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COMPARATIVE ANALYSIS OF ON -DEMAND MOBILE AD-HOC NETWORK

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ABSTRACT:

Mobile ad hoc networks (MANET) represent complex distributed systems that comprise wireless mobile nodes that can freely and dynamically self organize into arbitrary and temporary ad hoc network topologies. A mobile ad hoc network is a collection of nodes that is connected through a wireless medium forming rapidly changing topologies. The widely accepted existing routing protocols designed to accommodate the needs of such self-organized networks do not address possible threats aiming at the disruption of the protocol itself. In this paper In this paper, we compare we compare and evaluate the performance metrics Ad-hoc On-demand Distance Vector (AODV) routing protocol, Ad-hoc On-demand Multipath Distance Vector (AOMDV) routing protocol. This paper investigates all these routing protocols corresponding to packet delivery fraction (pdf), end to end delay, Packet loss. The ns-2 simulation results showed that AODV has better performance compare to AOMDV routing protocol mobile ad-hoc network.

1. INTRODUCTION

Mobile Ad Hoc Network (MANET) is a collection of communication devices or nodes that wish to communicate without any fixed infrastructure and pre-determined organization of available links. The nodes in MANET themselves are responsible for dynamically discovering other nodes to communicate. It is a self-configuring network of mobile nodes connected by wireless links the union of which forms an arbitrary topology. The nodes are free to move randomly and organize themselves arbitrarily; thus, the network's wireless topology may change rapidly and unpredictably. Routing is a core problem in networks for sending data from one node to another. Wireless Ad Hoc networks are also called Mobile Ad Hoc multi-hop wireless networks is a collection of wireless mobile hosts forming temporary network without the aid of any established infrastructure or centralized administration. Mobile Ad Hoc Networks (MANETs) are characterized by a dynamic, multi-hop, rapid changing topology. Such networks are aimed to provide communication capabilities to areas where limited or no communication infrastructures exist. MANET's can also be deployed to allow the communication devices to form a dynamic and temporary network among them. A mobile Ad Hoc network (MANET) is receiving attention due to many potential military and civilian applications. MANETs have several salient characteristics: ***1) Dynamic topologies 2) Bandwidth-constrained, links 3) Energy constrained operation 4) limited physical*** *security*. Therefore the routing protocols for wired networks cannot be directly used for wireless networks. Some examples of the possible uses of ad hoc networking include students using laptop computers to participate in an interactive lecture, business associates sharing information during meeting, soldiers relaying information for situational awareness on the battlefield and emergency disaster relief personnel coordinating efforts after a hurricane or earthquake. A MANET uses multi-hop routing instead of static network infrastructure to provide network connectivity.

Several routing protocols have been proposed for mobile Ad Hoc networks. In this paper we present a number of ways of classification or categorization of these routing protocols and did the performance comparison of an AODV, AOMDV routing protocols.

2. CLASSIFICATION MANET ROUTING PROTOCOL:

There are different criteria for designing and classifying routing protocols for wireless ad hoc networks.

1. **Proactive (Table Driven) Routing Protocol**
2. **Reactive (On-Demand) Routing Protocol**
3. **Hybrid Routing Protocol**

Proactive (Table-Driven) Routing Protocols

These routing protocols are similar to and come as a natural extension of those for the wired networks. In proactive routing, each node has one or more tables that contain the latest information of the routes to any node in the network. Each row has the next hop for reaching a node/subnet and the cost of this route. Various table-driven protocols differing the way the information about a change in topology is propagated through all nodes in the network. There exist some differences between the protocols that come under this category depending on the routing information being updated in each routing table. Furthermore, these routing protocols maintain different number of tables. The proactive protocols are not suitable for larger networks, as they need to maintain node entries for each and every node in the routing table of every node. This causes more overhead in the routing table leading to consumption of more bandwidth. Examples of such schemes are the conventional routing schemes, Destination Sequenced Distance Vector (DSDV).

Reactive (On-Demand) Protocols

Reactive routing is also known as on-demand routing protocol since they don't maintain routing information or routing activity at the network nodes if there is no communication. These protocols take a lazy approach to routing. They do not maintain or constantly update their route tables with the latest route topology. If a node wants to send a packet to another node then this protocol searches for the route in an on-demand manner and establishes the connection in order to transmit and receive the packet. The route discovery usually occurs by flooding the route request packets throughout the network. Examples of reactive routing protocols are the dynamic source Routing (DSR),ad hoc on-demand distance vector routing (AODV).

Hybrid Routing Protocol

Hybrid protocols seek to combine the Proactive and Reactive approaches. An example of such a protocol is the Zone Routing Protocol (ZRP).

AD HOC ON DEMAND DISTANCE VECTOR (AODV)

The Ad hoc On Demand Distance Vector (AODV) routing algorithm is a routing protocol designed for ad hoc mobile networks. AODV is capable of both unicast and multicast routing. It is an on demand algorithm, meaning that it builds routes between nodes only as desired by source nodes. It maintains these routes as long as they are needed by the sources. Additionally, AODV forms trees which connect multicast group members. The trees are composed of the group members and the nodes needed to connect the members. AODV uses sequence numbers to ensure the freshness of routes. It is loop-free, self-starting, and scales to large numbers of mobile nodes. The AODV protocol uses *route request* (RREQ) messages flooded through the networking order to discover the paths required by a source node. An intermediate node that receives a RREQ replies to it using a *route reply* message only if it has a route to the destination whose corresponding destination sequence number is greater or equal to the one contained in the RREQ. The RREQ also contains the most recent sequence number for the destination of which the source node is aware. A node receiving the RREQ may send a route reply (RREP) if it is either the destination or if it has a route to the destination with corresponding sequence number greater than or equal to that contained in the RREQ. If this is the case, it unicast a RREP back to the source. Otherwise, it rebroadcasts the RREQ.Nodes keep track of the RREQ's source IP address and broadcast ID. If they receive a RREQ which they have already processed, they discard the RREQ and do not forward it. As the RREP propagates back to the source nodes set up forward pointers to the destination. Once the source node receives the RREP, it may begin to forward data packets to the destination. If the source later receives a RREP containing a greater sequence number or contains the same sequence number with a smaller hop count, it may update its routing information for that destination and begin using the better route. As long as the route remains active, it will continue to be maintained. A route is considered active as long as there are data packets periodically traveling from the source to the destination along that path. Once the source stops sending data packets, the links will time out and eventually be deleted from the intermediate node routing tables. If a link break occurs while the route is active, the node upstream of the break propagates a route error (RERR) message to the source node to inform it of the now unreachable destination(s).

AD HOC ON DEMAND MULTIPATH DISTANCE VECTOR (AOMDV)

Ad-hoc On Demand Multipath Distance Vector Routing Algorithm (AOMDV) is proposed in [5]. AOMDV employs the "Multiple Loop -Free and Link-Disjoint path" technique.

In AOMDV only disjoint nodes are considered in all the paths, thereby achieving path disjointness. For route discovery route request packets are propagated throughout the network thereby establishing multiple paths at destination node and at the intermediate nodes. Multiples Loop-Free paths are achieved using the advertised hop count method at each node. This advertised hop count is required to be maintained at each node in the route table entry. The route entry table at each node also contains a list of next hop along with the corresponding hop counts. Every node maintains an advertised hop count for the destination. Advertised hop count can be defined as the "maximum hop count for all the paths". Route advertisements of the destination are sent using this hop count. An alternate path to the destination is accepted by a node if the hop count is less than the advertised hop count for the destination.

3. METHODOLOGY

3.1 Simulation Environment

Simulation environment is as follows:

PARAMETER	VALUE
SIMULATOR	NS-2
ROUTING PROTOCOL	AODV,AOMDV
NUMBER OF NODE	50
AREA	500m x500m
PACKET SIZE	512byte
SIMULATION TIME	100
TRAFFIC TIME	CBR
MAC PROTOCOL	Mac/802.11
MAX. SPEED	10,20,30,40

3.2 NS-2 (Network Simulator-2)

The NS-2 [3] is a discrete event driven simulation and in this the physical activities are translated to events. Events in this are queued and processed in the order of their scheduled occurrences. The functions of a Network Simulator [9] are to create the event scheduler, to create a network, for computing routes, to create connections, to create traffic. It is also useful for inserting errors and tracing can be done with it. Tracing packet son all links by the function trace-all and tracing packets on all links in nam format using the function namtrace-all.

3.3 Performance Metrics

We report four performance metrics for the protocols:

***Packet Delivery Fraction (PDF*)**: The ratio between the number of data packets received and the number of packets sent.

Average End-to-End Delay: It is the ratio of time difference between every CBR packet sent and received to the total time difference over the total number of CBR packets received.

Packet loss (%): packet loss is the failure of one or more transmitted packet to arrive at their destination.

4. SIMULATION RESULTS AND ANALYSIS

***Packet Delivery Fraction (PDF*)**

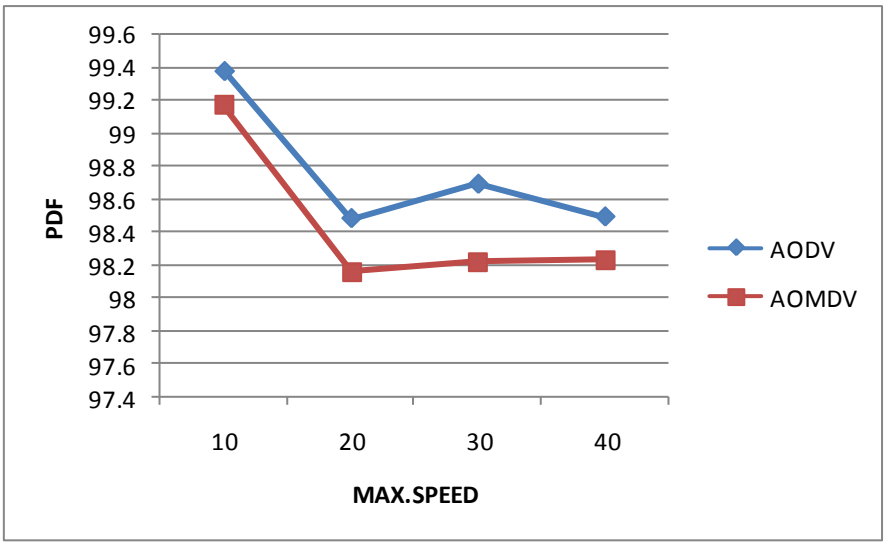

Figure 1- Packet Delivery Fraction with varying Maximum Speed

Average End-to-End Delay:

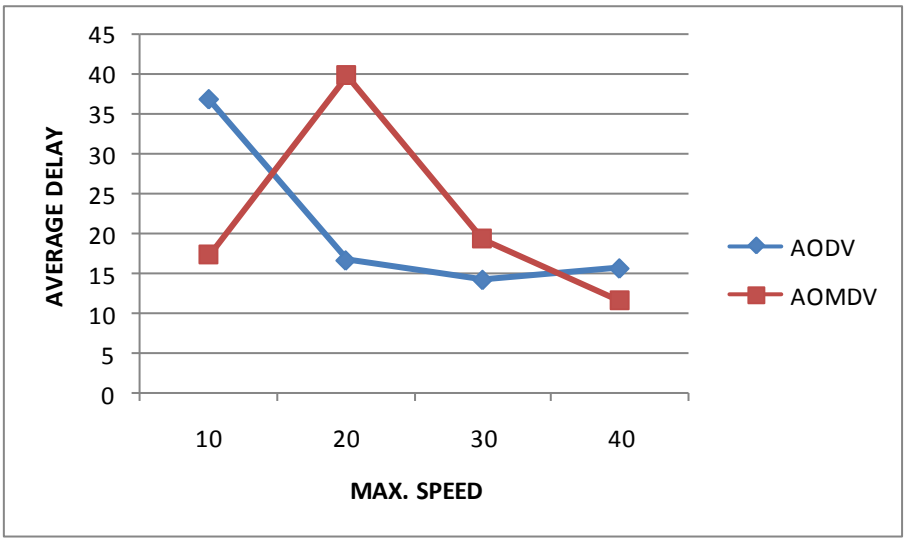

Figure 2- ***Average End-to-End Delay*** **with varying Maximum Speed**

Packet loss (%):

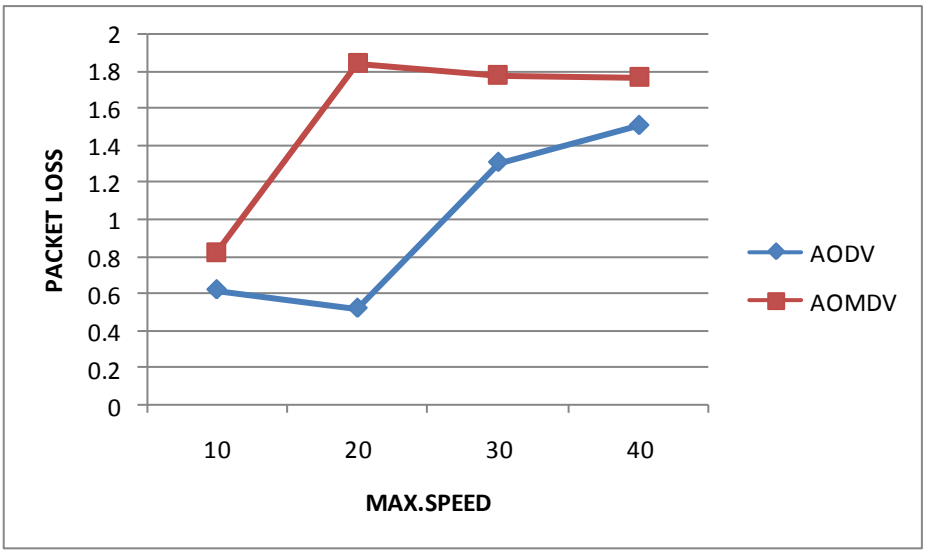

Figure 3 - Packet loss (%) with varying Maximum Speed

5. CONCLUSION:

This paper studied performance of AODV and AOMDV based on CBR traffic source. These routing protocols were compared in terms of Packet delivery fraction, Average routing overhead and packet loss. When subjected to varying Maximum Speed in MANET. Simulation results show that by comparing the performance AODV and AOMDV .results are good AODV compare than to AOMDV using the simulation software NS-2.27.

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