ANALYSIS THE EFFECT OF MISBEHAVIOUR NODES ON VoIP OVER WiMAX USING OPNET

Khushboo khanna#1, Sandeep Kaur Dhanda#2,Manpreet Kaur#3

#1 Baba Banda Singh Bahadur Engg College, Fatehgarh Sahib, Punjab [INDIA]

#2 Baba Banda Singh Bahadur Engg College, Fatehgarh Sahib, Punjab [INDIA]

#3 Baba Banda Singh Bahadur Engg College, Fatehgarh Sahib, Punjab [INDIA]

ABSTRACT

Worldwide Interoperability for Microwave Access (WiMAX) is a promising wireless technology based on the IEEE 802.16 standards that provide high-speed and reliable communications in large areas up to 30 miles (50 km). In this Paper, the performance of WiMAX for Voice over IP (VoIP) by varying no. of misbehavior nodes is analysed by using different encoder schemes. The performance is analysed by using OPNET Modelller. The performance is compared in terms of Delay, Throughput, Traffic Recieved. the results shows that the performance of G.711 is better than other codes.

Keywords— WiMAX, VoIP, OPNET 14.5, Misbehaviour nodes,

INTRODUCTION

Wimax (World Wide Interoperability for Microwave Access) is an IEEE standard (IEEE 802.16) that promises high bandwidth solution with long range for metropolitan area networks. IEEE 802.16 is able to cover large geographical area since the distance between the Base Station (BS) and the Subscriber Station (SS) can extend up to 30 miles [1].

VoIP as a communication technology supports transportation of voice data via Internet Protocol (IP) based networks. This communication technology seems to have edge over circuit-switched Public Switched Telephone Network (PSTN) as a result of its effectiveness in voice transportation in the form of digital IP packets via the TCP/IP based Internet. This technology enables the transmission of telephone calls through Internet or Intranet as opposed to PSTN by sending packetized voice signal via Internet Protocol (IP) [2].

The remainder of this paper is organized as follows. In Section 2, we briefly summarize the related work on the subject of performance evaluation of WiMAX networks. Section 3 gives an overview of the experimental setup over performance of WiMAX over VoIP can be evaluated. In Section 4 Simulation results on the WiMAX test bed over VoIP are discussed. Section 5, we discuss conclusion and future work.

RELATED WORK

There have been an increase in global demand for wireless data services as well as real-time applications like VoIP, audio and video streaming [3]. This increasing demands is as a result of rapid growth which has been massively witnessed in several wireless technologies recently. Countless researches are on-going in areas of wireless technologies deployment (especially WiMAX) using Voice over IP based network system, all in a bid to come up with a communication system that will be able to provide optimal wireless services so as to meet the increasing user demands. As self-reliant units, holons have a degree of independence and handle circumstances and problems on their particular levels of existence without reaching

higher level holons for assistance. The self-reliant characteristic ensures that holons are stable, able to survive disturbances.

In their respective researches in [4], the authors argue that it is necessary that the capabilities of a network to support VoIP applications be measured prior to its deployment with such network. According to them, the network's readiness to support deployment with VoIP system could be investigated by using network modeling and simulation approaches, measuring for voice packet end-to-end delay, voice packet delay variation, throughput and voice jitter after injecting real time (VoIP) traffic into the network. The author's argument if adhered to, will help in solving a great deal of problem as it will save both time and resources instead of just deploying real-time applications such as VoIP with just any wireless access technology without prior investigation of whether such network has any real-time application support capabilities or not.

With reference to [5], VoIP system has become increasingly popular more than ever even as WiMAX Networks are been deployed in several countries across the globe. Hence, many researchers in recent years as well as currently have focused extensively on different features of VoIP services over WiMAX networks, all focused on investigating and identifying network add-on performance criteria that will enhance the quality of service delivery of VoIP system over WiMAX networks.

In [6], the authors have investigated to a remarkable extent the audio, data and video support features in WiMAX Networks. Their research was focused on examining the QoS deployment over WiMAX Networks and comparison of the performance achieved using WiMAX service classes like Unsolicited Grant Service (UGS) and Extended real time Polling Service (ertPS). The studies carried out by these authors have confirmed that WiMAX Networks supports real-time application more compared to other wireless access technologies like WLAN and 3G.

EXPERIMENTAL SETUP

In this experiment the Effect of Misbehavior Nodes on VOIP over Wimax is analyzed by using OPNET Simulator. OPNET Simulator 14.5 [7] was used to analyze the performance of Wimax. We used OPNET modeler, as OPNET modeler provides a comprehensive development environment supporting the modeling of communication network and distributed systems [8]. OPNET modeler provides better environment for simulation, data collection and data analysis [7]. The basic model of this experiment is shown in fig.1. In this experiment In each scenario seven Hexagonal cells are taken. Each cell have a radius of 2 Km. In each cell there is one Base station and 15 mobile nodes are taken. These nodes are circularly placed. The BS connected to the IP backbone via a DS3 WAN link. The basestations are connected to backbone cloud through ppp_DS3 link. The Backbone Cloud is also connected to VOIP server through ppp Sonet os12 link. To analyse the performace of misbehavior different experiment is carried out as follows:-

Experiment 1: here we used scenarios simulation to study the effect of different codecs on VoIP services over WiMAX networks without misbehavior nodes . Then we make scenario with Misbehaviour nodes to study the effect of different codecs on VoIP services over WiMAX networks by varying Misbehaviour nodes. The encoder schemes used for the investigation include ITU-T G.711 (default encoder scheme), G.723 and G.729 with voice frame size used per packet set to "7".

Experiment 2: here we used scenarios simulation to study the effect of different codecs on VoIP services over WiMAX networks without misbehavior nodes . Then we make scenario with Misbehaviour nodes to study the effect of different codecs on VoIP services over WiMAX networks by varying Misbehaviour nodes. The encoder schemes used for the

investigation include ITU-T G.711 (default encoder scheme), G.723 and G.729 with voice frame size used per packet set to "13".

SIMULATION RESULTS

In this experiment the effect of misbehavior nodes on VOIP over wimax is analysed. The comparision is done in ters of Delay,Throughput,Traffic Received.

Delay

Fig shows that as we increase the no. of misbehavior nodes the delay is increased in starting but after the node is identified that it is misbehaviuor the delay wil decrease. The fig also shows that the performance of G.711 is good when there is no misbehavior nodes but as misbehavior nodes come the performance of G.723 is become good.

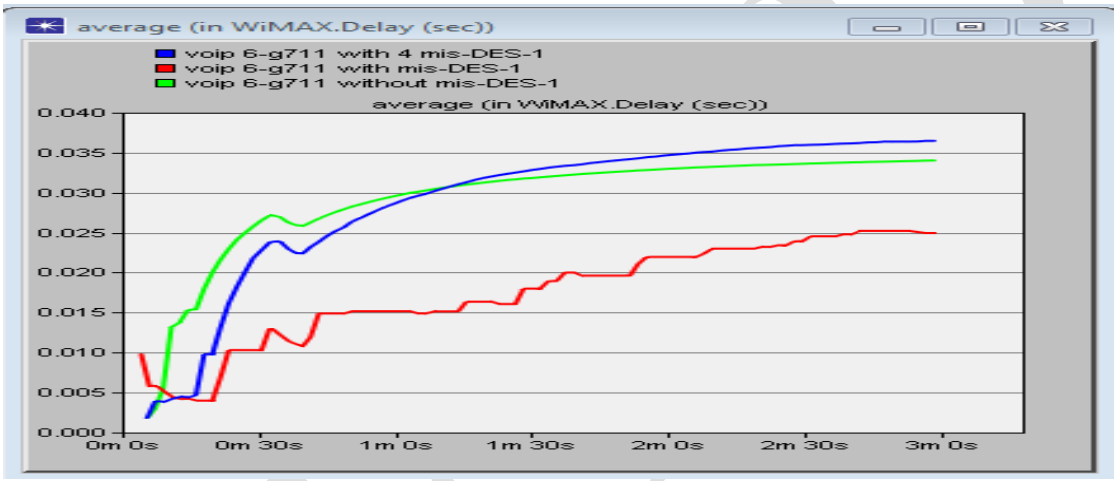

Figure 1. Delay for G711 with packet 7

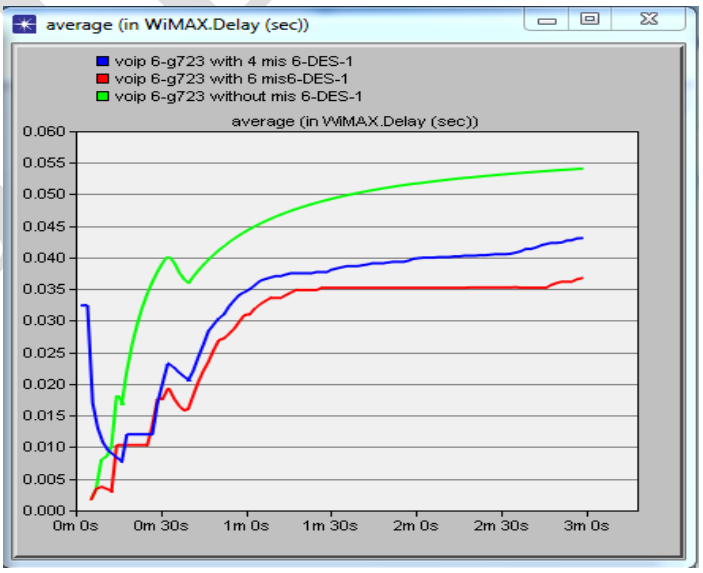

Figure 2 Delay for G723 with packet 7

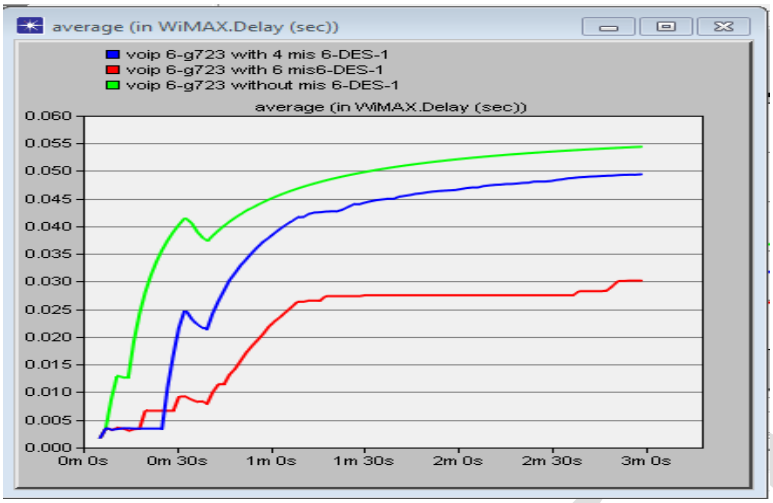

Figure 3 Delay for G723 with packet 7

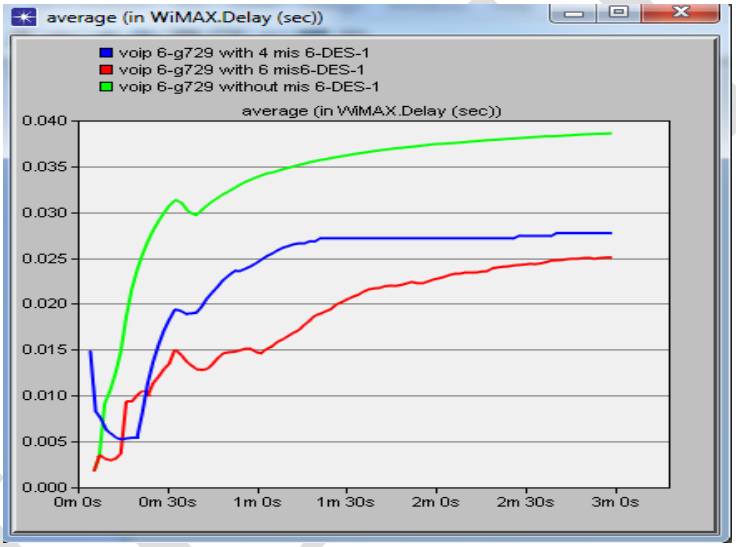

Figure 4 Delay for G729 with packet 7

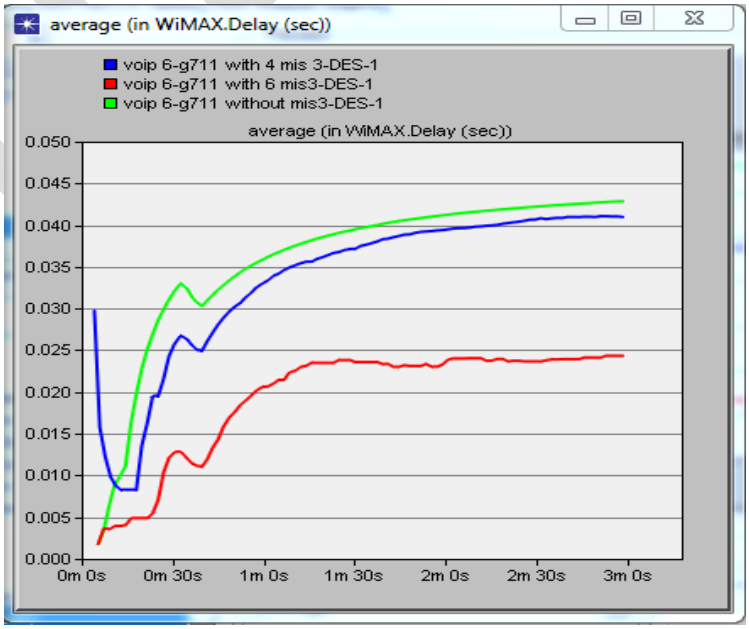

Figure 5 Delay for G711 with packet 13

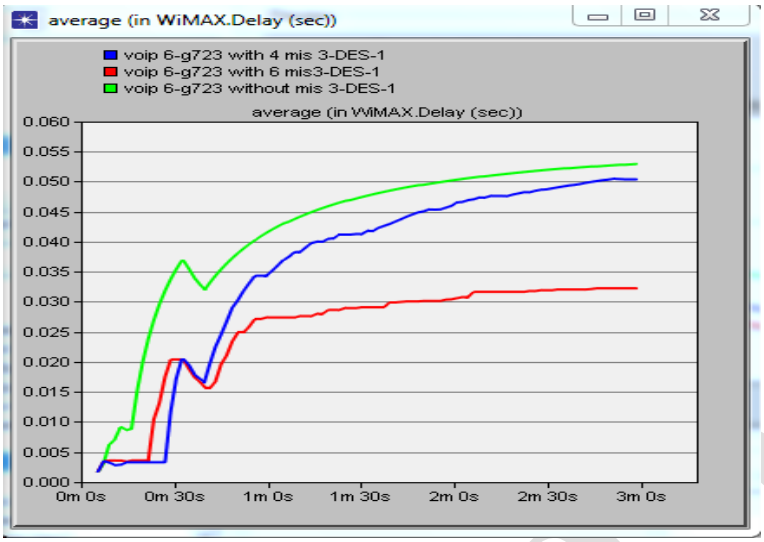

Figure 6 Delay for G723 with packet 13

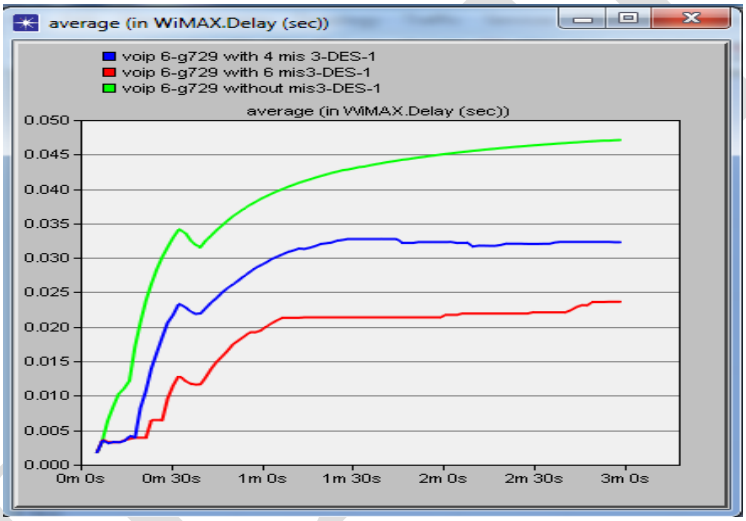

Figure 7 Delay for G729 with packet 13

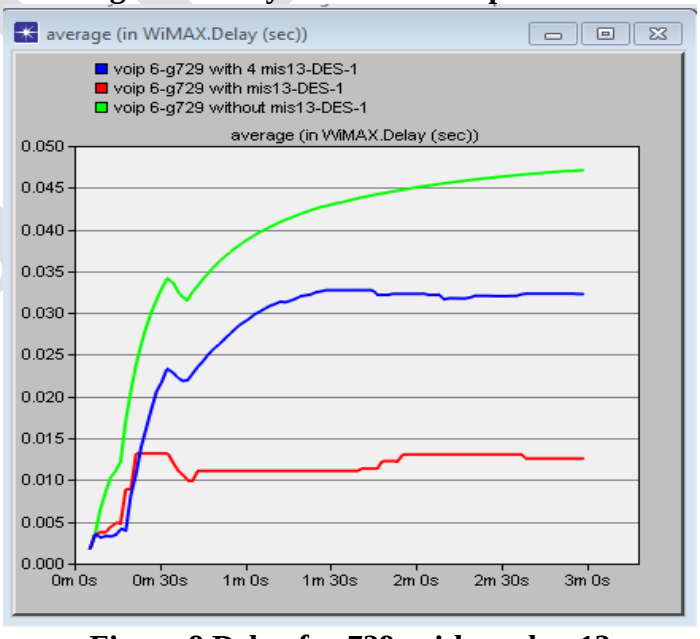

Figure 8 Delay for 729. with packet 13

fig shows that as we increase the voice frame size used per packet the delay also increase .Fig also shows that as we increase the no. of misbehavior nodes the delay will decrease because due to security the data will drooped and next packet Is received fastly so delay decreases . The fig also shows that the performance of G.711 is good when there is no misbehavior nodes . the fig also shows that as we increase the packet size delay also increase. The fog also shows that the delay of G.729 have less delay than other.

Traffic Received

Fig shows that with increase in misbehavior node the data received will decrease because due to security the packets will be droped by base station and this packet will not be received by other nodes so data received will decrease with increase in misbehavior nodes. The results also shows that the data received bin G.711 is highest than other.

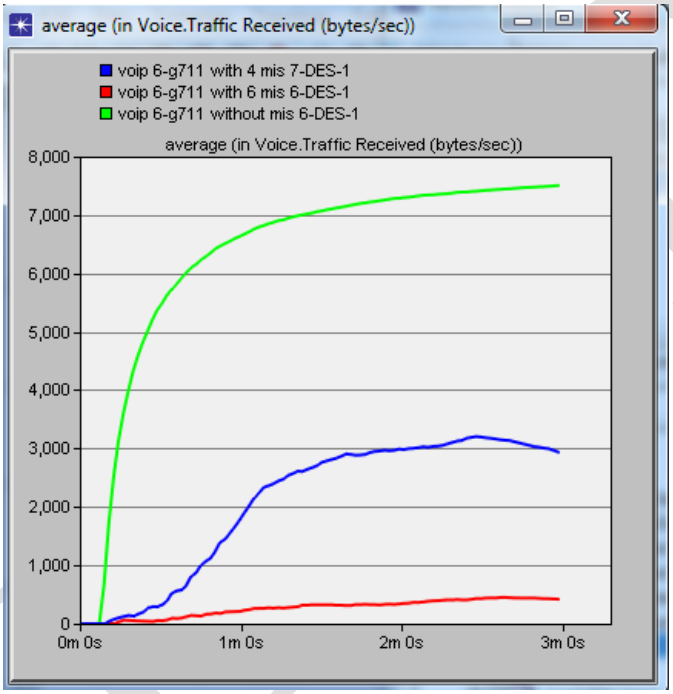

Figure 9 Traffic Received for G711 for packet 7

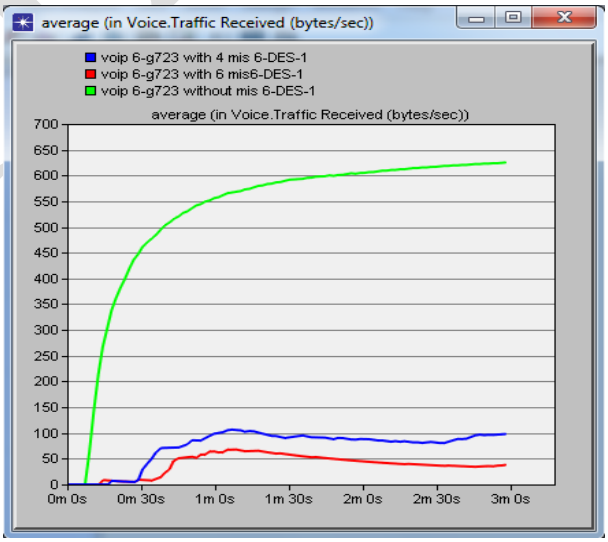

Figure 10 Traffic Received for G723 for packet 7

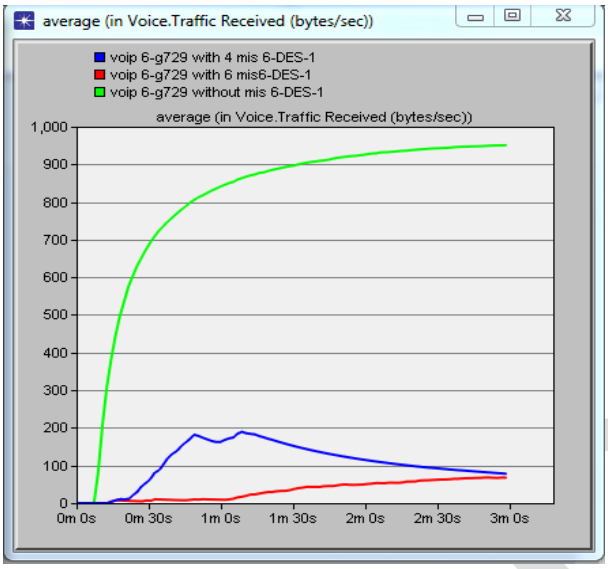

Figure 11 Traffic Received for G729 for packet 7

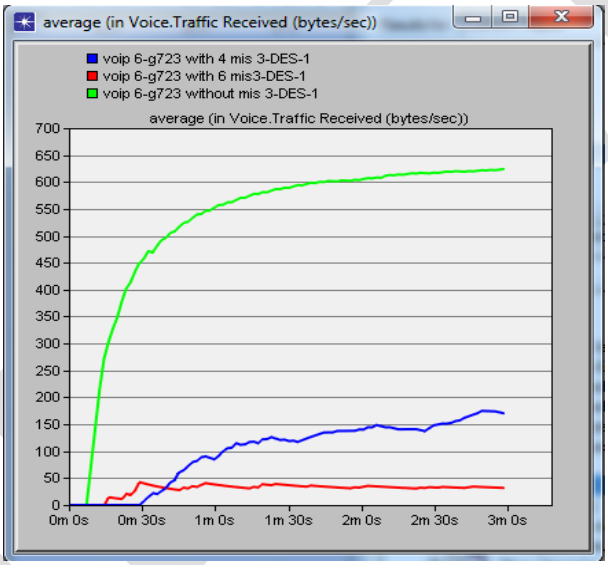

Figure 12 Traffic Received for G723 with packet 13

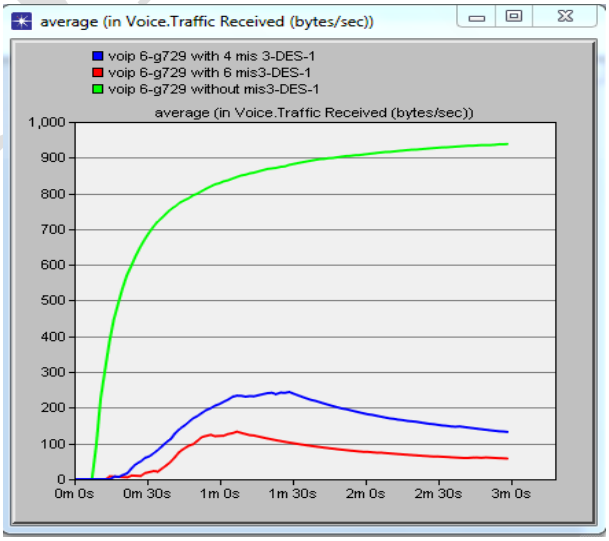

Figure 13 Traffic Received for G729 with packet 13

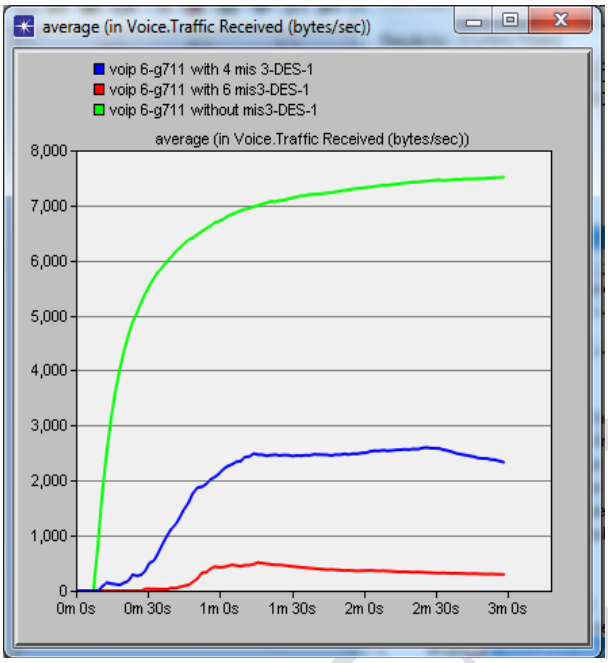

Figure 14 Traffic Received for G711 with packet 13

Fig shows that as we increase the misbehavior nodes the traffic received will also decrease

Throughput

The fig shows that as we increase the misbehavior nodes the throughput decrease because of security misbehavior packets are droped due to which throughput decrease. These result also shows that G.711 have highest throughput.

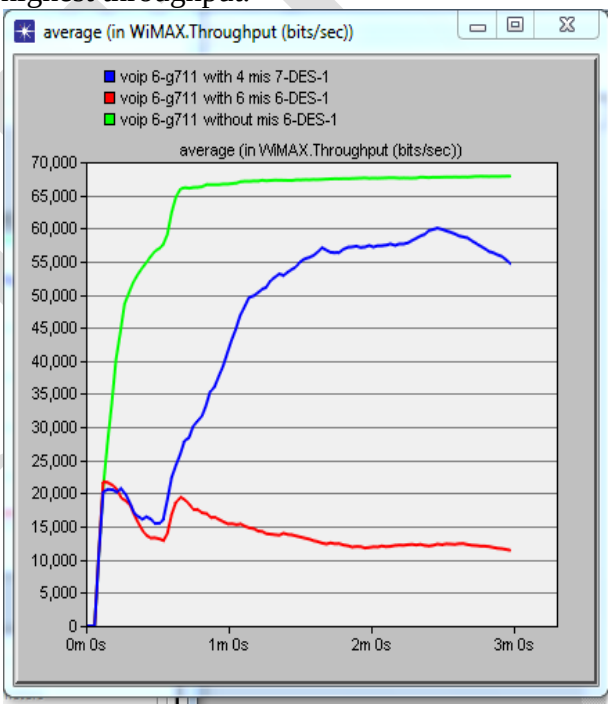

Figure 15 Throughput for G711 with packet 7

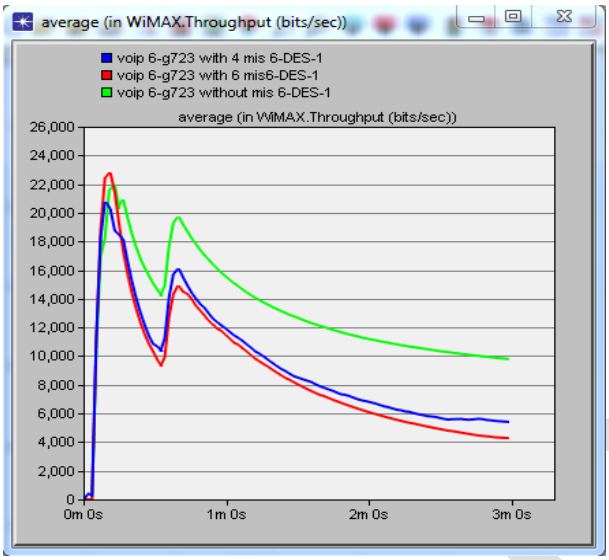

Figure 16 Throughput for G723 with packet 7

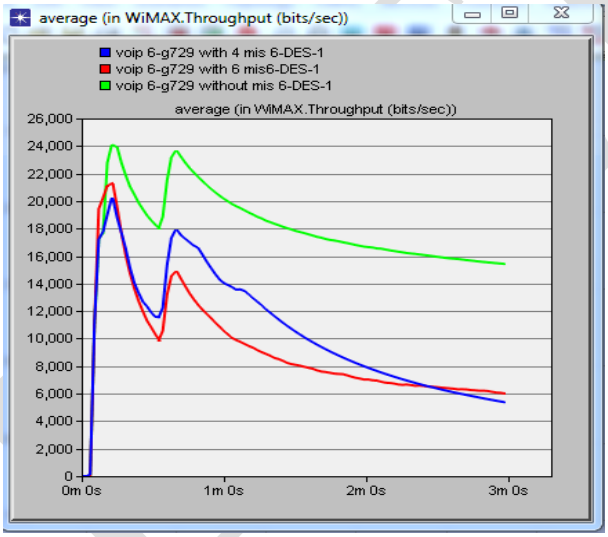

Figure 17 Throughput for G729 with packet 7

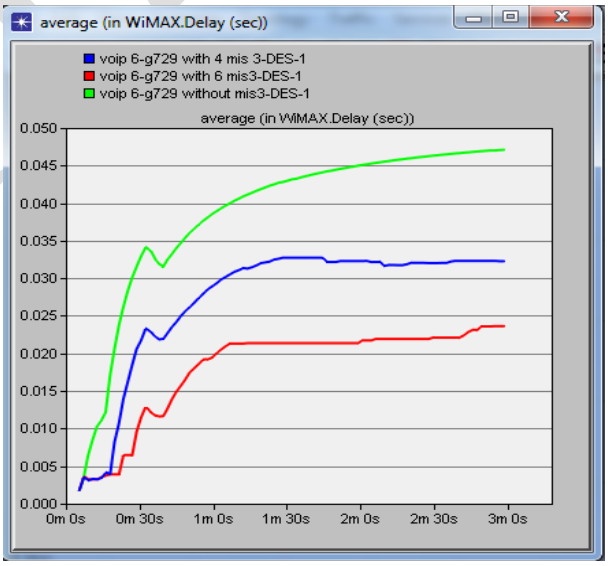

Figure 18 Throughput for G729 with packet 13

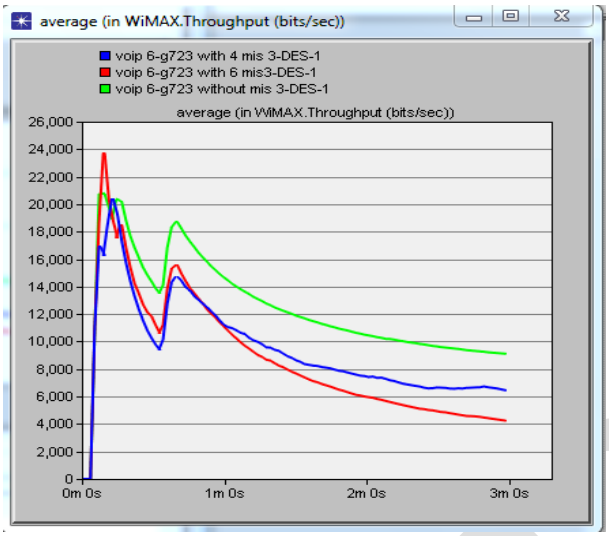

Figure 19 Throughput for G723 with packet 13

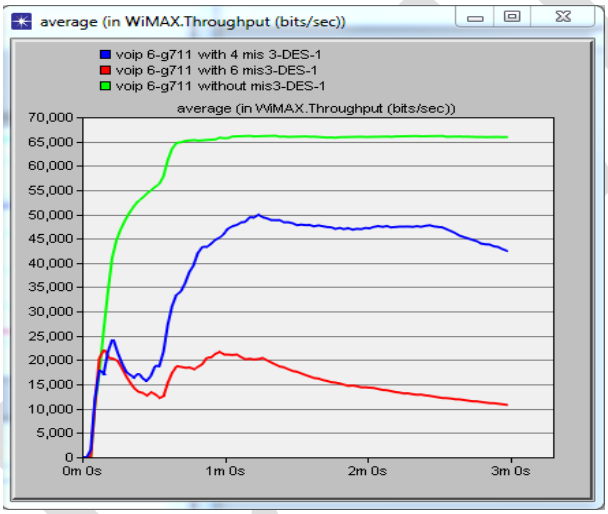

Figure 20 Throughput for G711 with packet 13

Fig shows that as we increase the packets the throughput will also decrease but this decrease is very less.

Conclusion and Future Scope

In these research analyses of the performance of VoIP over Wimax by varying no. of misbehavior nodes in terms of Traffic Received, Throughput and Delay is carried out. Its aim is to address the performance metrics of QoS for VoIP over WiMAX access technology.To analysis the performance differeNT CODES IS USED G.711,G.723,G.729 The OPNET Modeler is used to design and characterize the performance parameters of wimax. In this experiment the placement of nodes are circular. within hexagonal cell of radius 2 km. Here the speed of each node is 5m/s. Simulation is carried out for three minutes. The results showed that with increase in misbehavior nodes Throughput,Delay and Traffic Send are decrease. The result also shows that The performance of G.711 is better than other.

References

[1] Yi-Ting, M. A. I., Y. A. N. G. Chun-Chuan, and L. I. N. Yu-Hsuan. "Design of the cross-layer QoS framework for the IEEE 802.16 PMP networks." IEICE transactions on communications 91.5 (2008): 1360-1369.

[2] Sengupta, Shamik, Mainak Chatterjee, and Samrat Ganguly. "Improving quality of VoIP streams over WiMax." Computers, IEEE Transactions on 57.2 (2008): 145-156.

[3] Fröhlich, B. and Plate, J. 2000. The cubic mouse: a new device for three-dimensional input. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems

[4] Salah, Khaled, et al. "An analytical simulator for deploying IP telephony." International Journal of Network Management 19.1 (2009): 25-37.

[5] Halepovic, Emir, Carey Williamson, and Majid Ghaderi. "Wireless data traffic: a decade of change." Network, IEEE 23.2 (2009): 20-26.

[6] Flizikowski, Adam, Mateusz Majewski, and Marcin Przybyszewski. "QoE assessment of VoIP over IEEE 802.16 networks with DaVinci codes using E-model." Future Network and Mobile Summit, 2010. IEEE, 2010.

[7] Modeler, O. P. N. E. T. "14.5." (2005).