



ORIGINAL RESEARCH PAPER

Computer Science

5th GENERATION WIRELESS CELLULAR NETWORKS NEED FOR INDIAN CITIZEN AS 21st CENTURY TECHNOLOGY

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ABSTRACT

In this paper I have explained the 5th Generation wireless cellular networks technology which is very popular in India as 21st century technology with much more myths for against Indian government spread by unknown citizens in 2022-23. As per current existing Indian cellular networks system we are very much behind than world latest technologies. During COVID-19 time most of the offices, industries, markets and education systems totally depends on online work scenario. The information and communication technology played vital role to performed virtual workplace as real system. Online working, teaching, studying increased after COVID-19 but the demand increased for high bandwidth cellular networks. Now the days IT companies starts their 20 to 30 percent works as works from home.

1. INTRODUCTION:

First of all the wireless communication has started in early 1970s. In next four decades, a wireless mobile technology has evolved from 1st Generation to 5th Generation generations. 5th generation wireless technology offer very high bandwidth data speed over the network with high mobility of moving devices and vehicles that user never experienced before. The 5th generation technologies offer various new advanced features which makes it most powerful and in huge demand in the future. Now days different wireless and mobile technologies are present such as 3rd generation mobile networks, LTE (Long Term Evolution), WiFi (IEEE 802.11 wireless networks), WiMAX (IEEE 802.16 wireless and mobile networks), as well as sensor and adhoc networks, or personal area networks. Mobile terminals include variety of interfaces like GSM which are based on circuit switching. All wireless and mobile networks implements all- IP principle, that means all data and signaling will be transferred via IP (Internet Protocol) on network layer. 5th generation technology provide facilities like smart camera, MP3 live streaming recording, live video player, large phone memory storage, live audio player etc. that user never imagine and for children rocking fun with Bluetooth technology.



Fig-1: Wireless Network and Communication System

The 5th generation wireless mobile networks can be completely wireless communication without limitation, which makes perfect wireless real world – World Wide Wireless Web (WWW). 5th generation is based on 4th generation technologies and overcome its limitations with high bandwidth. The 5th generation wireless mobile internet networks are real wireless world which shall be supported by LAS- CDMA (Large Area Synchronized Code Division Multiple Access), OFDM (Orthogonal frequency division multiplexing), MCCDMA (Multi Carrier Code Division Multiple Access), UWB (Ultra wideband), Network-LMDS (Local Multipoint Distribution Service), and IPv6. 5th generation technologies offers tremendous data capabilities and unrestricted call volumes and infinite data broadcast together within latest mobile operating system. 5G should make an important difference and add more services and benefits to the world over 4th generation. 5th generation should be more intelligent technology that interconnects the entire world without limits. This generation currently

launched in metropolitan cities of India and spread 100% all over India i.e. small town and villages till 2024.

2. 5th GENERATION JOURNEY A MILESTONE:

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.

1st Generation Networks

1G emerged in 1980s. It contains Analog System and popularly known as cell phones. It introduces mobile technologies such as Mobile Telephone System, Advanced Mobile Telephone System, Improved Mobile Telephone Service, and Push to Talk. It uses analog radio signal which have frequency 150 MHz, voice call modulation is done using a technique called Frequency-Division Multiple Access. 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.

2nd Generation Networks

2G emerged in late 1980s. It uses digital signals for voice transmission and has speed of 64 kbps. It provides facility of SMS 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

3rd Generation Networks

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.

4th Generation Networks

4th generation downloading speed of 100Mbps and 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. 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.

Table-1: Comparative of 5G Destination Journey

CONTENT	1G	2G	3G	4G	5G 100%
Origin	1970	1990	2004	NOW	2024
Bandwidth	2kbps	64kbps	2Mbps	1Gbps	>1Gbps
Multipl exing	FDMA	TDMA	CDMA	CDMA	CDMA
Switching Technique	CIR CUIT	CIR CUIT	PACKET	ALL PACKET	ALL PACKET
Network Type	PSTN	PSTN	PACKET	INTERNET	INTERNET

3. 5th GENETATION INFRASTRUCTURE

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 Infrastructures 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 with remote reconfiguration data from RRD attached to Reconfiguration Data models. 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/GERAN to 3G/UTRAN and 4G/EUTRAN in addition to 802.11x WLAN and 802.16x WMAN. Other standards are also enabled such as IS/95. Interoperability process-criteria and mechanisms enable both terminal and RMTc to select from heterogeneous access systems.

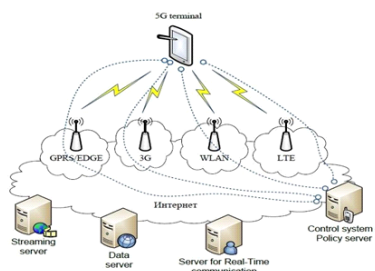


Fig-2: 5th Generation Wireless Network Infrastructure

4. IMPORTANCE OF 5th GENERATION WIRELESS NETWORKS:

- Very High bandwidth, high mobility, high capacity, and low cost per bit.
- It supports interactive live multimedia, voice, video, Internet, and other broadband services, more effective and more attractive, and have Bi- directional, accurate traffic statistics.
- 5th generation technology offers Global access and service portability. It offers the high quality services due to high error tolerance.
- 5th generation technology use remote management that

user can get better and fast solution.

- The uploading and downloading speed of 5G technology is very high.
- 5th generation technology offer high resolution for crazy cell phone user and bi-directional large bandwidth shaping.
- It is providing large broadcasting capacity up to Gigabit which supporting almost 70,000 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.

5. REAL TIME SYSTEM NEED HIGH BANDWIDTH AS 5G

In the modern time which is totally devoted to ICT and technology growing era, need smart appliances and devices like motor car, equipments and other peripherals that used daily basis and real time system. We need smart home, smart refrigerator, smart watch with computer features, smart class rooms, smart vehicle etc. need high bandwidth wireless networks technology

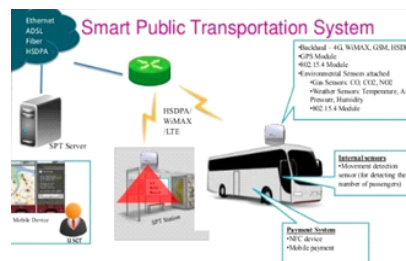


Fig-3: Real Time Smart Transportation System

6. CONCLUSION AND FUTURE SCOPE:

In 21st century modern world need high bandwidth wireless cellular networks technology which come over all the previous limitation and the Indian citizen can enjoy virtual world scenario which can realize the work from home culture.

REFERENCES

1. Ganesh R. Patil and Prashant S.Wankhade, 5G wireless Technology, IJCSMC, Vol. 3, Issue. 10, October 2014.
2. Tripathi, Rajak and Shrivastava, Role of 5G Networks: Issues, Challenges and Applications, IJEAT ISSN: 2249-8958 (Online), Volume-8 Issue-6, August, 2019
3. T.Venkat Narayana Rao, 5g technologies – an anecdote of network service for the future , Journal of Global Research in Computer Science Volume 2 No (7), July 2011 164-170.
4. Mudit Ratana Bhalla. Generations of Mobile Wireless Technology - A Survey, International Journal of Computer Applications (0975 – 8887) Volume 5–No.4, August 2010
5. Vasavi Bande, Mounika Marepalli, Leepika Gudur Evolution of 4G-Research Directions Towards Fourth Generation Wireless Communication , International Journal of Computer Science and Information Technologies , Vol.2 (3) , 2011, 1087-1095.