



Consumer Strategies for Adoption of Performance Analysis of 4g Mobile Services

Sandeep Kumar Mohapatra, Uma Sankar Mishra

Abstract : We use a preference test to determine the ability of consumers to pay for mobile services enhancements with an emphasis on changes to four-gyms and roaming networks. Increasing mobile Internet speed (eventually, with 4 G), unlimited mobile Internet, improved quality (possible with 4 G) and unrestricted use in two neighboring countries are the characteristics of improved mobile services we are investigating. (unrestricted roaming). The results show that uncontrolled roaming services are most important to people. The next move to do is to increase the speed and infinite attributes at 1 per cent. . The statistically insignificant effect of improved quality at the rate of 5percent indicates that users are satisfied with the current quality level which they achieve with 3G. To research 4 G network recognition of mobile and web consumers. To analyze how the use of 4 G technologies viewed smartphone and internet consumers. Research the factors affecting smartphone and web users ' behavioural expectations (BI) through 4G. Mobile User necessities are rising faster than constantly and the limitations of the existing mobile communication systems have required the researchers to emanate up with additional advanced and proficient technologies. 4G and 4G-LTE mobile technology is the next step in this trend. This is next generation of wireless networks 4G-LTE that will completely replace 3G networks. it is responsible for its customers with enhanced speed and entirely IP based multimedia services. 4G-LTE is completely approximately an integrated, global network that will be intelligent to afford a complete IP solution where voice, data and streamed multimedia can be specified to users on a basis. But there is a pronounced essential of deploying such technologies that can incorporate entirely these systems into a single combined system. The aim of this paper is to focus the benefits, challenges in deployment and opportunity of technologies. Comparative analysis of 4G-LTE based on performance in new communication trend and generations in India.

Keywords: Video over LTE, 4G-LTE , fifth generation networks

I.INTRODUCTION

High-speed access to mobile data has become one of the most important demands of smart phone subscribers. The increasing availability of intelligent equipment and ever-growing demand for multi-media streaming services have considerably increased the volume of mobile data traffic [10]. In 2016, the total generated mobile data was 8.8 Exabytes 50% of which belonged to video contents. It is expected that this amount will reach 71 Exabytes in 2020 75% of which will belong to video contents [12].

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Network carriers have spent lots of R&D costs on providing better data. Therefore, it has led to significant expansion of mobile broadband. Statistics and figures indicate that mobile broadband subscriber growth rate has been steadily higher than that of fixed broadband in the world. Fixed broadband penetration rate has reached 11.9% in 2016 from 0.9% in 2012 while mobile broadband penetration rate has reached 49.4% in 2016 from 21.7% in 2012 (Figure 1). In I.R. Iran, mobile broadband penetration rate has been much higher than that of fixed broadband as the growth rate of fixed broadband subscribers has moved from 2.81% in the summer 2012 only to 12% in the spring 2017 while the growth rate of mobile broadband subscribers has shifted from 1.92% in summer 2012 to 42.5% in spring 2017 (Figure 2). Cellular technologies such as the third generation (3G) and fourth generation (4G) of mobile networks have majorly contributed to the development of mobile broadband. 3G Technology was developed during the 90's and entered global market in 2002. This technology was getting widespread in 2007. Actually, in December 2007, 190 operators in 40 countries provided 3G services to their customers. In I.R. Iran, Rightel operator which was established in 2007, received the 3G service license in January 2010 but the operator started its work in June 2011. In I.R. Iran, 3G mobile networks entered the market with a delay of 9 years. In fact, the commercialization of 3G in I.R. Iran coincided with the commercialization of 4G in the world. In I.R. Iran, the fourth generation of mobile networks was launched in September 2014 by the I.R. Irancell operator. Subsequently, mobile operators such as Mobile Telecommunication Company of Iran (MCI) and Rightel also launched 4G mobile networks. Limitations such as low-rate of transmission, mobility and bandwidth constraints were among the most important reasons leading mobile operators to go to launch 4G mobile networks.

Item	1G	2G	3G	4G
Development time	1970	1982	1990	2004
Commercialization time	1984	1991	2002	2010-2011
Technical features	Analog voice	Digital voice Short messages	Live podcast speed up to 2Mbps, vide form of telecommunication	IP-based, Multimedia, Long distance transmission
International standard	AMPS, TACS, NMT	GSM, TDMA, DAMPS, CDMA, PDC	WCDMA, CDMA2000, DETC, TDSCDMA	3GPP
Speed	1.9 Kbps	9.6-172 Kbps	382 Kbps-2.Mbps	86-326 Mbps
Application	Voice	Voice and Data	Voice, Data, video call	Voice, Data, video call, Online game, HD TV

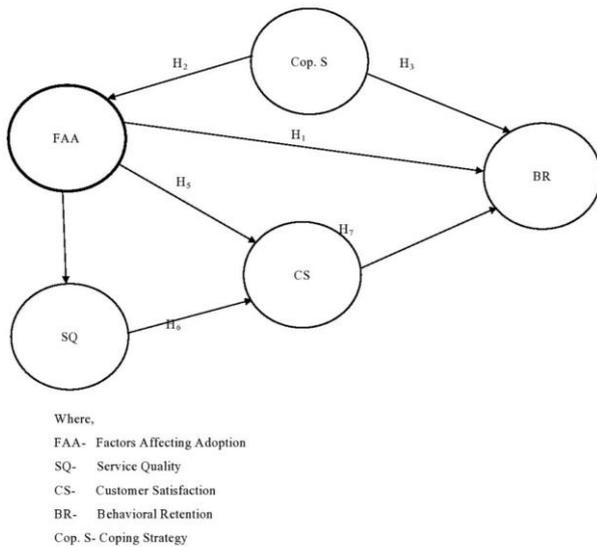
Table 1: Different generations of mobile technologies from 1G to 4G

The study's approach to philosophy is that the TAM paradigm is combined with presumed entertainment value so as to maximize the understanding of 4 G Lte implementation from the viewpoint of learners.



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This study analyzed the connections between perceived benefit, perceived user friendliness, perceived entertainment value, actions and the willingness of students to use 4 G mobile services. The results show that the intent of students to use the 4 G mobile services is based on an understanding of the usefulness, ease of use and access to the functions of the 4 G mobile services. In addition, the findings showed that it is necessary to use 4 G mobile quickly. The functions of networks. However, the findings illustrate how simple or easily connecting with each other is, as viewed, to the 4 G mobile services.



However, in spite of the large investments of the three main operators of I.R. Iran, namely MCI, Irancell and Rightel, in the development of 4G LTE network, as well as the increasing penetration of mobile broadband in I.R. Iran (about 42.5% by the end of the spring of 2017), The LTE mobile penetration rate in I.R. Iran is estimated at 6% by the end of spring 2017. This fact indicates that the main volume of mobile broadband subscribers in I.R. Iran is still using UMTS / HSPA 3G networks. In other words, about 29 million of total mobile broadband subscribers (i.e., 34 million subscribers by the end of spring 2017) are currently using 3G cellular networks. Given the mobile broadband penetration rate in I.R. Iran and the third-generation share in it (85%), it is clear that mobile broadband subscribers lock on these third-generation UMTS / HSPA networks and the poor reception of the fourth generation will slow down future investments in LTE networks. This can result in some negative unintended consequences as following: - Failure to provide a large number of high quality services: With the help of LTE technology, operators can provide much more diverse and high-quality services. Some of the major advantages of this technology include faster mobile data, more bandwidth, much less latency, better management of data traffic, highlevel video streaming, Voice over LTE (VoLTE), Video over LTE (ViLTE), entry to vertical markets (e.g., public safety, health and transportation), low legacy cost due to more integrability with fifth generation networks (5G), network better efficiency, cell broadcast and lots of value-added services - Inability to compete with OTT technologies: Because LTE operators can provide better quality services than OTT technologies, such as VoLTE versus Voice over Internet Protocol (VOIP) offered by

whatsapp or ViLTE compared to the video over the Internet protocol provided by Skype - Loss of many revenue opportunities: The revenue generated by LTE is forecast to be \$ 350 billion by 2020 [69]. Considering that I.R. Iran is 1.08% of the world's population, I.R. Iran's share of this amount can be equal to 3.780 billion. Therefore, if the fourth generation is not well understood in I.R. Iran, Iranian operators will lose that income share.

Prolongation of payback period: If operators' subscribers migrate slowly from 3G to 4G, this can prolong the payback period of 4G network and create a lot of costs for operators - The lack of integrability with fifth generation networks (5G) and loss of many IOT opportunities: IOT is recognized to have a tremendous effect over ICT industry in the near future. The Forbes Media Company predicts that the IOT revenue share will be \$ 14.4 trillion by 2022. Of this, \$ 2.5 trillion has been spent on improving employees' productivity, another 2.5 trillion in reducing costs, 2.7 trillion in improving logistics and supply chains, 3 trillion in reducing market entry time, and 3.7 trillion in improving the customers' experience [56]. 5G plays a pivotal role in realizing the IOT and utilizing its capacities. 4G technologies, in particular LTE-Advanced Pro technology, have a high potential to integrate with 5G in comparison to other cellular technologies. Via this technology, operators can get integrated with 5G networks without getting stuck at a huge legacy cost. Therefore, if the operators only stay on 3G networks, huge costs will be imposed on them to migrate to 5G Networks, and moreover, they will lose huge opportunities.

II.RELATED WORK

In literature review we will discuss wireless network generations from 1G to 5G.this advancement of wireless network consist of few Generations and is still going on. Each generation have some standards and techniques. Due to these new features wireless standards is increasing day by day. The wireless communications industry is achievement momentum in equally fixed and mobile applications. The sustained growth in demand for completely types of wireless services (voice, data, and multimedia) is increasing the requirement for difficult capacity and data rates not merely in fixed but similarly in mobile applications. 1G , 2G , 2.5G, 3G , 3.5G cellular networks[1] are suffering numerous problems for reaching a comprehensive mobile broadband access, bounded by issues such as bandwidth, coverage zone, or infrastructure costs. In this situation, Wi-MAX and LTE[2] looks to fulfil these necessities, provided that vehicular mobility and high service domain and data rates. Definite to afford broadband wireless access, it is progressively achievement concentration as a different last mile technology to DSL[3] lines and cable modems, and a corresponding technology where wireless networks are not satisfactorily developed. In this research work to represent a comparative study of the different number of operator1 (QPSK), operator 2(BPSK) , operator3(NCG), operator4(CG), operator 5 4G-LTE system.

Additional precisely, it inspects the reasonable implementation of a LTE physical layer simulator over BER v/a SNR, constructed through Matlab Simulink.

1G: 1 G represents the first mobile technology generation used for analog voice transfer. 2 G, commonly known as GSM, is the second generation. The only drawback to the 2 g is that the bandwidth is much lower, about 64 kbps, 2.5 g and that it is not secured and it has small volumes, poor audio transmission rates, little anonymity, 2 g is a second generation, commonly recognized as a high efficiency and safety Global Mobile Communication Network. Since 2 G, it's grown, it's got a better 2 G network. This operated similarly via the existing 2 G network so it became popular because people could easily check email and access websites via their phones.

3 G: 3 G In audio and video codecs it uses upgraded voice calls superiority to resource. UMTS (Universal Mobile Phone System) is the latter technology. Different countries accept it internationally. It offers increased 2Mbps max navigation speeds and max data speeds and provides video conferencing support.

HSPA and HSPA+ are correspondingly 3.5 G and 3.75 G and 3.75G. This gives 14Mbps and 168Mbps separate downlink speeds. 3.75 G will carry out this diligent MIMO (Multiple Input and Multiple Output) use with low speed and latency.

4 G: 4 G is mainly arranged for WiMAX and LTE (Long Duration Evolution) methods. LTE enabling VoIP voice messaging is increased adoption through WiMAX. LTE supplies 300Mbps data transmission speeds. Yet LTE-Advance is essential because it has a 450Mbps data transfer speed. LTE will also carry voice over LTE network or VoLTE, which will relay HD speech noises through LTE network.

5 G: Has it arrived: research is successful and 5 G can progress soon. With 5 G, there are special requirements, including data transfer capacity of 10Gbps, equal reduced latency and network problems, stable reliability and a 100 percent regional area coverage. This necessity is not fulfilled by any existing technology. 4.5 G, which add 1Gbps performance to a specific advancement in mobile communication technologies, was described in this report.

The origins of Ad Hoc networking lie in the Packet Radio Network (PRNET) project of the U.S. Department of Defense in 1972[F. While the internets were conceived at the end of the 1960s, Rusek et al., 2013 was a P2P network[A.Oram,2001]. The lack of a range of enabling technology has hampered the mobile ad hoc networks (MANETs)' progress up until recently, Phone and electronic wireless communications, for example. Nevertheless, the advances made in these authorizing innovations during the 1990s have regenerated the enthusiasm of MANETs, which has drawn significant attention to the sector[C. B and Elliott. Heil 2000]. Heil 2000. Wireless network of first generation (1 G) is the traditional, mobile phone-only system, which was introduced in the 1980s. 1st generation Analog cellular frequency up to 2.4 kbps. Analog network networks all over the world were transmitted signals to the same trunked lines by the mid-1980s. As the traffic of voice. This means that the signaling and voice traffic for each user have been handled with a single physical connection. The overhead

command must have both signal and voice traffic on the Public Switched Telephone (PSTN) network. Two simultaneous networks were provided by PSTN in the mid-1980's. One is for calling signals and the other is client communication. This method is recognised in all current telecommunications networks as the through signaling of channels. The mobile Mobile Switching Center (MSC) has lately used a dedicated signaling network to communicate internationally, Allow MSCs worldwide to share information regarding subscribers. Voice communication on the PSTN is maintained in many of our cellular telephone systems today, although signal data is sent to a different signaling network for each message. 9Cs normally provide access to the signaling network for a negotiated fee. In North America, the mobile signaling service uses SS7 (no. 7) and the IS-41 protocol is used by every MSC to connect on the mainland to other MSCs[Theodore S. Relief,2010].

2 G is wireless network technology of second generation. In 1991 wireless networks of second generation are developed in line with the GSM standard. 2 G innovations also allowed different mobile telecommunications networks to offer services such as SMS, photo messaging and MMS. 2 G is more powerful infrastructure. For both the sender and the receiver, 2 G software has ample protection. Every text message is encrypted digitally. This electronic authentication requires information transmission to be accessed and interpreted by only the intended recipient. The most common norm for all wireless networks is GSM (Global Mobile Communications System). Even if this technology comes from Europe, it is now used in over 212 countries. The first to lead to international roaming is GSM engineering. The biggest difference is that the radio signals that 1 G networks use analog, whilst 2 G networks are digital. 2 G networks are digital. AMPS was first introduced by the USA and is a 1 G mobile device. Since 2 G wireless network 2.5 G, 2 G and 3 G wireless technology are a step in the right direction. For contrast to the circuit switched domain, the word "second generation and a third" is used for defining 2 G networks that have inserted a packet switched domain. It does not necessarily provide faster services as time slots are also used for circuit data services (HSCSD). The 2 G mobile communication network in 2 G is an electronic platform. It can be extended to applications as Wireless Application Protocols (WAP) such as e-mail and World Wide Web Access. It was launched in Finland in 1991 on a commercial basis. This system is still used mostly in various parts of the world. For data and voice services, this generation. Two digital modulation schemes are being used for this generation: one for multiple access time division (TDMA) and the second is multiple access code division (CDMA)[Xichun Li, 2009].

In 1991, in the United States, the first digital system was established. In the second generation of wireless communication device, IS-54 (TDMA) within 1991, three forms of innovations took place.

IEEE 802.11 is a foundational requirement for the connectivity of the mobile local area network (WLAN). Originally adopted in 1997, the IEEE 802.11 standard.

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The software has been developed for home and office settings for mobile local connection and incorporates three forms of transmitting systems, i) IR; ii) FHSS; and iii) DSSS. Throughout 1999, the Orthogonal Frequency Division (OFDM) and the High Scale Direct-Spread-Spectrum Series (HR-DSSS) became two new delivery techniques. In 2001, the second model of OFDM modulation for high data rates was introduced [IEEE 802.11, 1999].

The 3rd generation was specified by International Mobile Telecommunications-2000 (IMT—2000) and the Univ. Mobile and mobile communications service (UMTS), standard for 3rd generation. The use of the 3 G system can also effectively transfer bandwidth-enhanced packet shift information. 3 G technologies provide mobile users with more advanced services. The 3 G is ready to launch its success in the area of computer networking (WCDMA, WLAN, Bluetooth) and wireless devices (cell phone and GPS) in 2005. The information can also be transmitted through technologies known as packet switching, voice calls can be interpreted by means of a circuit switching, connection to globally roaming, clarification in voice calls, fast contact, Web, mobile Television, video conference, videogaming, multi-media messaging service (MMS), 3D sports, multi-gaming, etc.

Kamarularifin Abd Jalil et al., 2009] said researchers and industries have been pushing forward a comprehensive expression in the upcoming 4th Generation (4G-LTE) mobile communication system, due to the emergence of new technology in mobile communications systems and the increasingly demanding demand.

T.] [T. H. Le and A. Le and A. On the cable television industry, H. Aghvami, 2000] says expanding 4 G networks in 2009 is very real. Comcast and T-Mobile have been partnering together to create a 'mobile 4 G network' with trials in Washington, D.C. In recent years. And Philadelphia.-And Washington, Maryland.

The fundamental reason for the move to the All-IP is that all technologies developed so far must have a common platform and that the various services provided are compatible with users expectations. The main difference between GSM/3 G and All-IP is that the RNC and BSC connectivity is now distributed across the BTS and a number of networks and gateways. So the network is less expensive and the exchange of information is much quicker [Mishra, Ajay K., 2004]. 4G-LTE means- "Those who choose the preferred coverage at fair QoS and affordable prices will be safe and versatile, 4G-LTE Mobile Communications Services launched in 2010 but will become the mass market by 2014-15. The current ITU-R age of mobile broadband connectivity will be characterized by IMT-Advanced 4 G-LTE Standards.

IMT-Advanced offers a global platform to build integrated mobile services for next generations that offer easy access to data, improved roaming capabilities, unified messaging and immersive broadband. "International infrastructure has become crucial," says ITU, "ICTs and broadband networks — similar to the transport, energy and water networks, but with an impact that promises to be even stronger and more extensive. Such significant developments to broadband wireless services will fuel economic and social development and boost momentum towards the UNMDGs." [ITU, 2010].

www.authorstream.com] states that academics and companies have been attracted to the next wave of digital wireless technology with a significant increase in smartphone subscription. High speed, high quality, high performance and low cost services like voice, multimedia and Internet via Ip are the main aim of the 4G-LTE technology. 4G-LTE is IP-based, 200Mbps and 1Gbps compatible infrastructure for indoor as well as outdoor. This generation is in the process of development. The 4G-LTE software was explained by a word MAGIC.

The scientists in [Yu, F. Recent changes to connectivity technologies have been examined and essential mobility standards for circuits-switched and packets-switched networks have also been addressed at various levels. The researchers proposed that procedures were appropriate for intra-and inter-system treatment. The researchers stressed the need to develop cross-layer techniques that will coordinate switching between access networks and the ongoing maintenance of connections.

In [JahangirKhan et al. 2011], the researchers explained that in a wireless environment traffic QoS parameters are not enough (performance, delay and loss rates). Connections will briefly split during a process called handoff in a wireless world. The safety issue is also important, particularly in m-commerce and e-commerce applications, for Mobile Wireless Networking [Cip Craig J, 2003]. The safety concerns in a wireless network are increasing with user flexibility. Current validation and authentication of information on the Air Interface wireless network infrastructure to ensure security for its clients. IEEE 801.11 [IEEE 802.11, 1999] describes the WEP, a mechanism of user authentication and data encryption between the Computer and the Wireless LAN access point. This is a wired alternative security system. In big companies the security of the IP network level [Sandra Kay Miller, 2001] could confirm the safeness of corporate and proprietary data. Ms.] as per [Ms. S. Sapakal & Ms. Sonali S. Reshma S.Kadam, 2013]

The Virtual Private Network (VPN) provides a reliable opportunity to access fixed networks. Mishra, Ajay K., 2004] notes that a mobile device is typically convenient, limited in volume, and built to perform a certain range of functions; it would ordinarily be impossible to have an ongoing power supply if the system were allowed to move freely according to [Xichun Li, AbudullaGani et al., 2009] 4G-LTE wireless technology will tie together several existing and future wireless networks (e.g. OFDM, MC-CDMA, LAS-CDMA and Network- LMDS). The first is LTE (Long-term Evolution), second is Wi-MAX (Worldwide Interoperability of Microwave Access). 4G-LTE wireless Technology should include numerous current and prospective wireless network systems (for example, OFDM, MC-CDMA, LAS-CDMA), and other infrastructure, and other innovations under the umbrella of 4G-LTE (Long term evolution), 4G-LTE is a suitable and debate mechanism for discussing potential specifications for a high-speed wireless network. 4G-LTE applies to mobile communication specifications for fourth generation.

This provides both mobile and wireless telecommunications networks wherever it is anticipated that around 2010–2015.4G-LTE will provide very seamless and cost-effective international roaming.

5 G is Mobile Technology of the 5th generation. The 5th phase of Wireless Mobile Communication is the OFDM, MC-CDMA, LAS-CDMA, UWB, Network-LMDS and IPv6 based wireless internet network. IPv6 [Xichun Li, AbudullaGani et al.,2009].5 G (mobile networks in the fifth generation, or wireless systems in the fifth generation), is a key protocol used in certain research papers and projects to identify the next major mobile communication. The network discovery strategy for human mental terminals has been developed according [Haifeng Tan et al., 2010]. The purpose is also to increase the adaptability of the process by the resource usage.

The model for development of the network architecture for potential wireless 5-G networks, with protocols and algorithms, is recent according to [Aleksandar Tudzarov, ToniJanevski,2011]. Different radio interfaces are suggested for each data connectivity software in the mobile terminal in the 5 G network architecture . A very interesting description of the design of the protocol for the new architecture. An exhaustive framework has been discussed covering block diagrams for tunneling and handling transfers between IP tunnels. The fuzzy concept was utilized to select RATs during handover. Four kinds of service-voice calls, real-time data traffic, video telephony and high bitrate-are considered in simultaneous analytics. The new concept was proposed to measure performance for the next network generation. Jahangir Khan et al.,2011] researchers analyzed the 5 G network not only with increased speed, but also with greater information. It is planned that this wave will be released by 2020.

The [Alexandar Tudzarov, Toni Janevski, 2011& Federico Boccardi et al., 2014] Network author may address problems related to license rate and spectrum management. The 5 G terminals could have radios identified by code . It will also have various modulation and error management schemes. It would provide hundreds of channels without downloading [P. Taylor, 2009]. Now, it would improve the performance of the platform and add new features to new application fields.

5 G (mobile and cellular networks of the fifth generation) can be a full digital connectivity that incorporates perfect world technology—the WWW. WWW. An contrast to the 4G-LTE / IMT network, 5 G is the next major mobile connectivity system.

. Some applications that gain from mobile communication include home automation, emergency response, intuitive, efficient urban shopping, smart product management protection, and e-books [Pankaj Sharm,2013].

5 G technologies include all sorts of state-of - the-art features which in the near future render 5 G mobile technology the most powerful and challenging. People can use their computer with broadband internet connectivity or hook up their 5 G mobile cell phones. Pratap Singh, 2012]. Sapana, Singh.

Karlsruhe, M. & Karl, M. (2016) Drawing up information in this report, 4 G Technology will be effectively implemented by the telecom operators during the initial phase of

deployment on the awareness of the critical focus aspects. This study may also take ideas from government and other organizations or staff concerned. Bangl's telecom operators can use the results of this study

III.PROPOSED METHODOLOGY

The world of business uses it ever more widely as information and communication technology (ICT) increasingly evolves –and through ever more complex implementations. Developing mobile communications technology is critical to this. The new 4 G LTE technology provides significant improvements to past cellular networks which brings the pledge that networking is no more an obstacle to the opportunities that company flexibility delivers. 4 G LTE ("Fourth Generation–Long Term Evolution"). Such enhancements in software and market flexibility can have a number of advantages : n Better marketing and customer service n Product and service enhancements n Productivity gains–Staff and staff efficiency–Quality of process management and development–Direct cost reductions n Increased employee engagement n Greater agility, flexibility and decision taking These advantages are shared by businesses in countries where 4 G LTE I 67 percent saw an increase in productivity in a survey commissioned by EE of organizations using LTE in America. Moreover, 47 percent were able to reduce the costs, 39 percent said they won more business and more than three four quarters of them agreed when asked if 4 G helped their organizations ' innovate and jump out of competition.' 4 G LTE provides significantly higher throughput (speed of transfer of data), reduced delay (faster response time from the network) and increased spectrum reliability (increasing network total capacity) compared to previous mobile network technologies. n More applications for mobile devices, outside the home or the office are possible in practice n Quickly or in realtime, large files can be shared and media streamed n Close to immediate time-sensitive data delivery; 4 G LTE allows: n Fully mobile use of the software which needs genuine speeds n Increased security (' owning of ' mobile connection) n Security (no encryption to another, likely public, network) As for real-time communication or activity compared to WLAN. The new applications of LTE, focused on efficient high speed or responsive delivery of data, would provide enhancements in the quality of many existing applications. Applications provide creative solutions of telemedicine, remote monitoring, digital, fully mobile desktops, and high definition mobile video conferencing. LTE has increased its use and user experience to accelerate the use of existing mobile apps, but not really good. LTE's . Finally, the LTE's high bandwidth can be used as an alternative or backup for fixed broadband connections to support fast temporary workspaces. This article describes some of the real benefits that businesses can expect from LTE and explores specific applications in five vertical examples: construction, health, retail, transport and professional services, in conjunction with Arthur

D, who has little experience with other countries ' project. On the basis of these results, this paper describes five main types of enterprise applications or ' usecases' and demonstrates how 4 G LTE will greatly enhance their performance: n Rapid workplace set-up n Rich machine and remote monitoring applications n Video conferences, remote and rich media collaboration n The UK's clear public commitment to 4 G LTE deployments is broad and EE is committed to launching services by end 2012. n Large-format translation n Fast workplace setup n Rich machine and remote monitoring applications The advantages of 4 G were expected for business customers now. A survey carried out by the EE Commission shows that 94% of decision makers in IT in the UK think 4 G will be "an important tool of business." The UK organizations now have to look into how to exploit the benefit of 4 G LTE and more than 60 percent expect to deploy 4 G "within six months from their launch. We will fully understand the nature of their customers ' requirements—staff, vendors, distributors and companies—and how we receive assistance from 4 G LTE and how sales and expenses can be increased. This concept should become a whole flexibility plan for businesses and business case outlining how the company can be reconfigured to draw on its advanced mobility pledge

In wireless system, the speed of transmission is impacted by particular factors such as noise, frequency etc. The transmission speed develops profligate and earlier with a modification in communication drift and generations. 4G-LTE afford higher Bandwidth, higher data rate. We have discussed earlier that at present, 5G is not a term officially used for any specific specification or in some official document yet. In this research work to represent a comparative study of the dissimilar number of operator1 (QPSK), operator 2(BPSK), operator3 (NCG), operator4 (CG), operator 5 4G-LTE system. The objective of this research is to convey broad study with respect to Fourth Generation Long Term Evolution (4G-LTE) Mobile wireless network and the performance will be estimated in dissimilar operating environment with the use of numerous analytical techniques with alteration in novel communication trend and generations. The foremost objectives of the research are with these subsequent points: A comparative study for services and applications of 4G-LTE Mobile wireless network offered by numerous telecommunication operators in India. Statistical analysis of 4G-LTE

- This project is basically performance comparison of various latest wireless communication technologies.
- We have used different modulation scheme and different hardware design (multiple antenna at TX and RX) and different wireless environment (AWGN and Rayleigh channel) for different operators.
- We have used BPSK, QPSK and QAM as modulation techniques we have also used OFDM (orthogonal frequency division multiplexing) for higher bandwidth and data rates. we have also implemented MIMO(multiple input and multiple output) antennas at transmitter and receiver to increase throughput and reliability of communication system.

- We have used 4 X 4 and 2 x 2 MIMO; 4G system is using 2X2 MIMO.
- 4 X 4 means 4 TX antenna and 4 RX antennas.
- OFDM and MIMO are the basic building blocks of 4G and 5G systems.
- AWGN (additive white Gaussian noise) is channel which introduces noise in the signal.
- Rayleigh is the channel which introduces fading in the signal, fading means if the transmitter and receiver mobiles are moving in that case there will be reflection and refraction of signal, this causes interference and change in signal strength.
- BER (bit error rate) indicates the number of lost bits when data is transmitted from TX to RX.
- $BER = \frac{\text{no. of bits lost}}{\text{total bits transmitted}}$
- SNR is the signal to noise ratio i.e. $SNR = \frac{\text{signal power}}{\text{noise power}}$.
- Channel estimation is the method of adding redundant bits with transmitting bits, which are known at the receiver.
- By adding extra bits, behaviour of wireless channel can be predicted that means how much noise and interference in introduced by the channel.
- 4G/5G systems uses different channel estimation techniques, we have used these techniques for different operators.
- Node mobility means the speed at which mobile units or nodes are moving.
- We have used MATLAB 2017 for implementation.
- We have various operators and these are classified on the basis of hardware (number of antennas at base station and other hardware) they are using, channel estimation methods they are using, data rate they are providing, data lost (bit error rate) due to environment etc.

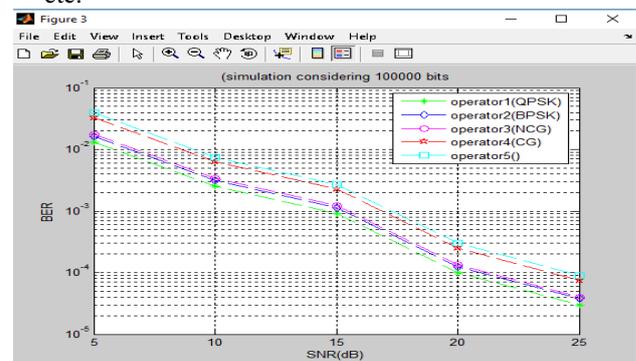


Figure 2: Comparative Analysis Of 4g-Lte Based On Performance In New Communication

RESULT1-from result1 figure(BER vs. SNR), as the SNR is increasing that means noise in the atmosphere is reducing and therefore less number of bits(data) will be lost so BER is reducing. In result 1 the operator1 has the best performance. RESULT2-figure2(node mobility Vs throughput(data speed)) As the node mobility is increasing that means mobile nodes are moving with fast rate so more chances of data (packets)lost ,throughput scale in figure shows that at different node mobility different operator can support different packet transfer rate.



Operator1 has the best performance. RESULT3 shows the end to end delay among nodes Vs node mobility, this result has mixed performance among the operators.

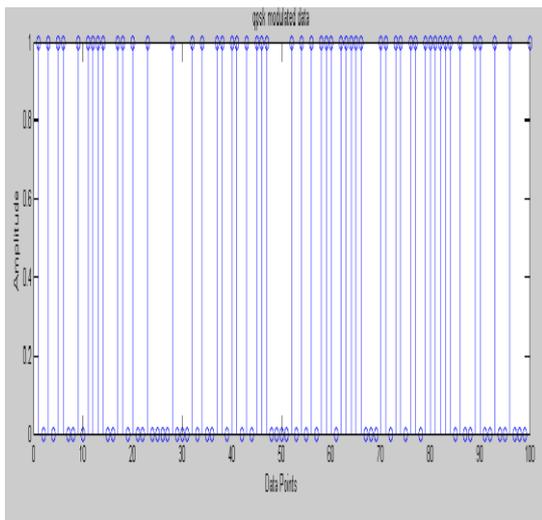


Figure 3: QPSK Modulated Data Results

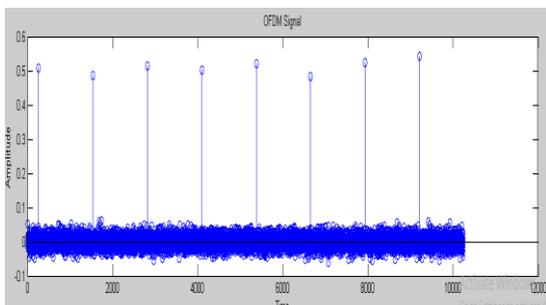


Figure 4: show the results between the amplitude and OFDM signal

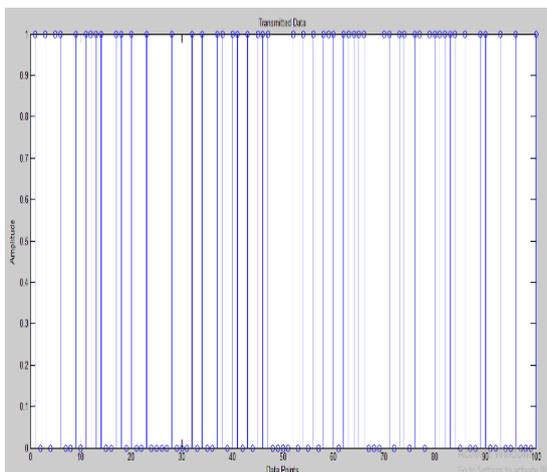


Figure 5: show the result between the amplitude and transmitted data

IV.FINDINGS OF THE STUDY

Research data from 150 participants from the age group of 20 to 35, comprising graduates and a community category of interviewees, showed significant trends in respondents' behavioural expectations for 4 G networks.

1) Both respondents are comfortable with the 4 G technologies brought in Kigali in the Capital City since they had already used and had 3 G technology.

2) 4 G technology is viewed as a better choice than 3 G technology, because web browsing is not fulfilled by the pace of the Web for most respondents

3) The variables under review, i.e., regardless of age and gender of respondents, The willingness (BI) of respondents to implement 4 G technology has been significantly affected by the PU, PEH, ATD & Preis.

4) Cost has a major impact in Kigali City on 4 G acceptance because most respondents are learners and they expect new 4 G technologies not to be an economic affair to them in contrast to 3G.

V.CONCLUSION

Because the study's variables have shown that they have significant effects on the activity purpose of respondents for the use of 4 G networks, the author recommends to 4 G service providers the following guidelines.

1) 4 G service providers should provide more flexible and enjoyable ways to communicate, easily accessible and easy at the same time.

2) As a 4 G technology demonstration which may create customers' interest by looking at speed & quality of the network the test package with the limited data may be supplied to interested consumers up to 1-2 GB.

3) The happy 4 G technology test in Kigali can proceed to mouth-to-mouth for fast market penetration.

4) Organizations should immediately supply early bird customers with a free product quantity together with a daily / monthly plan to attract large customer bases.

5) Channel size reliability increases customer satisfaction, which also allows new old customers to attract current members in 3 G to access 4G.

In this paper, comparative analysis in real world scenario with LTE signal using the different number of operator1 (QPSK), operator 2(BPSK), operator3(NCG), operator4(CG), operator 5 4G-LTE system. The comparison with different operator in presence of noise in occurrence of interference illustrations that in occurrence of only noise and in absence of interference, drastic variation. This paper has conversed numerous significant contribution of the earlier research attempts. The major object of the paper was to appreciate the efficiency in the techniques for improving the LTE network from the viewpoint of developing packet system. It was correspondingly create that there were important studies done towards reviewing the existing analysis too.

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