



STUDY ON 5G WIRELESS COMMUNICATION SYSTEM

Srishti Mishra^{*1}, Rakesh Patel², Chhaya Mehar³

¹*Student, B.E. (IT) Kirodimal Institute of Technology, Raigarh (C.G.), India.

²Lecturer, Department of Information Technology Kirodimal Institute of Technology Raigarh (C.G.), India.

³Student, B.E. (IT) Kirodimal Institute of Technology, Raigarh (C.G.), India.

*Correspondence Author: mishra.srishti1994@gmail.com

Keywords: 1G, 2G, 3G, 4G, 5G and Super Core.

Abstract

There is a rapid advancement in wireless communication technology providing the network services. Mobile wireless technologies have experience 4 or 5 generations of technology revolution and evolution, namely from 0G to 4G. Current research in mobile wireless technology concentrates on advance implementation of 4G technology and 5G technology. Currently 5G term is not officially used. In 5G researches are being made on development of World Wide Wireless Web (WWW), Dynamic Adhoc Wireless Networks (DAWN) and Real Wireless World.

Introduction

Mobile wireless industry has started its technology creation, revolution and evolution since early 1970s. In the past few decades, mobile wireless technologies have experience 4 or 5 generations of technology revolution and evolution, namely from 0G to 4G. The cellular concept was introduced in 5G Technology stands for 5th Generation Mobile technology. 5G technology has changed the means to use cell phones within very high bandwidth. 5G Technology stands for fifth Generation Mobile technology. From generation 1G to 2.5G and from 3G to 5G this world of telecommunication has seen a number of improvements along with improved performance with every passing day. This fast revolution in mobile computing changes our day to day life that is way we work, interact, learn etc. This paper also focuses on all preceding generations of mobile communication along with fifth generation technology. Fifth generation network provide affordable broadband wireless connectivity (very high speed). The paper throws light on network architecture of fifth generation technology. Currently 5G term is not officially used. In fifth generation researches are being made on development of World Wide Wireless Web (WWW), Dynamic Ad hoc Wireless Networks (DAWN) and Real Wireless World. Fifth generation focus on (Voice over IP) VOIP-enabled devices that user will experience a high level of call volume and data transmission. Fifth generation technology will fulfill all the requirements of customers who always want advanced features in cellular phones. The main features in 5G mobile network is that user can simultaneously connect to the multiple wireless technologies and can switch between them. This forthcoming mobile technology will support IPv6 and flat IP. Fifth generation technology will offer the services like Documentation, supporting electronic transactions (e-Payments, e-transactions) etc.

Evolution

Mobile communication has become more popular in last few years due to fast revolution in mobile technology. This revolution is due to very high increase in telecoms customers. This revolution is from 1G- the first generation, 2G- the second generation, 3G- the third generation, and then the 4G- the fourth generation, 5G- the fifth second generation.

First generation (1g)

1G emerged in 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 analog radio signal which have frequency 150 MHz, voice call modulation is done using a technique called Frequency-Division. Multiple at all since voice calls were played back in radio towers, making these calls susceptible to unwanted eavesdropping by third parties [3].

Second generation (2g)

2G emerged in late 1980s. It uses digital signals for voice transmission and has speed of 64 kbps. It provides facility of SMS (Short Message Service) and use the bandwidth of 30 to 200 KHz. Next to 2G, 2.5G system uses packet switched and circuit switched domain and provide data rate up to 144 kbps. E.g. GPRS, CDMA and EDGE [3]

Third generation (3g)

It uses Wide Band 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[3].

Fourth generation (4g)

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 [3]. LTE (Long Term Evolution) is considered as 4G technology. 4G is being developed to accommodate the QoS and rate requirements set by forthcoming applications like wireless broadband access, Multimedia Messaging Service (MMS), video chat, mobile TV, HDTV content, Digital Video Broadcasting (DVB), minimal services like voice and data, and other services that utilize bandwidth

Fifth generation (5g)

5G Technology stands for 5th Generation Mobile technology. 5G mobile technology has changed the means to use cell phones within very high bandwidth. User never experienced ever before such a high value technology. Nowadays mobile users have much awareness of the cell phone (mobile) technology. The 5G technologies include all type of advanced features which makes 5G mobile technology most powerful and in huge demand in near future. A user can also hook their 5G technology cell phone with their Laptop to get broadband internet access. 5G technology including camera, MP3 recording, video player, large phone memory, dialing speed, audio player and much more you never imagine. For children rocking fun Bluetooth technology and Pico nets has become in market.

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

Generation	1G	2G	2.5G	3G	3.5G	4G	5G
Start	1970-1980	1990-2000	2001-2004	2004-2005	2006-2010	2011-Now	Soon (2020)
Data Bandwidth	2 Kbps	64 Kbps	144 Kbps	2 Mbps	More than 2 Mbps	1 Gbps	more than 1 Gbps
Technology	Analog Cellular	Digital Cellular	GPRS, EDGE, CDMA	CDMA 2000 (1xRT, EVDO) UMTS, EDGE	EDGE, Wi-Fi	WiMax LTE, Wi-Fi	www
Service	Voice	Digital Voice, SMS, Higher Capacity Packet Size Data	SMS, MMS	Integrated High Quality Audio, Video & Data	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	CDMA	CDMA
Switching	Circuit	Circuit, Packet	Packet	Packet	All Packet	All Packet	All Packet
Core Network	PSTN	PSTN	PSTN	Packet N/W	Internet	Internet	Internet
Handoff	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal & Vertical	Horizontal & Vertical

5G technology is going to be a new mobile revolution in mobile market. Through 5G technology now you can use worldwide cellular phones and this technology also strike the china mobile market and a user being proficient to get access to Germany phone as a local phone. With the coming out of cell phone alike to PDA now your whole office in your finger tips or in your phone. 5G



technology has extraordinary data capabilities and has ability to tie together unrestricted call volumes and infinite data broadcast within latest mobile operating system. It can handle best technologies and offer priceless handset to their customers. 5G Technologies have an extraordinary capability to support Software and Consultancy. The Router and switch technology used in 5G network providing high connectivity. The 5G technology distributes internet access to nodes within the building and can be deployed with union of wired or wireless network connections.

Key Concepts of 5G

- Real wireless world with no more limitation with access and zone issues [15].
- Wearable devices with AI capabilities.
- Internet protocol version 6 (IPv6), where a visiting care-of mobile IP address is assigned according to location and connected network.
- One unified global standard.
- High altitude stratospheric platform station (HAPS) systems.
- 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 [15].
- 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 [15].

Why need of 5G?

- Very High speed, high capacity, and low cost per bit [7].
- It supports interactive multimedia, voice, video, Internet, and other broadband services, more effective and more attractive, and have Bi-directional, accurate traffic statistics [7].
- 5G technology offers Global access and service portability.
- It offers the high quality services due to high error tolerance.
- It is providing large broadcasting capacity up to Gigabit which supporting almost 65,000 connections at a time.
- More applications combined with artificial intelligent (AI) as human life will be surrounded by artificial sensors which could be communicating with mobile phones [6].
- 5G technology use remote management that user can get better and fast solution.
- The uploading and downloading speed of 5G technology is very high.
- 5G technology offer high resolution for crazy cell phone user and bi-directional large bandwidth shaping [3].
- 5G technology offer transporter class gateway with unparalleled consistency [3].

Features of 5g technology

- 5G technology offer high resolution for crazy cell phone user and bi-directional large bandwidth Shaping.
- The advanced billing interfaces of 5G technology makes it more attractive and effective.
- 5G technology also providing subscriber supervision tools for fast action.
- The high quality services of 5G technology based on Policy to avoid error.
- 5G technology is providing large broadcasting of data in Gigabit which supporting almost 65,000connections [15].
- 5G technology offer transporter class gateway with unparalleled consistency.
- The traffic statistics by 5G technology makes it more accurate.
- Through remote management offered by 5G technology a user can get better and fast solution.
- The remote diagnostics also a great feature of 5G technology.
- The 5G technology is providing up to 25 Mbps connectivity speed.
- The 5G technology also support virtual private network.
- The new 5G technology will take all delivery service out of business prospect
- The uploading and downloading speed of 5G technology touching the peak.
- The 5G technology network offering enhanced and available connectivity just about the world.

Conclusion

5G technology going to be a new mobile revolution in mobile market. Through 5G technology now you can use worldwide

[http:// www.gjesrm.com](http://www.gjesrm.com) (C) Global Journal of Engineering Science and Research Management



cellular phones and this technology also strike the china mobile market and a user being proficient to get access to Germany phone as a local phone [13]. The development of the mobile and wireless networks is going towards higher data rates and all-IP principle. Mobile terminals are obtaining each year more processing power, more memory on board, and longer battery life for the same applications. 5g include latest technologies such as cognitive radio, SDR, nanotechnology, cloud computing and based on All IP Platform.

Reference

1. *5G WIRELESS ARCHITECTURE-2010*” By Vadan Mehta.
2. Amos Edward Joel (Bell Labs), “Cellular Mobile Communication System.”
3. en.wikipedia.org/wiki/5G.
4. *5G-network-architecture-huawei*
5. <http://123seminaronly.com/Seminar-Reports/012/63854282-5G.pdf>
6. *5G Mobile Phone Technology*” from www.pediain.com