ISSN: 2321-7782 (Online)
Impact Factor: 6.047
Volume 4, Issue 7, July 2016
International Journal of Advance Research in Computer Science and Management Studies
Research Article / Survey Paper / Case Study
Available online at: www.ijarcsms.com

A Performance Analysis on WiFi & WiMax

Kapil[1]
MTech Scholar
Department of Computer Science & Engineering,
Om Institute of Technology & Management,
Hisar, Haryana, India

Surender Singh[2]
Asstt.Professor & H.O.D. (CSE)
Department of Computer Science & Engineering,
Om Institute of Technology & Management,
Hisar, Haryana, India

Abstract: This paper present the erectness of the mobility of Wi-Fi & Wi-Max. Wi-Max network can be built around an entire city, instead of providing limited coverage area while as Wi-Fi provides the services in broadband LAN. However it does not meet QoS requirements for real-time data traffic applications such as voice and video transmissions. Broadband Wireless technologies are increasingly gaining popularity by the successful global deployment of the Wireless Personal Area Networks.The results showed how different factors such as load and mobility might affect the performance of Wi-Fi. The simulation input parameter is mobility and output parameter are end to end delay, packet delay ratio, delay jitter and throughput were considered as the performance measures in this study.

Keywords: IEEE 802.15, IEEE 802.16, IEEE 802.11, WEP.

I. INTRODUCTION

Wi-Fi:-The standards of IEEE 802.11 technology is better known as Wi-Fi technology is being deployed into Broadband Wireless Access. The Local Area Network access points to quickly and efficiently connect computers to internet service providers and to LAN's respectively. Wi-Fi is more like a traditional Ethernet network and requires configuration to set up shared resources, transmit files and to set up audio links (for example, headsets and hands-free devices). It uses the same radio frequencies as Bluetooth but with higher power resulting in a stronger connection. IEEE 802.11 provides high bandwidth connectivity in a LAN environment that is suitable for most data applications. [15] Wi-Fi was originally designed for best-effort services. WLAN has different standards. The most common ones are IEEE802.11 and IEEE802.11g.[8] The Carrier Sense Multiple Access (CSMA) technique used in the Wi-Fi 802.11 standard provides fair and equal access to all devices. It is essentially a listen-before-talk mechanism. Data rate is depends on the range of coverage and utilization of wireless network resources. The newly standard can provide data rate up to 100Mbps in limited area. Wi-Fi is more cost-effective when compared with traditional wireless voice communications and Wi-MAX.The data is modulated by physical layer using DQPSK and DBPSK for the 2 Mbps and 1 Mbps data rates respectively. MAC provides logical connection among various subscribes stations and determine when a station is allowed to transmit and when it may be able to receive data packets over the shared wireless medium. **(11)**

Wi-MAX:- is short name for Worldwide Interoperability of Microwave access. It is described in IEEE 802.16 Wireless Metropolitan Area Network standard. It is expected that Wi-Max compliant systems will provide fixed wireless alternative to conventional DSL and Cable Internet. As WiMAX networks are all-IP networks, voice services over WiMAX are implemented as Voice over IP (VoIP). The data rate generated by VoIP codecs differs from one codec to another, as there is a tradeoff between the voice quality, generated date rate and complexity of the codec. Since wireless resources are scarce, the need to deploy bandwidth efficient codecs with acceptable voice perception quality and moderate complexity is of great importance for WiMAX access networks. In addition, as digitized voice is packetized in small chunks the header overhead in VoIP is significant. In this paper, we examine the CS data rate required by a VoIP over Ethernet over WiMAX and IP over WiMAX flows. We compare the bandwidth requirements of all widely used codecs and analyze the performance of various rate reduction techniques (such as Voice Activity Detection and Header Suppression). As VoIP is expected to be a key application over WiMAX networks, this analysis is very important for network dimensioning and planning, call admission control and optimization of the application layer protocol implementation and parameterization.The transmissions are stronger and more stable because higher frequencies in the 10–66 GHz range can used, in which case, there is less interference and more bandwidth. On the other hand, NLOS service uses the 2–11 GHz range (similar to Wi-Fi) to transmit data because lower-wavelength transmissions are subject to fewer disruptions from physical obstructions. This is an improvement from earlier wireless technologies local multipoint distribution system and multichannel multipoint distribution system which were unable to provide NLOS service. **(11)**

Wi-MAX range depends upon connectivity if the connection is with Line of Sight. It can increase from up to 75 miles. Wi-MAX offers a solution called “Last mile” it can be used as alternative of cable and DSL internet access. Wi-MAX can provide data rate up to 70Mbps from larger distances which can be reached up 30 miles. Wi-MAX operates on two frequencies. IEEE 802 is very flexible standard and provides standard addresses frequencies ranges from 10 GHz to 66 GHz. IEEE 802.16 standard frequency stats that it will also support low latency applications like internet, video, voice all together. We will have idea until now that Wi-MAX is not yet as commercialized as Wi-Fi. (12)Wireless mesh networks comprise two types of nodes: mesh routers and mesh clients. In addition to providing the routing capability for gateway/bridge functions as in a conventional wireless router, mesh routers contain additional routing protocols to support multiple hops in a wireless mesh network.[13]

II. Simulation Tool

Our performance evaluation study of Bluetooth, Wi-Fi and WiMax is based on NS2 simulator tool. The tool is used for both wired and wireless communication network. However a simulation cannot provide evidence in real-world scenarios. NS2 uses a parallel discrete-event simulation capability provided by Parsec. It is used for sequential and parallel execution of discrete-event simulation models. We have analyzed the 802.15, 802.11 and 802.16 standard for IEEE. NS2 contains the application, bin, doc, include, java, mac, main, network, radio scenario, tcplib and transport directories. We change the parameters in *MyTCL.tcl* files. The changes are simulated and write the final statistics results innam mean animator file. [14]

III. Simulation Scenarios and Results

We have developed several simulation scenarios using GloMoSim, to find out the performance of Wi-Fi under specific conditions such as load, traffic type, mobility and coverage. The packet delay jitters for all scenarios where CBR traffic was used. The output parameters are end to end delay, throughput, collision and packet delivery ratio. [12] The simulation time was ten minutes for every scenario.These are defines and discussed below. The table present all the network input parameter which is used for simulation experiments. These are defines its specifications.

Table 1: Simulation Parameters

Parameter	**Wi-Fi**	**Wi-MAX**	**Description**
Simulation time	5s	5s	Maximum execution time
Terrain Dimensions	1200, 1200	1200,1200	Phy. area the nodes are placed
Number of Nodes	Varies	Varies	Nodes particip. in the network
Traffic Model	CBR	CBR	Constant Bit Rate link used
Node Placement	Uniform	Uniform	Node placement policy
Mobility	5-30 (m/s)	5-30(m/s)	Speed of node they are moving
MAC-Protocol	802.11	802.15	MAC layer protocol used
Routing Protocol	aodv	Aodv	Routing protocol used
Mac Propagation delay	1000Ns	NA	Propagation delay
Tx-Power	50	15	Power used
Bandwidth	2000000	12000000	Bandwidth used
Radio Frequency	2.4 eq	2.5 eq	Frequency used

Scenario 1: Packet Delivery Ratio

PDR is most important metric that we should consider in packet forwarding. It is the ratio between the number of packets that are received and the number of packets sent. This metric only considers backward path traffic. It may affects by different criteria such as packet size, group size, action range and mobility of nodes.

$$\textbf{PDR} = \frac{\text{Total Number of Packet Received}}{\text{Total Number of Packet Send}} \textbf{*100}$$

Table 2: Packet Delivery Ratio

Mobility	Total Packet sent	Received by Wi-MAX	Received by Wi-Fi
0-5	3963	3962	3198
5-10	3963	3962	1958
10-15	3963	3962	1770
15-20	3963	3962	1429
20-25	3963	3962	1356
25-30	3963	3962	1123

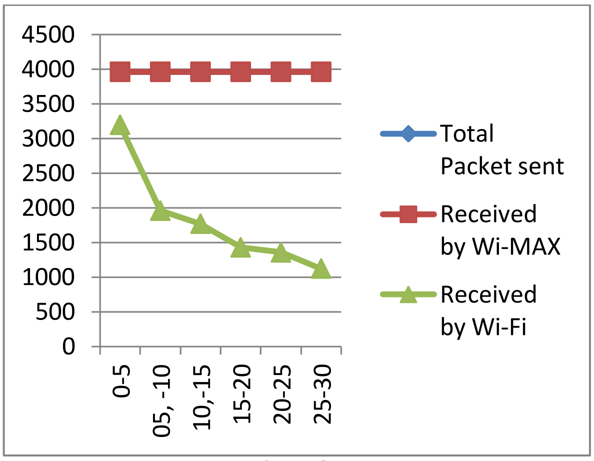

Fig. 1: Packet Delivery Ratio

Scenario 2: Average End To End Delay

The delay is the total latency experienced by a packet to traverse the network from the source to the destination. At the network layer the end-to-end packet latency is the sum of processing delay, packetization, transmission delay, queuing delay and propagation delay. The end-to-end delay of a path is the summation of the node delay at each node plus the link delay at each link on the path.

Table 3: Average End To End Delay

Mobility	Wi-MAX	Wi-Fi
5-10	0.005265	0.021097
10-15	0.005326	0.019536
15-20	0.005326	0.018203
20-25	0.005328	0.018149
25-30	0.005329	0.017933

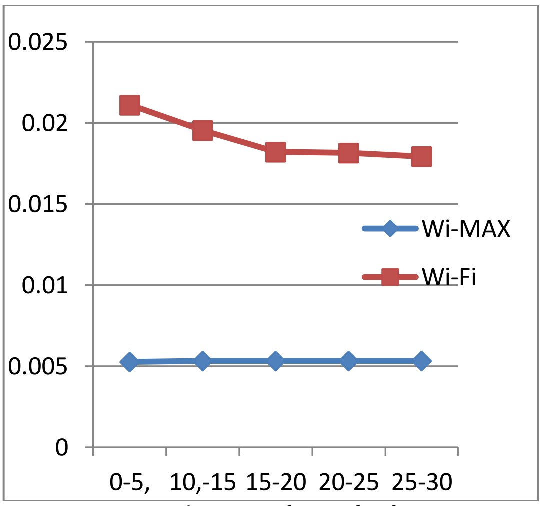

Fig.2: Average End To End Delay

Scenario 3: Packet collision Ratio

In networks packet collision occurs when two or more packets from different source nodes arrive at the same destination node simultaneously. The simulation measures the number of total packets (total_pkt) arriving at a specific node and calculates how many packets encounter collision (collided_pkt). The packet collision ratio is the ratio of collided_pkt to total_pkt. The metric packet loss rate measures the percentage of packets discarded at an end-node due to either collision or corruption. It is defined as the ratio of (collided_pkt +corrupted_pkt) to total_pkt. It is clear from the graph that the more collisions occur in case of Wi-Fi.

Table 4: Collision Ratio

Mobility	**Wi-Fi**	**Wi-MAX**
10 15	41	4
15-20	32	4
20-25	26	3
25-30	25	3

Fig.3: Wi-Fi Collision Ratio Sender Side

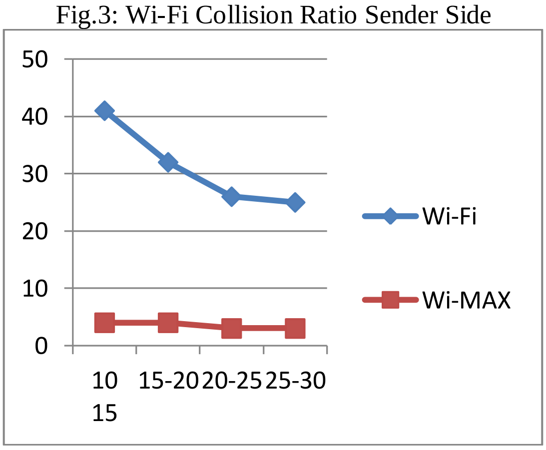

Fig.3: Colli. Ratio *Scenario 4: Packetthroughput*

It is defines the total no of send bits in per second. The matrix explain the quality of technology which is best or not because best throughput lead to best performance. It may be input or output throughput but output throughput is measured to calculate the performance. The Wi-MAX fewer affect than the Wi-Fi technology.

IV. Conclusion

This paper has presented a precise description of three of the most prominent developing wireless access networks and even discussed as to how these technologies may collaborate together to form an alternatives for implementing last-mile. Detailed technical comparative analysis between the 802.11 and 802.16 wireless networks that provide alternative solution to the problem of information access in remote inaccessible areas where wired networks are not cost effective has been looked into. This work has proved that the Wi-MAX standard isbest but, it is not to replace Wi-Fi.

References

1. Chou C. M., Li C. Y., Chien W. M. and Lan K. c. "A Feasibility Study on Vehicle-to-Infrastructure Communication WiFi vs. WiMAX". Proc. in IEEE DOI 10.1109/MDM.2009.127 0-7695-3650 pp. 397-978 (2009)
2. Ghazisaidi N., Kassaei H. and Bohlooli M. S. "Integration of Wi-Fi and Wi-Max Mesh Networks". Proc. in IEEE, Vol.5: ISBN: 978-0-7695-3667 pp. 1-6 (2008).
3. Henry P. S. andLuo H. "Wi-Fi what's Next?" Proc. in IEEE, Vol.40: ISSN: 0163-6804 pp. 66-72 (2002).
4. Mahasukhon P., Hempe M., Ci S. and Sharif, "Comparison of Throughput Performance for the IEEE 802.11a and 802.11g Networks". Proc. in IEEE 0-7695-2846 pp. (2007)
5. Ming C. C., Yuan L. C., Chien W., M. and chan K. "A Feasibility Study on Vehicle-to-Infrastructure Communication Wi-Fi vs. Wi-Max". Proc. in IEEE, Vol.1: ISBN: 978-0-7695-3650-7 pp. 397-398 (2009).
6. Nasser A., Abdullah M., Moinudeen H. and Khateeb W. "Scalability and Performance Analysis of IEEE 802.11a". Proc. in IEEE 0-7803-8886 pp. (2005).
7. Petajasoja S.,Takanen A., Varpiola M. andKortti H. "Case Studies from Fuzzing Bluetooth, Wi-Fi and Wi-Max". Proc. in Securing Electronic Business Processes Vieweg, Vol.2: ISBN: 978-3-8348-0346-7pp.188-195 (2007).
8. Rajasekhar S., Khalil I. and Tari Z. "A Scalable and Robust QoS Architecture for Wi-Fi P2P Networks"Proc. in Springer Verlag Berlin Heidelberg, Vol.3347: ISBN 978-3-540-24075-4 pp. 65–74 (2004).
9. Shuaib K. A. "A Performance Evaluation Study of WiMAX Using Qualnet". Proc. in WCE Vol I ISBN: 978-988-17012 pp. 5-1 (2009).
10. Shukla P. K, Silakari D. S, Bhadoria S. D. and Garg. "Multi-User FPGA An Efficient Way of Managing Expensive FPGA Resources Using TCP/IP, Wi-Max/ Wi-Fi in a Secure Network Environment". Proc. inIEEE, Vol.9: ISBN: 978-0-7695-3099-4 pp. 609-614 (2008).
11. Tananbaum A.S. "Computer Networks". 4th ed. Pearson Education, Inc. Publishing as Prentice Hall PTR ISBN: 0-13-066102-3 (2007).
12. Tang H., You Y., Rong C.W. and Shiang C. R. "An Integrated Wi-Max and Wi-Fi Architecture with QoS Consistency over Broadband Wireless Networks". Proc. in IEEE, Vol.18: ISBN: 978-1-4244-2308-8 pp. 1-7 (2009).
13. W. Stallings, Wireless Communications andNetwork. Prentice Hall, 2002.
14. Altman, E.; Jiménez, T. (2003). *NS Simulator for beginners* [Online]. Available: citeseer.ist.psu.edu/altman03ns.html
15. Issariyakul E at all. " Introduction to Network Simulator" Springer ISBN: 978-0-387-71759-3 e-ISBN: 978-0-387-71760-9 (2009).