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Effect of MANET Nodes on the Performance of WIMAX

Ajay Kumar

Adesh Institute of Engineering &
Technology, Faridkot
Ajaynarang810@icloud.com

Pankaj Sharma

Adesh Institute of Engineering &
Technology, Faridkot
pankajsharma85@gmail.com

Puneet Jain

Adesh Institute of Engineering &
Technology, Faridkot
puneetjain988@gmail.com

Abstract: *In this paper the interference is analyzed between wimax and manet nodes. For this manet nodes are moved using different mobility 5m/s -7m/s. The effect is also analyzed by varying number of cells and number of users. The performance has been analyzed in terms of Load, throughput, and delay. From the result, it is concluded that the performance decrease due to interference.*

Keywords: *Wimax, MANET, OPNET, Interference.*

I. INTRODUCTION

WiMAX is Wireless Interoperability for Microwave Access, it is the modern area used for research in Wireless Communication which is in view of the IEEE 802.16-2004 and IEEE 802.16e-2005 benchmarks and was outlined with much impact from Wi-Fi [12]. IEEE 802.16 backings two sorts of transmission duplexing: Time Division Duplexing (TDD) and Frequency Division Duplexing (FDD) and bolster both full and half duplex stations [10, 13]. WiMAX used orthogonal frequency division multiplexing (OFDM) which is a suitable modulation/access system for on-line-of-sight (LOS) conditions with high information rate [1, 2]. MANET is a decentralized, self-organizing network which has a smart antennas for each node i.e. Act as a transmitting and receiving data, which gives point to point communication from an appropriate route in the presence of any one

Routing protocol like AODV, GRP (Gathering based routing protocol), DSR (Dynamic Source Routing), OLSR (Optimized Link State Routing) etc. At present time the MANET become one of the most important wireless communication mechanisms among all other [17].

II. WIMAX STANDARDS

WiMax used the IEEE 802.16 standards. IEEE 802.16 provides one point to many points using 10 to 66 GHz frequency range for Line of Sight [3].

In 802.16a standard the ability to show one point to many points in the frequency range from 2 to 11 GHz. 802.16c standard use frequency range 10 to 66 GHz. 802.16d standard backings obligatory and discretionary components alongside TDD and FDD technologies. It's using information rate is 40 to 70 Mbps. 802.16e was an adjustment of the 802.16d standard which is faster [4, 5, 6].

III. WIMAX MODULE

WiMAX used five types of the module for making a communication in between transmitter and receiver [8, 14]. **Base Station:** the Base station is the hub that constantly joins wireless endorser gadgets to administrator systems. **Subscriber Station:** This is a stationary WiMAX-proficient radio framework that communications with a base station. These are mobile Station, relay station, and operator network. The functions are given radio access and IP network administrations to WiMAX subscribers.

IV. MANET

MANET is a collection of self-governing nodes that communicate with each other by forming a multi-hop network and maintaining connectivity in a decentralized manner So, MANET is decentralized, self-organizing networks which make a point to point communication in between source and destination from a suitable route in the presence of different type of routing protocol like

AODV, GRP (Gathering based routing protocol), DSR (Dynamic Source Routing), OLSR (Optimized Link State Routing), TORA etc. At present trend, the MANET become one of the most important wireless communication mechanisms among all other. Whenever a communication is established between source and destination then destination node should be lie in between the radio range of the source node which wants to initiate the communication, the autonomous and intermediate nodes within the network act like a router as well as host at the same time, which serves the packets from source node to destination node, with the help of routing protocol.

V. EXPERIMENTAL SETUP

In this paper, the interference of WiMAX and manet nodes is analyzed by moving manet nodes at different speed 5m/s -7m/s and wimax nodes at 5m/s. Further to check the performance of wimax in presence of manet no. of cells and no. of users are also increased. Firstly 5 cells are used which have 5 nodes in each cell then 6 cells are used and 11 nodes are used in each cell and then no: of cells are increased to 7 cells having 16 nodes in each cell. In each scenario, the no. of nodes of MANET remains the same which is 5. In each scenario, the nodes have an application of voice and HTTP both. These scenarios best service is used.

VI. RESULTS AND DISCUSSIONS

In this research work, the effect of MANET on WIMAX is analyzed in terms of Load, traffic sent (video), traffic sent (voice).

5.1 Load

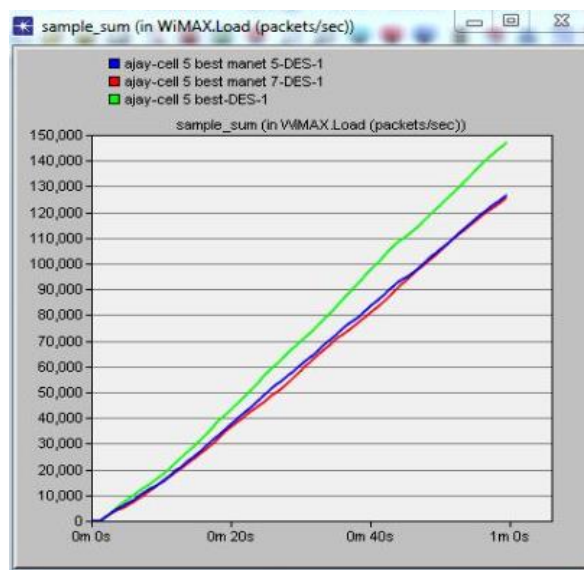


Fig 1: Load for cell 5

Fig 1 shows the result of Load for cell 5. The result shows that when there is no MANET node than Load is high which 150000packet/sec is and when MANET nodes come into existence then Load decreases to 120000packet/sec for every mobility.

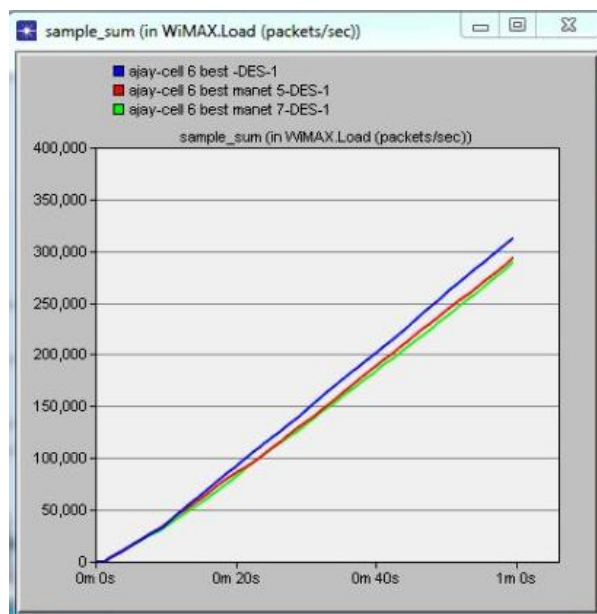


Fig 2: Load for cell 6

Fig2 shows the result of Load for cell 6. The result shows that when there is no MANET node that Load is high which is 320000packet/sec and when MANET nodes come into existence then Load decreases. Further, if nodes move with different speed then result is same which is 290000packet/sec

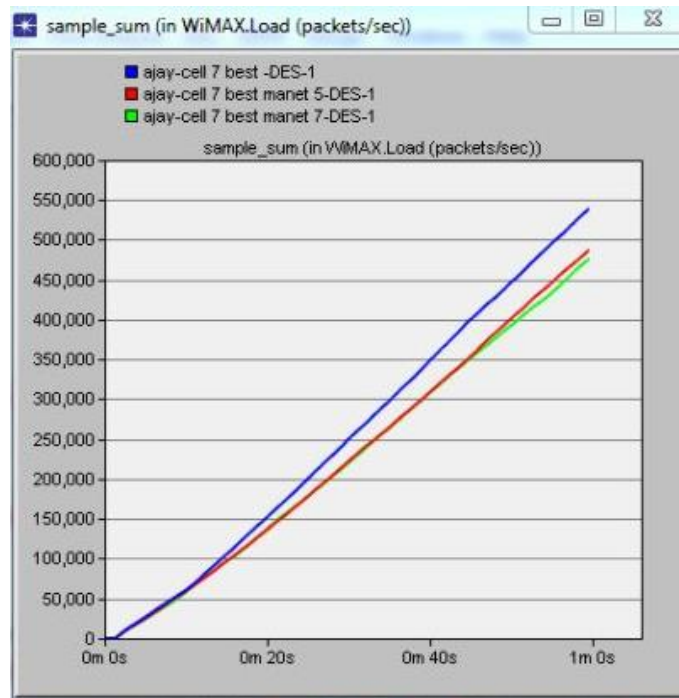


Fig 3: Load for cell 7

Fig 3 shows the result of Load for cell 7. The result shows that when there is no MANET node that Load is high which is 530000packet/sec and when MANET nodes come into existence then Load decreases. Further if nodes move with 5m/s mobility then result is high which 490000 packet/sec is and for 7m/s it is 450000packet/sec.

5.2 Throughput

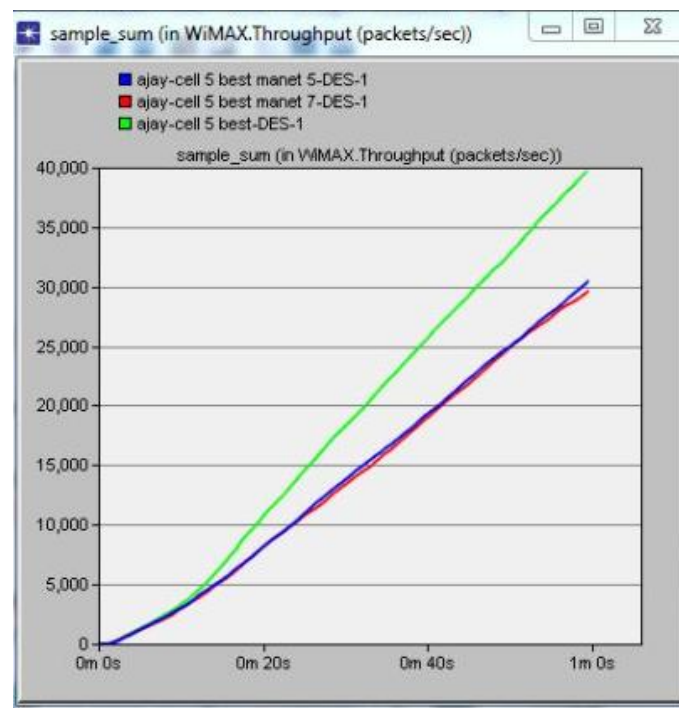


Fig 4: Throughput for cell 5

Fig 4 shows the result of throughput for cell 5. The result shows that when there is no MANET node that throughput is high which 40000 packets/sec is and when MANET nodes come into existence then throughput decreases. Further if nodes move with 5m/s mobility then result is high which is 30000packet/sec and for 7m/s is 29000packet/sec.

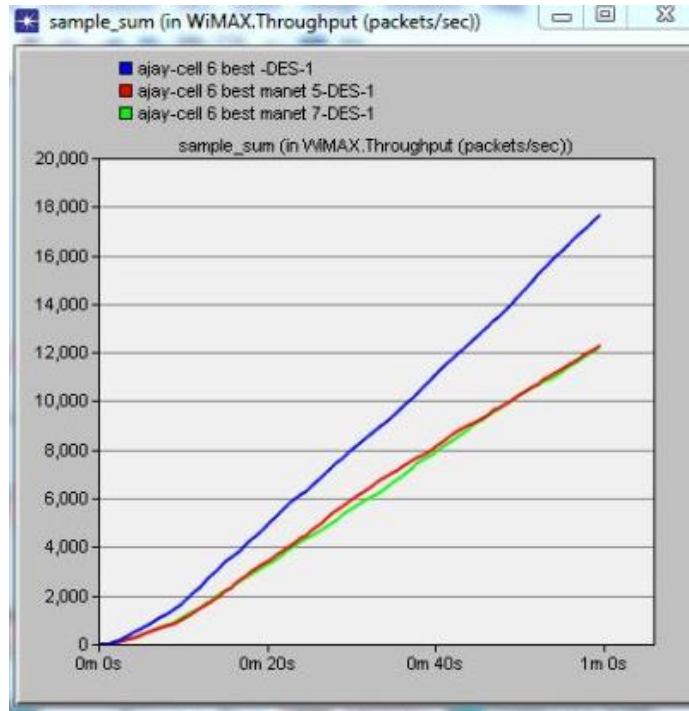


Fig 5: Throughput for cell 6

Fig 5 shows the result of throughput for cell 6. The result shows that when there is no MANET node that throughput is high which 17000 packets/sec is and when MANET nodes come into existence then throughput decreases. Further, if nodes move with mobility then the result is 12500packet/sec.

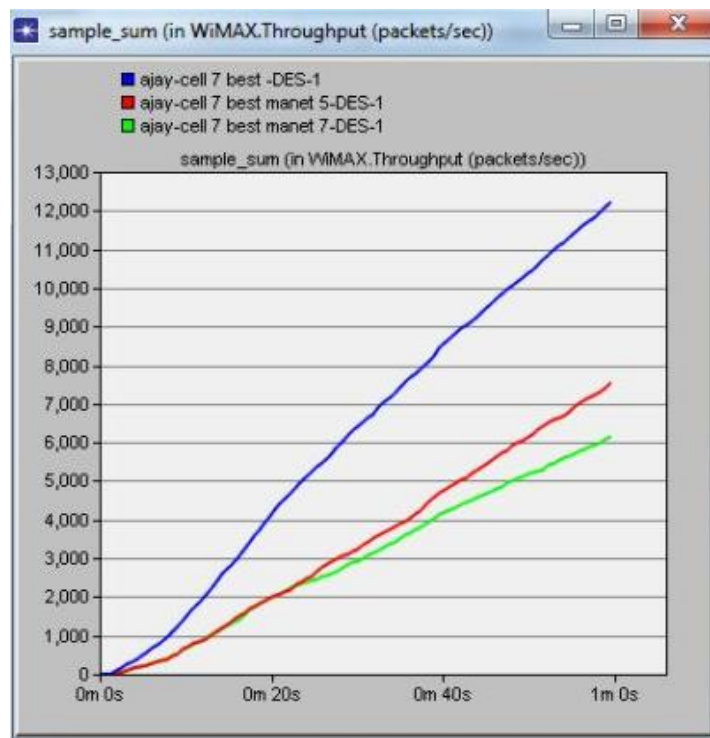


Fig 6: Throughput for cell 7

Fig 6 shows the result of throughput for cell 7. The result shows that when there is no MANET node that throughput is high which 12200 packets/sec is and when MANET nodes come into existence then throughput decreases. Further if nodes move with 5m/s mobility then result is 6800 packet/sec and for 7m/s is 6100 packet/sec.

5.2 Delay

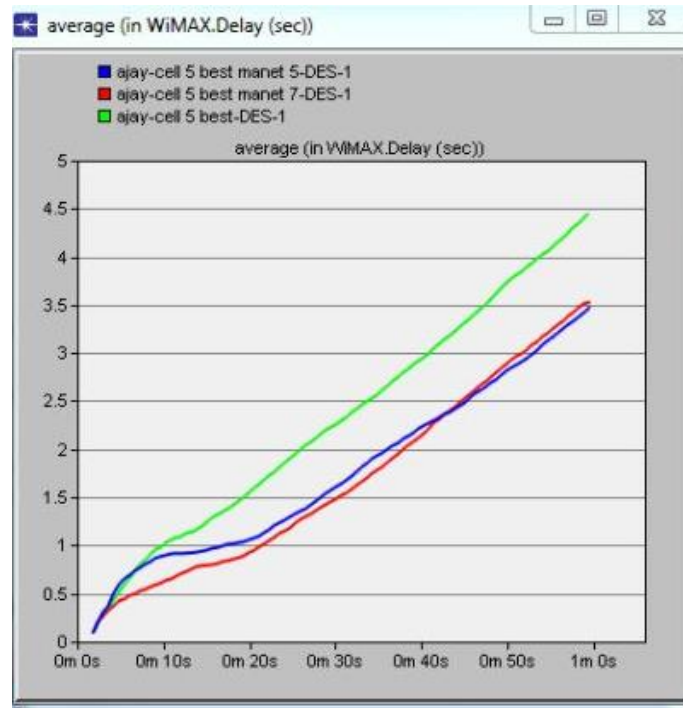


Fig 7: Delay for cell 5

Fig 7 shows the result of delay for cell 5. The result shows that when there is no MANET node that delay is high which 4.5 sec is and when MANET nodes come into existence then delay decreases. Further, if nodes move with mobility then the result is 3.5 sec.

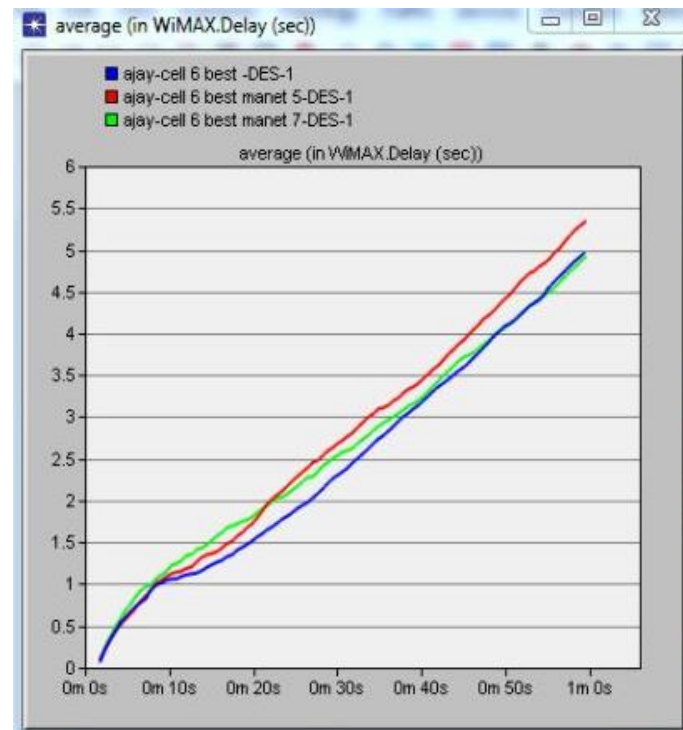


Fig 8: Delay for cell 6

Fig 8 shows the result of delay for cell 6. The result shows that when there is no MANET node that delay is high which 5.4 sec is and when MANET nodes come into existence then delay decreases. Further, if nodes move with mobility then the result is high this is 5 sec.

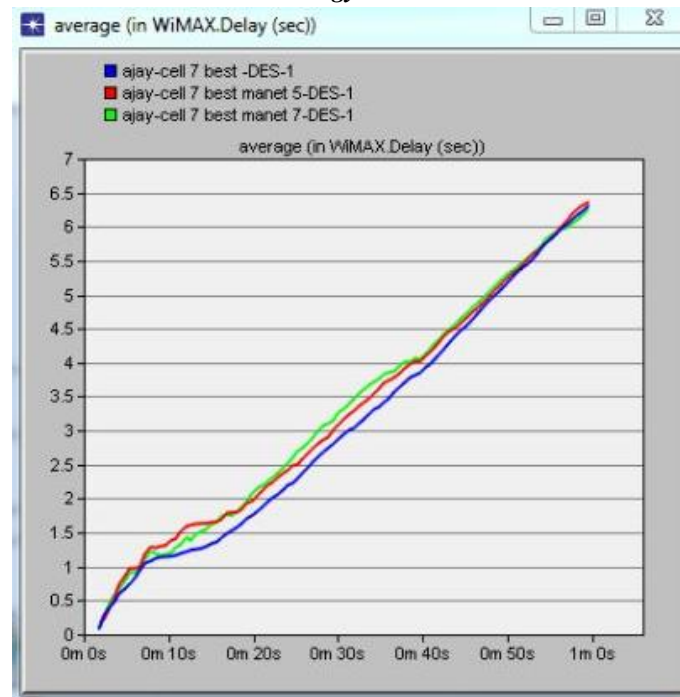


Fig 9: Delay for cell 7

Fig 9 shows the result of delay for cell 7. The result shows that when there is no MANET node that delay is high which 6.4 sec is and when MANET nodes come into existence then delay decreases. Further, if nodes move with mobility then the result is high this is 6.3sec.

CONCLUSIONS

In this paper, the effect of the presence of Manet on WiMAX is analyzed. For this Manet's nodes are moved at different speed. The performance of WIMAX is further analyzed by increasing no. of cells and no. of nodes. This performance is analyzed in terms of load, throughput, and delay. The results show that the performance of WIMAX decreases as MANET nodes come into existence. Further, if speed is increased then there is a small decrease in performance.

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