International Journal of Electrical Electronics & Computer Science Engineering
Special Issue - NCSCT-2018 | E-ISSN : 2348-2273 | P-ISSN : 2454-1222
March, 2018 | Available Online at www.ijeecse.com

Comparative Analysis of LTE (4G), 3G, 2G, 1G Review Paper

Dr. Megha Gupta[1], Ankit Kumar Shah[2]
[1]Associate Professor, [2]UG Scholar, Department of CSE, Poornima Institute of Engineering & Technology, Jaipur
[1]megha.gupta@poornima.org, [2]2014pietcsankit011@poornima.org

***Abstract:** As innovation is expanding step by step, the need of remote advances is additionally expanding. A remote innovation is ceaselessly an intrigue zone that is creating at an incredible speed, with cutting edge systems starting in every one of the fields of remote innovation. Remote innovation is an alluring region of innovation improvement of our age. For that improvement is group predominantly by the change of a correspondence medium for supporting media transmission into a correspondence medium for supporting different administrations , likes the transmission of the pictures, recordings, content, and information portions. The meaning of the correlation think about is to locate a successful association and correspondence of remote gadgets. In this paper accord with the near examination of remote cell advancements in particular characterize for various distinctive age. Worldwide System for Mobile correspondences or GSM utilizes advanced regulation to enhance voice nature of correspondence framework yet the system offers constrained information benefit. [1]*

***Keywords:** Data Rate, Wireless Technology, 2G/3G, LTE, Wimax, Wireless Coexistence.*

I. INTRODUCTION

Remote innovation and Wireless correspondences is an alluring region of innovation improvement of our age. Also, that portable correspondence innovation is moving in a pitiless, yet two write industry juggernauts of that innovation framework: LTE(4G) and Wi-Fi. The ingestion of the Internet of Things (IoT) world into both 4G and Wi-Fi advances makes this remote maze much harder to get around. In the IT business' Mobile and remote systems innovation have made repulsive development over the most recent couple of years. Right now numerous cell phones are fitted with a WLAN connector framework. With help IP for both 2.5G and 3G Public Land Mobile Networks (PLMN) In the age of 1G portable system frameworks were simple or semi-simple, that came in mid 1980s - they were additionally called NMT (Nordic Mobile Telephone). They offered predominantly discourse and related administrations. 1G correspondence organize alludes to simple cell innovations. Next development of remote correspondence innovation was 2G that indicates second era. It signifies beginning advanced frameworks, presenting, for example, short informing and lower speed information rate. Further age came as 3G, that misused zone of Wideband-CDMA WWS(W-CDMA), that zone gave great data transmission. Time of broadband remote. This really taking shape and have been effectively conveyed in just some piece of the world. Next further age came (LTE) 4G, that use in information administrations. In LTE(4G) is no different voice channel and the data transmission use of more extensive transfer speed.

II. EVOLUTION OF WIRELESS TECHNOLOGY

A remote innovation is a radio system appropriated zones called cells, Where every phone served by no less than one settled area handset, known as base station. In remote innovation, every cell utilizes an alternate arrangement of frequencies shape its adjacent cells, to dodge obstruction and give data transfer capacity.

Fig. 1.

1. First Generation (1G):

For the original (1G) of versatile correspondence innovation in view of the simple flagging. A simple framework created by North America, that know as simple cell phone framework (AMPS).An simple framework fundamentally in light of circuit-exchanged framework. numerous foundations had not institutionalizing a Wireless innovation. Because of the reality of a portable system interchanges framework showcase was sectional and the system framework was handle an administration office. In any case, a great development originated from Nordic nations (Denmark, Finland, Iceland, Norway, and Sweden), which was deciding a portable correspondences innovation.

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Fig. 2.

The original (1G) versatile interchanges organize advancements had constrained scope, certain administration organizations and clients in extraordinary enterprises .In the 1960s and 1970s,that administration was graphically restricted and the cell phone framework was too expensive, so it was generally riding in vehicles. In the 1970s, nations were centered around building across the country landline correspondences arrange in that give portable administrations amid 1970s without considering innovation institutionalization for future IT markets. In this way, the current self-sorted out synthesis of the business before the 1G was divided.

Fig. 3.

2 Second Generation (2G):

The second generation introduced a new variant to communication, that know for Digital Network. In the 1990s, the 'second generation' (2G) of digital network, mobile phone systems emanate, primarily using the GSM standard. Initially on GSM networks system and ultimately on all digital networks. The surge in mobile phone usage the result of 2G was bursting. For benefits of 2G were Digital signals require less battery power, so it helps mobile batteries to long. Digital system coding improves the voice clarity and reduces noise. Digital network encryption has provided secrecy.

Fig. 4.

Basically main aims was to provide a system that would be permit greater capacity to be achieved than to last generation (1G).

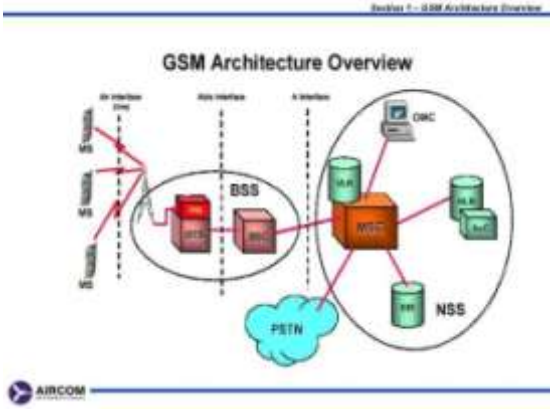

Fig. 5.

GSM mobile communication network design by mainly three subsystem, The mobile station (MS), The base station sub-system (BSS) . The system and exchanging sub-system (NSS) . In the portable correspondence the interface characterized between every one of sub-framework that characterize as 'An' interface b/w NSS and BSS,'Abis' interface b/w BSC and BTS and 'Um' air interface b/w BSS and Ms.

3. Third Generation (3G)

Third era (3G) remote innovation speaks to the converging of different 2G remote correspondences that incorporates both mainstream and shuttle segments. In 3G remote advancements that most imperative parts of bring together existing cell principles, for example, CDMA, GSM, and TDMA that The accompanying air interface achieves this outcome: wideband CDMA, CDMA2000 and the Universal Wireless Communication (UWC-136) interface. Wideband CDMA is appropriate with the current 2G GSM systems predominant and that requires transfer speed of between 5 MHz and 10 MHz.

Fig. 6.

Next interface is CDMA2000 that remain for CDMA IS-95, that the standard type of CDMA200 and utilized of interface CDMA200. The third interface, Universal Wireless Communications (UWC-136). Third era (3G)

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comprise of a Radio Access Network (RAN) and a center system and the center system comprises of a bundle exchanged area and CGF is additionally part of the center system framework. RAN usefulness is free from the center network. [6]

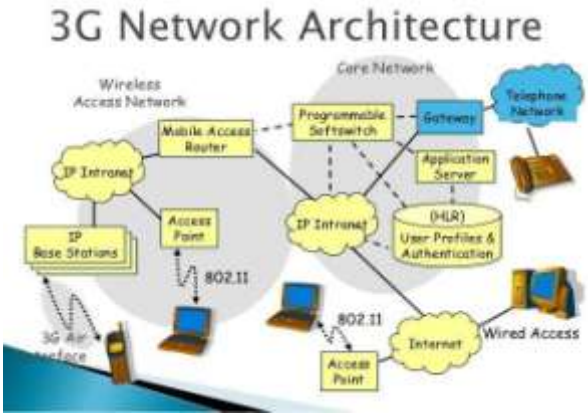


Fig. 7.

Band (Frequency) type	Narrow band	Narrow band	Wide band	Ultra Wide Band
Carrier frequency	30 KHZ	200 KHz	5 MHz	15 MHz
Advantage	Simpler (less complex) network elements	Multimedia features (SMS, MMS), Internet access and SIM introduced	High security, international roaming	Speed, High speed handoffs, MIMO technology, Global mobility
Disadvantages	Limited capacity, not secure, poor battery life, large phone size, background interference	Low network range, slow data rates	High power consumption, Low network coverage, High cost of spectrum licence	Hard to implement, complicated hardware required
Applications	Voice Calls	Voice calls, Short messages, browsing (partial)	Video conferencing, mobile TV, GPS	High speed applications, mobile TV, Wearable devices

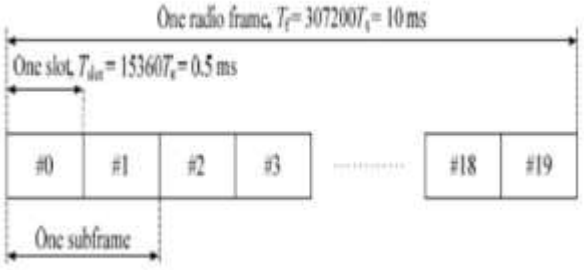
3G remote advancements more noteworthy security than 2G antecedents. In the 3G arrange foundation security, end-to-end security is advertised. A basic security parameter (CSP) is utilizing a cryptography to process encryption capacities. For the security information incorporates passwords, security codes. [6][5]

4. Fourth Generation (4G/LTE):

4G (LTE) is synonymous with Long Term Evolution (LTE) remote innovation, that is an advancement of the 3G remote innovation. Which LTE is a propelled type of 3G that denotes a bold move from half and half information to an information just IP arrange. There are basically two key advances that empower LTE administrations to accomplish higher information throughput : MIMO and OFDM. Orthogonal recurrence division multiplex (OFDM) is a transmission procedure that uses an in mass number of firmly dispersed transporters that are regulated. Numerous info various yield (MIMO) procedure another propel information throughput and phantom effectiveness. By utilizing various reception apparatuses at the transmitter and collector. The LTE(4G) standard uses both duplex tasks: Frequency division duplex (FDD) and time division duplex (TDD). In LTE(4G) have essentially two sort of casing structure i.e. downlink and uplink.

Its most elevated amount perspective of 36.211 for FDD LTE is as per the following. It just shows structure perspective of one casing in time area. It doesn't speak to any structure in recurrence domain. [3]

Table I.



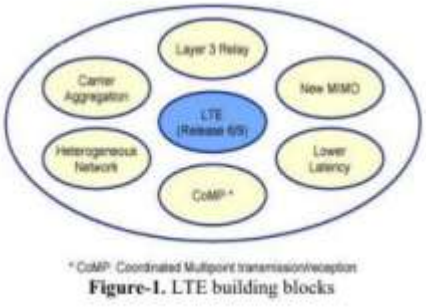


Figure-1. LTE building blocks

4G (LTE) engineering formed by 3GPP into various distinctive security System parameter. System area security, to ensure the system components and secure the flagging and client information trade.

Client space security, to control the protected access to portablestationsApplication space security, to build up secure interchanges over the application layer. Perceivability and arrangement of security, convey the open door for the client to check if the security highlights are in task. In the fourth Generation of correspondence innovation that the Consideration and execution of these all security upgrading measures are optional to the numerous LTE partners including MNOs. promote irregularities in security execution among MNOs.

III. COMPARISON BETWEEN 1G, 2G, 3G, LTE (4G)

The Generation of portable correspondence innovation (G, 2G, 3G and 4G) is allude to age of remote innovation. The fresher age is speedier, and more secure. 1G was in simple innovation (AMPS), and 2G are transmitted in computerized design in GSM and CDMA remote technologies.[4]

Table 2.

Parameters	1G	2G	3G	4G
Image				
Name	1st Generation Mobile Network	2nd Generation Mobile Network	3rd Generation Mobile Network	4th Generation Mobile Network
Introduced in year	1980s	1993	2001	2009
Location of first commercialization	USA	Finland	Japan	South Korea
Technology	AMPS (Advanced Mobile Phone System), NMT, TACS	IS-95, GSM	IMT2000, WCDMA	LTE, WiMAX
Multiple Address/Access system	FDMA	TDMA, CDMA	CDMA	CDMA
Switching type	Circuit switching	Circuit switching for Voice and Packet switching for Data	Packet switching except for Air Interface	Packet switching
Speed (data rates)	2.4 Kbps to 14.4 Kbps	14.4 Kbps	3.1 Mbps	100 Mbps
Special Characteristic	First wireless communication	Digital version of 1G technology	Digital broadband, speed increments	Very high speeds, All IP
Features	Voice only	Multiple users on single channel	Multimedia features, Video Call	High Speed, real time streaming
Supports	Voice only	Voice and Data	Voice and Data	Voice and Data
Internet service	No Internet	Narrowband	Broadband	Ultra Broadband
Bandwidth	Analog	25 MHz	25 MHz	100 MHz
Operating frequencies	800 MHz	GSM: 900MHz, 1800MHz CDMA: 800MHz	2100 MHz	800 MHz, 1800 MHz

IV. CONCLUSION

There are different extraordinary development of remote age that have been seen over the most recent couple of years. As specified in the most recent decade observer to an amazing development in the system correspondence. The expanding requests of clients activated research. The standard expanding interest of the cell arrange spurred to investigate in industry and to concoct fourth generation(4G) portable correspondence. The historical backdrop of the versatile correspondence demonstrates that numerous endeavors have been made to decrease the quantity of innovations to a flag worldwide standard. The original (1G) is satisfy the simple strategy while the second era (2G) has presented computerized system. This was trailed by the third era (3G), which has mission for information at higher speed to open the doors genuinely portable data transfer capacity which will be additionally discharged by fourth era. 4G will be give better quality picture and video interfaces The correspondence demonstrate has new created variants of HTML, JAVA, HTTP and some more. The fivth generation(5G) is guarantees to bring higher information exchange speeds (coming to up to one gigabits for each sec.[7]

V. REFERENCES

[1] F. Williams, Ericsson, "Fourth Generation Mobile," In Acts Mobile Summit99, Sorrento, Italy, June 1999.

[2] Jun-Zhao Sun, Jaakko Sauvola, And Douglas Howie, "Features In Future: 4g Visions From A Technical Perspective," In IEEE, 2001.

[3] Nabeel Ur Rehman, Asad Asif, Junaid Iqbal, "3G Mobile Communication Networks", In Explore Summer 2006.

[4] Third Generation (3G) Wireless White Paper, Trillium Digital Systems, Inc. March 2006.

[5] Amit Kumar, Dr. Yunfei Liu , Dr. Jyotsna Sen Gupta, Divya, "Evolution Of Mobile Wireless Communication Networks 1G to 4G", International Journal Of

[6] Electronics & Communication Technology, IJECT Vol 1, Issue 1, Dece- Mber 2010.

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