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Comparative Analysis of AODV & AOMDV Reactive Protocols

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Abstract— Manets are working in distributed environment and dynamically changing the network topology. Manet protocols can be table driven or on demand as per requirement . Such networks can be deployed anywhere and at any time or the fly. Because of the dynamic nature of MANETs, they are typically not very secure, so it is important to be cautious what data is sent over a MANET. AODV(adhoc on-demand distance vector) and AOMDV(adhoc on-demand multipath distance vector) both are O-demand (reactive) protocol. Performance of both reactive protocols are evaluated using NS-2 simulator under various metrics and no. of mobile nodes are 20 in the network.

Keywords— MANET, REACTIVE, PROACTIVE, AODV, AOMDV, THROUGHPUT

I. INTRODUCTION

On-Demand routing protocols work on the principle of creating routes as and when required between a source and destination node pair in a network topology.

Ad-hoc On-Demand Distance Vector Routing(AODV)

AODV is a reactive protocol that discovers routes on an as needed basis using a route discovery mechanism.It uses traditional routing tables with one entry per destination. Without using source routing, AODV relies on its routing table entries to propagate an RREP (Route Reply) back to the source and also to route data packets to the destination. AODV uses sequence numbers maintained at each destination to determine freshness of routing information and to prevent routing loops [1]. All routing packets carry these sequence numbers. AODV maintains timer-based states in each node, for utilization of individual routing table entries, whereby older unused entries are removed from the table. Predecessor node sets are maintained for each routing table entry, indicating the neighboring nodes sets which use that entry to route packets. These nodes are notified with RERR (Route Error) packets when the next-hop link breaks. This packet gets forwarded by each predecessor node to its predecessors, effectively erasing all routes using the broken link. Route error propagation in AODV can be visualized conceptually as a tree whose root is the node at the point of failure and all sources using the failed link as the leaves [1]. The advantages of AODV are that less memory space is required as information of only active routes are maintained, in turn increasing the performance, while the disadvantage is that this protocol is not scalable and in large networks it does not perform well and does not support asymmetric links.

1.2 Working of AODV

When a node wishes to send a packet to some destination It checks its routing table to determine if it has a current route to the destination .If Yes, forwards the packet to next hop node If No, it initiates a route discovery process .

1.2.1 Route discovery

It begins with broadcasting of RREQ to its neighbors specified for certain destination.
. Once an intermediate node receives a RREQ, It check its routing table for route to destination.
If found send RREP to source If not found it rebroadcast RREQ to its neighbor nodes by setting up a reverse route path to source node in its route table. It ignores RREQ if it is processed already . Finally on reaching RREQ to destination node, It unicast RREP to source node by using reverse route to source node .
The above procedure can be described visually as follows

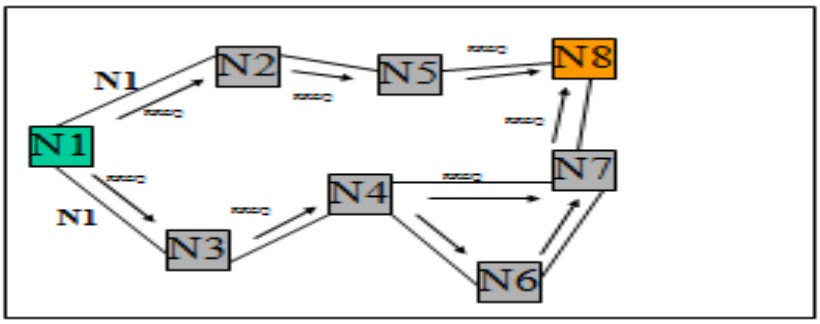


Figure 1.Route Discovery

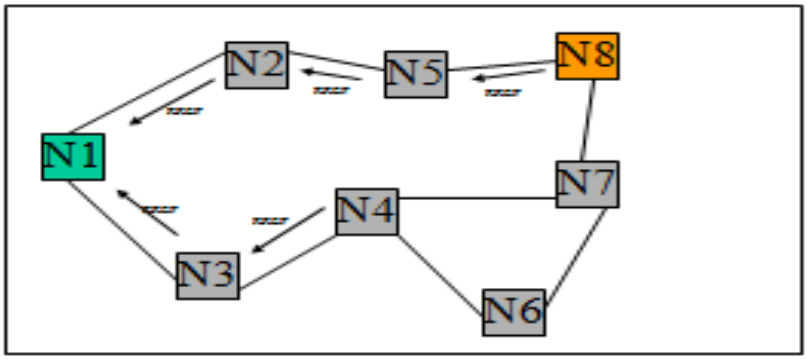


Figure 2.Route Reply

1.2.2 Route Maintenance Stage

A hello message is broadcasted by *active* nodes periodically. If no hello message from a neighbor .The upstream node will notify the source with an RERR packet & entire routes based on the node is invalidated. Source will initialize a new route discovery stage and
flood the RREQ packet .
Above procedure can be realized in the following figure

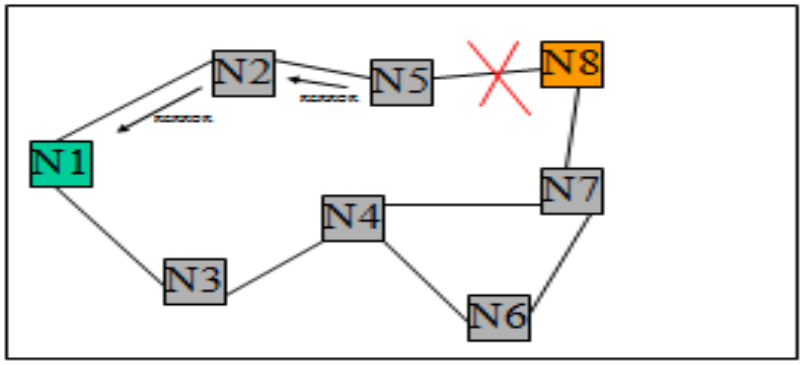


Figure 3 Propagation Of RERR

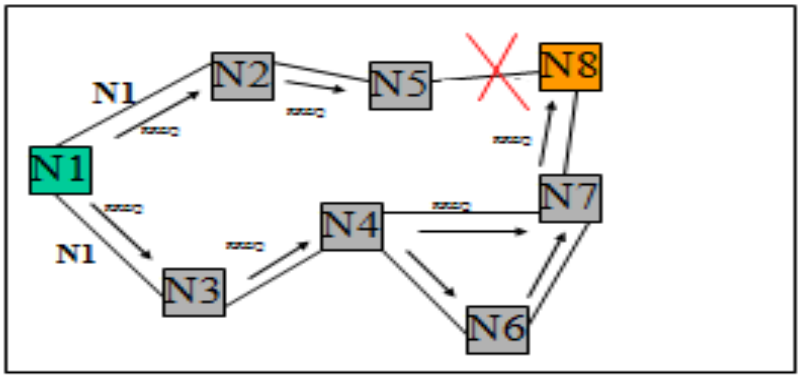


Figure 4 Route Rediscovery

1.3 Ad-hoc On-demand Multi path Distance Vector Routing (AOMDV)

Ad-hoc On-demand Multi path Distance Vector Routing (AOMDV) protocol is an extension to the AODV protocol for computing multiple loop-free and link disjoint paths . The routing entries for each destination contain a list of the next-hops along with the corresponding hop counts. All the next hops have the same sequence number. This helps in keeping track of a route. For each destination, a node maintains the advertised hop count, which is defined as the maximum hop count for all the paths, which is used for sending route advertisements of the destination. Each duplicate route advertisement received by a node defines an alternate path to the destination. Loop freedom is assured for a node by accepting alternate paths to destination if it has a less hop count than the advertised hop count for that destination. Because the maximum hop count is used, the advertised hop count therefore does not change for the same sequence number . When a route advertisement is received for a destination with a greater sequence number, the next-hop list and the advertised hop count are reinitialized. AOMDV can be used to find node-disjoint or link-disjoint routes. To find node-disjoint routes, each node does not immediately reject duplicate RREQs. Each RREQs arriving via a different neighbor of the source defines a node-disjoint path. This is because nodes cannot be broadcast duplicate RREQs, so any two RREQs arriving at an intermediate node via a different neighbor of the source could not have traversed the same node. In an attempt to get multiple link-disjoint routes, the destination replies to duplicate RREQs, the destination only

replies to RREQs arriving via unique neighbors. After the first hop, the RREPs follow the reverse paths, which are node disjoint and thus link-disjoint. The trajectories of each RREP may intersect at an intermediate node, but each takes a different reverse path to the source to ensure link disjointness . The advantage of using AOMDV is that it allows intermediate nodes to reply to RREQs, while still selecting disjoint paths. But, AOMDV has more message overheads during route discovery due to increased flooding and since it is a multipath routing protocol, the destination replies to the multiple RREQs those results are in longer overhead.

II. SIMULATED INFORMATION

AODV Protocol

Table1: Simulated information of AODV protocol

Parameters	**Value**
Simulator	**NS2**
Channel Type	Channel/Wireless Channel
Radio-propagation model	Propagation/TwoRayGround
Network Interface Type	Phy/WirelessPhy
MAC Type	Mac/802.11
Interface Queue Type	Queue/DropTail/PriQueue
Maximum packet in ifq	50
Link Layer Type	LL
Antenna Model	Antenna/OmniAntenna
Set val(nn)	20
Set val(rp)	AODV
Set Val(x)	500
Set val(y)	400
Set val(stop)	140

AOMDV Protocol

Table2: Simulated information of AOMDV protocol

Parameters	**Value**
Simulator	**NS2**
Channel Type	Channel/Wireless Channel
Radio-propagation model	Propagation/TwoRayGround
Network Interface Type	Phy/WirelessPhy
MAC Type	Mac/802.11
Interface Queue Type	Queue/DropTail/PriQueue
Maximum packet in ifq	50
Link Layer Type	LL
Antenna Model	Antenna/OmniAntenna
Set Val(nn)	20
Set Val(rp)	AOMDV

Set Val(x)	500
Set Val(y)	400
Set Val(stop)	140

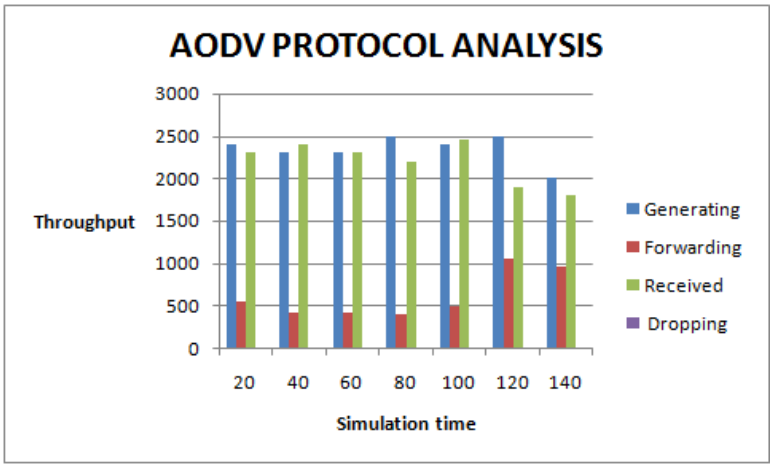
III. RESULTS

Comparison between AODV & AOMDV is made depending on these parameters:-

1. **Throughput of generating packets**
2. **Throughput of sending packets**
3. **Throughput of dropping packets**
4. **Throughput of forwarding packets**
5. **Throughput of receiving packets**

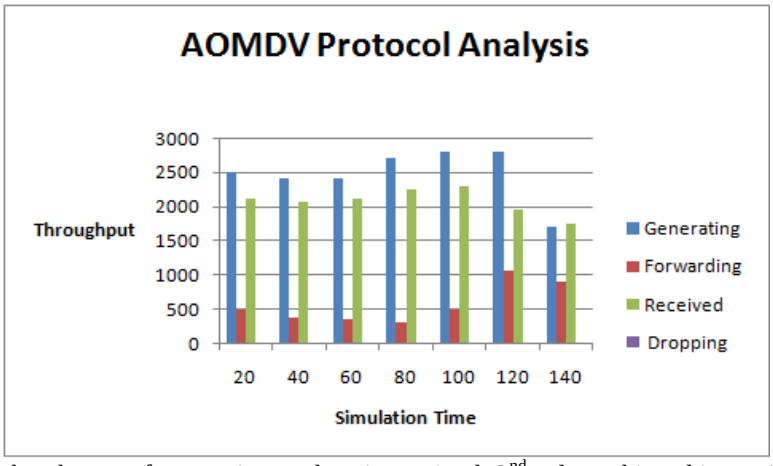
Based on these parameters we can conclude which protocol is best and on which metric.

AODV PROTOCOL ANALYSIS



This bar chart concludes that no. of generating packets are maximum and second maximal value is of received packets then forwarding. Dropping is approximately negligible at all simulation time.

Analysis of AOMDV Protocol



This bar chart concludes that the no. of generating packets is maximal ,2nd value achieved is received no. of packets ,3rd by forwarding dropping is minimal or negligibile as compared to other factors

IV. CONCLUSIONS

In case of AOMDV, dropping no. of packets are higher as compared to AODV. For e.g. at 45,62,112, 115,125 Values at AOMDV is higher as compared to AODV and all peaks are higher in case of AOMDV as compared to AODV. No. of generated packets is higher in case of AOMDV protocol as compared to AODV but its receiving power is smaller as compared to AODV. Forwarding Packets capacity is more in AODV as compared to AOMDV.

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