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Performance Comparison of DSR, AODV and DSDV Routing Protocols for Ad Hoc Networks

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Abstract: The thesis studies the importance of routing protocol in the field of communication. The main objective of this thesis is to show that among three routing protocol which protocol is best on which performance parameter. Many routing protocols exist in ad hoc networks which enable communication like, DSR, AODV, DSDV, etc. DSR delivers data in the adhoc network with the assumption that the network is connected but DSR fails when the network is partially connected i.e., source and destination are in different networks.

Keywords: Communication like, DSR, AODV, DSDV, etc

INTRODUCTION

Mobile ad hoc networking is rapidly gaining popularity due to the proliferation of miniature yet powerful mobile computing devices. Mobile ad hoc networks do not require any form of fixed infrastructure for hosts to be able to communicate with one another. The basic structure of the MANET is shown in Figure 1. A source node that needs to communicate with a destination node uses either a direct link or a multihop route to reach the later.

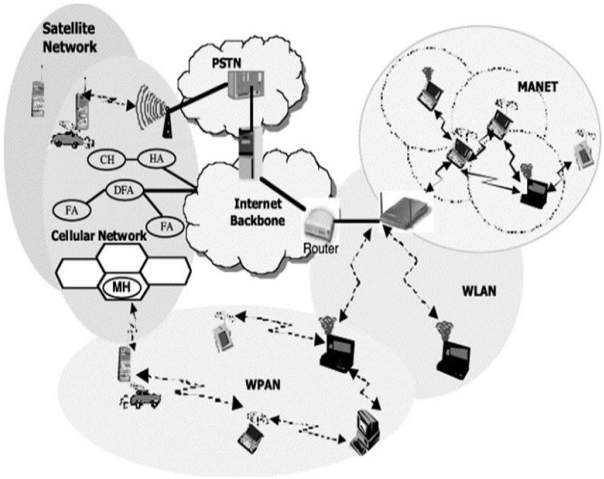

Fig1: Architecture of MANET

A Description of the Protocols

DYNAMIC ROUTING PROTOCOL (DSR):

Dynamic source routing protocol (DSR) is an on-demand routing protocol. It is designed to restrict the bandwidth consumed by control packets in ad hoc wireless networks by eliminating the periodic table-update messages required in the table-driven approach. The major difference between this and the other on-demand routing protocols is that it is beacon-less and hence does not require periodic hello packet (beacon) transmission, which are used by a node to inform its neighbors of its presence. DSR protocol consists of two stages: 1.Route Discovery and 2.Route Maintenance

1). Route discovery: During this process source node S initiates route discovery on demand basis. Source node S examine its routes cache for checking the availability or route from source to destination, but when the route is not available in the cache then the node initiates the route discovery process. Source node S sends the packet that includes the address of target node as well as the address of the intermediate nodes which helps in finding the destination.

2).Route Maintenance: Due to dynamic topology of the network, the route failure between the nodes arises due to link breakage etc, so for this the mechanism of route maintenance comes into the scenario. Reactive protocols have acknowledgement mechanism due to which route maintenance is possible.

Traditional routing protocols incorporate the process of route discovery along with route maintenance by means of constantly sending the periodic updates of routing. On contrary part, the level of the link or router alter, every regular updates will display the changes to every other routers, probably all routers started doing computation of new routes. Route error packet contains both the hosts' addresses at both ends of hop: the host which recognized that error and the host to which it was trying in transmitting the packet using this identified hop.

AD HOC ON-DEMAND DISTANCE VECTOR ROUTING (AODV) PROTOCOL

Ad hoc On-Demand Distance Vector (AODV) Routing is a routing protocol for mobile ad hoc networks (MANETs) and other wireless ad hoc networks. In AODV, the network is silent until a connection is needed. At that point the network node that needs a connection broadcasts a request for connection. Other AODV nodes forward this message, and record the node that they heard it from, creating an explosion of temporary routes back to the needy node.

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When a node receives such a message and already has a route to the desired node, it sends a message backwards through a temporary route to the requesting node. The needy node then begins using the route that has the least number of hops through other nodes. Unused entries in the routing tables are recycled after a time. When a link fails, a routing error is passed back to a transmitting node, and the process repeats. The AODV Routing Protocol uses an on-demand approach for finding routes, that is, a route is established only when it is required by a source node for transmitting data packets. It employs destination sequence numbers to identify the most recent path. The major difference between AODV and Dynamic Source Routing (DSR) stems out from the fact that DSR uses source routing in which a data packet carries the complete path to be traversed. However, in AODV, the source node and the intermediate nodes store the next-hop information corresponding to each flow for data packet transmission. Following are the Brief description of AODV:

- Route Requests (RREQ) are forwarded in a manner similar to DSR.
- When a node re-broadcasts a Route Request, it sets up a reverse path pointing towards the source i.e., AODV assumes symmetric (bi-directional) links
- When the intended destination receives a Route Request, it replies by sending a Route Reply (RREP).

DESTINATION-SEQUENCED DISTANCE-VECTOR ROUTING (DSDV) PROTOCOL

The Destination-Sequenced Distance-Vector (DSDV) Routing Algorithm is established on the concept of the opera Bellman-Ford Routing Algorithm with certain improvements. Every mobile station preserves a routing counter that lists all possible destinations, the number of required hops to reach the sink and the continuity symbol selected by the sink node. Sequence number is used to distinguish stale routes from recent ones and hence avert the development of curves. Periodically transitions of routing tables by the stations to their actual provincial. If a significant change has occurred in its table then station has to spreads its routing table from the uttermost restores appointed. So, the restores is both time-driven and event-driven. The routing table updates can be sent in two approaches: - an "entire depot" or a supplement restore. A full dump sends the full routing table to the neighbors and could periods various packets whereas in an supplement restore only those entries from the routing table are sent that has a measure development in so much as at the end restore and it must able in a packet. If there is space in incremental update packet hence those access may be combined whose continuity sequence has changed. When the network is relatively stable, supplemental restores are directed to avert new traffic and entire depot is relatively infrequent. In a fast-changing network, supplemental packets can advance huge so full dumps will be more frequent. Each route update packet, in addition to the routing table advice, also incorporates an exclusive continuity sequence assigned by the transmitter. The route labeled along the maximal (i.e. most recent) continuity symbol is applied. If two routes have the same sequence number then the route along the perfect measure (i.e. precise route) is applied. The stations stoppage the transmission of a routing update by settling time so as to eliminate those restores that would appear if a superior route were searched very soon.

SIMULATION

Simulation using NS2 simulator is carried out in order to simulate the performances of Ad-Hoc network routing protocols. The traffic sources are TCP. The mobility model uses "random waypoint model" in the rectangular field of 800m x 800m with 20 nodes to 125 nodes. The operations use a fixed number of packet sizes (512-bytes) and a packet rate of 4 packets per seconds.

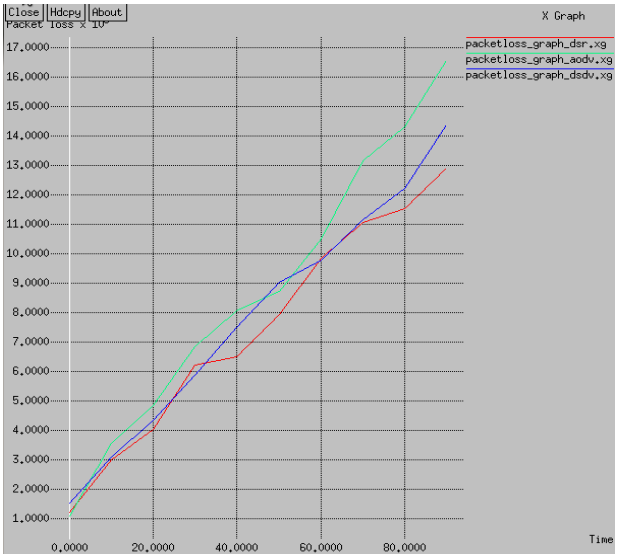
PERFORMANCE ME TRICS

These are the performance metrics through which we can see the performance of the proposed routing protocol.

- **Packet Drop Loss:** The number of total packet count which is not able to reach the destination in the network.
- **Packet Receive:** The count of packet reached to destination in the network.
- **Throughput:** Number of data packet transferred from source node to sink node or it should be processed in a specified time period.

RESULT ANALYSIS

The performance of all algorithms for the communication in connected environment using the DSR AODV and DSDV routing protocol and it is evaluated on the following performance metrics named as packet drop loss , packet receive, and throughput.



Comparison graph for Packet Loss

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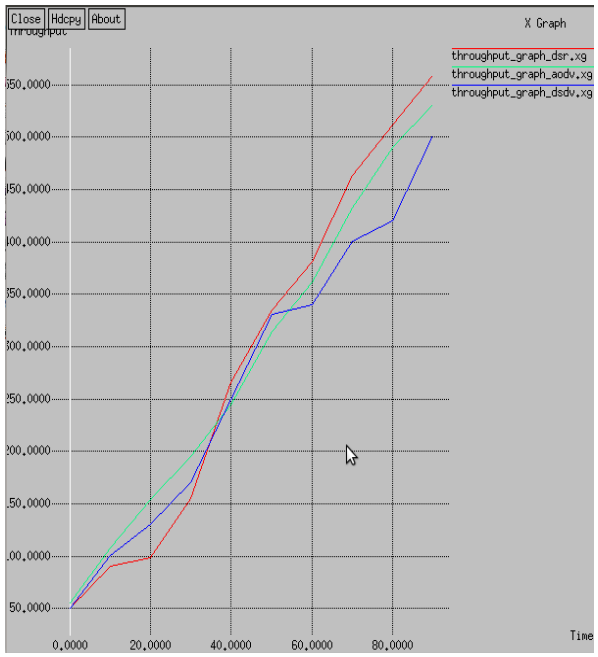
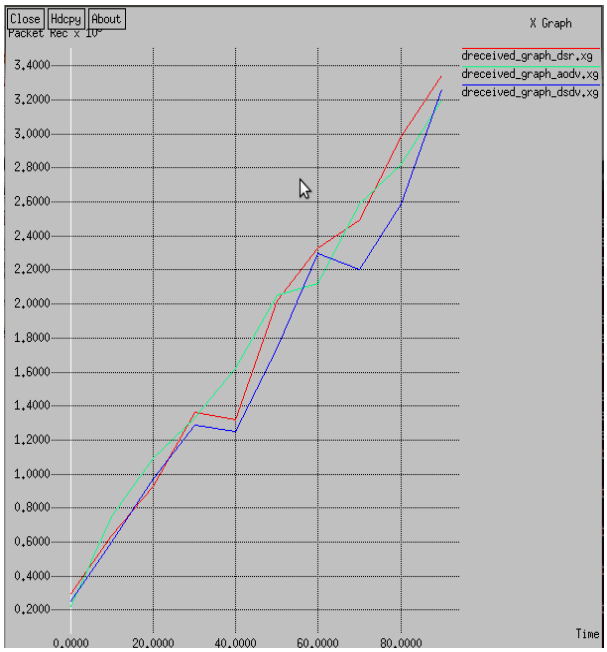


Comparison graph for Throughput



Comparison graph for Packet Receive

CONCLUSION

In this research work we just evaluated the three routing protocol named as DSR, AODV, DSDV on following three performance metrices Packet loss, Packet Receive, and Throughput. We proved that DSR has better performance other than AODV and DSDV. The basic idea behind this approach is to find out which protocol is better. We have implemented this experiment by using the NS2 simulators and to check the performance of the protocol. In this research we have implemented the concept that node will start the route discovery process as in the three routing protocol does.

After finding the route it will start exchanging the data and after this process is completed it stops. If route is broken in between process then route maintenance process will start.

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