ISSN No. 0976-5697

Volume 8, No. 5, May – June 2017

International Journal of Advanced Research in Computer Science

RESEARCH PAPER

Available Online at www.ijarcs.info

Upcoming 5G Wireless Technology and its Security Concept

Mohammad Sadique Ansari
Department-Computer Science
Jamia Hamdard University
New Delhi

Jawed Ahmed
Department-Computer Science
Jamia Hamdard University
New Delhi

Abstract: The abbreviation of 5G technology is fifth generation technology. Today globalization in telecommunication has seen lots of improvements like 0G, 1G to 2.5G and from 3G to 5G. 5G is a major phase of mobile telecommunication beyond 4G standard. 5G technology is not currently commercially used for any country of the world. 5G supported voice over IP (VOIP) enabled devices. The advantages of 5G technology are that users can simultaneously connect to the multiple wireless devices. The aim of 5G planning is to provide the higher density of mobile broadband users and supporting device-to-device ultra-reliable and massive machine communications and lower latency than 4G and lower battery consumption for better implementation of the internet of things.5G wireless technology is depend on IEEE 802.11 wireless technology. Wireless local area network (WLAN) wireless metropolitan area (WLAN) and AD-hoc wireless technology are included in 5G wireless technology. This paper covers the security of 5G wireless technology. The main aim is to provide protection of 5G wireless technology

Keywords:5G, Generation of wireless technology, Architecture of 5G Requirements of 5G, Security of 5G

I. INTRODUCTION

The wireless communication system has introduced in themid-1970s.Presently unique portable advances are available, for example, third generation mobile network (UMTS) general versatile media transmission frameworks like LTE and WIFI. [5] The world's first research center of 5G technology was introduced in 2012 by the government of UK at University of Surrey.5G technology provide very high bandwidth and allowing a higher density of mobile broadband users. The 5G wireless network should be bolstered by LAS-CDMA (large Area Synchronized Code-Division Multiple Access) MCCDMA (Multi-Carrier Code Division Multiple Access) OFDM (Orthogonal Frequency Division Multiple Access) UWB (Ultra-wideband) and IPv6. [5] Today's need is uninterrupted internet access to get information fastest communication system to interconnect with each other.5G is a complete wireless communication with almost no limitations so 5G technology can be called REAL WIRELESS WORLD. 5G technology has high transmission speed and less traffic more attractive and effective Bi-directional and fast solution. The connectivity speed of 5G technology is 25Mbps and uploading and downloading speed of 5G technology up to 1Gbps.the remote diagnostics is an incredible characteristics of 5G technology. The router and switch used in 5G technology provide connectivity. [8]5G technology provides high resolution for cell phone users. The main hardware of 5G technology use Ultra Wide Band (UWB) network with high bandwidth as low energy levels and use small antennas.

5G network expected to facilitate mobility symmetrical and asymmetrical data transmission, broadband connectivity anywhere anytime at any place with any device. 5G technology was providing subscriber supervision tools for fast action. To avoid from error 5G technology used high-quality service. 5G technology broadcasting a large amount of data in Gigabit and supporting almost 65000 connections at a time. The transporter class gateway 5G is un paralleled consistency. The traffic statistical data of 5G make it more accurate. By using 5G technology, user can get the fast solution. 5G technology additionally bolsters Virtual Private Network (VPN The new 5G innovation will give all conveyance benefit business prospect. 5G operates with the 5Ghz signal. 5G wireless technology has almost no any limitation and which makes 5G isolated wireless communication. [7] The main hardware of 5G are UWB networks smarter antennas multiplexing etc. [7] The main software of 5G are software define radio, packet layers implementation of packets encryption flexibility and virus.[7] The prediction to launch 5G all around the world is 2020. [5]

II . GENERATION OF WIRELESS TECHNOLOGY

Most recent couple of years mobile communication is more well-known because of the upheaval in wireless technology This insurgency is because of the high increment in telecoms clients. This revolution starts from 1G-the first generation,2G- the second generation,3G- the third generation,4G- fourth generation, and then the 5G- fifth generation. The fifth generation is the latest generation of wireless technology, but the fifth generation is not commercially used.

A.0G (Zero Generation)

Wireless technology was started from 0G. It belongs to pre-cell phone mobile technology. [2]There are many technologies used in 0G such as PTT (Push to talk) MTS (Mobile Telephone system), IMTS (Improved Mobile Telephone system), AMTS (Advanced Mobile Telephone system), OLT (Norwegian for offending land mobile Telephony public land mobile Telephony) and MTD (Mobile Telephony system D) [12]

B.1G (First Generation)

1G introduced in 1980s.1G is basically based on Analog system and known as cellphones1G utilizes analog radio signal which has frequency 150MHZ. Voice call tweak is finished by (Frequency Division Multiple Access) FDMA. 1G Wireless telecommunication contains many cells, and same frequency can be reused many times thus result is the great spectrum and increased the system capacity. The speed of 1G was up-to 2.4Kbps. 1G uses different mobile technologies like Mobile Telephone System (MTS) Advance Mobile Telephone Systems (AMTS) [5] push to Talk (PTT) and Improved Mobile Telephone System (IMTS). The first 1G cellular network was introduced in Japan by Nippon Telegraph and Telephone (NTT) in 1979.

C.2G (Second Generation)

2G was introduced in the last of 1980 and finalize in last 1988s. This is basically planned for voice transmission, and digital signal 2G technology is more efficient the speed of 2G is up to 64Kbps. The bandwidth is 32 to 200Khz. [1] The main facility provided by 2G is short message service(SMS) .2G technologies are may be time division multiple access(TDMA) or code division multiple

access(CDMA) [3] CDMA and TDMA are digital multiple access technologies. If we compare to the first generation than we found that 2G has excellent data services and advance roaming services. [1]

D.3G (Third Generation)

3G was introduced in 2001s. The transmission speed of 3G is from 125 Kbps to 2Mbps. In 3G data packets are sent with the help of switching technology. In 3G voice calls are define through circuit switching.3G operates at 2100Mhz and bandwidth of 15-20Mhz. [4] The first commercial 3G system was presented by NTT Do Co Mo in Japan which depends on W-CDMA innovation.[11] 3G provide very high-speed internet service video chatting, Mobile T.V, Multimedia messaging service and 3D gaming. We can access many services such as GLOBAL ROAMING with the help of 3G.

E.4G (Fourth Generation)

The first successful experiment for 4G was organized in the capital of Japan on June 23rd, 2005. [1] 4G is also called as LTE (Long Term Evolution). The speed of 4G is 100Mbps. The services provided by 4G is multimedia newspapers to watch T.V Programs, and transmission of data is faster than 3G. [6] Some applications of 4G are Mobile T.V, Video on demand, video conferencing, Mobile Wi-MAX; Location based services, Mobile ultra-broadband access and multi-carrier transmission [4]

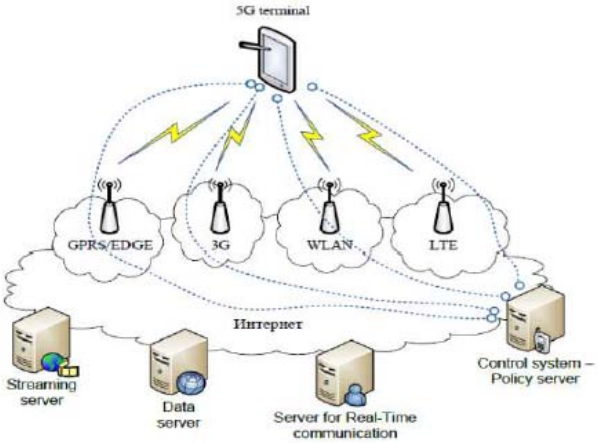
F.5G (Fifth Generation)

5G is a latest wireless technology, and it is based on IEEE 802.11ac. 5G is based on system performance business models and management and operations, user experience, enhance services. [12] All types of advanced features are included in 5G wireless technology which makes it most powerful in future. 5G completely bolstered World Wide Wireless Web (WWWW). 5G technology provide transporter class gateway along with unparalleled consistency.5G technology makes more precise of traffic management. [9]This latest technology Provide every propelled highlight of Mobile telephones like dialing pace, distributed storage, Mp3 recording, HD downloading and a great deal progressively that client had never observed. [10]

[Figure 1] Generation of wireless technology [12]

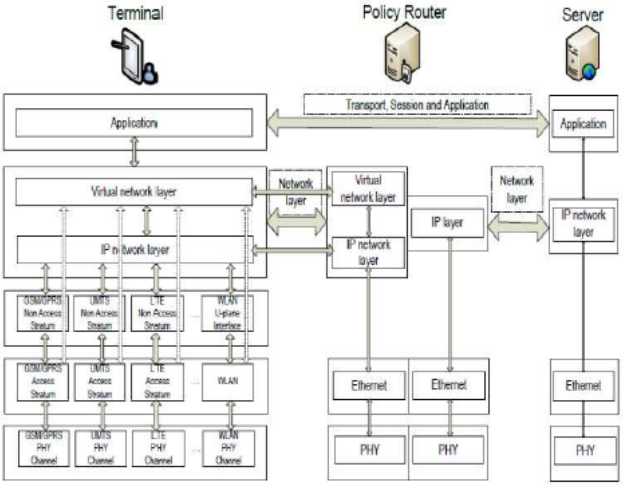
III. ARCHITECTURE OF 5G WIRELESS TECHNOLOGY

The features of 5G architecture are highly advanced. The network and various terminals of 5G are commonly promoting a new situation. Such as service provider adopt the value - added service efficiently. [14] As shown in figure 2. The working model of 5G is totally IP-based model. 5G is basically designed for mobile and wireless network. [14]



[Figure 2] Architecture of 5G [14]

The above system consists of a main user terminal and number of independent and autonomous radio access technologies. Each of the radio technologies is used to connect IP link through outside internet world. The IP technology is basically designed in such a manner to control for proper routing of IP packets belongs to particular application connections i.e. sessions between client applications and servers around the Internet. [14] Furthermore to generate accessible routing of packets must be fixed in according to with the given policies of the users (as shown in figure 3)

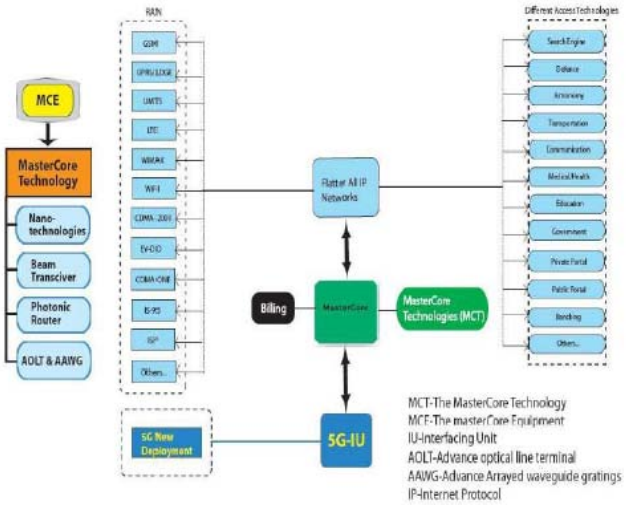


[Figure 3] protocol layout for the Elements of the 5G Architecture [14]

THE MASTER CORE OF 5G TECHNOLOGY

5G Master Core is getting to point for alternate advances, which have their individual effect on the previous remote system. The outline of ace center encourages to get worked into parallel multimode including all IP network and additionally 5G network mode. From figure 4 we can understand that it handles all network technologies of RAN and Different Access Networks (DAT) .so we can say that the technologies are suitable and manages all the new network elements of 5G. It is more and more efficient, less complex and more powerful. Any service mode can be opened with the help of world combination service mode. WCSM is a

magnificent component of Master Core Technology of 5G.for case An educator composes on the white board in a nation - it can be seen on another white board in any nation of the world other than sound and video. Another main characteristic of Master core of 5G is we can easily add any latest new services with the help of parallel multimode services



[figure 4] Master core diagram of 5G [13]

IV REQUIREMENTS OF 5G WIRELESS TECHNOLOGY

There are some requirements of 5G

- 1-10Gbps associations with end focuses in the field (i.e. not hypothetical most extreme).[17]
- I millisecond end-to-end round trek delay (inertness)
- 1000x transfer speed per unit territory.[17]
- 10-100x number of associated gadgets
- (perception of) 99.999% accessibility
- (perception of) 100% scope
- 90% decrease in system vitality use
- Up to 10year battery life for low power, machine-sort gadgets. [17]

V SECURITY MECHANISM OF 5G WIRELESS TECHNOLOGY

There are mainly six major modules of security architecture of 5G technology such as-

A.UNIFIED AUTHENTICATION MODULE

It runs on the second layer of OSI Models such as wireless network and wired network. It can fulfill all the criteria of 5G implementation. It meets all the requirement of Intra-AP, Inter-AP mobility support resource. It also supports physical network resource. [3]

B.EXTENSIBLE ADDITIONAL AUTHENTICATION MODULE

In group authentication one to one type of authentication takes place, but it is no longer possible. It considers group authentication which allows simultaneously authenticate all the device in the network. In multifactor authentication, we mainly target to unlock the mobile code. [3].

C. ENCRYPTION MODULE

In this process, handshake mechanism is used to get encryption keys to unlock the encrypt data frames. It also includes TKIP, WPA (Wi-Fi protected access) and AES (WAP2) Encryption TKIP (Temporal Key Integrity Protocol) provides support to legacy of 5G equipment and AES (Advanced Encryption Standard)

D. UAM (unified access modular) FOR USE OF INTER OPERABILITY ENERGY MAINTAINANCE AND POLICY REQUIREMENT QOS TOPOLOGY AND NETWORK ABSTRACTION

It meets all the requirement of interoperability energy resource and policy requirement topology discovery mechanism is used to distributed network. Network abstraction is used in the implementation of unified access module. [3] The interface design in such manner that it holds all the physical network resources and support higher level interfaces of resources. It also controls the virtual networks through the complexity and characteristic of the physical network resource

E.IDS (INTRUSION DETECTION SYSTEM) SUPPORT ROUGE AP ACCESS OVER FUTURE 5G AND LOCATION BASED ACCESS DEVICE IDENTITY ACCESS

The function of IDS is intrusion detection from all connected access point and reports attacked are detected by Wireless Lan Controller (WLC). It provides AP solution. It can detect all rouge devices by observing beacons. Dynamic ad hoc wireless network supports device to device access points.it does not able to control the base station, so central nodes are free to move in any direction. It provides access point between the terminal device that communicates directly instead of the base station.

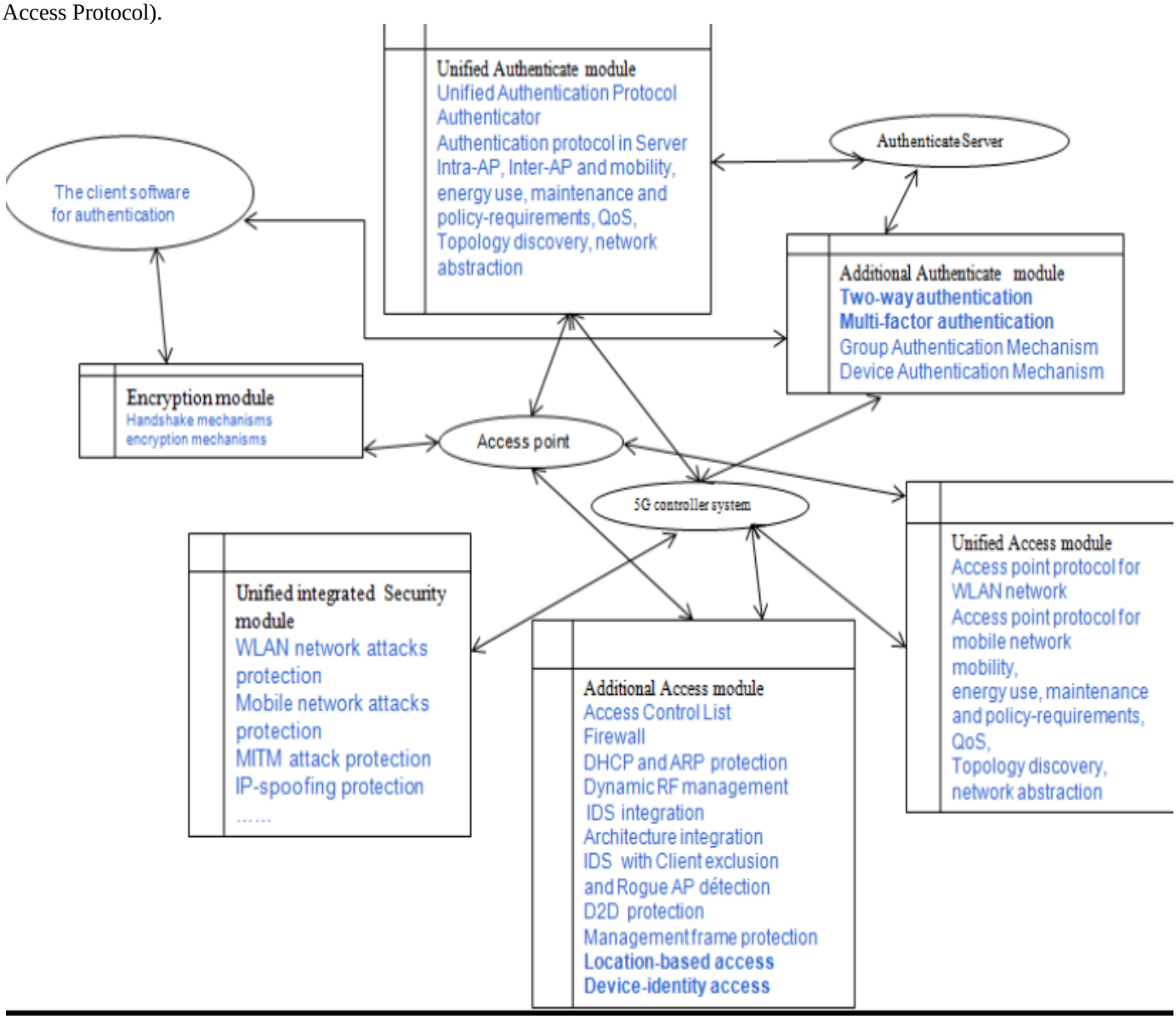
F. UNIFIED INTEGRATED SECURITY MODULE this module is split into following parts

WLAN network attacks from protection- basically security of port to limit a wireless (MAC) flooding attack by locking the port and sending an SNMP (Simple Network Management Protocol) trap and use DHCP (Dynamic Host Configuration Protocol) snooping to provide security and maintaining DHCP, snooping binding table and penetrating untrusted DHCP messages [3]

The mobile network attack protection-the reason of the establishment of the connection to the mobility is to solve the various existing attacks. Mobile network attacks keep attacks based on GSM (Global System for Mobile Communication) network because of the policy of security through obscurity. The hacker may try to break encryption algorithm and tracing the mobile terminals difficult since each time the mobile terminal is accessed by the network for the attack. The goal of the attacker is trying to spy on Wi-Fi communication to extract information through the principle of Bluetooth base attack because unregistered services do not need of authentication and accessible application has a virtual serial port to control the phone. An attacker needed to hack the port to full control on the device.

ARP-based MITM attack protection- An address resolution protocol (ARP) request is to misdirect traffic to an infected computer. It can be solved by dynamic ARP check- up which is very useful in wireless deployments where many SSIDs/VLANs present on H-REAP (Hybrid Remote Edge Access Protocol).

IP was snooping attack protection- IP snooping attack steal the IP address of another user to execute DOS (Denial of service) attack. It can be escaped by IP source group which allows the switch to filter any traffic coming from the wireless user that does not match an entry in the DHCP binding tables. [3]



[Figure 5] security mechanism of 5G wireless technology[3]

VI APPLICATION OF 5G WIRELESS TECHNOLOGY

1) 5G is helpful in genuine remote world with less constraint with get to and zone issues.

2) Internet convention adaptation 6 (IPv6), where a meeting consideration of portable IP deliver is doled out as per area and associated arrange.

3) Wearable gadgets with AI capacities.

4) High elevation stratospheric platform station (HAPS) frameworks. The radio interface of 5G correspondence Frameworks in recommended in a Korean innovative work program to be founded on Beam Division Multiple Access (BDMA) and gathering agreeable transfer procedure. [6]

5) Cognitive radio technology, otherwise called brilliant radio: enabling diverse radio advances to have a similar range effectively by adaptively finding unused range and adjusting the transmission plan to the prerequisites of the advances as of now sharing the range. [5]

6) One brought together worldwide standard.

VII FUTURE SCOPE OF 5G WIRELESS TECHNOLOGY

The future change of Nano - center will be staggering as it joins with artificial intelligence (AI). Anybody can ready to control his clever robot utilizing his mobiles telephones. Mobile can automatically type the messages what your brain think [4]. In future 5G technology can

think as 6th sense technology.5G innovation will give super and flawless usage of cell correspondence in future.5G will reliable to use and more effective cost, promising generation. 5G will monitor any place of the world from anywhere. The main future scope for 5G technology is that the possibility of communication between planets (which means a person on earth can communication with astronaut on some other planet by using his mobile) without any delay.5G Wireless technology going to be another versatile transformation in Mobile market.

VIII CONCLUSION

In this Paper we understand that 5G is quick and reliable.. 5G generation technology provides amazing data capabilities and without barrier calls volumes and infinite number of data broadcast together within latest mobile operating system. 5G ought to be more wise innovation that interface the entire world unbounded.5G technology has a brilliant future since it can deal with best advancements and also offer extremely valuable handset to their clients. This era is required to be presented around 2020. 5G (fifth generation) all IP platforms based on cognitive radio, SDR, Nano, cloud computing and are included in the latest technologies. This paper is also covers the 5G wireless security mechanism to meet the increasing security mechanism. We study the security issues of the existing wireless technology and conclude that it is more efficient from any threats.

IX. ACKNOWLEDGMENT

I would like to thank the Jamia Hamdard University for every support in writing this paper. We also like to thank the faculty of Computer Science and Engineering

X. REFERENCES

[1] 5G- future generation technologies of wireless communication “revolution 2020” by Manjural H.Khan and P.C. Barman published in American Journal of Engineering Research Vol-4, Issue-5, PP-206-215, 2015

[2] 0G to 5G Mobile Technology : A Survey by Haard Mehta, Darpit Patel, Bhumik Joshi, Hardik Modi Published in Journal of Basic and Applied Engineering Research Vol-1, Nov 6: Oct, 2014

[3] Unified security architecture research for 5G wireless system by Qi Fang Zhang weijie wang Gujun and Fang Hui published in Web Information System and Application conference 2014

[4] 5G Wireless Technologies- Still 4G auction not over, but time to start talking 5G by Ms. Neha Dumbere, Ms. Monali Patwa, Ms. Kajal Patwa Published in International Journal of Science, Engineering and Technology Research, Vol-2, Issues-2, Feb-2013

[5] 5G-Mobile Technology by Ms.Reshma S.Sapakal and M.s Sonali S. Kadam published in International Journal of Advanced Research in computer Engineering & Technology Vol-2, Issues-2, Feb 2013

[6] Study Of Recent Development in 5G wireless Technology by Dheeraj Gandala Published in International Journal Of Electronics and Comunication Engineering And Technology vol-4, Issue-5, Sep-Oct 2013

[7] Key concept and network architecture for 5G Mobile Technology by S.Sapna and S.Pratap Published in International Journal of Scientific Reserarch Engineering and Technology (IGSRET) Vol-1 Issue-5 PP 165-170 AUG 2012

[8] 5G technology- Redifining wireless Communication in upcoming years by Akhilesh Kumar Pachauri 1 and Ompal Singh Published in International Journal of Computer Science and Management Research Vol-1 Issue-1 Aug 2012 ISSN 2278-733X

[9] Evolution of Network by Jay R Churi, T Sudish , Surendran ,Shreyas, Ajay Tugdi Published in International conference in Advanced in Communication and Computing Technology 2012

[10] Key Concept and network Architecture For 5G Mobile Technology by Singh ,Sapna, and Pratap Singh Published in International Journal of Sientific Research Engineering and Technology 1.5 (2012): 165-170

[11] An "LTE Advanced " the 4G Mobile Broadband Technology by Parikh, J. And Basu Published in International Journal Of Computer Application 13 (5): 17-21

[12] Evolution of Mobile Wireless Communication Networks 1G to 4G by Kumar Amit, Dr Yunefi Liu and Jyotsna Sengupta.Divya published in International Journal of Electronics &Communication Technology, IJECT 1.1 (2010)

[13] www.googlemap.com

[14] http//www.tutorialspoimt.com/5g/5g architecture

[15] “5G Mobile phone Technology” from www.pediain.com

[16] http://selise.ch/5g-mobile-technology

[17] Understanding 5G:perspectives on future technological advancments in mobile

