Performance Analysis of VOIP Codes under Different Mobility Pattern

Manpreet Kaur
NWIET,MOGA

Rishideep Singh
HOD,NWIET,MOGA

Abstract— ***In this Paper, the performance of WiMAX for Voice over IP (VoIP) by apllying different mobility patterns is analyzed for Good sectors and bad sectors. The performance is analysed by using OPNET Modelller. The performance is compared in terms of Load and Throughput. The results shows that the performance of G.711 is better than other codes. The result also shows that the performance of Random walk is better in most of the cases. The result also shows that with increase in packet voice per frame the Load and Throughput decrease.***

Keywords— Opnet, Wimax, VOIP, Voice Codes, Mobility Patterns.

1. INTRODUCTION

Worldwide Interoperability for Microwave Access (WiMAX) technology is the only wireless system that is capable of offering the good Quality of System (QoS) at high data rates for IP networks. It supports data rates of 70Mbps over ranges of 50km with mobility support at faster speeds [1]. Demand of WiMAX getting increase vastly in market studies last years, 133 million subscribers will be supported at the end of 2012 [2]. There is an increasing trend to install WiMAX technology for offering different application, such as voice, data, video, and multimedia services. Each of these applications has different QoS requirements.

WiMAX is a wireless broadband technology, which supports point to multi-point (PMP) broadband wireless access. WiMAX is basically a IEEE Standard 802.16, which was designed to support the European standards. 802.16's predecessors (like 802.11a) were not very accommodative of the European standards. The IEEE wireless standard has a range of up to 30 miles, and can deliver broadband at around 75 megabits per second. This is theoretically, 20 times faster than a commercially available wireless broadband. WiMAX can be used for wireless networking like the popular Wi-Fi. WiMAX, a second-generation protocol, that allows higher data rates over longer distances, efficient use of bandwidth, and avoids interference almost to a minimum. WiMAX can be termed partially a successor to the Wi-Fi protocol, which is measured in feet, and works, over shorter distances.

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).

Mobility Models

1) Random walk mobility model

In this mobility model mobile host moves from current location to new location by choosing randomly direction and speed from the predefined ranges between min speed and max speed. Since many entities move in unpredictable ways, the Random Walk Mobility Model was developed to mimic this erratic movement [J Ying Ge[2002]]. In this kind of mobility model, a mobile node randomly chooses a direction and speed to move from its current location to a new location. The speed and direction are chosen from pre-defined ranges, [minimum speed, maximum speed].

2) Random way point mobility model

In this model, the position of each MN is randomly chosen within a fixed area and then moves to the selected position in linear form with random speed. This movement has to stop with a certain period called pause time before starting the next movement. The pause time is determined by model initialization and its speed is uniformly distributed between [Min Speed, Max Speed][Ramanpreet Kaur,Rakesh Kumar,2014].

3) Static mobility model

In this model some nodes are not moving and some nodes are moving.

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

2. EXPERIMENTAL SETUP

In this experiment the Effect of different mobility patterns 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. OPNET modeler provides better environment for simulation, data collection and data analysis [7]. In this experiment In each scenario Eight Hexagonal cells are taken. Each cell have a radius of 2 Km. In

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each cell there is one Base station and 20 mobile nodes are taken. These nodes are circularly placed. The BS connected to the IP backbone via a DS3 WAN link. The base stations are connected to Router through ppp_DS3 link. The Backbone Cloud is also connected to VOIP server through ethernet link. To analyse the performance of node failure 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 for different mobility patterns by applying Good sectors (64qam2/3) to five nodes and rest by bad sector(qpsk3/4). Then we make scenario with nodes having Good sectors (64qam2/3) modulation technique to five nodes and rest by bad sector (adaptive) modulation technique to study the effect of different codecs on VoIP services over WiMAX networks by using different mobility patterns. 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 for different mobility patterns by applying Good sectors (64qam2/3) modulation technique to five nodes and rest by bad sector (qpsk3/4) modulation technique. Then we make scenario with nodes having Good sectors (64qam2/3) modulation technique to five nodes and rest by bad sector (adaptive) modulation technique to study the effect of different codecs on VoIP services over WiMAX networks by using different mobility patterns. 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".

3. RESULTS

In this paper the effect of different mobility patterns is analyzed on VOIP over wimax in terms of load and throughput

4. Load

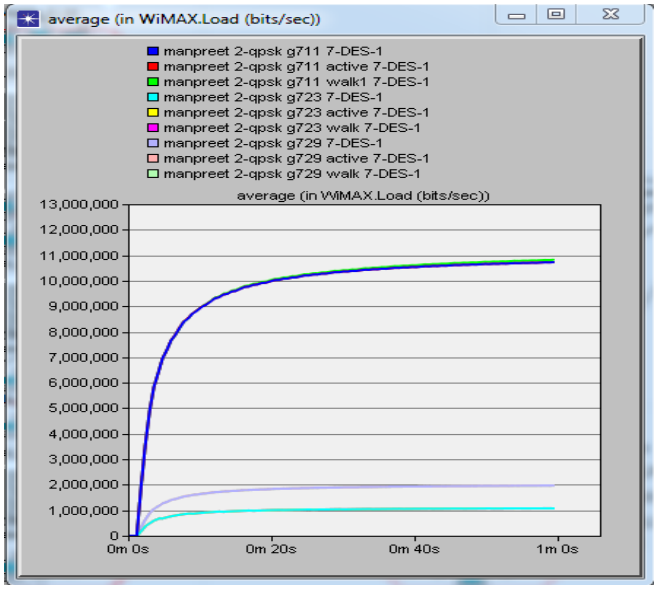

Fig 1; Load for QPSK for Voice frame per packet 7

Fig 1 shows that the load of QPSK for different mobility pattern is same which is 11000000 bits/sec for G711 for voice frame per packet is 7. Fig 1 shows that the load of QPSK for different mobility pattern is same which is 1100000 bits/sec for G723 for voice frame per packet is 7. Fig 1 shows that the load of QPSK for different mobility pattern is same which is 2000000 bits/sec for G729 for voice frame per packet is 7.

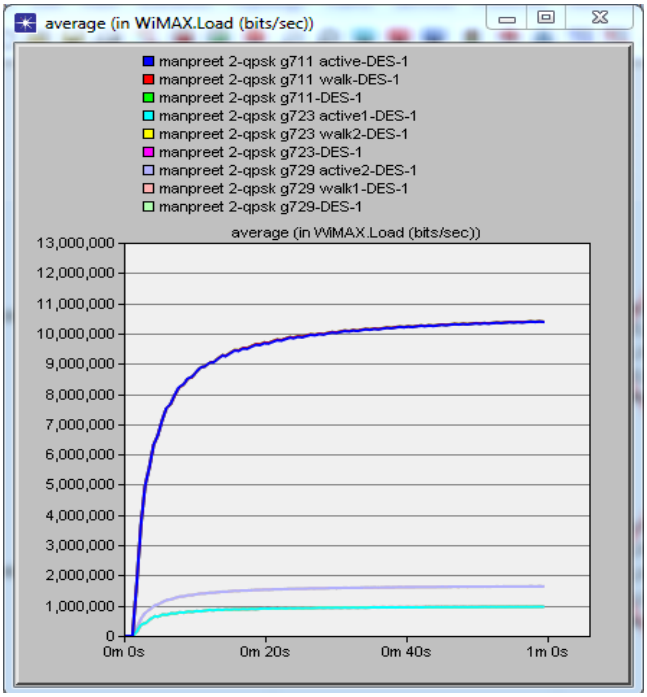

Fig 2; Load for QPSK for Voice frame per packet 13

Fig2 shows that the load of QPSK for different mobility pattern is same which is 10500000 bits/sec for G711 for voice frame per packet is 13. Fig 2 shows that the load of QPSK for different mobility pattern is same which is 990000 bits/sec for G723 for voice frame per packet is 13. Fig 2 shows that the load of QPSK for different mobility pattern is same which is 1600000 bits/sec for G729 for voice frame per packet is 13.

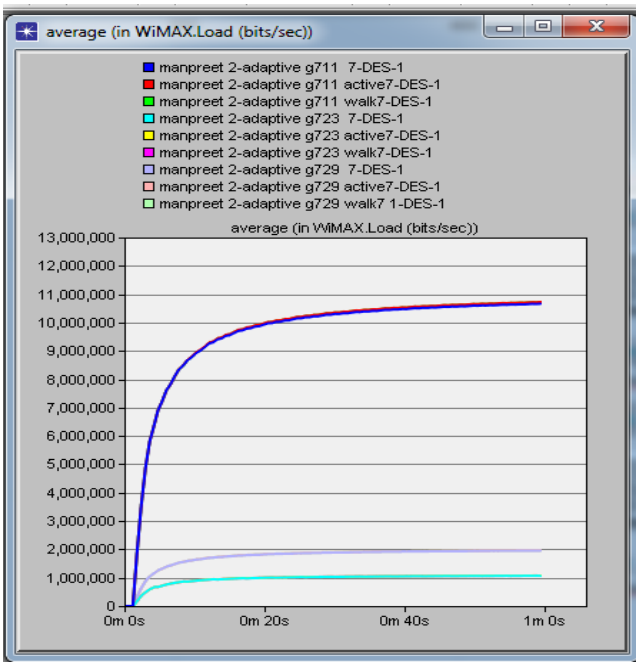

Fig 3: Load for Adaptive for Voice frame per packet 7

Fig3 shows that the load of Adaptive for different mobility pattern is same which is 10900000 bits/sec for G711 for voice frame per packet is 7. Fig3 shows that the load of Adaptive

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for different mobility pattern is same which is 10900000 bits/sec for G723 for voice frame per packet is 7. Fig3 shows that the load of Adaptive for different mobility pattern is same which is 2000000 bits/sec for G729 for voice frame per packet is 7.

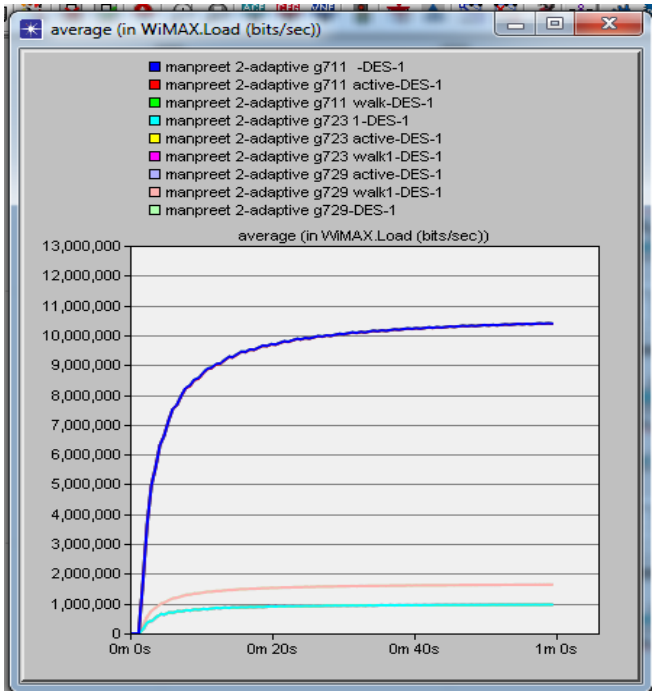

Fig 4: Load for Adaptive for Voice frame per packet 13

Fig 4 shows that the load of Adaptive for different mobility pattern is same which is 10500000 bits/sec for G711 for voice frame per packet is 13. Fig 4 shows that the load of Adaptive for different mobility pattern is same which is 990000 bits/sec for G723 for voice frame per packet is 13. Fig 4 shows that the load of Adaptive for Random walk and random way point mobility pattern is same which is 1600000 bits/sec and for Active mobility pattern is 1000000 bits/sec for G729 for voice frame per packet is 13.

Result shows that the load of all mobility patterns is same. These result also shows that the performance of G711 is better than other.

5. *Throught put*

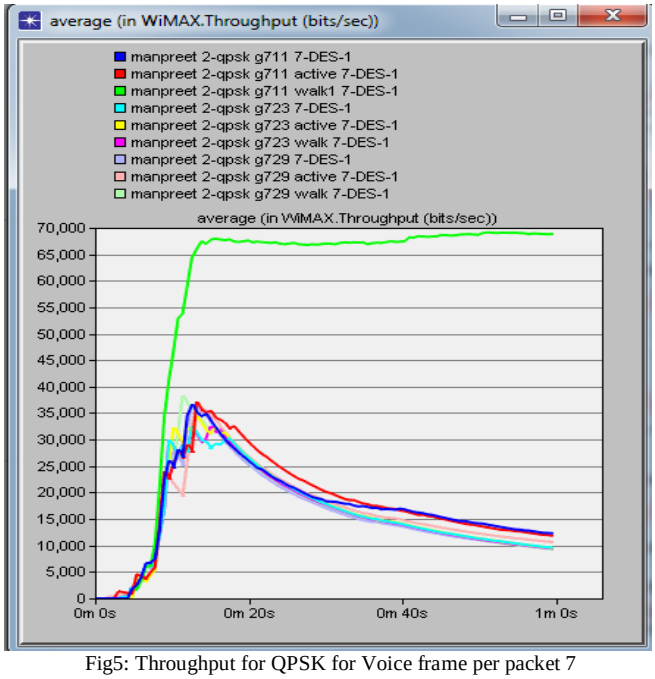

Fig5: Throughput for QPSK for Voice frame per packet 7

Fig 5 shows that the throughput of QPSK for Random walk is highest which is 70000 and for random way point and active is same which is 13000 bits/sec for G711 for voice frame per packet is 7. Fig 5 shows that the throughput of QPSK for different mobility pattern is same which is 10000 bits/sec for G723 for voice frame per packet is 7. Fig 5 shows that the throughput of QPSK for Random walk and active is highest which is 11000 and for random way point is 10000 bits/sec for G729 for voice frame per packet is 7

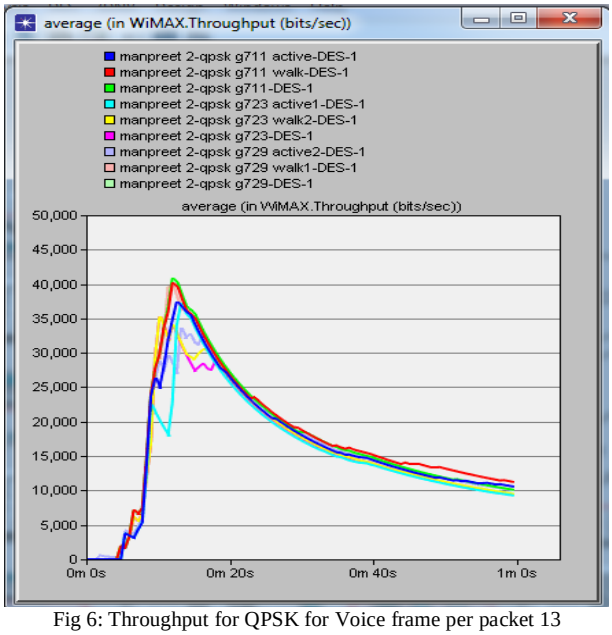

Fig 6: Throughput for QPSK for Voice frame per packet 13

Fig 6 shows that the throughput of QPSK for different mobility pattern is same which is 11000 bits/sec for G711 for voice frame per packet is 13. Fig 6 shows that the throughput of QPSK for different mobility pattern is same which is 10000 bits/sec for G723 for voice frame per packet is 13. Fig6 shows that the throughput of QPSK for different mobility pattern is same which is 10000 bits/sec for G729 for voice frame per packet is 13.

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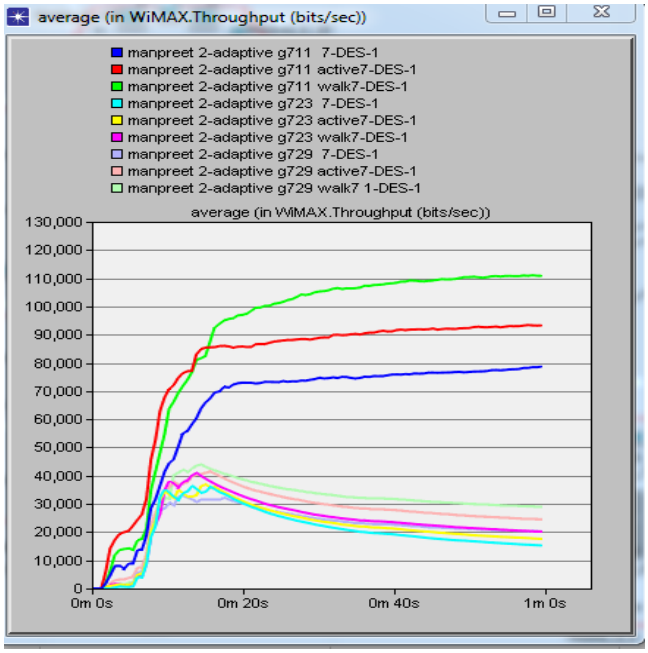

Fig7: Throughput for Adaptive for Voice frame per packet 7

Fig 7 shows that the throughput of Adaptive for Random walk is highest which is 110000 and for random way point is 92000 bits/sec and active is same which is 80000 bits/sec for G711 for voice frame per packet is 7. Fig 7 shows that the throughput of Adaptive for Random walk is highest which is 20000 and for random way point is 15000 bits/sec and active is same which is 17000 bits/sec for G723 for voice frame per packet is 7. Fig7 shows that the throughput of Adaptive for Random walk is highest which is 28000 and for random way point is 20000 bits/sec and active is same which is 25000 bits/sec for G729 for voice frame per packet is 7.

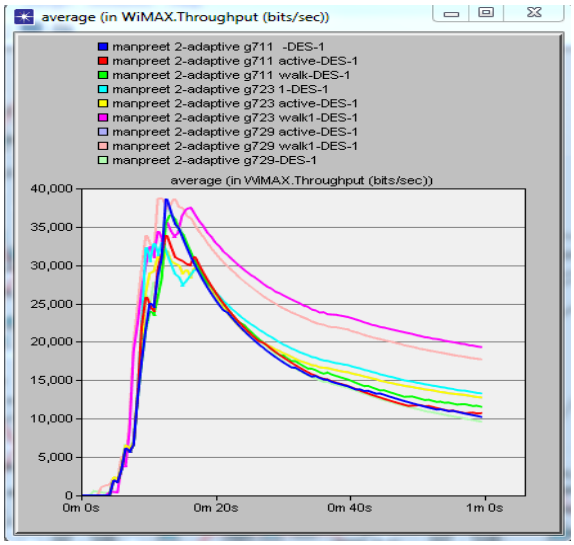

Fig 8: Throughput for adaptive for Voice frame per packet 13

Fig 8 shows that the throughput of Adaptive for different mobility pattern is same which is 11000 bits/sec for G711 for voice frame per packet is 13. Fig 8 shows that the throughput of Adaptive for Random walk is highest which is 18000 and for random way point is 14000 bits/sec and active is same which is 13000 bits/sec for G723 for voice frame per packet is 13. Fig 8 shows that the throughput of Adaptive for Random walk is highest which is 18000 and for random way point is 10000 bits/sec and active is same which is 14000 bits/sec for G729 for voice frame per packet is 13..

The result also shows that the performance of Random walk is better in most of the cases. The result also shows that with increase in packet voice per frame the Load and Throughput decrease. The result also shows that the performance of G711 is better than other.

6. CONCLUSION

In these research analyses of the performance of VoIP over Wimax by varying Mobility patterns in terms of Load and Throughput is carried out by applying Bad sectors and good sectors to nodes. To analysis the performance different codes is used G.711, G.723 and G7.29. For the simulation OPNET Modeler is used. 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 one minutes. From this experiment it is concluded that mostly random walk performs better than other. These results also show that the performance of g711 is better than other. the result also shows that when 16qam3/4 is used in Adaptive scenarios the performance is good rather when it is used is QPSK3/4. From these result it is also concluded that with increase in packet frame per size the performance decrease.

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