International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2018 IJSRCSEIT | Volume 3 | Issue 1 | ISSN : 2456-3307

Performance Evaluation of Infra Red WLAN for 1 Mbps and 2 Mbps Using OPNET for AODV Routing Protocol

Neeraj[1], Pooja[2], Jonish[3]
[1]M-Tech Department of CSE, IITB, Sonepat, Haryana, India
[2]Assistant Professor,& Head of Department of CSE, IITB, Sonepat, Haryana, India
[3]Department of CSE, Sonepat, Haryana, India

ABSTRACT

In this paper performance analysis of Infra Red WLAN is done for 1 and 2 mbps data rate for AODV routing protocol. We used OPNET Simulation tool and created a network containing 25 mobile nodes with data rate 1 Mbps and 2 Mbps with transmission power 0.005 watts and buffer size 1024000 bits each node moves randomly in the network and simulation time was 2000 sec. Infra Red WLAN is compared in terms of 1 Mbps and 2 Mbps for different QOS's using AODV protocol. According to the resulted performance we can say that infrared wireless LAN might do a better job of satisfying requirements for mobile applications in campus networks. The simulation result of the research has practical reference value for further study.

Keywords: AODV, IRLAN, INFRA RED, MANET, QOS, OPNET

I. INTRODUCTION

Mobile ad hoc Network is a dynamic distributed network. Due to the dynamic nature the network topology keep changes randomly. The mobility of nodes in MANETs results in frequent changes of network topology making routing in MANETs a challenging task. Routing protocol is the major issue in data communication's performance of MANET. AODV in MANET helps node to send and receive packets and each node acts both as a router and as a host. Hence, routing protocol required is to be effective and accurate so as to handle mobility of nodes for giving best utilization to technology. Nodes are like laptop, computers and wireless phones have a limited transmission range for direct transmission. The success of communication depends on cooperation of other nodes. [5]

The Ad hoc On-Demand Distance Vector (AODV) algorithm enables dynamic, self-starting, multi-hop routing between participating mobile nodes wishing to establish and maintain an ad hoc network. AODV allows mobile nodes to respond to link breakages and changes in network topology in a timely manner. In AODV, every node maintains a table, containing information about which neighbor to send the packets to in order to reach the destination. It is a relative of the Bellman-Ford distant vector algorithm, but is adapted to work in a mobile environment. [1]

Wireless LAN is the major issue in data communication's performance of MANET. Hence, Wireless LAN required is to be effective and accurate so as to handle mobility of nodes and to give best utilization to technology. Routing protocol is a standard that determines how nodes find the way to forward packets between devices in the network. In this paper performance of Infra Red Wireless LAN is evaluated by using FTP and HTTP application type and AODV as Ad hoc Routing Protocol of WLAN Standard. [2]

Table 1. Wlan Classifications

WLAN Physical Characteristics	Data Rates
Frequency Hopping	1 , 2 Mbps
Direct Sequence	1 , 2 , 5.5 , 11 Mbps
Infra Red	1 , 2 Mbps
OFDM(802.11a)	6 , 9 , 12 , 18 , 24 , 36 , 48 , 54 Mbps
Extended Rate PHY(802.11g)	1 , 2 , 5.5 , 11 , 6 , 9 , 12 , 18 , 24 , 36 , 48 , 54 Mbps

II. RELATED WORK

Narender[1] In this paper analysis of the performance of AODV routing protocol is done with the use of OPNET simulation tool, they created a 27 mobile nodes networks on data rate 1 and 11 Mbps and transmission power 0.005 watts with buffer size 256000 bits the time of simulation was 1200 sec. AODV routing protocol is compared in terms of AODV Route Discovery time, FTP Download Response Time(sec), HTTP Object Response Time (sec), WLAN Delay (sec) and AODV Total Cached Replies Sent in scenario for the simulation analysis and performances.

Anjali [2] analyzed the performance of AODV, OLSR and GRP routing protocols is evaluated for FTP based application traffic on IEEE 802.11 WLAN Standard and 48 Mbps data rate. The network performance is evaluated by using OPNET simulator based on various quantitative metrics- Network Load, Throughput, Retransmission Attempts and Media Access Delay by varying physical characteristics and number of nodes. A comparative performance analysis of these protocols have been carried out in this paper and in the last conclusion will be presented which demonstrate that performance of routing protocols differs by varying the network and selection of accurate routing protocol according to the network ultimately influences the efficiency of the network in a magnificent way.

Chetna [3] analysis and performance of AODV, DSR, GRP and OLSR is done for 1 mbps data rate. We used OPNET Simulation tool we created a network containing 30 mobile nodes with data rate 1 Mbps with transmission power 0.005 watts and buffer size 1024000 bits each node moves randomly in the network and simulation time was 1500 sec. Routing protocols are compared in terms of WLAN Load, WLAN Media Access Delay, WLAN Retransmission Attempts (packets), WLAN Throughput and WLAN Delay (sec). According to the analysis of resulted performance in 1 Mbps we can say that DSR > GRP >AODV > OLSR. The simulation result of the research has practical reference value for further study.

Kuldeep vats [5] analyzed the performance of DSR, OLSR and GRP routing protocols. They used OPNET simulation tool. They created a network containing 150 mobile nodes with the data rate of 18 mbps and transmit power of 0.11 watts. Each node moves randomly within the network range 10,000 sq m and Simulation time was 1000 sec. According to their simulation result OLSR presented the best performance and GRP presented low to OLSR and high to DSR or finally DSR presented the low performance (DSR<GRP<OLSR) is analyzed.

III. IR WIRELESS LAN

The primary IEEE 802.11 standards in use today are 802.11a and 802.11b, which both use radio waves for transferring information wirelessly over a network. Few people realize, however, that the 802.11 standard also includes the 802.11 Infrared (IR) Physical Layer 802.11 IR defines 1Mbps and 2Mbps operation by bouncing light off ceilings and walls to provide connectivity within a room or small office.

The reason that 802.11 IR is unheard of is that there are no known vendors that sell products compliant with 802.11 IR. Some offer infrared-based wireless LANs that come close to the standard. For example Spectrix, once the chair of the 802.11 IR group, offers wireless LAN products that implement diffused optical technologies very similar to 802.11 IR. The primary difference between infrared and radio wireless LANs is the frequency of the transmitted signal. Don't become complacent with radio frequency (RF) technologies, such as 802.11a and 802.11b, as the only option for wireless LANs. An infrared wireless LAN might do a better job of satisfying requirements for mobile applications for campus networks.

IV. SIMLATION SETUP

This research used software known as OPNET Modeler, Which is a tool provided by the OPNET Technologies in order to undertake the experimental evaluation; the version named OPNET Modeler 14.5 has been adopted for study [12]. It is easy to work with GUI interface and the OPNET provides us the GUI interface to work. And it is easy to built model of working in GUI Virtual environment. OPNET is one of the most extensively used commercial simulators based on Microsoft Windows platform, which incorporates most of the MANET routing parameters compared to other commercial simulators. It simulates the network graphically and gives the graphical structure of actual networks and network components.

Table 2. Simulation Parameters

Simulation Parameter	Value
Simulator	OPNET Modular 14.5
Area	2000*2000
Network Size	25 Nodes
Data Rate	1, 2 Mbps
Mobility Model	Random waypoint
Traffic Type	FTP, HTTP
Simulation Time	2000 sec
Address Mode	IPV4
Standard	IEEE 802.11 INFRA RED
Routing Protocol	AODV

Table 3. Aodv Parameters

Attribute	Value
Active Route Timeout	3.0
Hello Interval(sec)	Uniform(1,1.1)
Allowed Hello Loss	2
Net Diameter	35
Node Traversal Time(sec)	0.04
Route Error Rate Limit (pkts/sec)	10
Timeout Buffer	2
TTL Start	1
TTL Increment	2
TTL Threshold	7
Local Add TTL	2
Packet Queue Size (Packets)	Infinity
Local Repair	Enabled
Addressing Mode	IPV4

Table 4. Wireless Lan Parameters

Attribute	Value
Physical Characteristics	INFRA RED
Data Rate	1,2 Mbps
Short Retry Limit	7
Long Retry Limit	4
Max Receive Lifetime (sec)	0.5
Buffer Size(bits)	1024000
Roaming Capability	Enabled
Large Packet Processing	Fragment

Figure 1 shows the simulation environment of scenario containing 25 WLAN mobile nodes, one fixed WLAN Server, Application definition, Profile definition and Mobility conFigure We configure the nodes in the scenario to work with 1 Mbps and 2 Mbps data rate with INFRA RED WLAN standard.

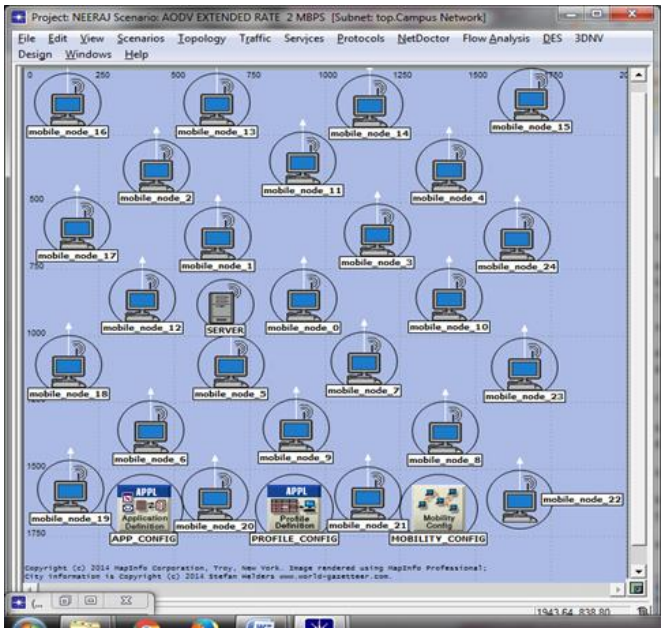

Figure 1. Network Model for 25 Nodes scenario

V. PERFORMANCE MERICS

A. FTP Download Response Time (sec)

Time elapsed between sending a request and receiving the response packet. Measured from the time a client application sends a request to the server to the time it receives a response packet. Every response packet sent from a server to an FTP application is included in this statistic

B. FTP Upload Response Time (sec)

Time elapsed between sending a file and receiving the response. The response time for responses sent from any server to an FTP application is included in this statistic.

C. HTTP Page Response Time (sec)

Time elapsed between sending a request and receiving the response page. Measured from the time a client application sends a request to the server to the time it receives a response page.

D. WLAN Retransmission Attempts (packets)

It is the total number of retransmission attempts by all WLAN MACs in the network until either packet is successfully transmitted or it is discarded as a result of reaching short or long retry limit.

E. WLAN Media Access Delay (sec)

It represents the global statistic for the total of queuing and contention delays of the data, management, delayed Block-ACK and Block-ACK Request frames transmitted by all WLAN MACs in the network.

VI. SIMULATION RESULTS AND ANALYSIS

Figure (2 - 6) below shows Email Download Response Time(sec), FTP Upload Response Time (sec), GRP Total No. of Backtracks, WLAN Retransmission Attempts (packets) and WLAN Media Access Delay (sec) in 20 mobile nodes scenario for IEEE 802.11 Infra Red standard at 1 Mbps and 2 Mbps data rate with GRP. The color scheme is showing the protocols behavior in different graphs which gives the average values. From these average values we will conclude the behavior of the IRWLAN.

A. FTP Download Response Time (sec)

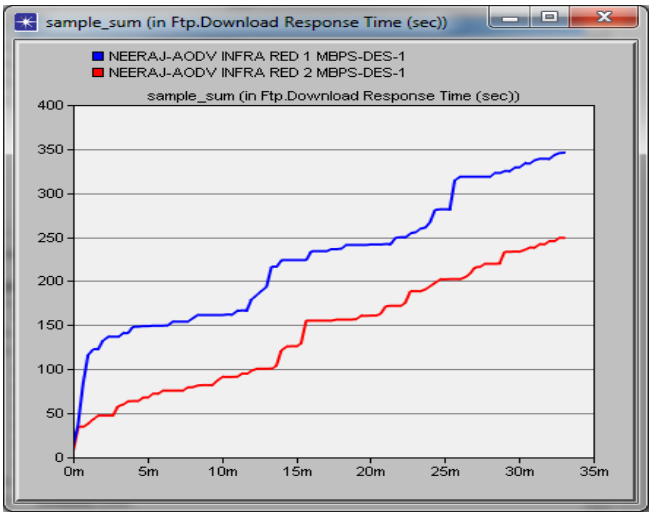

Figure 2. Sample Sum for FTP Download Response Time (sec) in 1 and 2 Mbps for IRWLAN AODV

According to simulation, as we can see in Figure 2, FTP Download response time in Infra Red WLAN AODV 1 Mbps is more than 2 Mbps. This shows 2 Mbps works well than 1 Mbps in Infra Red WLAN AODV in terms of FTP Download Response time.

B. FTP Upload Response Time (sec)

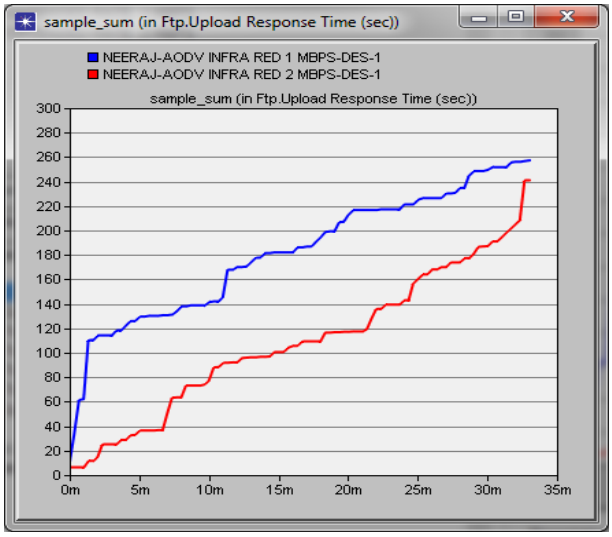

Figure 3. Sample Sum for FTP Upload Response Time (sec) for 1 and 2 Mbps for IRWLAN AODV

According to simulation, as we can see in Figure 3, FTP Upload Response time in Infra Red WLAN AODV 1 Mbps is higher than in 2 Mbps. This shows 2 Mbps works well than 1 Mbps in Infra Red WLAN AODV in terms of FTP Upload Response time.

C. HTTP Page Response Time (sec)

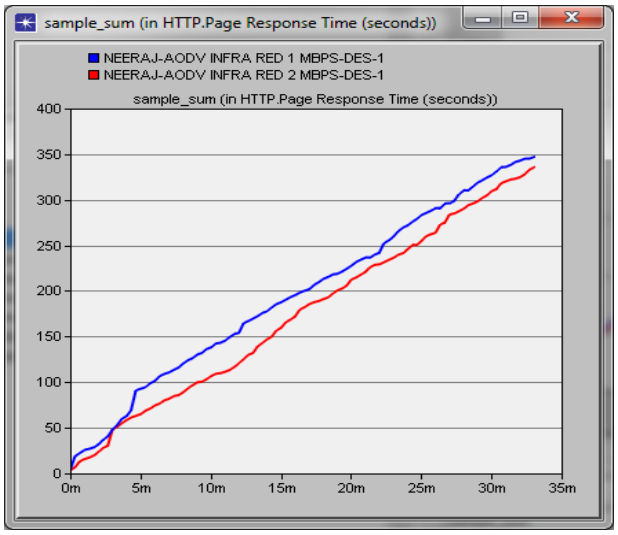

Figure 4. Sample Sum for HTTP Page Response Time (sec) for 1 and 2 Mbps for IRWLAN AODV

According to simulation, as we can see in Figure 4, HTTP Page Response Time (sec) in Infra Red WLAN AODV 1 Mbps is higher than in 2 Mbps. This shows 2 Mbps works well than 1 Mbps in Infra Red WLAN AODV in terms of HTTP Page Response Time (sec).

D. WLAN Retransmission Attempts (packets)

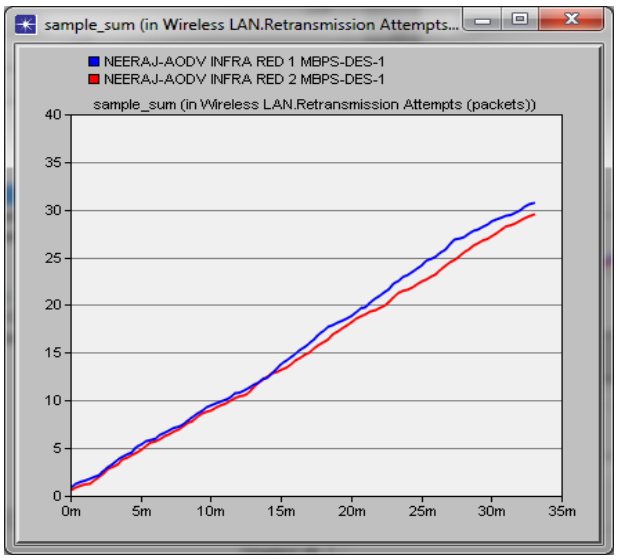

Figure 5. Sample Sum for Retransmission Attempts in packets for 1 and 2 Mbps for IRWLAN AODV

According to simulation, as we can see in Figure 5, Wireless LAN Retransmission Attempts in Infra Red WLAN AODV 1 Mbps is higher than in 2 Mbps. This shows 2 Mbps works well than 1 Mbps in Infra Red WLAN AODV in terms of WLAN Retransmission Attempts.

E. WLAN Media Access Delay (sec)

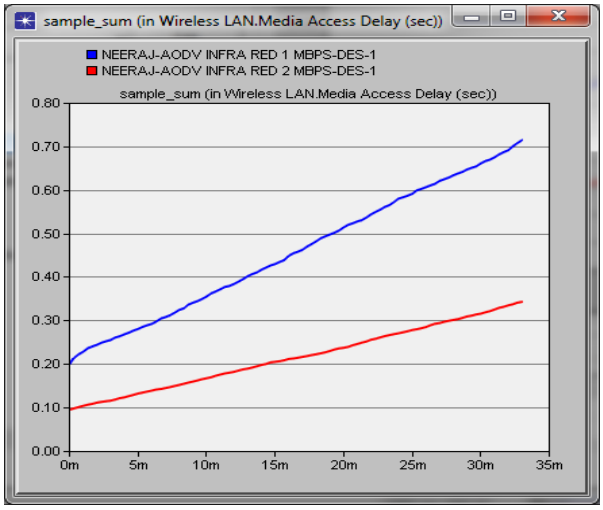

Figure 6. Sample Sum for Media Access Delay for 1 and 2 Mbps for IRWLAN AODV

According to simulation, as we can see in Figure 6, Media Access Delay in Infra Red WLAN AODV 1

Mbps is higher than in 2 Mbps. This shows 2 Mbps works well than 1 Mbps in Infra Red WLAN AODV in terms of Media Access Delay.

VI. CONCLUSION

In this paper performance of Infra Red WLAN is evaluated with the use of AODV Protocol for metrics like FTP Download Response Time (sec), FTP Upload Response Time (sec), HTTP Page Response Time (sec), WLAN Retransmission Attempts (packets) and WLAN Media Access Delay (sec) by using 25 nodes scenario with IEEE 802.11 Infra Red WLAN Standard in 1 Mbps and 2 Mbps. From the above discussion we find out that Infra Red 2 Mbps performs better in terms of FTP Download Response Time (sec), FTP Upload Response Time (sec), HTTP Page Response Time (sec), WLAN Retransmission Attempts (packets) and WLAN Media Access Delay (sec).

Table 5. Resulting Values

S. NO.	PERFORMANCE METRICS	IR WLAN AODV (1 Mbps)	IR WLAN AODV (2 Mbps)
1	FTP DOWNLOAD RESPONSE TIME (SEC)	-	BETTER
2	FTP UPLOAD RESPONSE TIME	-	BETTER
3	HTTP PAGE RESPONSE TIME (SEC)	-	BETTER
4	RETRANSMISSION ATTEMPTS	-	BETTER
5	WLAN MEDIA ACCESS DELAY	-	BETTER

Infra Red WLAN have large no of possibilities to be worked on. An infrared wireless LAN might do a better job of satisfying requirements for mobile applications. The simulation result of the research has practical reference value for further study in the campus networks the IR- LAN have very large no of possibilities.

VII. REFERENCES

[1]. Jonish, Kapil Chawla, "Different QOS Based Simulation Evaluation of TORA and GRP Routing Protocol Based on Frequency Hopping", IJCSMC, Vol. 3, Issue. 11, November 2014, pg. 523 – 531.

[2]. Anjali, Maninder Singh, "Performance Analysis of Proactive, Reactive and Hybrid MANET Routing Protocols on IEEE 802.11 Standard", International Journal of Computer Applications,pp.1-8,Volume 54-No.12,September 2012.

[3]. Chetna, "Simulation analysis and performance of AODV, DSR, GRP and OLSR is done for 1 mbps data rate", IJARCSSE, Volume2, issue 6, pp-171-178,June 2012.

[4]. Ravinder Ahuja, "Simulation based Performance Evaluation and Comparison of Reactive, Proactive and Hybrid Routing Protocols based on Random Waypoint Mobility Model", International Journal of Computer Applications, Vol. 7, No.11, pp. 20-24, Oct. 2010.

[5]. Kuldeep Vats, Monika Sachdeva and Dr. Krishan Saluja, " Simulation and performance Analysis of OLSR, GRP, DSR Routing Protocol using OPNET", International Journal of Emerging trends in Engineering and Development, Vol.2 ,Issue 2, pp 390-404, March-2012.

[6]. Pravin GhoseKar, Girish Katkar and Dr. Pradip Ghorpade, "Mobile Ad Hoc Networking: Imperatives and Challenges",IJCA, pp. 153-158, 2010.

[7]. Xiaoyan Hong, Kaixin Xu and Mario Gerla, "Scalable Routing Protocols for Mobile Ad Hoc Networks", IEEE Network, vol. 16, issue 4, pp 11-21, Aug.2002.

[8]. Mostafa Fazeli, "Assessment Of Throughput Performance Under OPNET Modeler

Simulation Tools In Mobile Ad Hoc Networks (MANETs)" 3rd ICCI,CSN , IEEE 2011.

[9]. Ashish Shrestha and Firat Tekiner, "On MANET Routing Protocols for Mobility and Scalability." In International Conference on Parallel and Distributed Computing, Applications and Technologies, p.p. 451-456, November 2009. IEEE Computer Society.

[10]. Guo, L, and Peng, Y. (2010) "Performance evaluation for on-demand routing protocol based on OPNET modules in wireless mesh network" Computer and Electrical Engineering (Elsevier), vol. 37(2011), pp. 106-114.

[11]. T.H. Clausen, "The optimized link state routing protocol evaluating through experiments and simulation" mind pass centre for distributed system, Aalborg university ,Denmark.

[12]. Opnet Technologies, Inc. "Opnet Simulator," Internet: www.opnet.com.