

# Comparative Study of different Mobile Technology

Ms Sindhu S Pandya

Laxmi Institute of Commerce and Computer Application, Sarigam (BCA Department)  
E-mail: [sindhuhilai@yahoo.com](mailto:sindhuhilai@yahoo.com)

---

**Abstract**—Mobile communications is developing at a booming speed, with advanced techniques emerging in all the fields. In a cellular network, each cell uses a different set of frequencies from neighbouring cells, to avoid interference and provide guaranteed bandwidth within each cell. In this paper we review the architecture and functionality of wireless cellular technologies namely First, Second, Third, Fourth and Fifth Generations based on their portals, performance, advantages and disadvantages. The significance of this study is evaluated for a fast and effective connection and communication of devices.

**Keywords:** Cellular network, data rates, interfacing, mobile communications, packet switching mode, remote server, wireless networks.

## 1. INTRODUCTION

3G is the third generation of mobile phone standards and technology and represents one of the biggest opportunities the business world has ever seen, increasing the potential of mobile internet combining a camera, video camera, computer, stereo, MP3 player and radio into one device.

Mobile broadband is becoming a reality as the internet generation grows accustomed to having broadband access wherever they go, and not just at home or in the office. The majority of people are served by HSPA (High Speed Packet Access) and LTE (Long Term Evolution) Networks. With HSPA send and receive video or music using 3G phones.

The fifth generation communication system is envisioned as the real wireless network, capable of supporting wireless World Wide Web (www) applications. There are two views of 5G systems: evolutionary and revolutionary. In the evolutionary view the 5G systems will be capable of supporting the www allowing a highly flexible network such as Dynamic Adhoc Wireless Network. In revolutionary view, 5G systems would be an intelligent technology capable of interconnecting the entire world without limits. An example application could be a robot with in-built wireless communication with artificial intelligence.

## 2. EVALUATION OF WIRELESS NETWORK STUDIES

The nomenclature of the cellular wireless generations generally refers to a change in the fundamental nature of the service.

- a) 1G: First generation refers to the analog “brick phones” and “bag phones” as they were first introduced for mobile cellular technology, originated in the 1980s. Analog systems were based on circuit-switched technology and designed for voice, not data. Roaming was not possible and the efficient use of frequency spectrum was not possible. 1G refers to the first generation of wireless telephone technology, mobile telecommunications. The analog telecommunications standards that were introduced in the 1980s.
- b) 2G: 2G emerged in late 1980s. It uses digital signals for voice transmission and has speed of 64 kbps providing facility of SMS and use the bandwidth of 30 to 200 KHz. The second generation, 2G system, fielded in the late 1980s and finished in the late 1990s, was planned mainly for voice transmission with digital signal and the speeds up to 64kbps. 2G wireless cellular mobile services was a step ahead of 1G services by providing the facility of short message service (SMS) unlike 1G that had its prime focus on verbal communication. The bandwidth of 2G is 30 – 200 KHz.
- c) 3G: 3G wireless technology represents the convergence of various 2G wireless telecommunications systems into a single global system that includes both terrestrial and satellite components. One of the most important aspects of 3G wireless technologies is its ability to unify existing cellular standards, such as CDMA, GSM and TDMA under one umbrella. 3G is the third generation of mobile phone standards and technology. 3G technologies have enabled faster data transmission speeds, greater network capacity and more advanced network services. In May 2001, NTT DoCoMo launched the first pre-commercial 3G network- branded as FOMA. 3G offers a vertically-integrated, top-down, service-provider approach to

delivering wireless internet access. 3G is a technology for mobile service providers. Mobile services are provided by service providers that own and operate their own wireless networks and sell mobile services to end-users.

- d) 4G: 4G is a conceptual framework, a high speed wireless network that can transmit multimedia and data and interface with wire-line backbone network. 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. 4G is a wireless access technology. It will be the successor of 3G.
- e) 5G: The 5G terminals will have software defined radios and modulation schemes as well as new error-control schemes that can be downloaded from the internet. The terminals will have access to different wireless technologies at the same time and the terminal will be able to combine different flows from different technologies. In 5G, each network will be responsible for handling user-mobility, while the terminal will make the final choice among different wireless/mobile access network providers for a given service. Such choice will be based on open intelligent middleware in the mobile phone. 5G technology stands for fifth generation provide affordable broadband wireless connectivity. Currently 5G term is not officially used. Fifth generation focus on VOIP-enabled devices that user will experience a high level of call volume and data transmission.

### 3. DIFFERENTIATION BETWEEN 3G AND 4G

3G is currently the world's best connection method when it comes to mobile phones, and especially for mobile internet. The biggest difference between 3G and 4G is in the existence of complaint technologies. 3G includes EVDO, HSPA and WCDMA where as 4G includes LTE, WiMax, UMB. 3G technologies use a hybrid of circuit switching and packet switching. Circuit switching is a very old technology that has been used in telephone systems for a very long time. Packet switching is a technology that is very prevalent in computer networks but has since appeared in mobile phones as well. The efficiency of packet switching allows the mobile phone company to squeeze more conversations into the same bandwidth. 4G technologies would no longer utilize circuit switching even for voice calls and video calls. It uses only packet switching network.

### 4. FEATURES OF 3G:

3G telecommunications is a generation of standards for mobile phones and mobile telecommunication services fulfilling the International Mobile Telecommunications. Application services include wide area wireless voice telephone, mobile Internet access, video calls and mobile TV, all in a mobile

environment. It allows operators to provide users a bigger range of the latest services, as it gets bigger network capacity via heightened spectral efficiency. The included services are video calls, wide-area wireless voice telephone and broadband wireless information all included within the mobile environment.

### 5. COMPARISON OF ALL GENERATIONS OF MOBILE TECHNOLOGIES

Technology → Features ↓	1G	2G	3G	4G	5G
Start/Deployment	1970-1980	1990-2004	2004-2010	Now	Soon
Data Bandwidth	2Kbps	64Kbps	2Mbps	1Gbps	Higher than 1Gbps
Technology	Analog Cellular Technology	Digital Cellular Technology	CDMA 2000	WiMax LTE Wi-Fi	WWW
Service	Mobile Telephony	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 NW	Internet	Internet

### 6. APPLICATIONS OF 4G

Virtual Presence: This means that 4G provides 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.

1. Tele-Medicine: 4G 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.
2. Tele-Geoprocessing 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.

## 7. ADVANTAGES OF 5G COMMUNICATION SYSTEMS:

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.

1. User personalization: high data transfer rates and ubiquitous coverage of 5G networks would provide users access to large repository of data and services and can filter these data and services as per their preferences by configuring the operational mode of their devices, so that they can preselect the service features they want to use.
2. High performance and interoperability: Low transfer rates of 4G restrict the user's ability to take advantage of the rich multimedia contents across the wireless networks.
3. Intelligent Networking: 4G is based on cell or base station WAN design. 5G aims at building hybrid networks utilizing both the wireless LAN concept and WAN design.

## 8. THREATS OF 5G IMPLEMENTATION:

The following threats are expected from the application implementation of 5G network:

1. 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.
2. Since 5G is a secure IP based solution it will be vulnerable to all the security threats.
3. Spoofing attacks can lead to misdirected communication and internet banking related frauds.

## 9. CONCLUSION

The study shows though 2G provide services that are good and high data speed at low cost, and call rates are at low tariff but the data speed is comparatively low. But 3G provide high rate of data access and some exclusive services that were not provided by previous versions like 3G video calling. The smart phones are more compatible to 3G services as the applications on a smart phone require high data speed.

The last few years have witnessed the phenomenal growth of wireless generations. There is ever increasing demands of the cellular networks which motivated the researchers and industrialists to come up with 4G mobile communication. 1G has fulfilled the basic mobile voice using analog techniques, while 2G has introduced capacity and coverage using digital techniques. This is followed by 3G, which has the quest for data at higher speeds to open the gates for truly "Mobile Broadband" experience, which will be further realized by the 4G. 4G will provide better-than-TV quality images and video links. The communication model has new developed versions of HTML, Java, GIF, HTTP and many more. 5G technologies include all type of advanced features which makes 5G technology most powerful and in huge demand in near future.

4G seems to be a very promising generation of wireless communication that will change the people's life to wireless world. The advent of 5G will revolutionize the field of communication domain, bringing wireless experience to a completely new level. It will provide wealth of features and services making the world a smaller place to live. The mobile terminals of the 5G have more processing power and more memory on board.

## REFERENCES:

- [1] Vijay K. Garg Ph.D., P.E. – camuel halpern M.S, and Kenneth F. Smolik, Ph. D, P.E. –Third Generation (3G) Mobile Communication System.
- [2] [en.wikipedia.org/wiki/History\\_of\\_mobile\\_phones](http://en.wikipedia.org/wiki/History_of_mobile_phones)
- [3] [en.wikipedia.org/wiki/3G](http://en.wikipedia.org/wiki/3G)
- [4] K.Kumaravel Assistant Professor Dept. Of Computer Science, Dr N.G.P. Arts and Science College, Coimbatore, India- 641048 Comparative study of 3G and 4G in mobile technology
- [5] S. Chatterjee, W.A.C Fernando, M.K. Vasantha, "Adaptive modulation based MC CDMA systems for 4G wireless consumer applications," Consumer Electronics, IEEE Transactions on , Volume 49, Issue 4, Nov 2003.
- [6] F.G.Bria, 4<sup>th</sup> Generation Wireless Infrastructures: Scenarios and Research Challenges, IEEE Personal Communications, 2010
- [7] Pereria, Vasco & Sousa, Tiago. "Evolution of Mobile Communications: from 1G to 4G", Department of Informatics Engineering of the University of Coimbra, Portugal 2004.
- [8] Mobile Technology: Evolution from 1G to 4G, Electronics for you, June 2003.