A Study of Access Technology in Wireless WWW

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Abstract- Presently days, the researchers in ghastly recurrence of cell correspondence are all the more concentrating in change the new development innovation to give better viability and solace to the cell clients. This paper elucidates the headway of Wireless World Wide Web designing, measures, and course of action from 4G-5G convenient frameworks with unmistakable quality on present and future examples in the districts of remote frameworks organization, media advancement, framework development displaying, and framework organizations. It also clears up the assorted times, redesigns in 5G when stood out from 4G and other cell propels.

Keywords: Wireless World Wide Web technology, 5G mobile networks, solace cell and framework.

I. INTRODUCTION

Wireless communication is the reassign of information over a distance without the use of improved electrical conductors i.e., "wires". The distances implicated may be short (a few meters as in television remote control) or long (thousands or millions of kilometers for radio communications). When the circumstance is clear, the term is often shortened to "wireless". It encompasses various types of fixed, mobile, and portable two-way radios, cellular telephones, Personal Digital Assistants (PDAs) and wireless networking. In 1895, Guglielmo Marconi[3] opened the way for modern wireless communications by transmitting the three-dot Morse code for the letter 'S' over a distance of three kilometers using electromagnetic waves[2]. From this beginning, wireless communications has developed into a key element of modern society. Wireless communications have some special characteristics that have motivated focused studies. First, wireless communications relies on a scarce resource – namely, radio spectrum state. Second, use of spectrum for wireless communications required the development of key complementary technologies; especially those that allowed higher frequencies to be utilized more efficiently [1,2].

The 4G and 5G generation wireless mobile systems anticipated to provide global roaming across the world different types of wireless and mobile networks, for case of point from satellite to mobile networks and to Wireless Local Area Networks (WLANs) [6,7]. 4G is an all IP-based mobile network using dissimilar radio access technologies providing perfect roaming and providing connection via always the best available network. The visualization of 4G wireless mobile systems is the provision of broadband access, at faultless global roaming, and Internet, data and voices at everywhere, utilize for "suitable" always best connected technology[4]. 4G systems are expected to offer a speed of over 100 Mbps in stationary mode and an average of 200Mbps for mobile stations reducing the download time of multimedia and graphics components by more than ten times compared to currently available 2 Mbps on 3.5G systems.

The 5G generation communication system is envisioned as the real wireless network, capable of behind the Wireless World Wide Web (WWWW) [10]. Hear there are two views of 4.5G systems: i) Evolutionary and ii) Revolutionary. In Evolutionary view the 4.5G (or beyond 4G) systems will be capable of supporting wwww allowing a highly flexible network such as a Active Adhoc Wireless Network (AAWN) [8,9]. In Revolutionary view, 4.5G systems should be an intelligent technology capable of interconnecting the entire world without limits it's called as Wireless World Wide Web (wwww). The 5G system is still a primarily research and expansion upon 4G. The challenges for development of 4.5G systems depend upon the evolution of different fundamental technologies, standards and exploitation [5]. First we explain the evolutionary process from 1G to 5G in light of used technologies and business demands. Next, we discuss the architectural developments for 1G-5G systems and discussion on standards. Finally, we concentrate on achievement of 5G technology.

II. EVOLUTION OF NETWORK GENERATIONS (1G – 5G)

A. Zero Generation Technology (0G –0.5G):

0G refers to pre-cellular technology in 1970s. These mobile telephones were typically mounted in cars or trucks; these all are briefcase models. Mobile radio telephone systems preceded modern cellular mobile telephony technology. Since they were the predecessor of the first generation of cellular telephones, these systems are sometimes referred to as 0G (zero generation) systems. These technologies used in 0G systems incorporated PTT (Pull to talk), MTS (Mobile Telephone System), EMTS (Enhanced Mobile Telephone Service), SMTS (Superior Mobile Telephone System) and MTD. 0.5G is a group of technologies with enhanced

feature than the basic 0G technologies. These early on mobile telephone systems can be illustrious from earlier closed radio telephone systems in that they were available as a commercial service that was part of the public switch telephone.

B. First Generation Technology (1G):

In 1980 the mobile cellular time had started. The First-generation mobile systems worn analog transmission for talking services. In 1979, the first cellular system in the world became outfitted by Nippon Telephone and Telegraph (NTT) in Tokyo and Japan. These systems offered handover and roaming capabilities but the cellular networks were unable to interoperate between countries. This was one of the inevitable disadvantages of first-generation mobile networks. In the United States, the Superior Mobile Phone System (SMPS) was launched in 1982. The system was allocated a 40-MHz bandwidth within the 800 to 900 MHz frequency range. The first deployed in Chicago, with a service area of 2100 square miles. SMPS offered 832 channels, with a data rate of 10 kbps. Although Omni directional antennas we are used in the earlier SMPS implementation, it was realized that using directional antennas would yield better cell reuse. In fact, the smallest reuse factor that would fulfill the 18db signal-to-interference ratio (SIR) using 120-degree directional antennas was found to be 7. Hence, a 7-cell reuse pattern was adopted for SMPS. Transmissions from the base stations to mobiles occur over the forward channel using frequencies between 869-894 MHz. The reverse channel is used for transmissions from mobiles to base station, using frequencies between 824-849MHz.The Traffics multiplexed onto an FDMA (frequency division multiple access) system.

C. ***Second Generation 2G:***

In 1991, Second generation 2G cellular telecom networks were commercially launched the GSM standard in Finland. The primary benefits of 2G networks over 1G predecessor were that phone conversations were digitally encrypted. 2G systems were significantly more efficient on the spectrum allowing for far greater mobile phone penetration levels; and 2G introduced data services for mobile, starting with SMS text messages. 2G technologies enabled the various mobile phone networks to provide the services such as text messages, picture messages and MMS (Multi Media Messages). After 2G was launched, the previous mobile telephone systems were retrospectively dubbed 1G. While radio signals on 1G networks are analog, radio signals on 2G networks are digital. Both systems use digital signaling to connect the radio towers (which listen to the handsets) to the rest of the telephone system.

D. 2.5G –GPRS (General Packet Radio Service):

2.5G, which stands for "second and a half generation," is a cellular wireless technology developed in between its predecessor, 2G, and its successor, 3G. The term "second and a half generation" is used to describe 2Gsystems that have implemented a packet switched domain in addition to the circuit switched domain. "2.5G" is an informal term, invented solely for marketing purposes, unlike "2G" or"3G" which are officially defined standards based on those defined by the International Telecommunication (ITU). GPRS could provide data rates from 56 kbit/s up to 115 kbit/s. It can bused for services such as Wireless Application Protocol (WAP) access, Multimedia Messaging Service (MMS), and for Internet communication services such as email and World Wide Web access. GPRS data transfer is typically charged per megabyte of traffic transferred, while data communication via traditional circuit switching is billed per minute of connection time, independent of whether the user actually is utilizing the capacity or is in an idle state.2.5G networks may support services such as WAP, MMS, SMS mobile games, and search and directory

E.2.75G – EDGE (Enhanced Data rates for GSM Evolution):

EDGE (EGPRS) is an abbreviation for Enhanced Data rates for GSM Evolution, is a digital mobile phone technology which acts as a bolt-on enhancement to 2G and 2.5G General Packet Radio Service (GPRS) networks. This technology works in GSM networks. EDGE is a superset to GPRS and can function on any network with GPRS deployed on it, provided the carrier implements then necessary upgrades. EDGE technology is an extended version of GSM. It allows the clear and fast transmission of data and information. It is also termed as IMT-SC or single carrier. EDGE technology was invented and introduced by Cingular, which is now known as AT& T. EDGE is radio technology and is a part of third generation technologies. EDGE technology is preferred over GSM due to its flexibility to carry packet switch data and circuit switch data.

F. Third Generation Technology (3G – 3.75G):

The third generation, as the name suggest, follows two previous generations. The Early SMPS networks used Frequency Division Multiplexing Access (FDMA) to carry analog voice over channels in the 800 MHz frequency band. 3G technologies enable network operators to offer users a wider range of more advanced services while achieving greater network capacity through improved spectral efficiency. Services contain wide area wireless voice telephony, video calls, and broadband wireless data, all in a mobile environment. The High-Speed Packet Access (HSPA) is a collection of mobile telephony protocols that extend and advance the performance of existing UMTS protocols. The basic feature of 3G Technology is fast data transfer rates. 3G technology is much flexible, because it is able to support the five major radio technologies. These radio technologies operate under CDMA, TDMA and FDMA.

G. 3.5G – HSDPA (High-Speed Downlink Packet Access):

High-Speed Downlink Packet Access (HSDPA) is a mobile telephony protocol, also called 3.5G (or"3½G"), which provides a smooth evolutionary path for UMTS-based 3G networks allowing for higher data transfer speeds. HSDPA is a packet-based data service in W-CDMA downlink with data transmission up to 8-10 Mbit/s (and 20 Mbit/s for MIMO systems) over a 5MHz bandwidth in WCDMA downlink. HSDPA implementations includes Adaptive Modulation and Coding (AMC), Multiple-Input Multiple-Output (MIMO), Hybrid Automatic Request (HARQ), fast cell search, and advanced receiver design.

H. 3.75G – HSUPA (High-Speed Uplink Packet Access):

The 3.75G refer to the technologies beyond the well-defined 3G wireless/mobile technologies. High-speed Uplink Packet Access (HSUPA) is a UMTS / WCDMA uplink evolution technology. The HSUPA mobile telecommunications technology is directly related to HSDPA and the two are gracious to one another. HSUPA will enhance advanced person-to-person data applications with higher and symmetric data rates, like mobile e-mail and real-time person-to person gaming. Traditional useful applications along with many consumer applications will benefit from enhanced uplink speed. HSUPA will initially boost the UMTS / WCDMA uplink up to 1.4Mbps and in later releases up to5.8Mbps.

I. ***Fourth Generation(4G):***

4G refers to the fourth generation of cellular wireless standards. It is an heir to 3G and 2G families of standards. The categorization of the generations usually refers to a change in the fundamental nature of the service. The spread spectrum transmission and at least 200 kbit/s, and it's estimated to be follow by 4G, which refers to all-IP packet-switched networks, mobile ultra-broadband (Gigabit Speed) access and multi-carrier transmission. Pre-4G technologies such as mobile WiMAX and first-release 3G Long Term Development (LTD) have been available on the market since 2006 and 2010 respectively. It is basically the extension in the 3G technology with more bandwidth and services offers in the 3G.The expectation for the 4G technology is basically the high quality audio/video streaming over end to end Internet Protocol. (IP). The WiMAX or mobile structural design will become progressively more translucent, and therefore the recognition of several architectures by a particular network operator ever more common.

J. Key concepts of 5g:

The key concepts discussing 4.5G and beyond 4G wireless communications are:

- ✓ Real wireless world with no more limitation with access and zone issues.
- ✓ Wearable devices with AI capabilities.
- ✓ Internet protocol version 6(IPv6).
- ✓ One unified global standard.
- ✓ Technologies can be a 2.5G, 3G, 4G or 5G mobile networks.
- ✓ Cognitive radio technology, also known as smart radio
- ✓ High altitude stratospheric platform station (HAPS) systems.

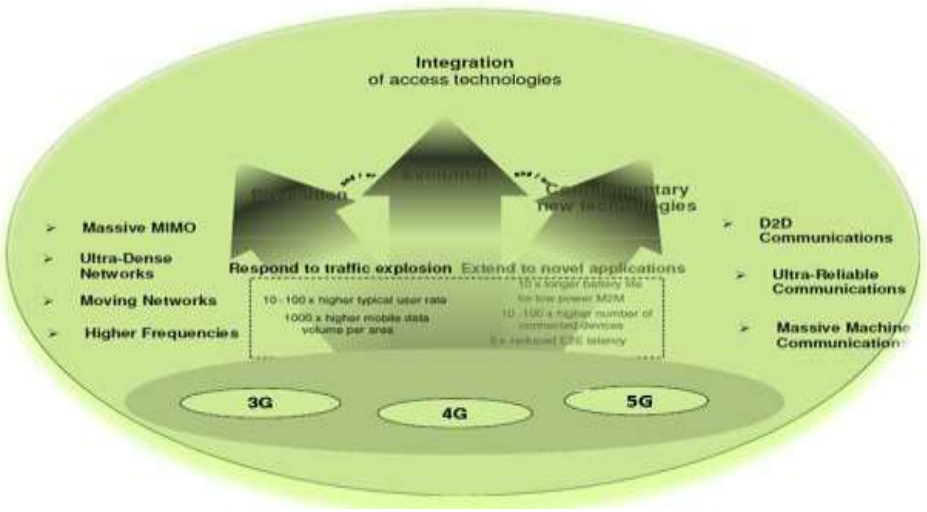

Figure 1: Integration of access technology

III. NETWORK ARCHITECTURE

At figure 2 shows a diagram of the architecture of a cellular system. It provides an idea of the different apparatus in the network. In the radio access subsystem, the mobile station (MS), sometimes called user equipment is the device whose position is to be determined. Base stations (BSs – also called Node Bs) are fixed transmitters that are points of access to the rest of the network. A MS communicates with a BS during idle periods (signaling), cellular phone calls (voice) or other data transmission. Base stat ions are controlled by radio network controllers (RNCs) that also manage the radio resources of each BS and MS (frequency channels, time slots, spread spectrum codes, transmit powers, and so on).

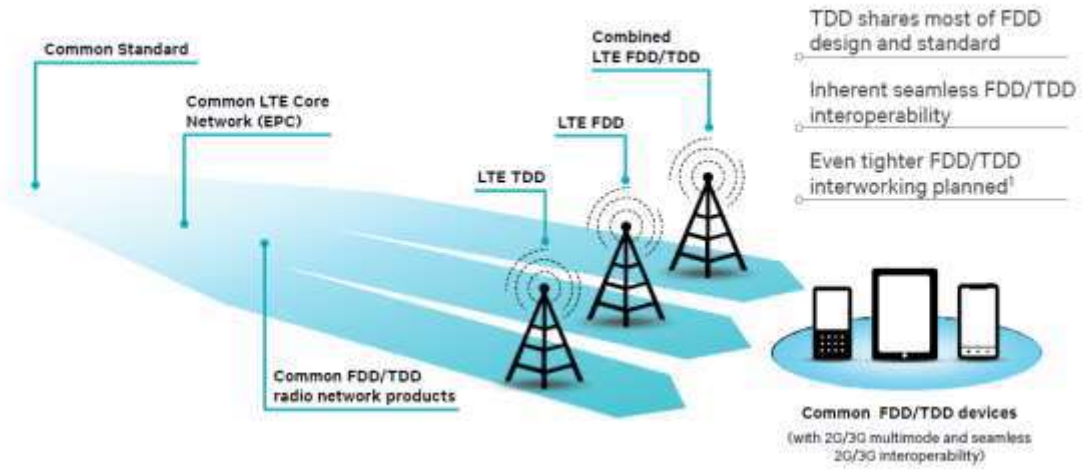

Figure 2: Generic cellular network architecture

The network subsystem carries voice and data traffic and also handles routing of calls and data packets. The mobile switching center (MSC) and the serving and gateway GPRS support nodes (SGSN and GGSNs) are responsible for handling voice and data respectively. These network entities perform the task of mobility management, where they keep track of the cell or group of cells where a MS is located and handle routing of calls or packets when a MS performs a handoff, i.e., it moves from one cell to another. This architecture was designed to specifically handle voice and data communications of wwww and needs enhancements to enable support for location services. In particular, new entities are required to determine position location information, communicate this information appropriately to the concerned parties.

The location measurement unit (LMU) is a device that assists the MS in determining its position or uses signals from the MS to determine the position of the MS. It is used with assisted GPS to help the MS determine its position. With other positioning techniques such as uplink time difference of arrival, it makes measurements of radio signals and communicates this information to network entities such as the RNC. An LMU may be associated with a BS, in which case it communicates with the RNC over a wired link. Alternatively, it may be a standalone LMU which uses the air interface to communicate with the RNC.

The Mobile Positioning Center (MPC) is the entity that handles position information in cellular networks that use ANSI-41 for signaling. It uses a Position Determining Entity (PDE) to determine the MS's position using a variety of technologies such as assisted GPS or observed time difference of arrival. The PDE can determine a MS's position while the MS is in call or when it starts a call. There may be multiple PDEs that are used by one MPC. The MSC is associated with an MPC. The same MPC may be associated with multiple MSCs.

IV. HARDWARE & SOFTWARE

A. 5G HARDWARE

UWB NETWORKS: Higher bandwidth at low energy levels. This short-range radio technology is ideal for wireless personal area networks (WPANs). UWB complements existing longer range radio technologies – such as Wi-Fi,* WiMAX, and cellular wide area communications – that bring in data and communications from the outside world. UWB provides the needed cost-effective, power-efficient, high bandwidth solution for relaying data from host devices to devices in the immediate area (up to 10 meters or 30 feet).

Bandwidth

4000 megabits per second, which is 400 times faster than today's wireless networks.

Smart Antennas

Switched Beam Antennas support radio positioning via Angle of Arrival (AOA) information collected from nearby devices. The use of adaptive antenna arrays is one area that shows promise for improving capacity of wireless systems and providing improved safety through position location capabilities. These arrays can be used for interference rejection through spatial _altering, position location through direction ending measurements, and developing improved channel models through angle of arrival channel sounding measurements.

Multiplexing

CDMA (Code Division Multiple Access) CDMA employs analog-to-digital conversion (ADC) in combination with spread spectrum technology. Audio input is first digitized into binary elements. The frequency of the transmitted signal is then made to vary according to a defined pattern (code), so it can be intercepted only by a receiver whose frequency response is programmed with the same code, so it follows exactly along with the transmitter frequency. There are trillions of possible frequency-sequencing codes, which enhance privacy and makes cloning difficult.

B. 5G SOFTWARE

5G will be single unified standard of different wireless networks, including wireless technologies (e.g. IEEE 802.11), LAN/WAN/ PAN and WWWW, unified IP and seamless combination of broad band. Software Defined Radio, Packet layer, implementation of packets, encryption, flexibility etc.

V. CONCLUSION

In this paper we have proposed 5G cell telephone idea structural planning and its models are mostly exhibited. The 5G cellular telephone is composed as an open stage. Another upset of 5G innovation is going to start on the grounds that 5G innovation going to give extreme finishing to ordinary PC and laptops whose commercial center quality will be effected. There is heaps of change from 1G, 2G, 3G, and 4G to 5G in the realm of information transfers. The new nearing 5G innovation is accessible in the business sector in restrictive tax, high crest future and much consistency than its former advances.

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Rakesh Kumar ER was born in Kanyakumari District, Tamil Nadu, India in 1985. He obtained his B.Sc., M.Sc. M.E. M.Phil. Degrees in Computer Science in the years 2005, 2007, 2010 and 2012, M.B.A Degree in Human Resources in the year of 2013 respectively. He has more than 7 years of teaching experience. He has presented 5 research papers in various national and international conferences. He has also published more than 15 research papers in reputed national and international journals. He has guided several UG and PG students for their project work. His area of interest is Network Security and Wireless Sensor Networks. Currently, he is with SAMS College of Engg. & Tech, Chennai, India, as Asst. Prof and Head of the Department of Computer Science and Engineering.