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Effect of Mobility Models on VOIP Codes in wimax

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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 Delay, Traffic received and Packet end to end delay. The results shows that the performance of G.711 is better than other codes. the result also shows that the performace of Random walk is better in most of the cases. the result also shows that with increase in packet voice per frame the Delay, Traffic received and Packet end to end delay decrease.

Keywords— Wimax,Voip,Mobility Patterns, Codes,opnet

I. 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].

WiMAX innovation has the capacity hand-off feature, voice and constant information. WiMAX can be considered as IP access arrange and is extremely obvious for parcel based center systems. WiMAX frameworks are obliged to pass on broadband access organizations to private and undertaking customers in an effective way. WiMAX would work like Wi-Fi yet at higher rates over immense separations and for a more prominent number of customers. WiMAX, which is an IP-based remote broadband advancement, can be composed into both wide-territory third-era (3G) versatile and remote and wire line systems allowing it to wind up a piece of a consistent whenever, anyplace broadband access arrangement

WiMAX systems have four major design segments [5, 8, 11].

Base Station which use the hub that consistently join wireless endorser gadgets to administrator systems. BS uses the component like radio wires, handsets, and other electromagnetic wave transmitting gear.

Subscriber Station is a stationary WiMAX-proficient radio framework that communications with a base station.

Mobile Station is a subscriber station that is planned to be utilized while as a part of movement at up to vehicular paces.

Relay Station is SSs designed to forward movement to different RSs or SSs in a multi-hop Security Zone.

Wimax can be used for differnt types of apllication such as VOIP. 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) [7,8].

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.

II. EXPERIMENTAL SETUP

In this experiment the Effect of mobility models on VOIP over Wimax is analyzed by using OPNET Simulator. OPNET Simulator 14.5 [9] 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 [9]. In this experiment In each scenarios eight Hexagonal cells are taken. Each cell have a radius of 2 Km. In each cell there is one Base station and 20 mobile nodes are taken. These nodes are circularly placed and having mobility of 5m/s. The BS connected to the IP backbone via a DS3 WAN link. The base stations are connected to backbone Router through ppp_DS3 link. The Backbone Router is also connected to VOIP server through ethernet link. To analyse the performance of mobility paterns 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 with different mobility modelss(random way point,random walk and static). in these scenarios 5 nodes having good sectors(16 qam 3/4) and rest having bad sectors (QPSK 3/4).then this scenarios is repeated by applyng good sectors(16 qam 3/4) to 5 nodes and rest by bad sectors (Adaptive).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 with different mobility modelss(random way point,random walk and static). in these scenarios 5 nodes having good sectors(16 qam 3/4) and rest having bad sectors (QPSK 3/4).then this scenarios is repeated by applyng good sectors(16 qam 3/4) to 5 nodes and rest by bad sectors (Adaptive).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".

III. RESULT

In this paper the effect of different mobility models is analysed over VOIP using good sectors and bad sectors in terms of Traffic recieved, packet end to end delay and delay.

Traffic recieved

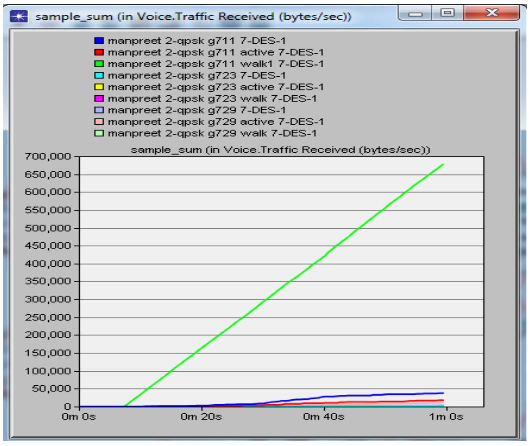

Fig 1: Traffic recieved for QPSK for voice frame per packet 7

Fig 1 shows that when random walk is used then traffic recieved is highest which is 680000 bits/sec, when random way point is used then traffic recieved is 49000 bits/sec and when static is used than traffic recieved is 40000 bits/ sec for QPSK for Packet frame per voice 7 g711.

Fig 1 shows that when random way point is used then traffic recieved is highest which is 1900 bits/sec, when random walk is used then traffic recieved is 1400 bits/sec and when static is used than traffic recieved is 900 bits/sec for QPSK for Packet frame per voice 7 for g723.

Fig 1 shows that when Active is used then traffic recieved is highest which is 10000 bits/sec, when random way point is used then traffic recieved is 4000 bits/sec and when random walk is used than traffic recieved is 1000 bits/ sec for QPSK for Packet frame per voice 7 for g729.

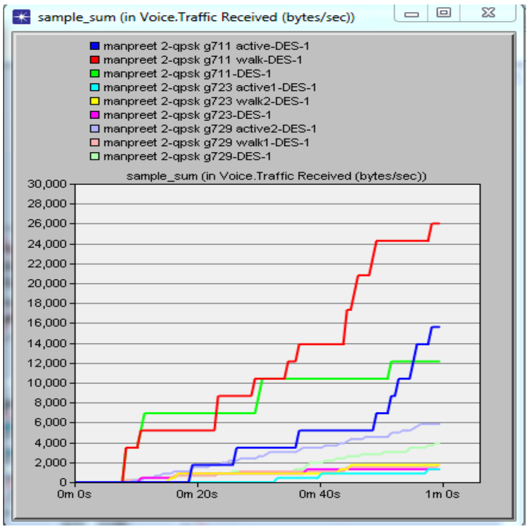

Fig 2: Traffic recieved for QPSK for voice frame per packet 7

Fig 2 shows that when random walk is used then traffic recieved is highest which is 26000 bits/sec, when random way point is used then traffic recieved is 12000 bits/sec and when static is used than traffic recieved is 16000 bits/ sec for QPSK for g711 for Packet frame per voice 13.

Fig 2 shows that when random walk is used then traffic recieved is highest which is 1700 bits/sec, when random way point is used then traffic recieved is 1300 bits/sec and when static is used than traffic recieved is 1300 bits/ sec for QPSK for g723 for Packet frame per voice 13.

Fig 2 shows that when Active is used then traffic recieved is highest which is 5900 bits/sec, when random way point is used then traffic recieved is 4000 bits/sec and when random walk is used than traffic recieved is 1500 bits/ sec for QPSK for Packet frame per voice 13 for g729.

Fig 3: Traffic recieved for Adaptive for voice frame per packet 7

Fig 3 shows that when random walk is used then traffic recieved is highest which is 1150000 bits/sec, when random way point is used then traffic recieved is 800000 bits/sec and when static is used than traffic recieved is 950000 bits/ sec for Adaptive for Packet frame per voice 7 g711.

Fig 3 shows that when random walk is used then traffic recieved is highest which is 110000 bits/sec, when random way point is used then traffic recieved is 60000 bits/sec and when static is used than traffic recieved is 80000 bits/sec for Adaptive for Packet frame per voice 7 for g723.

Fig 3 shows that when random walk is used then traffic recieved is highest which is 160000 bits/sec, when random way point is used then traffic recieved is 100000 bits/sec and when Active is used than traffic recieved is 120000 bits/ sec for Adaptive for Packet frame per voice 7 for g729.

Fig 4 shows that when random walk is used then traffic recieved is highest which is 30000 bits/sec, when random way point is used then traffic recieved is 16000 bits/sec and when static is used than traffic recieved is 18000 bits/ sec for Adaptive for g711 for Packet frame per voice 13.

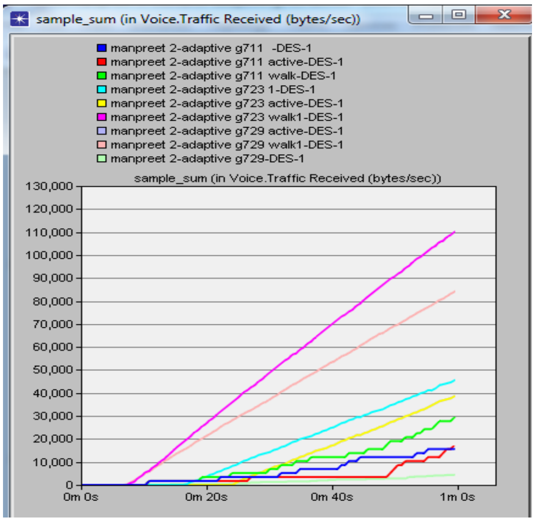

Fig 4: Traffic recieved for Adaptive for voice frame per packet 7

Fig 4 shows that when random walk is used then traffic recieved is highest which is 110000 bits/sec, when random way point is used then traffic recieved is 45000 bits/sec and when static is used than traffic recieved is 40000 bits/ sec for Adaptive for g723 for Packet frame per voice 13.

Fig 4 shows that when random walk is used then traffic recieved is highest which is 85000 bits/sec, when random way point is used then traffic recieved is 5000 bits/sec and when Active is used than traffic recieved is 40000 bits/ sec for QPSK for Packet frame per voice 13 for g729

These result shows that mostly random walk performs better than other. these result also shows that the performance of g711 is better than other. From these result it is also concluded that with increase in packet frame per size the performance decrease

Packet end to end delay

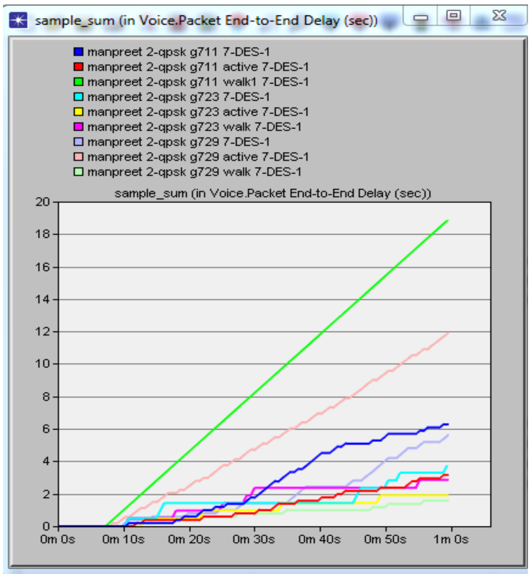

Fig 5 : Packet end to end delay for QPSK for voice frame per packet 7

Fig 5 shows that when random walk is used then Packet end to end delay is highest which is 19 sec, when random way point is used then Packet end to end delay is 6 sec and when static is used than Packet end to end delay is 3 sec for QPSK Packet frame per voice 7 for g711.

Fig 5 shows that when random way point is used then Packet end to end delay is highest which is 3.6 sec, when random walk is used then Packet end to end delay is 2.9 sec and when static is used than Packet end to end delay is 1.9 sec Packet frame per voice 7 for g723.

Fig 5 shows that when Active is used then Packet end to end delay is highest which is 12 sec, when random way point is used then Packet end to end delay is 5.5sec and when random walk is used than Packet end to end delay is 1.5 sec for QPSK for Packet frame per voice 7 for g729

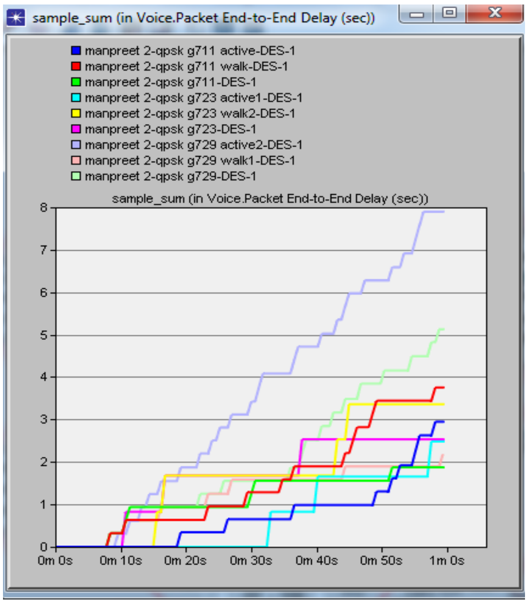

Fig 6 : Packet end to end delay for QPSK for voice frame per packet 13

Fig 6 shows that when random walk is used then Packet end to end delay is highest which is 3.8 sec, when random way point is used then Packet end to end delay is 3 sec and when static is used than Packet end to end delay is 1.9 sec for QPSK for Packet frame per voice 13 for g711.

Fig 6 shows that when random walk is used then Packet end to end delay is highest which is 3.4 sec, when random way point is used then Packet end to end delay is 2.5 sec and when static is used than Packet end to end delay is 2.6 sec for QPSK for Packet frame per voice 13 for g723.

Fig 6 shows that when Active is used then Packet end to end delay is highest which is 8 sec, when random way point is used then Packet end to end delay is 5 sec and when random walk is used than Packet end to end delay is 2 sec for QPSK for Packet frame per voice 13 for g729

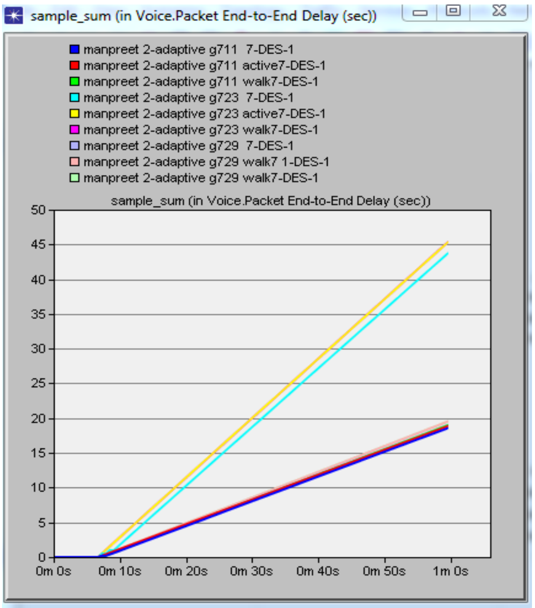

Fig 7 : Packet end to end delay for Adaptive for voice frame per packet 7

Fig 7 shows that Packet end to end delay is same for random walk, random way point and static which is 19 sec for Adaptive Packet frame per voice 7 for g711.

Fig 7 shows that when random walk is used then Packet end to end delay is highest which is 45 sec, when random way point is used then Packet end to end delay is 43 sec and when static is used than Packet end to end delay is 45 sec Packet frame per voice 7 for g723.

Fig 7 shows that Packet end to end delay is same for random walk, random way point and static which is 19 sec for Adaptive for Packet frame per voice 7 for g729

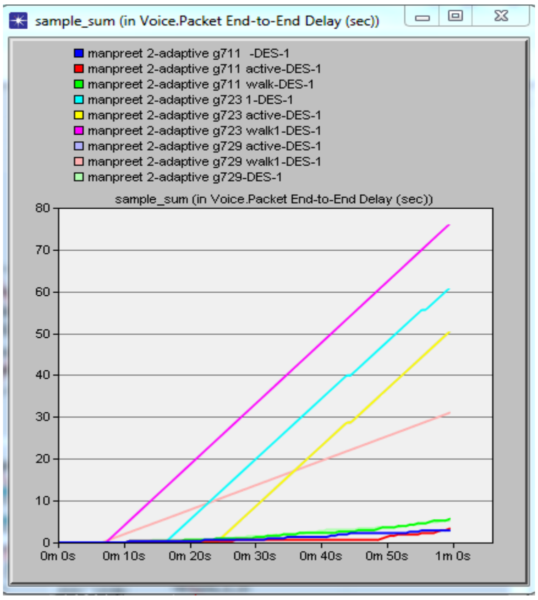

Fig 8 : Packet end to end delay for Adaptive for voice frame per packet 13

Fig 8 shows that when random walk is used then Packet end to end delay is highest which is 5.5 sec, when random way point is used then Packet end to end delay is 2.9 sec and when static is used than Packet end to end delay is 3.2 sec for QPSK for Packet frame per voice 13 for g711.
Fig 8 shows that when random walk is used then Packet end to end delay is highest which is 75 sec, when random way point is used then Packet end to end delay is 60 sec and when static is used than Packet end to end delay is 50 sec for Adaptive for Packet frame per voice 13 for g723.
Fig 8 shows that when random way point is used then Packet end to end delay is highest which is 50 sec, when random walk is used then Packet end to end delay is 5 sec and when Active is used than Packet end to end delay is 31 sec for QPSK for Packet frame per voice 13 for g729
These result shows that mostly random walk performs better than other because if more packet are transmitted than more time needed to recieve all the packet so packet end to end delay increases . These result also shows that the performance of g711 is better than other. From these result it is also concluded that with increase in packet frame per size the performance decrease

Delay

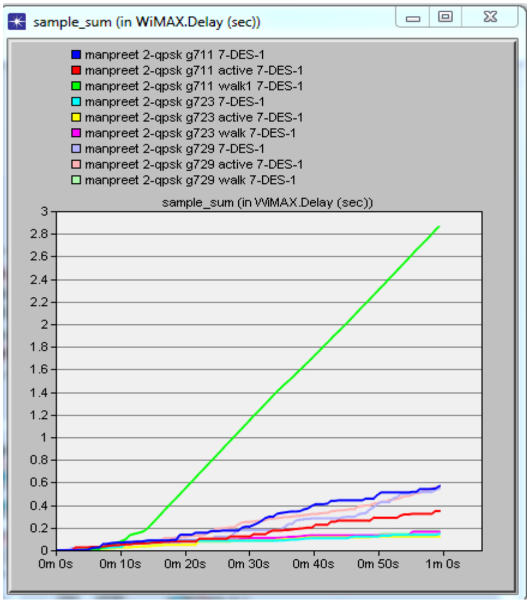

Fig 9 : Packet end to end delay for QPSK for voice frame per packet 7

Fig 9 shows that when random walk is used then delay is highest which is 2.9 sec, when random way point is used then delay is 0.6 sec and when static is used than delay is 0.3 sec for QPSK for Packet frame per voice 7.

Fig 9 shows that when random way point is used then delay is highest which is 0.17 sec, when random walk is used then delay is 0.14 sec and when static is used than delay is 0.12 sec for QPSK for Packet frame per voice 7 for g723.
Fig 9 shows that when Active is used then delay is highest which is 0.56 sec, when random way point is used then delay is 0.55 sec and when random walk is used than delay is 0.18 sec for QPSK for Packet frame per voice 7 for g729.

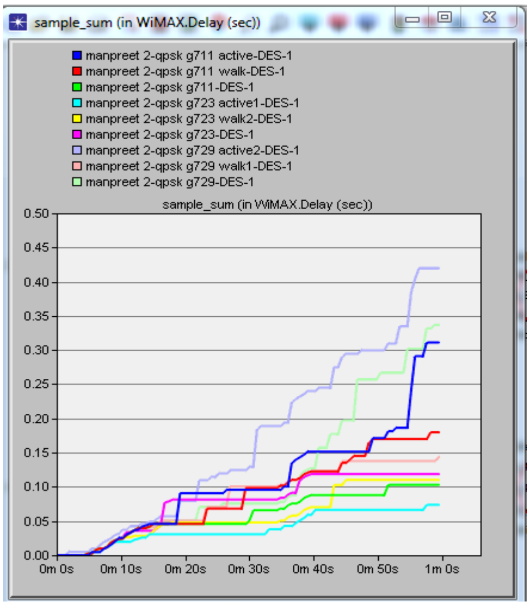

Fig 10 : Packet end to end delay for QPSK for voice frame per packet 13

Fig 10 shows that when random walk is used then delay is highest which is 0.18 sec, when random way point is used then delay is 0.32 sec and when static is used than delay is 0.10 sec for QPSK for Packet frame per voice g711 for 13.
Fig 10 shows that when random walk is used then delay is highest which is 0.11 sec, when random way point is used then delay is 0.12 sec and when static is used than delay is 0.08 sec for QPSK for g723 Packet frame per voice 13.
Fig 10 shows that when Active is used then delay is highest which is 0.42 sec, when random way point is used then delay is 0.33 sec and when random walk is used than delay is 0.15 sec for QPSK for Packet frame per voice 13 for g729

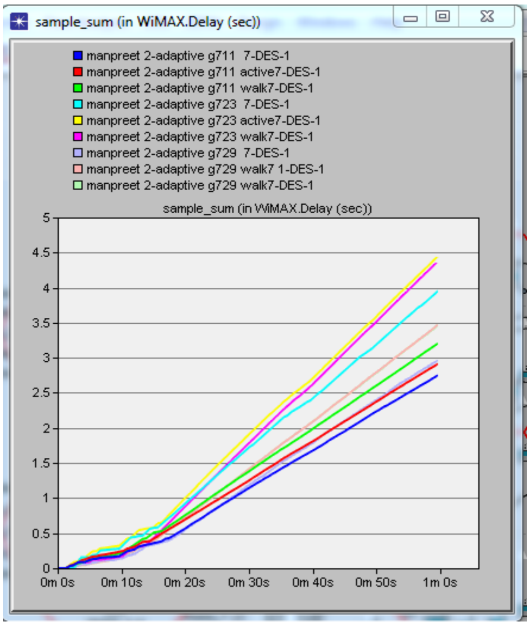

Fig 11 : Packet end to end delay for Adaptive for voice frame per packet 13

Fig 11 shows that when random walk is used then delay is highest which is 3.3 sec, when random way point is used then delay is 2.7 sec and when static is used than delay is 2.9 sec for Adaptive for Packet frame per voice 7.
Fig 11 shows that when random walk is used then delay is highest which is 4.4 sec, when random way point is used then delay is 4 sec and when static is used than delay is 4.4 sec for Adaptive Packet frame per voice 7 for g723.
Fig 11 shows that when random walk is used then delay is highest which is 3.5 sec, when random way point is used then delay is 3 sec and when is used Active than delay is 3 sec for Adaptive for Packet frame per voice 7 for g729

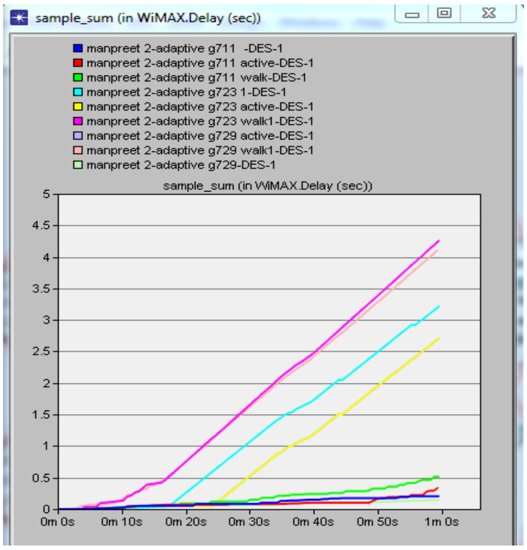

Fig 12 : Packet end to end delay for Adaptive for voice frame per packet 13

Fig 12 shows that when random walk is used then delay is highest which is **0.52** sec, when random way point is used then delay is 0.20 sec and when static is used than delay is 0.35 sec for Adaptive for Packet frame per voice g711 for 13.

Fig 12 shows that when random walk is used then delay is highest which is 4.3 sec, when random way point is used then delay is 3.2 sec and when static is used than delay is 2.7 sec for QPSK for g723 Packet frame per voice 13

Fig 12 shows that when random walk is used then delay is highest which is 4.2 sec, when random way point is used then delay is 02.7 sec and when Active is used than delay is **0.2** sec for Adaptive for Packet frame per voice 13 for g729

These result shows that mostly random walk performs better than other because if more packet are transmitted than more time needed to recieve all the packet so delay increases . These result also shows that the performance of g711 is better than other. From these result it is also concluded that with increase in packet frame per size the performance decrease

IV. CONCLUSIONS AND FUTURE SCOPE

In these research analyses of the performance of VoIP over Wimax by varying Mobility patterns in terms of Delay, traffic recieved and Packet end to end Delay is carried out by applying Bad sectors and good sectors to nodes. To analysis the performance different codes is used G.711,G.723,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 result also shows that the performance of g711 is better than other. the result also shows that when 16qam3/4 is used in Adaptive scnarios 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. In future one can analyse this effect by increasing nodes, by increasing speed.

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