International Journal of Electrical, Electronic and Communication Sciences
ISSN: 2517-9438
Vol:4, No:10, 2010

"Simulation Study for Performance Comparison of Routing Protocols in Mobile Adhoc Network"

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***Abstract*---**Due to insufficient frequency band and tremendous growth of the mobile users, complex computation is needed for the use of resources. Long distance communication began with the introduction of telegraphs and simple coded pulses, which were used to transmit short messages. Since then numerous advances have rendered reliable transfer of information both easier and quicker. Wireless network refers to any type of computer network that is wireless, and is commonly associated with a telecommunications network whose interconnections between nodes is implemented without the use of wires. Wireless network can be broadly categorized in infrastructure network and infrastructure less network. Infrastructure network is one in which we have a base station to serve the mobile users and in the infrastructure less network is one in which no infrastructure is available to serve the mobile users this kind of networks are also known as mobile Adhoc networks. In this paper we have simulated the result for different scenarios with protocols like AODV and DSR; we simulated the result for throughput, delay and receiving traffic in the given scenario.

***Keywords*—**Adhoc Network, AODV, DSR. Mobility

I. Introduction

MOBILE Adhoc Network is a future technology; various challenges are superimposed by this technology. MANET inherited the challenges from fixed wireless cell architecture; in addition bandwidth and highly dynamic topology and battery back up problem.

MANET is used where no infrastructure is available for communication; such like disastrous area, military tactical application, sensor network.

Future information technology will be based on wireless technology. Infrastructure based cellular and mobile networks are still limited by the need of infrastructure such like base station, allocation of frequencies .To fulfill the demand of users various approaches are given such as frequency reuse concepts, clustering technique, sectoring technique, and different frequency allocation/assignment schemes. The Ad Hoc On-Demand Distance Vector (AODV) routing protocol enables multi-hop routing between participating mobile nodes wishing to establish and maintain an ad-hoc network. AODV is based upon the distance vector algorithm.

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The difference is that AODV is reactive, as opposed to proactive protocols like Distance Vector (DV), Dynamic Source Routing (DSR) also belongs to the class of reactive protocols and allows nodes to dynamically discover a route across multiple network hops to any destination.

In this paper section II is describing the related work section III shows the Simulation Environment and section IV shows the validation and section V holds the conclusion about the simulation.

II. Related Work

Many routing protocols have been proposed [6][7][8][9][10][11][12][13][14][15][16], but few comparisons between the different protocols have been made. Of the work that has been done in this field, only the work done by the Monarch project at Carnegie Mellon University (CMU) has compared some of the different [17] proposed routing protocols and evaluated them based on the same quantitative metrics.

III. Simulation Environment

The Simulator we have used to simulate the Adhoc routing protocols was the Opnet Modeler 12, OPNET Modeler is the industry's leading network development software first introduced in 1986 by MIT graduate. Opnet allows to design and study communication networks, devices, protocols, and application. Modeler is used by the world's most prestigious technology organizations to accelerate the R&D process. Some of the customers include Pentagon, MIT, UIC, and many more.

A. Problem Definition

In this realistic scenario we have taken the campus of "Graphic Era University" for our simulation.

We have one static server with standard application (FTP) located at PARAM lab,situated at the center of Graphic Era University, and for simulation we have taken 20 mobile nodes with AODV and DSR enabled, and all nodes were randomly distributed with the mobility of 10 meter / sec. All nodes were trying to download a file from the server having the size of 12000000 Bytes. And Inter request time was 3600 seconds and packet size for downloading the file was taken default for WLAN & version of TCP was TCP Reno. Environment size for simulation was 1000x1000 mtrs .

B. Simulation Setup:

In Opnet we have to configure the profile for MANET, and there were three important configurations for standard application.

i. Mobility Configuration

Mobility configuration, related to description about the mobility of mobile nodes, and for this we set the three important parameters

TABLE I
MOBILITY CONFIGURATION

S. No.	Parameter	Value
1	Speed	10 Meter / Sec
2	Pause Time	0 Sec
3	Start Time	10 Sec.

Above parameter indicates that all nodes, moving with the speed of 10 meter/ second in unidirectional ,Pause time means, all nodes are moving continuously during the simulation time, & Start Time shows the start of activity after 10 seconds of simulation start up.

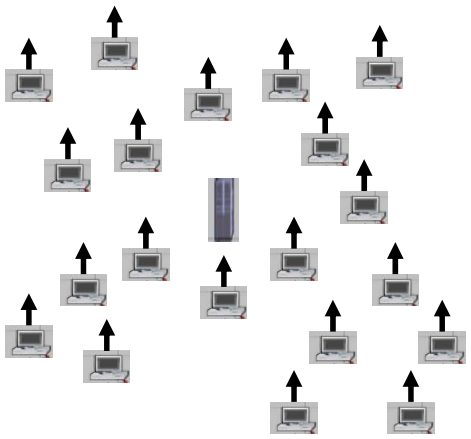

Fig. 1 Scenario for Graphic Era University WLAN Server with Standard Application

ii Application Definition

Application definition , related to the description about the application for which our setup would deal.

TABLE II
APPLICATIONV DEFINITION

S.No.	Parameter	Value / Type
1	Application Type *Standard*	FTP
2	File Size	12000000 Byte
3	Inter Request Time	3600 seconds

For this Scenario we have taken standard application type FTP & inter request time , 3600 Seconds it means only one request generated during the simulation time (approx.). And file size which is ready to download by the mobile node is 12000000 Bytes.

iii. Profile Definition

TABLE III
PROFILE DEFINITION

S.No.	**Parameter**	**Value**
1	Start Time	5 Seconds
2	Start Time offset	5 Seconds
3	Repeatability	Once at Start.

Start time of simulation was 5 seconds and offset was again 5 seconds which means total start time was 10 seconds. Start Time offset means after completing one request second request would be process after this time and the repeatability once at start.

TABLE IV
PARAMETERS FOR AODV

S.no.	Parameter	Value
1	Active Route Time Out	3 Seconds
2	Hello Interval (Uniform distribution) Min Max	 1 1.1
3	Addressing Mode	IPV4
4	Net Diameter(Number of max possible hops)	35

TABLE V
PARAMETERS FOR DSR

S.no.	Parameter	Value
1	Route Expiry time	300 seconds
2	Request Table Size	64 Nodes

TABLE VI
SIMULATION PARAMETERS (AT A GLANCE)

S.no.	Parameter	Value
1.	Transmission Range Transmission Power Packet Reception Power	 0.005 - 95 dBm
2.	Simulation Time	600 Seconds
3.	Number of Nodes	20 Mobile nodes
4.	Pause Time	0 Seconds
5.	Environment Size	(1000*1000)Meter
6.	Traffic Type	FTP
7.	Packet (Data) Rate	11 Mbps
8.	Packet Size	Default for WLAN

IV. Validation

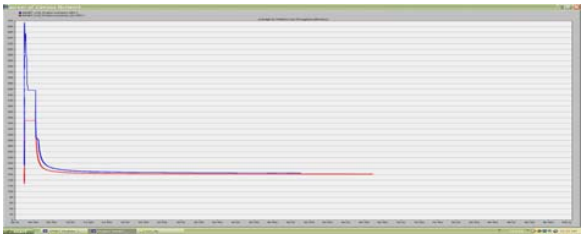

Fig. 2 Wireless LAN Throughputs (Server)
Red color graph shows DSR; Blue color graph shows AODV

A. Analysis for Wireless LAN Throughput (Server)

In the result analysis for the throughput of the whole scenario, blue graph shows throughput of the AODV and red graph shows the throughput of the DSR protocol. On analyzing them we concluded that throughput of AODV is slightly better than the DSR.

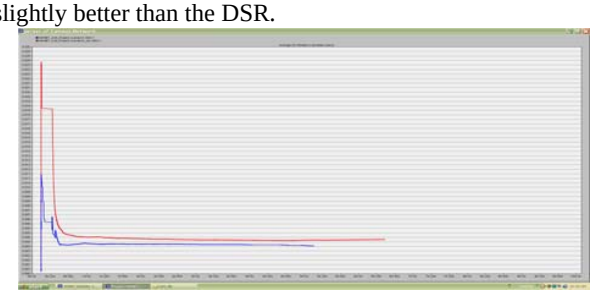

Fig. 3 WLAN Delay

B. Result Analysis for WLAN Delay

In the result analysis for the Delay of the scenario, Value of delay on DSR protocol is near about 0.024 Seconds and value of delay on AODV protocol is 0.011 seconds on start of the simulation but after some time it is almost constant for both the cases,where constant value of delay for the DSR is 0.004 Seconds and for AODV it is 0.003 Seconds. On analyzing them we concluded that delay of AODV is slightly better than the DSR.

Fig. 4 Route Discovery Time

C. Result Analysis for Route Discovery Time

In the result analysis for the route discovery time of the scenario for AODV and DSR routing protocol, Initially, when simulation start i.e. when protocol search the route for node to server, Value of route discovery time on DSR protocol is near about 0.12 Seconds and value of delay on AODV protocol is 0.08 Seconds. Due to the mobility of nodes route discovery time is changing whole of the simulation time but we can see that for our scenario performance of route discovery time in case of AODV is much better than the DSR.

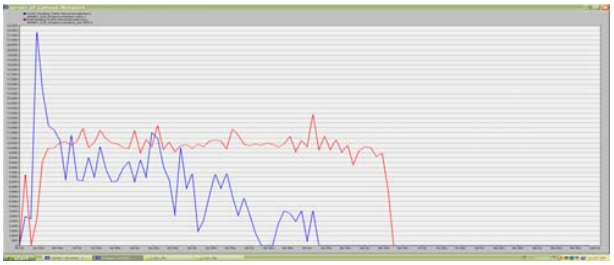

Fig. 5 Routing Traffic Received

D. Result Analysis for Routing Traffic Received

In the result analysis for the routing traffic received of the scenario for AODV and DSR routing protocols in bits / Sec, Blue graph shows Traffic Received for AODV and Red graph shows the traffic received for DSR protocol. On analyzing the graph we concluded that overall performance of AODV is much better than the DSR.

V. Conclusion

In this paper we have simulated the performance result for Mobile Adhoc Network Routing Protocols and taken the realistic scenario for the "Graphic Era University WLAN Server with Standard Application (FTP)". In this scenario we selected AODV and DSR, both are from reactive protocols families and analyze the performance with respect to the parameters like Average Throughput, Delay, Route Discovery Time for AODV and DSR and Routing Traffic Received in both protocols and from above discussion and simulation we can say that performance of AODV is much better than the DSR.

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