A STUDY OF DEVELOPMENT OF 4G-RESEARCH DIRECTIONS TOWARDS FOURTH AGE WIRELESS COMMUNICATION

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ABSTRACT

Mobile communication play a vital l role in the data and voice network front. With the deployment of mass scale 3G just around the globe, new directions are already being researched. This paper tends to the fourth era versatile correspondence. The Fourth Generation (4G) Mobile Correspondence not just stresses on increment in information rate what's more, new interfaces yet it additionally speak the propelled remote portable correspondence. The rapid remote access the frameworks in an Open Wireless Architecture (OWA) stage which has turned into the center point of this rising people to come versatile innovation. In light of the OWA display, 4G versatile would convey the best business to the remote market and Asia-Pacific which happens to be the most unique market of new age portable correspondence with over $100 Billion organizations in the following decade. The 4G versatile innovation is the crossing point and union of remote portable and remote access the world over. Any single engineering remote framework, counting 3G, HSDPA, WiMax, and so on, is a transitional arrangement just, and will be supplanted by open remote design framework soon where in different distinctive remote norms can be incorporated and focalized on open stage. The appearance of 4G remote frameworks has made numerous exploration openings. The desires from 4G are high as far as information rates, ghostly productivity, versatility and joining the utilization of Wi-Fi empowered phones to get to web far from the PC is expanding step by step. The utilization of Wi-Fi empowered telephones as IP telephones, and their correspondence inside a neighborhood remote LAN is talked about in this paper. This proposed demonstrate is a type of media transmission that permits information and voice transmissions to be sent inside a particular scope of interconnected systems. The models, which are Wi-Fi empowered, can be utilized to speak with each other through the Wi-Fi correspondence channel. Every cell phone associates with a gadget which has the Server which is a piece of the system and distinguishes itself in the directing table. Our proposition permits free calls inside the system with astounding voice transmission. This model will be a model of nomad gadgets conveying through in the Wi-Fi data transmission and will significantly diminish the correspondence cost in substantial associations.

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INTRODUCTION

The primary operational cell correspondence framework was set up in the Norway in 1981 and was trailed by the comparable frameworks in United States and United Kingdom. These first age frameworks gave voice transmissions by utilizing frequencies around 900MHz and simple regulation. The second era (2G) of the remote portable system was in light of low-band advanced information flagging [1]. The most mainstream 2G remote innovation is known as Global Systems for Mobile Communications (GSM). The principal GSM frameworks utilized a 25MHz recurrence range in the 900MHz band. Start for 3G began in the 1980s. At first it concentrated on mixed media applications, for example, videoconferencing for cell phones. 3G thinking needed to develop as web client requested an ever increasing number of remote applications and administrations. As individual remote handsets turn out to be more typical than settled phones, obviously individual remote Internet access will take after and clients will need broadband Internet get to. The goal of the 3G was to build up another convention and new advances to additionally improve the portable encounter. Conversely, the new 4G structure to be built up will endeavor to achieve new levels of client encounter and multi-benefit limit by likewise incorporating all the portable advancements that exist i.e. GSM-Global System for Mobile Communications, GPRS-General Packet Radio Administration, IMT-2000-International Mobile Communications, Wi-Fi-Wireless Fidelity, Bluetooth and so on. The fundamental goals of 4G systems can be expressed in the accompanying properties. Omnipresence, Multi-benefit stage and low piece cost. To accomplish the proposed objectives, an extremely adaptable system that would join different radio access advancements must be made. This system must give high transfer speed, from 50- 100 Mbps for high versatility clients, 1Gbps for low portability clients and advancements that allow quick handoffs and effective conveyance of administration. Orthogonal Frequency Division Multiplexing (OFDM) is turned out to be a conceivable various access innovation to be utilized as a part of 4G. Be that as it may, OFDM accompanies its own particular difficulties like high Peak to Average Ratio, linearity concerns and stage commotion. This paper proposes an answer for diminish Peak to Normal Ratio by cut-out technique. ATLAB as used to produce the OFDM flag to demonstrate that cut-out lessens Crest to Average Ratio. The development of the quantity of portable supporters in the course of the most recent years prompted an immersion of voice situated remote communication. From various 214 million supporters in 1997 to 1.162 millions out of 2002 [1], it is anticipated that by 2010 there will be 1700 million supporters overall [2]. It is presently time to investigate novel requests and to discover better approaches to expand the versatile idea. The initial steps have just been taken by the 2.5G, which gave clients get to to an information organize (e.g. Web get to, MMS-Multimedia Message Service). Be that as it may, clients and applications requested more correspondence control. As a response to this request another age with new models has been created-3G. Despite the huge introductory happiness that developed this innovation, just a single 3G organize exists in business utilize today. This system has been sent in Japan in 2001 utilizing worldwide standard IMT-2000, with incredible achievement. 4G remote is the term used to portray the fourth-age of remote

administration. 4G is a stage up from 3G, which is as of now the most predominant and fast remote administration. 4G is just accessible in restricted regions today. Dash, for case utilizes WiMax innovation for its 4G organize, while Verizon Wireless uses an innovation called Long Term Advancement (LTE). Regardless of what innovation is behind it, 4G remote is intended to convey speed. On a normal 4G remote should be four to ten times speedier than the present 3G systems. Run says its 4G WiMax system can offer download speeds that are ten times quicker than a 3G association, with speeds that best out at 10 megabits for every second. Verizon's LTE arrange, in the mean time, can convey speeds between 5 mbps and 12 mbps.

Correspondence frameworks have grown consistently and new methods for correspondences are being created from time to time. PDAs have advanced from being straightforward specialized gadgets to an intense versatile PC. The instrument has turned out to be commercial to the point that it's accessible as a enter thing in everybody's pocket, profiting the client and serving as a lucrative business for the producers. The expansion in the quantity of specialist organizations has made it a war zone for every one of them to acquire clients, and the less expensive one continuously figures out how to exceed others. Specialist co-ops, for example, Vodafone, Airtel, Loop have effectively earned a name in showcase are as yet growing their administration everywhere throughout the world. The thought of having a typical channel (air) for sending multitudinous frequencies and utilize the data transfer capacity that is accessible has dependably been interesting for every one of us-yet at what cost? It is a tumultuous undertaking to plan a correspondence framework knowing how seriously it is vulnerable to commotion. Existing advances like the GSM based calling gave by

the specialist co-ops cost clients to pay for the administrations they utilize. Also the rates for these administrations fluctuate after some time and this causes the clients with bother. So to take out the clients reliance on the specialist co-ops we exhibit a answer for this by formation of an application which gives its clients the offices like free calling inside a Wireless system, Content informing, any sort of information sharing and that too in genuine time

DEVELOPMENT OF 4G

The development of portable administration from the 1G (original) to 4G(fourth era) are examined in this area. This process started with the outlines in the 1970s that have progressed toward becoming known as1G. The soonest frameworks were executed based on simple innovation and the fundamental cell structure of versatile correspondence [12]. Numerous principal issues were illuminated by these early frameworks. Various contrary simple frameworks were set in benefit the world over amid the 1980s. The 2G (second era) frameworks composed in the 1980s were as yet utilized basically for voice applications however depended on advanced innovation, including computerized flag preparing strategies. These 2G frameworks if circuit-exchanged information correspondence administrations at a low speed. The aggressive race to outline and actualize advanced frameworks drove again to a wide range of and incongruent gauges, for example, GSM (worldwide framework portable), for the most part in Europe; TDMA (time division various get to) (IS-54/IS-136) in the U.S.; PDC(personal advanced cell) in Japan; and CDMA (code division numerous entrance) (IS-95), another U.S. framework. These frame works work across the nation or globally and are the present standard frameworks, in spite of the fact that the information rate for clients in these framework is exceptionally

constrained. Amid the 1990s, two associations attempted to characterize the following, or 3G, portable framework, which would dispense with past contrary qualities and turn into a really worldwide framework. The 3G framework would have higher quality voice channels, as well as broadband information abilities, up to 2 Mbps. Shockingly, the two gatherings couldn't accommodate their contrasts, and this decade will see the presentation of two versatile benchmarks for 3G. What's more, China is nearly executing a third 3G framework. A between time step is being taken in the vicinity of 2G and 3G, the 2.5G. It is fundamentally an upgrade of the two noteworthy 2G advances to give expanded limit on the 2G RF (radio recurrence) channels furthermore, to present higher throughput for information benefit, up to 384 kbps. A vital part of 2.5G is that the information channels are streamlined for parcel information, which presents access to the Internet from versatile devices[13], regardless of whether phone, PDA (individual computerized right hand), or PC. Nonetheless, the interest for higher access speed interactive media correspondence in the present society, which significantly relies upon PC correspondence in advanced organization, appears to be boundless. As per the recorded sign of an age transformation happening once per decade, the present gives off an impression of being the correct time to start the exploration on a 4G portable correspondence framework.

Table 1.The Generations of correspondences is appeared

Serial. no	Generation	Requirements	Comments
1	1G	No official requirements Analog Technology	Deployed in the 1980s
2	2G	No official requirements Digital Technology	First digital system deployed in the 1990s New services such as SMS and low rate Data Primary Technologies include IS CDMA and GSM
3	3G	ITU's IMT-2000 required 144 kbps mobile, 384 kbps pedestrian, 2mbps indoors	Primary technologies include CDMA 2000 1X/EV-DO and UMTS-HSPA WiMAX now an official 3G technology
4	4G	ITU's IMT advanced requirements ability to operate it up to 40 MHz radio channels and with very high spectral efficiency	No technology meets requirement today IEEE 802.16m and LTE advanced being designed to meet requirements

INNOVATIONS OF 4G

OFDMA

Orthogonal Frequency Division Multiplexing (OFDM) gives clear preferences to physical layer execution and likewise a structure for enhancing layers execution by proposing an extra level of flexibility. Utilizing OFDM, it is conceivable to abuse the time area, the space, the recurrence area and even the code space to misuse radio channel utilization. It guarantees exceptionally strong transmission in multipath conditions with decreased recipient intricacy. OFDM likewise gives a recurrence assorted variety increase, making strides the physical layer performance. It is additionally perfect with other improvement Technologies, for example, shrewd receiving wires and MIMO. OFDM balance can likewise be utilized as a various access innovation (Orthogonal

Frequency Division Numerous Access; OFDMA). Here, each OFDM image can transmit data to and from a few clients utilizing a distinctive arrangement of sub bearers (i.e. sub channels) [14]. This gives extra adaptability to asset assignment (expanding the limit) and furthermore empowers cross layer streamlining of radio connection utilization.

WIMAX-WORLD INTEROPERABILITY FOR MICROWAVE ACCESS

IEEE 802.16 STANDARD

The current WiMAX update depends on IEEE 802.16e2005, affirmed in December 2005. It is an improvement to the IEEE Std 802.16-2004, thus the real standard is 802.16- 2004 as corrected by 802.16e-2005[5]. In this manner, these determinations should be viewed as together. IEEE 802.16e-2005 enhances IEEE 802.16-2004 by:

- Adding support for portability (delicate and hard handover between base stations).
- Scaling of the Fast Fourier change (FFT) to the direct transmission capacity with a specific end goal to keep the transporter separating consistent crosswise over various channel bandwidths (i.e. 1.25 MHz,

5 MHz, 10 MHz or 20 MHz).

- Advanced radio wire decent variety plans, and half breed.
- Adaptive Antenna Systems (AAS) and MIMO innovation.
- Denser sub-channelization, along these lines enhancing indoor Entrance Introducing Turbo Coding and Low-Density Equality Check (LDPC).
- Introducing downlink sub-channelization, permitting overseers to exchange scope for limit or bad habit versa.
- Adding an additional QoS class for VoIP applications. Utilization of WiMAX: There are two noteworthy utilizations of WiMAX:
- Fixed WiMAX (IEEE 802.16-2004): Settled WiMAX applications are point-to-multipoint empowering the conveyance of last mile remote broadband access as an substitute to link and DSL for homes and organizations. Settled WiMAX Adoption is as of now accessible however the selection rate is affected by the high cost of gear in correlation with link or DSL. It gives more noteworthy advantages to creating nations that don't as of now have physical framework to help wired broadband access as depicted in the figure 1.
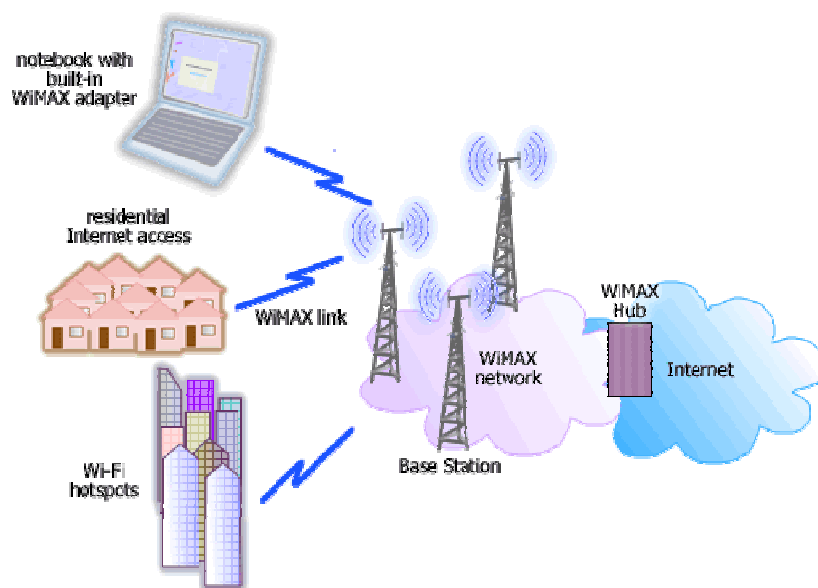

Figure 1.Fixed WiMAX Architecture

MOBILE WIMAX (IEEE 802.16-2005)

Mobile WiMAX offers the full versatility of cell systems at genuine broadband velocities. Portable WiMAX Adoption Mobile WiMAX hardware will touch base to transporters toward the finish of 2007. Nonetheless, portable hardware testing ordinarily takes between 12 to year and a half before the gear is presented to the purchaser advertises as depicted in the figure 2.
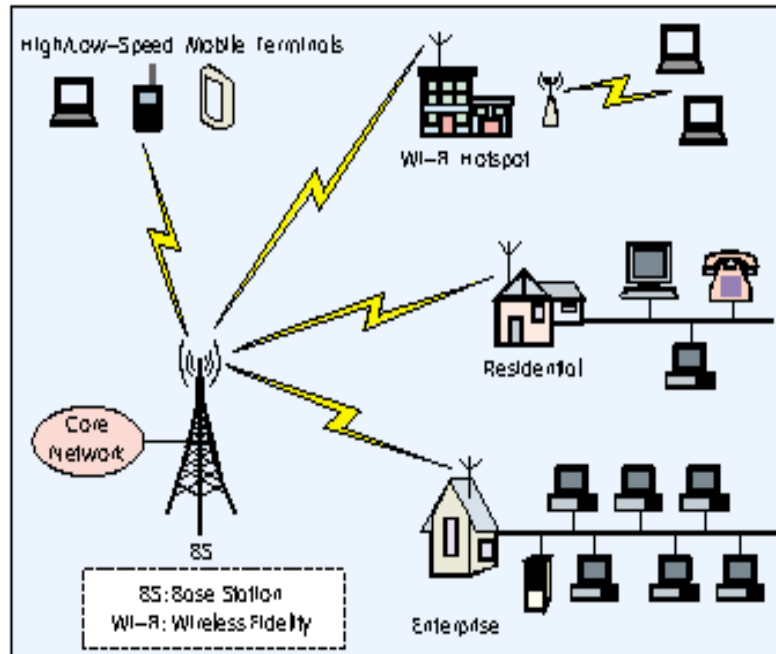

Figure 2.Mobile WiMAX Architecture

WIMAX VERSUS WI-FI

WiMAX versus Wi-Fi WiMAX/Wi-Fi Comparison: As depicted in the table II WiMAX and Wi-Fi are to some degree free, tending to somewhat extraordinary requirements. WiMAX utilizes private, authorized range and gives Wi-Fi-like benefit with ensured execution to bigger open regions, comparable in scope to cell organizes today. Wi-Fi employments shared range and works at short separations, making it perfect for minimal effort, private systems (where utilization of the organize is compelled to an office building or grounds) or free open frameworks (where benefit ensures are definitely not required).empowering agent for the accumulation of multi-standard pico/small scale cells. For a producer, this can be a capable guide to giving multi-standard, multi-band gear with diminished advancement exertion and expenses through synchronous multichannel preparing.

Table 2.Comparison of WiMAX and Wi-Fi

Serial. no	WiMAX	Wi-Fi
1	WiMAX uses a QoS mechanism based on connections between the base station and user device. Each connection is based on specific scheduling algorithms	Wi-Fi is more popular in end user devices which operates in short distances
2	WiMAX is a long range system, covering many kilometers, that uses licensed/unlicensed spectrum to deliver connection to a network and Internet	Wi-Fi uses unlicensed spectrum to provide access to a local network
3	WiMAX network operators provide a WiMAX Subscriber Unit which connects to metropolitan WiMAX network and provides Wi-Fi within the home/ business for local device	Wi-Fi runs on the Media Access Control's CSMA/CA protocol, which is connectionless and contention based, whereas WiMAX runs a connection-oriented MAC.
4	Both 802.11 (Wi-Fi) and 802.16(WiMAX) define Peer-to-Peer (P2P) and ad hoc networks, where in end user communicates to users/ servers on another LAN using its access point/ base station	Wi-Fi uses contention access and all subscriber stations that wish to pass data through a wireless access point (AP) and stations compete for the AP's attention on a random interrupt basis

PROGRAMMING DEFINED RADIO

Programming Defined Radio (SDR) profits by the present high handling energy to create multi-band, multi-standard base stations and terminals. In spite of the fact that in future the terminals will adjust the air interface to the accessible radio access innovation, at display this is finished by the framework. A few foundation picks up are normal from SDR. For case, to build organize limit at a particular time (e.g. amid a games occasion), an administrator will reconfigure its arrange including a few modems at a given Base Transceiver Station (BTS). SDR makes this reconfiguration simple and adaptable. With regards to 4G frameworks, SDR will turn into an enabler for the aggregation of multi-standard pico/micro cells. For a manufacturer, this can be a powerful aid to providing multi-standard, multi-band equipment with reduced development effort and costs through simultaneous multichannel processing.

DIFFERENT INPUT MULTIPLE OUTPUT (MIMO)

MIMO utilizes flag multiplexing between a few transmitting receiving wires and time or recurrence. It is very much coordinated to OFDM, as it is conceivable to process autonomous time images as soon as the OFDM waveform is accurately intended for the channel. It alludes to the innovation where there are numerous reception apparatuses at the base station and numerous reception apparatuses at the cell phone. The use of different radio wire innovation incorporates cell telephones with two radio wires, PCs with two reception apparatuses (i.e. worked in the left and right half of the screen), and in addition CPE gadgets with numerous growing antennas[2]. This part of OFDM fundamentally improves preparing. The flag transmitted by m radio wires is gotten by n reception apparatuses. Handling of the got signs may convey a few execution changes: run, nature of

got flag furthermore, range adequacy. On a fundamental level, MIMO is more proficient when numerous various way flags are gotten. The execution in cell organizations is as yet subject to research and reproductions. Be that as it may, it is for the most part recognized that the pickup in range effectiveness is specifically identified with the base number of receiving wires in the connection. MIMO remains for Multiple Input and Multiple Output, The dominating cell organize execution is to have numerous reception apparatuses at the base station and a solitary receiving wire on the cell phone. This limits the cost of the versatile radio. As the expenses for radio recurrence (RF) parts in cell phones go down, second receiving wires in cell phone may turn out to be more typical. Numerous cell phone receiving wires are at present utilized as a part of Wi-Fi innovation (e.g. IEEE 802.11n), where WiFi-empowered PDAs, PCs and other gadgets regularly have at least two receiving wires.

TYPES OF MIMO: MULTI-RECEPTION APPARATUS COMPOSES

- SISO/SIMO/MISO are worsen instances of MIMO
    - Multiple-information and single-yield (MISO) is a worsen situation when the recipient has a solitary reception apparatus.
    - Single-input and different yield (SIMO) is a decline situation when the transmitter has a solitary reception apparatus.
    - Single-input single-yield (SISO) is a radio framework where neither the transmitter nor collector have various reception apparatus.
- Principal single-client MIMO systems
    - Bell Laboratories Layered Space-Time (BLAST), Gerard. J. Foschini (1996)
    - Per Antenna Rate Control (PARC), Varanasi, Guess (1998), Chung, Huang, Lozano (2001)
    - Selective Per Antenna Rate Control (SPARC), Ericsson (2004)

ELEMENTS OF MIMO

MIMO can be sub-partitioned into three primary classes, precoding, spatial multiplexing or SM, and assorted variety coding. Pre-coding: is multi-stream shaft framing, in the tightest definition. In more broad terms, it is thought to be all spatial handling that happens at the transmitter. In (singlelayer) shaft framing, a similar flag is radiated from each of the transmit reception apparatuses with suitable stage (and here and there pick up) weighting with the end goal that the flag control is expanded at the recipient input. The advantages of bar shaping are to increment the got flag pick up, by making signals discharged from various reception apparatuses include helpfully, and to decrease the multipath blurring impact. Without dispersing, pillar shaping outcomes in an all around characterized directional example, yet in regular cell customary bars are not a decent similarity.

SPATIAL MULTIPLEXING: requires MIMO reception apparatus setup. In spatial multiplexing, a high rate flag is split into various lower rate streams and each stream is transmitted from an alternate transmit recieving wire in the same recurrence channel. In the event that these signs land at the beneficiary radio wire cluster with adequately extraordinary spatial marks, the collector can isolate these streams into (nearly) parallel channels. Spatial multiplexing is an effective system for expanding channel limit at higher flag to-commotion proportions (SNR). The most extreme number of spatial streams is constrained by the lesser in the quantity of radio wires at the transmitter or beneficiary. Spatial multiplexing can be utilized with or without transmit channel learning.

DIVERSITY CODING: procedures are utilized when there is no channel learning at the transmitter. In assorted variety techniques, a single stream (not at all like numerous streams in spatial multiplexing) is transmitted, however the flag is coded utilizing strategies called space-time coding. The flag is produced from each of the transmit radio wires with full or close orthogonal coding. Decent variety coding abuses the free blurring in the numerous reception apparatus connects to upgrade flag decent variety. Since there is no channel learning, there is no shaft shaping or exhibit pick up from assorted variety coding.

CALLING WITHIN THE NETWORK

For a cell phone to speak with a switch it needs a stage. An Android application can be utilized as a part of a cell phone that is Wi-Fi empowered to speak with a switch. This is an exceptionally helpful device in light of the fact that by speaking with the switch straightforwardly, numerous procedures of systems administration can be streamlined. Android gives a powerful, adaptable condition for applications running on versatile. It incorporates adaptable UIs, vigorous security, worked in organize conventions, and support for arranged and disconnected applications that can be downloaded powerfully. So this stage is the thing that associates the client and his gadget to the server running on another workstation associated with a similar system. The application will record the voice from the transmitter side and store it in a cushion and this information put away in the cradle will be gotten at the beneficiary's side. For ringing any individual X a client needs to guarantee that the individual X is associated with the system and enrolled on the server running on the PC. The client will ask for the server to send the IP of the individual X which on accepting a demand will answer with an IP (if accessible). On accepting the IP the guest gadget will make an attachment and correspondence will start over that specific attachment. On the off chance that the individual X moves out of the scope of the system the call will consequently be ended and the passage of individual X will be expelled from the server.

ARRANGEMENT OF STEPS

- At the point when a gadget associates with the system it gets an IP from the Wireless switch which is then included the server's steering table.
- Each telephone is recognized by a client name. So the steering table updates its IP with a comparing client name.
- Calls can be made to any client in the directing table distinguished by client name and this data is made accessible to all clients signed into the system

APPLICATION OF 4G

Upgraded Mobile Gaming Experience improved remote capacities that convey portable gaming cooperation with inertness under five milliseconds. Play online multiplayer recreations while going at high speeds or sitting outside. Individual Media Repository Create an individual media store that can be gotten to from home and making a course for see photographs, watch films and tune in to your own music gathering. Virtual Presence Use 3D image producing virtual reality programs that give a fake nearness pretty much anyplace. For instance, choose in the event that you need to by and by react when somebody rings your front entryway while you are far from home. Broadband Access in Remote Locations 4G systems will give a remote other option to broadband access to private and business clients. Likewise, 4G will give the main chance to broadband access in remote areas without a foundation to help link or DSL get to.

Table 3.Comparative Study of 3G against 4G

Requirement: Architecture	3G(Including 2.5)	4G
Data Elements	Voice driven.	Converged data and voice over IP
Network Arch	Wide area cellbased	Hybrid: Integration of wireless LAN
Speed	384 Kbps to 2 Mbps	20 to 100 Mbps in mobile mode.
Bandwidth	5-20 MHz	100 MHz (or more)
Frequency	1800-2400 MHz	2-8 GHz
Access Tech.	WCDMA, 1Xrtt	OFDM and MCCDMA
Switching	Circuit and Packet	Digitally packetized voice
Component Design	Optimized antenna design, multiband adapters	Smarter Antennas, Software, multiband and wideband radios
Forward Error Correction	Convolution rate 1/2, 1/3	Concatenated coding scheme
IP	A number of air link protocols, IP 5.0	All IP (IPv6)

- **VIRTUAL PRESENCE**: This implies 4G gives client benefits consistently, regardless of whether the client is off-site.
- **VIRTUAL NAVIGATION:** 4G furnishes client with virtual route through which a client can get to a database of the lanes, structures and so forth.
- **TELE-GEO HANDLING APPLICATIONS:** This is a mix of GIS (Geographical Information System) also, GPS (Global Positioning System) in which a client can get the area by querying.
- **TELE-MEDICINE AND EDUCATION:** 4G will bolster remote wellbeing observing of patients and for individuals who are keen on deep rooted training, 4G gives a decent opportunity.
- **CRISIS MANAGEMENT:** Natural debacles can cause break down in correspondence frameworks. In this day and age it might take days or a little while to reestablish the framework. Be that as it may, in 4G it is relied upon to reestablish such emergency issues in a hardly any hours.
- **MULTIMEDIA-VIDEO SERVICES:** 4G remote frameworks are anticipated that would convey proficient interactive media administrations at extremely high information rates. Fundamentally there are two sorts of video administrations: blasting and gushing video administrations. Spilling is performed when a client requires ongoing video administrations, in which the server conveys information consistently at a playback rate. Blasting is fundamentally document downloading utilizing a cushion and this is done at the most noteworthy information rate exploiting the entire accessible data transfer capacity.

POINTS OF INTEREST

- Permits telephone calls at zero cost.
- It is highly secured, because no outside device has access to the data uploaded and downloaded between routers and the device
- Simple to actualize.
- Does not require any additional equipment to be introduced in the gadget.

REQUIRMENT

This model can benefit any number of clients however it demonstrates poor execution in a moderate system and might be backed off by issues like cross talk, delay, steering disappointment in high rush hour gridlock circumstances. Starting expense is high and it

will just work on telephones that are Wi-Fi empowered (which are more costly than non-Wi-Fi empowered handsets.

CONCLUSION

The history of mobile communications shows that several attempts have been made to reduce a number of technologies to a single global standard. Proposed 4G frameworks offer this guarantee of a standard that can be grasped around the world through its key idea of joining. Future remote systems should bolster assorted IP mixed media applications to permit sharing of assets among various clients. There must be a low unpredictability of usage and a productive methods for bargain between the end clients and the remote framework. The fourth era guarantees to achieve the objective of individualized computing and correspondence with vision of reasonably to give high information rates wherever finished a remote system. 4G is anticipated that would be propelled by mid 2011 and the world is searching forward for the most keen innovation that would associate the whole world.

REFERENCES

[1]. J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68-73.

[2]. D. Tse and P. Viswanath, Fundamentals of Wireless Communication, Cambridge University Press, 2005.

[3]. Brian Woerner (June 20–22, 2001). "Research Directions for Fourth Generation Wireless" (PDF). *Proceedings of the 10th International* Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises (WET ICE '01). Massachusetts Institute of Technology, Cambridge, MA, USA.

[4]. "Teliasonera First To Offer 4G Mobile Services". The Wall Street Journal.

[5]. I. S. Jacobs and C. P. Bean, "Fine particles, thin films and exchange anisotropy," in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271-350.

[6]. Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interface," IEEE Transl. J. Magn. Japan, vol. 2, pp. 740-741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].

[7]. Brian Woerner (June 20–22, 2001). "Research Directions for Fourth Generation Wireless" (PDF). *Proceedings of the 10th International* Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises (WET ICE '01). Massachusetts Institute of Technology, Cambridge, MA, USA.

[8]. Mishra, A. R. (2007). In Advanced Cellular Network Planning and Optimisation: 2G/ 2.5G/3G. Evolution to 4G. The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, John Wiley & Sons.

[9]. Werner Mohr (2002). "Mobile Communications Beyond 3G in the Global Context" (PDF). Siemens mobile, http://www.cu.ipv6tf.org/pdf/werner_mohr.pdf.

[10]. "4G Coverage and Speeds". Sprint. http://nextelonline.nextel.com/en/popups/4G_coverage_popup.shtml.

[11]. D. Tse and P. Viswanath, Fundamentals of Wireless Communication, Cambridge University Press, 2005.

[12]. J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68-73.

[13]. Kuo-Hui Li, PhD-WiMAX Solutions Division Intel Mobility Group; June 05, 2006.