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Comparative Analysis of 4G-LTE Based on Performance in New Communication Trend and Generations in India

Ekta Acharya and Himani Vyas

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COMPARATIVE ANALYSIS OF 4G-LTE BASED ON PERFORMANCE IN NEW COMMUNICATION TREND AND GENERATIONS IN INDIA

Ekta Acharya
Pacific University
Udaipur (Raj.)
ektaachary80@gmail.com

Dr. Himani Vyas
Lachoo Memorial College
Jodhpur (Raj.)
hhimani.vyas@gmail.com

Abstract: ***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 irresponsible 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:4G, 5G(5thGeneration), Architecture, Transition, LTE-Advanced

I. INTRODUCTION

There has been a growing request for prior data transmission with unexpected diffusion of Smartphone and tablets in both the developed and developing economies entirely transversely the world. This requirement has continues better through ever growing processor speeds in mobile devices and expected development of cloud computing. In fact, Strategy Analytics forecasts that demand for data traffic will grow by 20-50 times by 2018.Consequently, there is a continuous requirement for technologies that support more rapidly transmission. Even though global expansion of 3G networks continue to drive this decade, upgrade from 3G to 4G is inevitable as need for more efficient data transmission becomes a necessity. The identification of various feasible backhaul technology options to carry the voice/data traffic among the access nodes deployed in the boat and the base station organised on the shore and linked to the service provider network considering numerous factors such as cost, vendor support, data rate, range of transmission, bandwidth necessity, etc. The problem can consequently be formulated as follows: Inexpensive long distance, private communication is not conceivable at sea currently. Maritime communication is mostly expending legacy VHF operating in broadcast mode. The variety of VHF radio and cellular networks is limited [1].Some backhaul technology accomplished of long distance communication is required to carry the traffic from the boat to shore or among boats As the LTE-Advanced possibilities to deliver identical high data rate and high capacity LTE, are considered by weak penetration capabilities of the signal due to their high available and cost-efficient operation frequencies (up to 2.7GHz), the cell edge develops additional thoughtful due to the bigger attenuation of the radio signal. So at high frequencies, the diffusion capabilities can hardly afford an acceptable connection in certain areas such as cell edges, tunnels, or inside buildings. To ensure full coverage, the solution was oriented towards the use of relay techniques. Currently we will deliberate about Mobile wireless network. A Mobile wireless network is a communication network where the next connection is wireless. The network is distributed over land areas called cells. This enables a large number of Mobile to communicate with every other and with fixed transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission. In a mobile network, every cell uses a

different set of frequencies to avoid interfering and provide bandwidth within each cell. These cells provide radio coverage to join together over a wide geographic area. Mobile phones take three general forms so mobile data service uses technologies such as GSM, CDMA or GPRS, 3G networks such as W-CDMA,EDGE or CDMA2000 and more recently 4G networks such as LTE,LTE-Advanced. These networks are usually available within range of commercial base station. The major aspect is Quality of Service. it is a measure of network performance that reflects the network's transmission quality and service availability. For each flow of network traffic, quality of service can be defined by three parameters: Reliability, Delay and Bandwidth. Future Mobile wireless network will need to support various Ip multimedia applications to process sharing of resources among multiple users.

Fig.1: Representative structure of wireless network.

According to number of researcher there are numerous significant concerns connected to QoS in wireless networks that do not acquire addressed in the wire line environment. These concerns arise since wireless networks are essentially dissimilar from wire line networks. Some important wireless network characteristics contain handoff approaches and Channel Assignment Strategies for QoS.In handoff strategies when a mobile moves into a dissimilar cell while a conversation is in progress, the Mobile Switching Center (MSC) handovers the call to a novel channel related to the novel base station. This handoff operation not individual comprises outcome a novel base station, but also includes that the voice and control signals be allotted to channels connected with the novel base station.

Additional is Channel Assignment Strategies for accomplishing QoS. Theses approach used as a static and dynamic. The choice of channel assignment strategies controls the performance of the scheme, mostly as to how calls are accomplished when an object user is handed off from one cell to another. In fixed channel strategy every cell is allocated a fixed set of voice channels. If completely the channels in that cell are engaged, the call is blocked and the subscriber does not receive service. Additional one is dynamic strategy, in this type of voice channels are not assigned to dissimilar cells forever, in its place every time a call request is organised, the base station demands a channel from the MSC. The prime objective of this paper is to evaluation different number of operator emerging trends of LTE network in this area. Section II deliberates almost the significant factors associated 4G-LTE network followed by Section III that discusses about proposed methodology and describe about current approach in Section IV we make some concluding remarks

II. RELATED WORK

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 : 1G stands for first generation of mobile technology in which analogy technology is used to transmit voice. it has low volume, less voice transmission and no security.2G: 2G stands for second generation which is similarly known as GSM (Global system for mobile communication It was much efficient and secure. It has enhanced voice quality and so it was accepted worldwide. When SMS came it similarly combined to it. The merely drawback of 2G is that it has less data transfer speed of 64Kbps maximum.2.5G and 2.75G: 2.5G is GPRS (General Packet Radio Service) and 2.75G is EDGE (Enhanced Data rates for GSM Evolution).it is developed after 2G it's have a better service against 2G. It similarly worked through current 2G network so it developed popular as people can effortlessly check mail on their devices and visit web pages.

3G: 3G it take upgrade in codec's of audio and video it resources enhanced voice calling superiority.

Technology after this is UMTS (Universal Mobile Telephone System). It is internationally accepted by various countries. It offers enhanced browsing speeds and data speeds 2Mbps max and it deliver support for video conferencing.

3.5G and 3.75G 3.5G and 3.75G are HSPA and HSPA+ correspondingly. This have provide downlink speeds of 14Mbps and 168Mbps separately. 3.75G is able to accomplish this thoughtful of speed and low latency consuming MIMO (Multiple Input and Multiple Output).

4G: 4G is essentially arranged in methods one is WiMAX and LTE (Long Term Evolution). LTE is a improved acceptance as WiMAX supports voice calling via VoIP. LTE deliver data transfer speeds of 300Mbps. And LTE-Advance is there as it afford data transfer rate of 450Mbps. LTE correspondingly bring VoLTE which is voice over LTE Network this will deliver HD voice noises over LTE Network.

5G: Is it arrived: researches are successful on and soon to can advance 5G. For 5G have particular different necessities such as 10Gbps data transfer speed, identical less call drop and network problems, reliable speed and 100% coverage of geographical area. None of the existing technologies fulfil this requisite. In this study to identified 4.5G which will contribute1Gbps speed to going to understand particular improvement in the mobile communication technology.

III. PROPOSED METHODOLOGY

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=no. of bits lost/total bits transmitted
- SNR is the signal to noise ratio i.e. SNR=signal power /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.

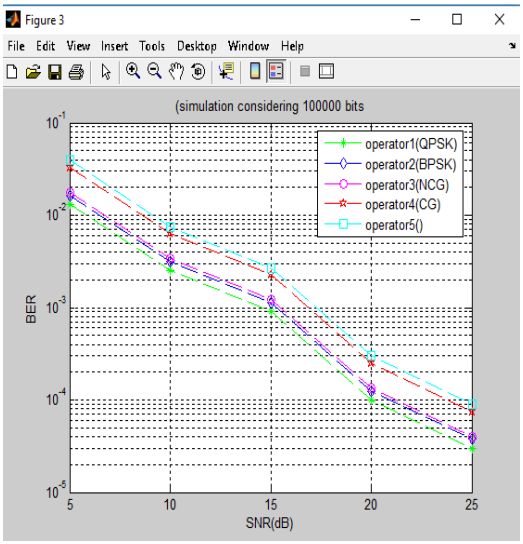

Figure 2: Comparative Analysis Of 4g-Lte Based On Performance In New Communication

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.

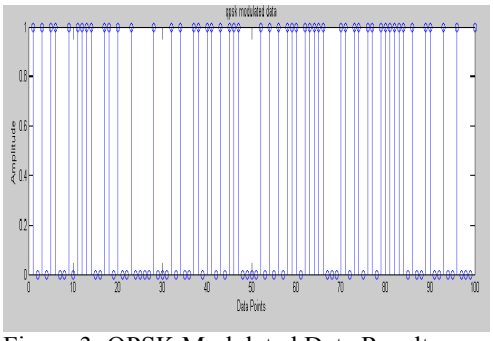

Figure 3: QPSK Modulated Data Results

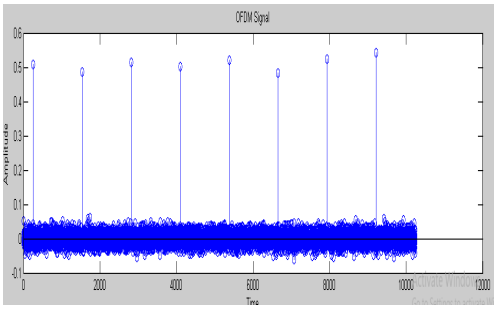

Figure 4: show the results between the amplitude and OFDM signal

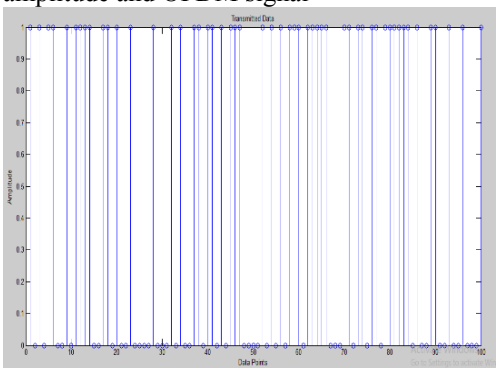

Figure 5: show the result between the amplitude and transmitted data

IV. CONCLUSION

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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