doctor without actually visiting hospital or clinic. By combining the features of Global Positioning System (GPS) and Geographical Information System (GIS) user can get the particular location by querying through tele-geoprocessing. In all over the world, if any natural disaster or calamities occur, it takes days or weeks to restore the broken down communication system [10-12]. With the help of 4G technology, it is possible to restore communication system very quickly. 4G technology supports for online education through its ubiquitous or omnipresence nature [13-16] and mobile banking in secured manner [17 - 21].

Table 1: ICT generations & characteristics

S.No	ICT Generations	Core and Related Technologies	Characteristic Features
1	1 G	AMPS (Advanced Mobile Phone Service)	Supports voice services-Analog Core network is PSTN (Private Switched Telephone Network)
2	1.5 G	CDMA (Code Division Multiple Access)	Analog cellular discontinued Speed-9.2 Kbits/sec Core network is PSTN
3	2.0 G	TDMA (Time division Multiple Access), PDA (Personal Digital Cellular)	PDC & TDMA only supports for one way data transmission Caller ID for calling is supported Not constantly on data connection-just initiated.Technology-1xRTT Core network is PSTN
4	2.5 G	CDMA (Code Division Multiple Access) , GSM (Global System For Mobile Communication)	Digital voice service is first introduced. Speed-128Kbits/sec. Technology-GPRS, EDGE, UMTS Core network is PSTN
5	3.0 G	WCDMA (Wideband Code Division Multiple Access), CDMA-2000, TD-SCDMA(Time division synchronous Code Division Multiple Access)	Excellent voice qualities. Speed-2Mbits/sec in WCDMA, Constantly on data connection. Speed-500-700 Kbits/sec in CDMA-2000 Based on the Interim Standards (95) CDMA standards, TD-CDMA Supports broad-band data services (such as multimedia & video), Improved roaming Features Core network is packet network

6	4.0 G	IP based packet switching	Speed 40-100 Mbits/sec in mobile Mode and 1Gbits/sec when it is in still. Core Network is the internet
7	5.0 G	Unified IP and Seamless combinations of broadband	Speed more than 1Gbits/sec. Core Network is the internet.
8	6.0 G	GNSS (Global Navigation Satellite System)	Integrate 5G cellular network and satellite network to provide global coverage. Speed more nearly 10 times more than 5G The core network is internet and satellite communication.

Table 2: ICT Generations & Applications

S.No	ICT Generations	Applications
1	1 G	Analog voice service
2	1.5 G	Improved analog voice service
3	2.0 G	Digital voice service, SMS (Short Messaging Service) Additional services like fax, data, messaging, and roaming between networks were provided.
4	2.5 G	Digital voice service, SMS (Short Messaging Service), fax, data, and roaming between networks with higher capacity packet.
5	3.0 G	1. Higher bandwidth packet-based transmission of text, voice, video, and multimedia needed to support data-intensive applications. 2. constantly connected to the Internet and have access to a consistent set of services worldwide 3. 3G mobile phone can be used as a phone, a computer, a television, a paper, a video conferencing center, a newspaper, a diary, and even a credit card. 4. Anytime anywhere multimedia
6	4.0 G	1.Streaming Video 2.High Level customisation in user end 3.Efficient transmission of video over wireless and bottleneck networks using network coding 4. Global Mobility. 5. High quality video calling. 6. Integrated wireless solution. 7. Ubiquitous service
7	5.0 G	1. Complete wireless communication with almost no limitations 2. Highly supportable to wireless world wide web (WWWW) 3. Multimedia newspaper and watch TV programs with more clarity online. 3. Support for interactive multimedia, voice, streaming vide and the internet and other with very good quality 4. Effectively used for Internet of Things (IOT) 5. Efficiently used for cloud computing. 6. Advanced billing applications in mobile systems.
8	6.0 G	1. From the office, only one can play or control all home electronic equipment 2. Unimaginable Internet Speed 3. Global roaming even in space and outside of the earth. 4. Customised and personalised service based on what user things in his/her mind. 5. Mind reading Applications.

4. 5G Technology:

Fifth generation mobile wireless technology not yet developed and denotes future of the mobile wireless telecommunication technology. 5G aims to achieve higher capacity than current 4G/IMT-advanced standard in terms of mobile broadband users per area unit, higher speed more than 1Gbit/s and high capacity streaming video. With

the help of 5G technology large population of the user can view and play high definition media continuously without any break, many hours in a day with the help of their mobile devices [22 – 23]. 5G research and development also focus on improved support on the machine to machine communications or internet of things with a lower cost per bit, lower battery consumption and more effective in all aspects compare to 4G technology.

4.1 Expected features and Functions of 5G Technologies:

The next generation mobile network alliance list out some standards for 5G technologies and it defines 5G technology in terms of several features [24-25] as

- ✓ Data rates of tens of megabits per second for tens of thousands or millions of users.
- ✓ Data rates 100 megabits per second or more for metropolitan areas focusing on more customers.
- ✓ Speed of more than 1 Gigabits per second simultaneously to many customers on the same office floor.
- ✓ Information rate that can be transmitted over specified bandwidth or spectral efficiency will be highly improved compared to 4G technology.
- ✓ It can able to provide advanced billing interfaces.
- ✓ It is going to provide the virtual private network.
- ✓ Virtual presence and virtual navigation can be highly improved compared to 4G technology especially in multimedia services.
- ✓ Uploading and downloading speed of 5G technology are going to be improved very much compare to present 3G and 4G technology.
- ✓ 5G technology expected to have extra ordinary capacity to support different types of software and hardware interfaces.
- ✓ Multimedia services with ever seen efficiency anywhere, anytime and anyplace or ubiquitously.
- ✓ Expected to provide services without affecting to human health or eco-friendly and environment-friendly.
- ✓ 5G architecture mainly going to based on nanotechnology, cloud computing and all IP-platform.
- ✓ Web standard is expected to WWWW (IpV6)
- ✓ Unified IP technology and combinations of broadband, local area network (LAN), wide area network (WAN), personal area network (PAN) and wireless LAN.
- ✓ Dynamic information access services and wearable devices with IA capabilities.

Expected Functions of 5G technology are:

- ✓ User can able to control his/her personal computer by handsets
- ✓ Online education will become easier, a student without actually coming to class, can sit anywhere in the world and attend the class.
- ✓ A doctor can treat a patient sitting in any part of the world. In a simple way, 5G technology makes medical treatment easier.
- ✓ Internet of Things can be controlled very effectively.
- ✓ Possible natural disaster can be easily and effectively detected in advance.
- ✓ Any information can reach any part of the world within seconds.
- ✓ Efficiency of weather forecasting can be greatly improved.
- ✓ Aircraft system can be affectively improved.

4.2 Challenges to Realize 5G:

- ✓ Technology is still under process, not yet developed.
- ✓ Lack of research in the particular technologies.

- ✓ Lack of standard rules and regulations from standard bodies or authorities.
- ✓ Lack of capabilities to supporting massive capacity and massive connectivity.
- ✓ Lack of support for increasing diverse and personalized services.
- ✓ Lack of Flexibility and availability of all available non-contiguous spectrum for widely different network deployment

4.3 ABCD Analysis of 5G:

ABCD analysis is a new model to analyse new concepts using its advantages, benefits, constraints, and disadvantages. This analysis helps the organisation to improve its services or revenue or profit depending on the different scenario or with respect to different types of problems [26 - 27]. ABCD analysis has two parts as ABCD listing [28 - 34] and ABCD framework [35 - 44]. In following section, we have listed the advantages, benefits, constraints, and disadvantages of 5G information communication technology.

(a) Advantages of 5G:

- ✓ 5G can able to provide advanced billing interfaces for mobile based applications.
- ✓ It is going to provide a virtual private network for different applications.
- ✓ Virtual presence and virtual navigation can be highly improved compared to 4G technology especially in multimedia services
- ✓ Uploading and downloading speed of 5G technology are going to be improved very much compare to 3G and 4G technology.
- ✓ Through global mobility, the user can use same mobile set and same SIM and access services in any location in the world.
- ✓ Unlike previous generation 5G will allow utilisation of any spectrum and any access technologies for the best delivery services to the needy customers.
- ✓ Extraordinary technology to support any type of services that comes to 5G network line.
- ✓ Multimedia streaming video, audio and internet services with every imaginable or ever seen efficiency.

(b) Benefits of 5G:

- ✓ Global roaming, user can use services or avail services anywhere of the world anytime.
- ✓ User can control home equipment from the office or office equipment from the home without actually visiting to actual locations.
- ✓ Availability of any services anywhere, anytime by utilisation of any access technologies or standards.
- ✓ Seamless service availability.
- ✓ Zero time delay in order to watch video online or ever imaginable quality of streaming video.
- ✓ Ever seen improvement in internet speed, audio, video or any multimedia services.
- ✓ High quality mobile cloud services.
- ✓ Easily upgradable and manageable with previous generation.
- ✓ User can control PCs through their mobile phone or handsets.

(c) Constraints of 5G:

- ✓ Lack of research and new technology
- ✓ Complex requirement of more than 10 Gb/s to support mobile cloud services
- ✓ Complex requirement of Maximum 10 milliseconds switching time between different radio access technologies in order ensure seamless services.
- ✓ Lacks of Global standard or standard authorities are not available as of now.

- ✓ Massive or unlimited capacity in supporting a number of users for several billion of applications and several billion of systems.
- ✓ Requirement to provide eco-friendly services.
- ✓ Energy consumption should be reduced to a large extent or exponential decrease.
- ✓ Expected to provide less costly services with high efficiency or quality.
- ✓ Expected to provide same speed for any services while on move or in still.
- ✓ Lack of technology to support all applications in one platform.

(d) Disadvantages of 5G:

- ✓ Possible failure of complex requirements.
- ✓ Possible failure of new technology due to non-acceptability from customers.
- ✓ Needs complicated hardware.
- ✓ Possible high implementation cost.
- ✓ The speed 5G technology claiming is difficult to achieve.
- ✓ No global standard or authorities as of now.
- ✓ High infrastructure is required at service providers' server side.

5. 6G Technology:

5.1 What is 6G Technology & Why?

6G mobile wireless communication technology or system is future mobile wireless communication technology expected to provide services which are ideal in all standards including seamless access, bandwidth, uploading downloading speed, voice calling, video calling, streaming video and all other multimedia services, integrating satellite communication network.6G standards are expected to develop by four countries as GPS by the USA, Galileo by Europe, COMPASS by China and GLONASS by Russia [45-47]. Due to the following reasons 6G are required;

- ✓ Integrating satellite communication system and 5G in order to provide high-quality global roaming
- ✓ Mobile network should able to read human mind and able to provide services based on what user thinks in his/her mind.
- ✓ Due to the human nature of continuous changing requirement and up gradation in existing technology.
- ✓ With the expectation to achieve some things, that is considered as 'never possible' or not existing as of now.
- ✓ High standard and efficiency in the internet of things.
- ✓ With the requirement of 100% energy saving and reusable or recycling process.
- ✓ With the expectation of no limitations in any aspects of mobile communication system.

5.2 Expected Features and Functions of 6G:

The next generation mobile network alliance list out some standards for 5G technologies and it list out several features of 6G as;

- ✓ Expected data speed of 1000 or 10000 Mbits/sec.
- ✓ Internet speed is unimaginable.
- ✓ Expectation to use the same mobile system even in other globe or in the moon or Jupiter using satellite communication system.
- ✓ Compatible with any service and access technologies.
- ✓ Expectation to provide accurate information about weather forecasting or natural disasters.
- ✓ Expected to provide coverage to the entire world with unified, single and global standard.

- ✓ User can able to communicate and avail all service anywhere, anytime without physically moving or by sitting in one place.
- ✓ Mobile should able to work based on user thinking.
- ✓ Absolutely zero latency in accessing or availing services.

Expected Functions of 6G technology are

- ✓ One can able to control his intelligent robotic system using his mobile.
- ✓ Artificial sensor will be communicating with the human mobile system in order to serve based on his/her mind thinking.
- ✓ Mobile can communicate with other planets like moon, mars or Jupiter.
- ✓ Single Noncore common for all nations and very small billing to end user.
- ✓ Communication without utilising any spectrum.
- ✓ Expanded and updated data center configuration.

5.3 Challenges to Realize:

- ✓ Technology is not yet developed and there is no standard specification of the requirements of 6G.
- ✓ No proper research in the particular technologies and requirement specifications.
- ✓ No standard rules and regulations from standard bodies or authorities.
- ✓ Possible failure to achieve all expected requirements.
- ✓ Heavy Infrastructure cost.

5.4 ABCD Analysis of 6G:

ABCD analysis is used in order to analyse feature expected 6G, which includes four factors as advantages, benefits, constraints, and disadvantages [26 - 44]. This analysis helps the development of new technology with some standard requirement or in developing the requirements. In following section we have listed the advantages, benefits, constraints, and disadvantages of 6G information communication technology.

(a) Advantages of 6G:

- ✓ Intelligent robotic system can be controlled using mobile from any place.
- ✓ No limit in access technology, bandwidth, multimedia services and speed similar to supercomputer speed.
- ✓ User can able to buy and get any grocery, vegetable or any other items through his mobile without any delay.
- ✓ Accurate information about weather forecasting or natural disasters.
- ✓ Roaming facility for the mobile system not only in the earth but also in the entire planet.
- ✓ Zero delay time in streaming videos.
- ✓ Nanotechnology can be improved efficiently.
- ✓ Communication can be possible without utilizing any frequency spectrum.
- ✓ Mobile system will communicate with the human brain to know human preferences and thinking.
- ✓ Ever seen and every imaginable growth for cloud computing and Internet of Things.

(b) Benefits of 6G:

- ✓ User can able to do all activities from a single place.
- ✓ User can able to avail all services in a single place or location through his/her mobile device.
- ✓ Comfortable and luxurious services.
- ✓ Robotic system can be controlled using mobile.
- ✓ Sea to space communication can be possible through a mobile handset.

- ✓ Natural disaster like an earthquake, Tsunami can be controlled using 6G.
- ✓ Home based ATM can be developed and controlled using the mobile handset.
- ✓ 6G can be effectively used in space and defense technology for better and quick communication
- ✓ Expected to produce energy from other galaxies.
- ✓ Like Smart cities, smart home, smart office, and smart village can be developed.
- ✓ Satellite to satellite communication can be achieved for the fair or good purpose of mankind.

(c) Constraints of 6G:

- ✓ No proper research and technology in 6G are developed so far.
- ✓ Complex requirement becomes very costly and difficult to achieve.
- ✓ Multiple standard and multiple requirements as of now and Global standard or standard authorities are not available.
- ✓ Requirement to provide eco-friendly services.
- ✓ Energy wastage should be zero percentage
- ✓ Expected to provide less costly services with high efficiency or quality.
- ✓ Expected to provide same speed for any services while on move or in still.

(d) Disadvantages of 6G:

- ✓ Satellite or any advanced communications can be used for diverse disaster applications.
- ✓ Possible failure of many requirements.
- ✓ Possible failure of new technology due to non-acceptability from customers.
- ✓ Needs complicated infrastructure including software and hardware.
- ✓ The speed 6G technology claiming is may be difficult to achieve.
- ✓ No global standard or authorities will result in different requirements by different countries.
- ✓ Difficult to implement in underdeveloped and developing countries due to high cost.

6. Anticipated Timeline of Wire-less ICT Generations:

The timeline of ICT generations depends on the development of core and related technologies and their commercialization and acceptance for usage in the society. Based on possible developments of core & related technologies and their penetration to society the anticipated timeline is predicted as is given in table 3. The growth of mobile technology continues until it reaches the characteristics of ideal technology and ideal systems characteristics as discussed in various ideal systems research [48 - 59].

Table 3: ICT generations & Time line

S.No	ICT Generations	Core and Related Technologies	Timeline
1	1 G	AMPS (Advanced Mobile Phone Service), Analog Technology, Circuit switching	1981-1985
2	1.5 G	CDMA (Code Division Multiple Access), Analog Technology, Circuit switching	1986-1991
3	2.0 G	TDMA (Time division Multiple Access), PDA (Personal Digital Cellular), Digital Technology, Circuit switching	1992-1995
4	2.5 G	CDMA (Code Division Multiple Access) , GSM (Global System For Mobile Communication), Digital Technology, Circuit switching, packet switching for data transfer	1996-2000
5	3.0 G	WCDMA (Wideband Code Division Multiple Access), CDMA-2000, TD-SCDMA(Time division synchronous Code Division Multiple Access), Circuit switching and packet switching	2001-2011

6	4.0 G	IP based packet switching, IP telephony	2012-2020
7	5.0 G	Unified IP and Seamless combinations of broadband, IP broadband	2020-2030
8	6.0 G	GNSS (Global Navigation Satellite System)	2030 & Beyond

7. Conclusion:

In this paper, we discussed the changing perspectives of 4G, 5G and further anticipated 6G wireless technologies. The 4G technology allows the downloading speed of 100Mbps and features such as Multi-Media Newspapers, T.V programs with the clarity as to that of an ordinary T.V. The demand of higher security and authentication of users for the secured transaction of financial data demanded further development in ICT through 5G technologies. 5G technology also provides inter-working between different technologies like LTE, Bluetooth, WiFi, LoWPan and others, to cross layer design in wireless technology. 5G is not a simple evolution of 4G technology and is an overall wireless solution and expected to be implemented between 2020 and 2030. This paper also contains the information and discussion on what is the possible 6G in mobile information communication technology? What are its features, functions, benefits, and timeline? Which are the new technologies will support the development of this most anticipated technology which is going to revolutionize the society as most developed civilian society. It is expected that the anticipated 5G technology time duration id 2020 to 2030 and 6G technology may prevail in the society beyond 2030 which has characteristics close to Ideal Communication System.

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