COMPARISON ANALYSIS AND SURVEY OF ROUTING PROTOCOLS IN MOBILE AD-HOC NETWORK

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Abstract- Mobile ad-hoc network has no infrastructure, it is decentralized in nature and self configuring. MANET is dynamic that is each node can freely in any direction. Hence the main challenge in the MANET is to equip each device to maintain the information to equip the traffic. This paper evaluates analyze and compare various routing protocols in MANET like AODV, AOMDV, DSR, DSD. The simulation is carried out in ns2.35 under Unix platform. The performance metrics used for evaluation are packets delivery ratio, throughput and end-to-end delay.

Keywords- AODV, DSDV, DSR, AOMDV, MANET, NS2.

I. INTRODUCTION:

Routing Protocol in Mobile Network: Mobile network is dynamic that is every node are independent of moving in any direction. There MANET. Hence to find a valid route in MANET routing protocols are used. Routing protocols handle and manage high mobility of nodes. Routing protocols in MANET can be classified into 3 categories.

- Proactive(Table Driven Routing Protocol)
- Reactive(On demand Routing Protocol)
- Hybrid Routing Protocol

Proactive (Table Driven Routing Protocol): In proactive protocol every node has information about every node that is every node has a topology information.

Hence a routing information is maintained about every node in routing table. These routing protocols update the routing table periodically or whenever there is a change in the network topology. These routing protocol update the routing table periodically or whenever there is a change in network topology. The main advantage this protocol is that the source node just run an appropriate path-finding algorithm on topology information it maintain. The algorithm does not need route discovery procedure to find the route for destination node. But the major in this routing protocol is that maintaining consistent up-to-date routing tables leads to messaging overheads, consumes more bandwidth, power which in all decreases the throughput. Following are the table driven protocols.

- Destination Sequence Distance Vector(DSDV)
- Wireless routing protocol(WRP)
- Fish eye state routing protocol (FSR)
- Optimized link state routing protocol(OLSR)
- Cluster Gateway switch routing protocol (CGSR)
- Topology Dissemination Based on Reverse Path Forwarding(TBRPF)

Reactive (On Demand) Routing Protocols: In these routing protocols nodes do not maintain the topology information. Routing is done in two steps

- **Route Discovery:**
- **Route Maintenance:**

Route Discovery: In this mechanism following steps are carried out

- A route discovery broadcast is sent from source to destination. Broadcast message consist source ip and destination ip
- All the nodes receives this broadcast and one of which is destination node
- The destination node replies back to the source node
- The hop count and signal quality for each hop is recorded as the reply travels back to the source node. Hence each router in the path build routing table entry containing the best path to destination.
- Thus the route from source to destination is discovered.

Route Maintenance- After the route from source to destination is discovered the route maintenance is initiated to maintain route is no longer required or the destination is unreachable. The advantage of reactive(on Demand) routing protocol is less overhead. Disadvantage is delay due to route discovery procedure. Dynamic Source Routing (DSR), Ad-hoc On Demand Distance Vector (AODV), Ad-hoc on Demand Multipath Distance Vector Routing Algorithm (Am (AOMDV), temporally Ordered Routing Algorithm (TORA) are reactive protocols.

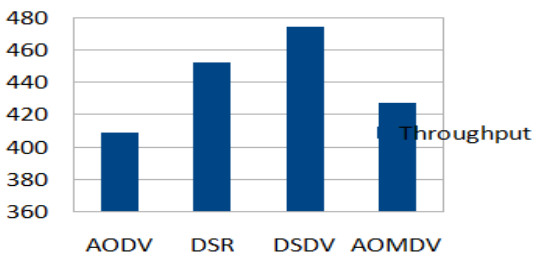
Hybrid Routing Protocol- We have seen proactive routing protocol as well as reactive routing protocols. Both have their own pros and cons. In Hybrid routing protocol it considers the advantages of both routing protocols and hence this protocol is better than both used in isolation. Zone Routing Protocol and Hazy

Sighted Link State are the examples of hybrid routing protocol

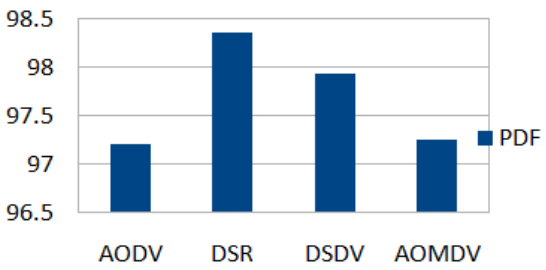
Performance Metrics

Parameters: Following are the performance metrics parameters considered in our paper

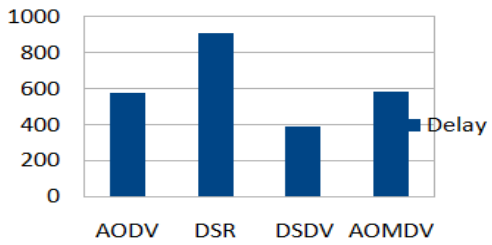
a. Throughput: Throughput is the number of packets arrived at destination per unit time.

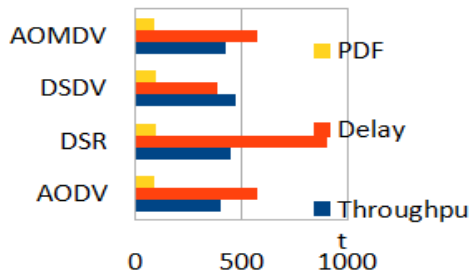


b. Packet Delivery Ratio (PDR): It is a ratio of total number packets sent by the sender with the total number of packets received by the receiver. A high PDF indicates good performance of a protocol.



c. End-to-End delay: It is the time required for a packet to reach destination from source. End-to-End delay also include all possible delay like route discovery, retransmission delay, propagation delay, queuing delay etc.





II. WIRELESS ROUTING PROTOCOLS.

Wireless Routing Protocols can be classified into two categories table driven routing protocol and On demand routing protocol where table driven protocols are proactive and maintain a routing table and on demand are active do not maintain a routing table. Our research paper has analyzed AODV, DSR, AOMDV, DSDV wireless routing protocol.

2.1 Ad-hoc On-Demand Distance Vector Routing(AODV):AODV stands for Ad-hoc on demand distance vector routing protocol. AODV is a routing protocol and is used in mobile Ad hoc network and which is capable of both unicast and multicast routing. As the name suggest AODV is an on demand routing algorithm that is it routes the packets between source to destination on demand. AODV algorithm maintains these routes from source to destination as long as they are needed by the source. AODV uses sequence number to ensure the freshness of the route. It is loop-free self starting and scales to large number of mobile nodes. In AODV route is discovered using two messages.

III. RREQ- ROUTE REQUEST

1. RREP- Route Reply

RREQ- Route Request : Whenever the source node desire to have a route to the destination node and no route exists between source to destination in such case source node broadcast (RREQ) route request packet across the network. All the nodes the network receiving this (RREQ) packet update their information for the source node and set up backward pointer to the source node in the route table. RREQ packet has source IP address, current sequence no, broadcast ID. The receiving RREQ packet replies back to source in two cases

a. If the node is a destination node.
b. If the node has a route to destination with corresponding sequence number greater than or equal to contained in the RREQ.

In either of these two cases the node replies back to the source with RREP packet. Otherwise the node in the network rebroadcast's the RREQ source IP address and broadcast ID. If they receive a RREQ which they have already processed, they discard the RREQ packet.

As the RREP propagates to the source the nodes set a forward pointer to the destination. As the source node receives this RREP packets it starts forwarding the packets to the destination. Later if source receives the RREP packet with greater sequence number or less hop count then it may update its routing information and begin to send packets to destination using better route. As long as route is active (route is said active as long as packets travel periodically from source to

destination using same route) the route is maintained. As soon as the link breaks RERR(route error) propagates to the source to inform that the destination is unreachable.

DSR-The Dynamic Source Routing Protocol is an on demand routing protocol. A node maintains route caches containing the source routes which it(source) knows or is aware of. Whenever the node learns about new route it updates its cache table entries. The two major phases of the protocol: Route Discovery and Route Maintenance.

Route Discovery: When a source node S wishes to send a packet to the destination node D, it obtains a route to D. This is called Route Discovery. Route Discovery is used only when S attempts to send a packet to D and has no information on a route to D.

Route Maintenance: When the network changes and the route is no longer valid then route maintenance mechanism allows the source node S to detect route to destination node D. At this time, Node S might use any other route that it happens to know or invoke Route Discovery to find a new route. This is used only when S is sending packets to D.

DSDV: Destination-Sequenced Distance-Vector Routing protocol is a proactive table driven algorithm based on classic Bellman-Ford routing. The main contribution of this algorithm is freedom from loops in routing table by the use of sequence number. DSDV is a proactive protocol in which all nodes learn the network topology before a forward request comes in. In DSDV protocol each node maintains routing information for all known destinations. The routing information is updated periodically. Each node maintains a table, which contains information for all available destinations, the next node to reach the destination, number of hops to reach the destination and sequence number. The nodes periodically send this table to all neighbors to maintain the topology, which adds to the network overhead. Each entry in the routing table is marked with a sequence number assigned by the destination node. The sequence numbers enable the mobile nodes to distinguish stale routes from new ones, thereby avoiding the formation of routing loops.

AOMDV: Adhoc On-Demand Multipath Distance Vector Routing Protocol(AOMDV) protocol calculates multiple loop free path between source and destination. If one path fails the protocols switches to the alternate path. Thus new route discovery is needed when all the routes fails. Hence AODV protocol needs fewer number of route discoveries, less delay and reduced overhead.

CONCLUSION:

Our paper has considered four wireless routing protocol ie AODV, DSDV, DSR, AOMDV and performance of these protocol are analyzed with respect to packet delivery ratio, delay and throughput. The simulation result shows that the delay for DSR. This is why AODV and AOMDV, with a good average throughput and PDR and a comparatively less end-end delay, may have a slight advantage over other protocols.

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