International Journal of Science & Technology
www.ijst.co.in
ISSN (online): 2250-141X
Vol. 1 Issue 2, December 2011

An Efficient Routing Protocol for Wireless LAN

Surendra Verma[1], Dr. Rajesh Mishra[2]
Phd. Scholar[1], Asst Prof[2]
Mewar University,Chittorgarh[1], Gautam Buddha University, Greater Noida[2]
er_suru@yahoo.co.in[1] , rmishra@gbu.ac.in[2]

ABSTRACT

This paper deals with the Simulation of Routing Algorithms for Wireless LAN using Network simulator. Due to rapid advent of many new applications in high-speed networks the issue of routing algorithms has become more and more important. Wireless LAN has two types of networks namely, Infrastructure Mode networks and Ad-hoc networks.

Different Routing algorithms are used in Ad-hoc networks. Ad hoc networks are basically peer-to-peer, multihop mobile wireless networks in which information packets are transmitted in a store and forward manner from a source to an arbitrary destination via intermediate nodes. The main aim of this paper is to simulate different Routing Algorithms of Ad-hoc networks on Network Simulator and calculation of the different parameters of these routing algorithms. NS2 is discrete event driven simulation where TCL is tool command language for simulation of slightly varying parameter for routing algorithm.

I. INTRODUCTION

1.1 Overview:

Due to rapid advancement, the networking and communication technologies require the support of wireless network. Therefore the issue of routing algorithm has become more and more important. Routing algorithm is part of network layer software responsible for deciding which output line an incoming packet should be transmitted. The WLAN consist of two parts adhoc networks and infrastructure mode. The Ad hoc networks are formed by wireless hosts which may be mobile, without (necessarily) using a pre-existing infrastructure; routes between nodes may contain multiple hops.

Routing is the process in which a route from a source to a destination node is identified and is achieved either by computing all routes before and pre-storing them or computing them when needed. The basic MAC layer and physical layer protocol has important role in routing. In past, routing algorithms were based on two methods that are distance vector routing and link state routing. For Ad hoc networks routing protocols are classified in two ways: they are Proactive Routing (table driven protocols) and another one is Reactive routing. In table driven routing protocols, consistent and up-to-date routing information to all nodes is maintained at each node. In On-Demand routing protocols, the routes are created as and when required. When a source wants to send to a destination, it invokes the route discovery mechanisms to find the path to the destination.

1.2 MANET:

MANET is mobile Adhoc-networks. An Adhoc-network is a collection of Nodes forming a temporary network without any additional infrastructure and no centralized control. Mobile nodes like PDA, Laptop act as transmitter receiver or as a router.

ISSN (online): 2250-141X
Vol. 1 Issue 2, December 2011

Figure 1.1 Ad-hoc Networks

Ad-hoc networks are self-organizing, self-configuring network. Ad-hoc networks can be utilized in an area where infrastructure doesn't exist. Networks structure is changed dynamically because of member's mobility. These nodes may be routers and/or hosts. The mobile nodes communicate directly with each other and without the aid of access points, and therefore have no fixed infrastructure. These networks can be established anywhere and any time. It allows communication without any physical infrastructure for highly dynamic topology with multihop. Application of the Ad-hoc networks in Millitary networks, disaster relief networks and wireless sensor networks.

II. LITERATURE SURVEY

2.1 Routing Algorithms:

Routing:

Routing is the process in which a route from a source to a destination node is identified and is achieved either by computing all routes before and pre-storing them or computing them when needed. Routing is used to decide path of packet transmission from one place to another place.

Routing Algorithm:

Routing algorithm is part of network layer software responsible for deciding on which output line should an incoming packet be transmitted. The routing protocol is the key factor for adhoc network as it decides directly the performance of the whole networks. In multihop wireless environment, an efficient Adhoc routing protocols play a very important role to ensure that every transmitted data packets reaches its final destination mobile node. Routing protocols for adhoc networks are required to support distributed operation means ability to work independently and dynamic network topology.

Routing Algorithms for Ad-hoc networks:

Routing protocols of Ad-hoc networks are classified in two ways: Proactive routing and Reactive routing algorithms.

Proactive Routing is Table Driven routing scheme. It is adaptive routing in which route always available on request. Route is determined by using routing table. The family of distance vector protocols is an example of proactive routing. They maintain consistency up to date routing information from each node to every other node in the network.

Reactive routing is on demand routing protocols. In which route determination procedure only on demand. Thus, when a route is needed some sort of global search procedure is initiated. The family of classical flooding algorithms belongs to the reactive group.

The advantage of the proactive schemes is that, whenever a route is needed, there is negligible delay in determining the route. In reactive protocols because route information may not be available at the time a datagram is received, the delay to determine a route can be significant. Many algorithms have been used in the adhoc network proactive and reactive routing algorithm category. These all algorithms have some different approach for routing of packets from source to destination. Here some protocols are described for ad-hoc networks and their characteristics are analyzed using Network simulator. These protocols are:

DSDV:

The DSDV destination sequenced distance

ISSN (online): 2250-141X
Vol. 1 Issue 2, December 2011

vector routing protocol is a table driven algorithm based on the classical Bellman –Ford routing mechanism. The improvement is made include freedom from loops in routing tables. Every mobile node in the network maintains a routing table for all possible destinations within the network and the number of hopes to each destination node. Each entry is marked with a sequence number, number assigned by the destination node .Routing table updates are periodically transmitted throughout the network in order to maintain table consistency.

Large amount of network traffic, route updates can employ in two types of packets they are first is the "Full Dump" and second is the "Incremental routing". A full dump sends the full routing table to the neighbors and could cover many packets whereas, in an incremental update only those entries from the routing table are sent that has a metric change since the last update and it must fit in a packet. When the network is relatively stable, incremental updates are sent to avoid extra traffic and full dump are relatively infrequent. In a fast changing network, incremental packets can grow big, so full dumps will be more frequent.

AODV:

The AODV is a Reactive on demand adhoc distance vector routing algorithm. AODV is an improvement on DSDV because it typically minimizes the number of required broadcasts by creating routes on demand basis as opposed to maintaining a complete list of routes, as in the DSDV algorithm. When a source node desires to send a message to some destination node and does not already have a valid route to that destination, it initiates a path discovery process to locate the destination. In AODV each router maintains route table entries with the destination IP address, destination sequence number, hop count, next hop ID and lifetime.

RREQs route requests and RREPs route replies are the two message types defined by the AODV. When a route to a new destination is needed, the node uses a broadcast RREQ to find a route to destination. A route can be determined when the request reaches either the destination itself or an intermediate node with a fresh route to the destination. The route is made available by unicasting a RREP back to the source of RREQ. Each node maintains its own broadcast id, sequence number. The broadcast ID is incremented for every RREQ packet. Since each node receiving the request keeps track of a route back to the source of the request, the RREP reply can be unicast back from the destination to the source, or from any intermediate node that is able to satisfy the request back to the source.

DSR:

The dynamic source routing DSR protocol is an on demand routing protocol that is based on the concept of source routing mobile nodes are required to maintain cache that contain the source routes of which the mobile is aware. Entries in the route cache are continually updated as new routes are discovered.

The protocol consists of two major phases: Route discovery and route maintenance.

When a mobile node has a packet to send to some destination, it first consults the route cache to determine whether it already has a route to the destination. If it has n unexpired route to the destination it will use this route to send packets. On the other hand, if the node does not have such a route to the destination it initiates route discovery by broadcasting a route request packet this route request contains the address to the destination along with the source nodes address and a unique identification number. A route reply is generated when the route request reaches either the destination itself, or an intermediate node whose route cache contains an unexpired route to the destination.

Route maintenance is a procedure, which maintains transmission of packets in the routing through the use of route error packets and acknowledgement. Route error generated when at a node data link layer encounters transmission error. Acknowledgements are used to verify the correct operation of the route link.

ISSN (online): 2250-141X
Vol. 1 Issue 2, December 2011

2.2 Simulation Tools:

Simulation of routing algorithms of adhoc networks is done by using many softwares like OPNET, GlomoSim, ns2 and OMNET++ etc. Here network simulator (NS2) software is used due to its availability and simplicity.

Simulation Model

Simulation of Routing algorithms on Network Simulator is represented in the Flow Diagram. Here the model, which is used for simulation, consist eight nodes topology in which there are four transmitting nodes and four receiving nodes. The mobile nodes move about within an area whose boundary is defined as 700m*600m.in which UDP agent with CBR traffic is used. The Packet size used for the transmission is 512 bytes and the rate is 400 kbps.

Simulation results Throughput

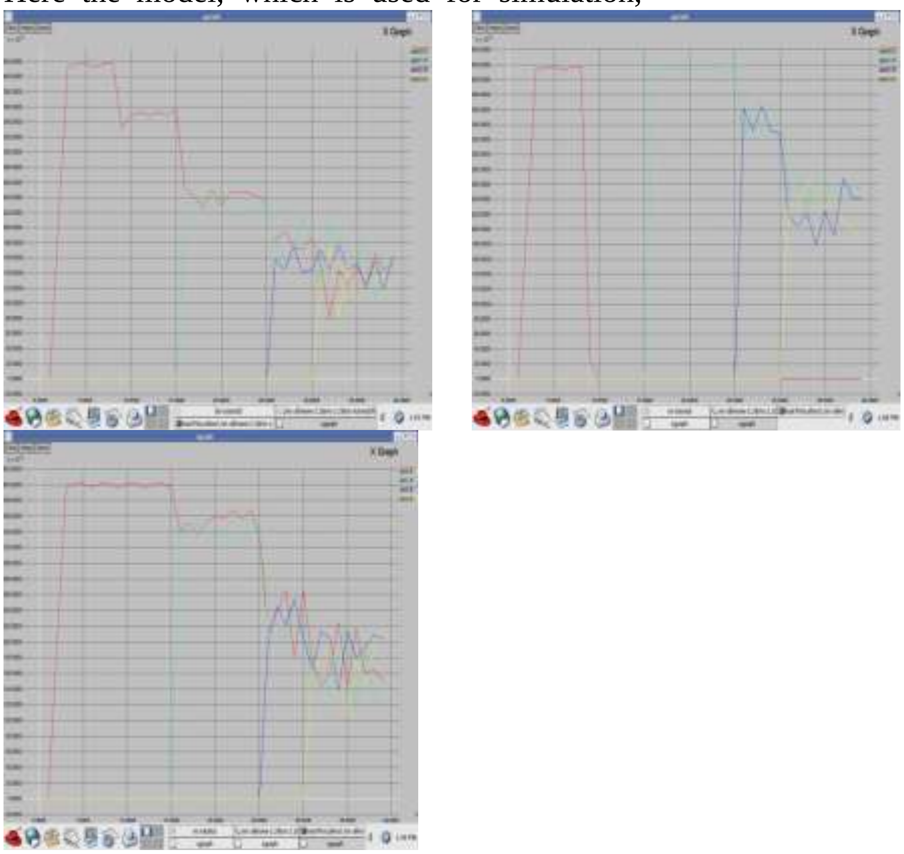

Figure no.4.5 AODV , DSDV , DSR Throughput variation with increase in number of Transmitting nodes

All the above three X graphs are generated after the simulation of TCL scripts of DSDV, AODV, DSR in which four different transmitting nodes show their bit rate performance. Node 1 starts transmitting at time T =1.5 sec while Node 2 starts transmitting at time T=15 sec. During the period of time between 1.5 sec and 15 sec Node 1 is the only transmitting node using the entire available bandwidth. This justifies the high performance of Node 1 during the specified interval of time. At time T=10 sec, Node 2 starts transmission hence sharing Channel resources with Node 1. This explains the heavy reduction of bit rate. The bit rate plot experiences heavier oscillations and reduction as the number of transmitting nodes

ISSN (online): 2250-141X
Vol. 1 Issue 2, December 2011

increases. High packet drop rate whenever the number of nodes sharing network resources increases.

Measurements and Graphs of Delay, Throughput and Overhead for AODV:

Bit rate	Delay
400	.905727
425	.902162
475	.890034
500	.868901
525	.846241

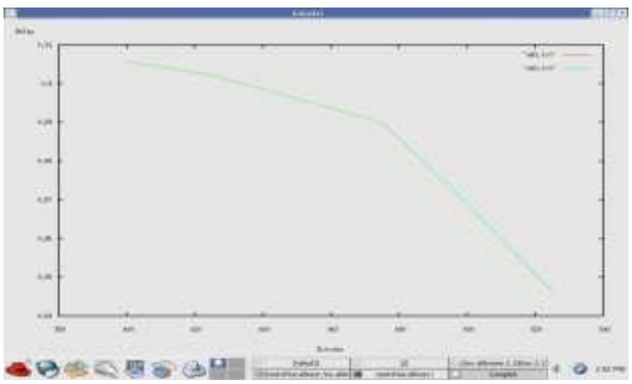

Figure no. 4.6 Delay of AODV

Bit rate	Throughput
400	149.26
425	146.84
475	142.78
500	141.05
550	137.71
575	135.94

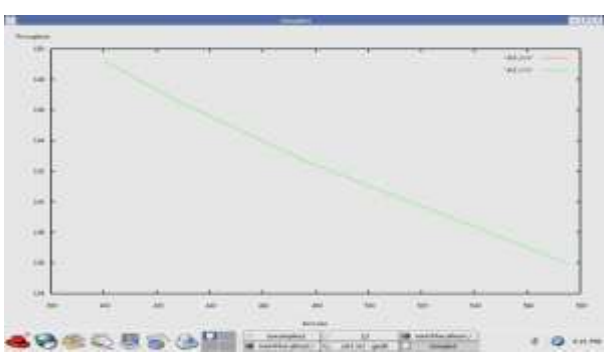

Figure no. 4.7 Throughput of AODV

Bit rate	Overhead
400	2.28
425	2.09
475	2.01
500	2.11
550	1.76
575	2.02

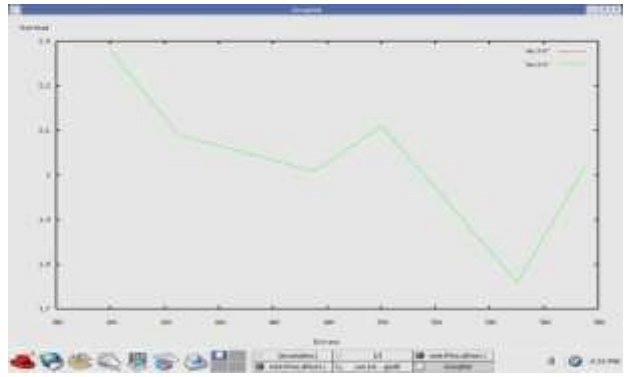

Figure no. 4.8 Overhead of AODV

Measurements and Graphs of Delay, Throughput and Overhead for DSDV:

Bit Rate	Delay
400	.425348
425	.42502
450	.425065
475	.417517
500	.410120
550	.399858
600	.387603

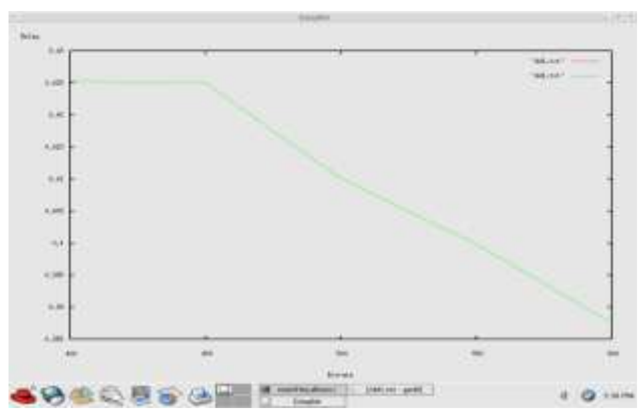

Figure no. 4.9 Delay of DSDV

Bit rate	Throughput
400	147.22
425	145.38
450	143.67
475	142.62
500	141.44
550	139.24

ISSN (online): 2250-141X
Vol. 1 Issue 2, December 2011

600	137.55

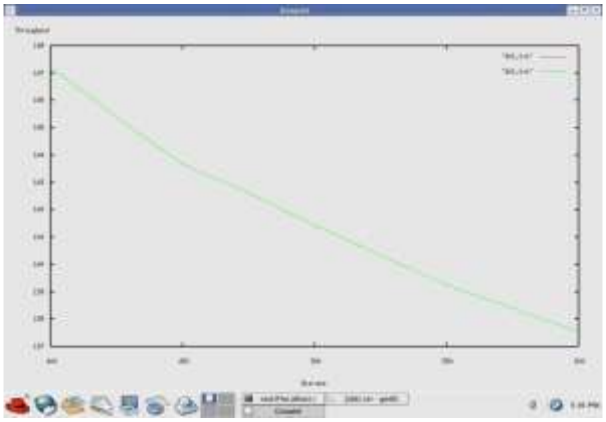

Figure no. 4.10 Throughput of DSDV

Bit rate	Overhead
400	4.61
425	4.58
450	4.13
475	4.08
500	3.70
550	3.57
600	3.13

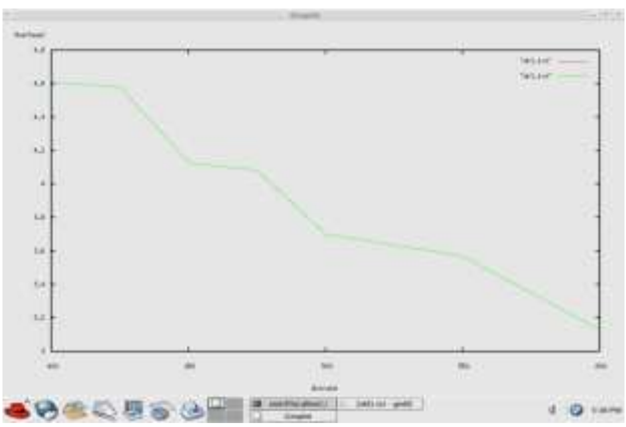

Figure no. 4.11 Overhead of DSDV

Measurements and Graphs of Throughput and Overhead for DSR:

Bit Rate	Throughput	Overhead
400	163.88	.70
425	160.81	.45
450	158.68	.60
475	156.68	.55
525	152.30	.58
550	150.88	.23
600	147.91	.17

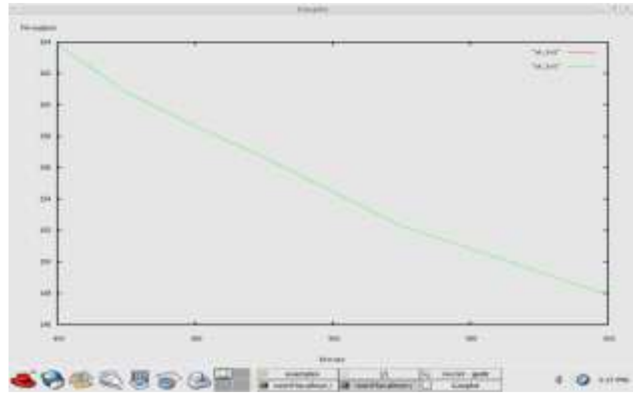

Figure no. 4.12 Throughput of DSR

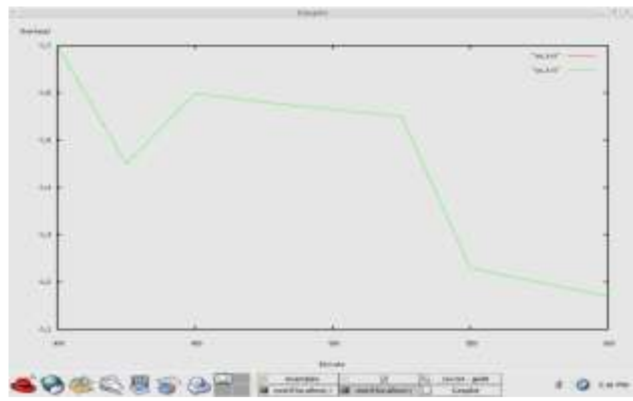

Figure no. 4.13 Overhead of DSR

Conclusion:

Simulation of routing algorithms provides the facility to select a good environment for routing and communication between devices used in Ad hoc networks. Here, simulation gives the knowledge how to use routing schemes in dynamic network.

Simulation results of all xgraph provide the information that if the number of nodes in the transmission increases then the throughput decreases. The throughput in gnuplot shows that throughput decreases with increase in the bit rate of the transmission. End to end delay also decreases with increase in bit rate. Number of overhead control packets used with transmission packets varies with increase in bit rate in the routing algorithms. Throughput of DSR algorithm is better than AODV and the AODV throughput is better than DSDV. So the reactive routing throughput is better than the proactive routing.

ISSN (online): 2250-141X
Vol. 1 Issue 2, December 2011

End to end delay of AODV routing is more than the DSDV routing. Since DSDV is a proactive routing protocol, in most of the cases it uses already established route and tries to get rid of the packets immediately resulting in low average delay. Overhead required in DSR is minimum while DSDV requires maximum overhead and AODV is in between the two.

REFERENCES

1. *www.isi.edu/nsnam/ns NS2 tutorial.*
2. *www.isi.edu/nsnam/ns/tutorial Marc Greis tutorial of Ns2.*
3. *www.nile.wpi.edu/NS Ns by examples.*
4. *http://www.vectorsite.net/tsawk.html AWK programming tutorial.*
5. *http://www.gnuplot.info/Tutorial on Gnuplot.*
6. *J. Broch, D.A. Maltz, D.B. Johnson, Y.C. Hu, and J. Jetcheva, A Performance Comparison of Multi-Hop Wireless Ad Hoc Network Routing Protocols, Proc. of the ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom), October 1998.*
7. *Computer networks, Andrew S Tanenbaum, fourth edition Pearson Education Asia .2003*
8. *Principles of wireless network – A unified approach by Kaveh Pahlavan and Prasant Krishnamurthy PHI.*