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"Performance Enhancement of Multicast Routing Protocol in MANET"

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Abstract

Mobile Ad Hoc Networks (MANET) is an important and challenging research area. The routing protocol should detect and maintain a good route between source and destination nodes in these dynamic networks. Many routing protocols have been proposed for mobile ad hoc networks, and none can be considered as the best under all conditions. This work consist a systematic comparative evaluation of a multicast routing protocol for MANETS. The protocol, called Ad – hoc on demand Multicast Distance Vector (AOMDV). This work containing evaluates the dynamic network of MANETS with between 45 nodes, which are dynamic nodes with 5m/sec, 15m/sec, 20m/sec and 25m/sec node mobility. The network comparison metrics are Packet Delivery ratio, End to End Delay and Residual Energy.

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I. Introduction

Recently laptop computers have replaced desktops with all respect as they continue to show improvements in convenience, mobility, capacity and availability of disk storage. Now small computers can be equipped with storage capacity of gigabytes, high resolution color display, pointing devices and wireless communication adapters. Since, these small computer can be operated with the power of battery, the user are free to move as per their convenience without bothering about constraints with respect to wired devices.

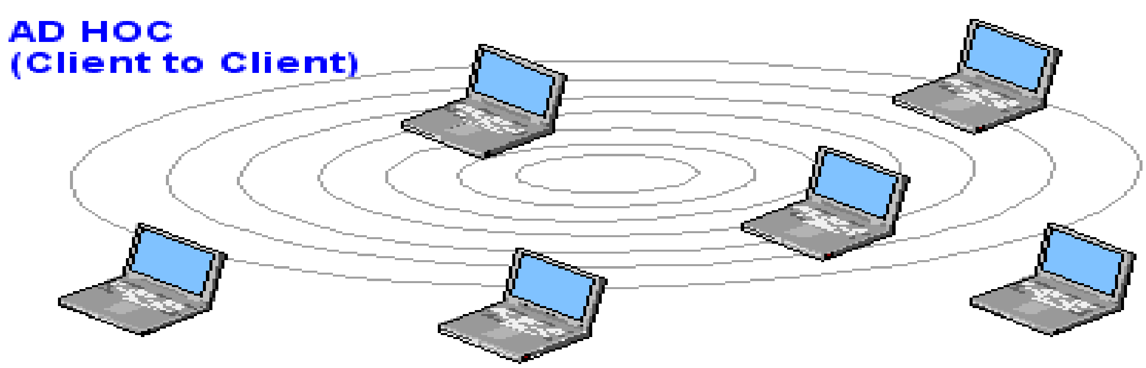

Figure 1. Ad-hoc network

In a wireless ad hoc network, the devices communicate with each other using a wireless physical medium without relying on pre-existing wired infrastructure. That's why ad hoc network is also known as infrastructure less network. These networks are also known as mobile ad hoc networks (MANETs), can form stand-alone groups of wireless terminals, but some of these may be connected to some fixed network. A very fundamental characteristic of ad hoc networks is that they are able to configure themselves on-the-fly without intervention of a centralized administration. The terminals in the ad hoc network can not only act as end-system but also as an intermediate system (routers). It is possible for two nodes which are not in the communication range of each other, but still can send and receive data from each other with the help of intermediate nodes which can act as routers. This functionality gives another name to ad hoc network as "multi-hop wireless network", 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. Our discussion is limited to two networks which are static and dynamic network with multipath routing.

II. Routing In Ad Hoc Network

The routing protocols for ad hoc wireless network should be capable to handle a very large number of hosts with limited resources, such as bandwidth and energy. The main challenge for the routing protocols is that they must also deal with node density, meaning that nodes can appear and disappear in various scenarios. Thus, all nodes of the ad hoc network act as routers and must participate in the route discovery and maintenance of the routes to the other nodes. For ad hoc routing protocols it is essential to reduce routing messages overhead despite the increasing number of nodes and their mobility. Keeping the routing table small is another important issue, because the increase of the routing table will affect the control packets sent in the network and this in turn will cause large link overheads [9]. In this paper we are working on AOMDV protocol.

III. Ad -Hoc On-Demand Multicast Distance Vector Routing (Aomdv)

Ad-hoc On-demand MultiCast 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 disjointing. 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.

IV. Network Scenarios

We have implemented our work i.e. Creation of MANET Scenario for NS-2 and then to analyze Different networks with the use of Various performance matrices Like Packet Delivery Ratio, End to End delay and Residual Energy. In our case firstly we have created network for dynamic scenario which has to be used along with multipath routing than we have created a TCL script consist of various routing protocol in our case i.e. DSR, DSDV and AOMDV than a particular MANET scenario or topology in our case it consist of 45 nodes.

V. Evaluation Of Results

Packet Delivery Ratio:- This is the fraction of the data packets generated by the CBR sources to those delivered to the destination. This evaluates the ability of the protocol to discover routes.

Packet Delivery Ratio:- Figure a shows the PDR under various node mobility.

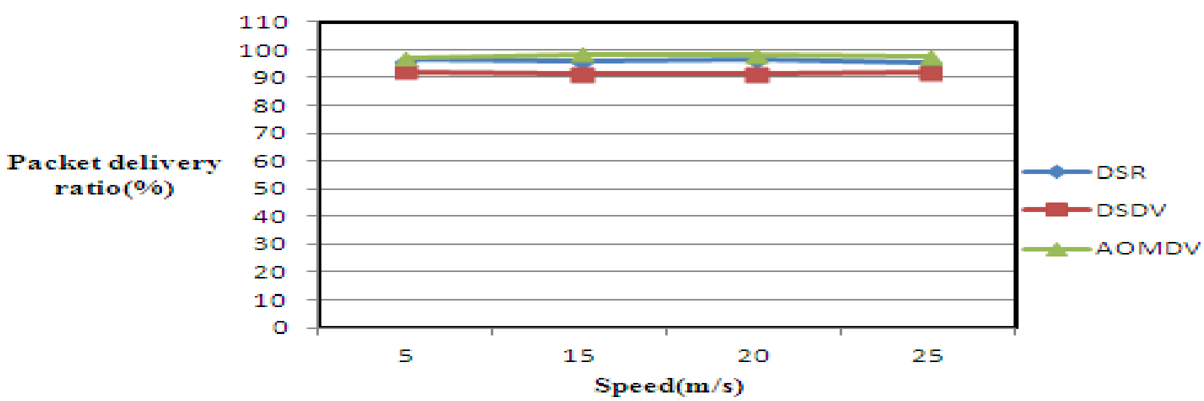

Figure 2. Packet Delivery Ratio

Analysis of Packet Delivery Ratio:- From the above graph it is clear that for AOMDV routing protocol average PDR is high as compare to DSDV and DSR routing protocols.

Residual ENERGY:- Total amount of energy used by the Nodes during the Communication or simulation for example node having 100 percent energy and after complete simulation 40 percent energy remaining so we can say that the Residual energy of the node is 60 percent.

Residual Energy:- Figure 3 shows the Residual Energy under node mobility with DSR, DSDV and AOMDV routing protocol.

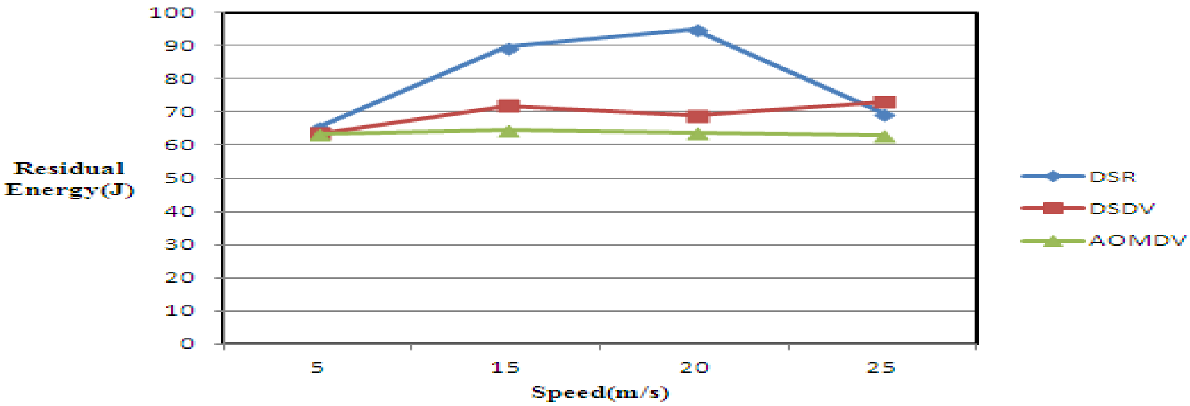

Figure 3. Residual Energy for 45 nodes

Analysis of Residual Energy:- From the above graph it is clear that DSR have higher residual energy as compare to DSDV and AOMDV routing protocols.

End to End Delay:- This is the average delay between the sending of the data packet by the CBR source and its receipt at the corresponding CBR receiver. This includes all the delays caused during route acquisition, buffering and processing at intermediate nodes.

End to End Delay:- Figure 4 shows the end to end delay under various node mobility.

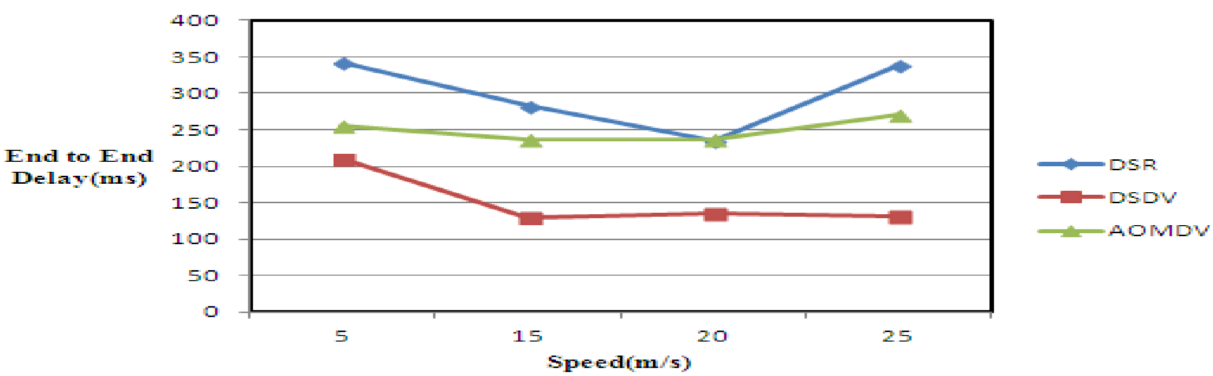

Figure 4. End to End Delay

Analysis of End to End Delay:- From the above graph it is clear that DSDV have low end to end delay as compare to the DSR and AOMDV routing protocols.

VI. Conclusion

In this work, we focused on the routing protocols for mobile ad-hoc networks. We have presented an simulation study to AOMDV, DSDV and DSR using a variety of workloads such as packet delivery ratio, End to End Delay and Residual Energy According to practical results, it is clearly that the PDR in AOMDV is high with respect to node mobility but it is not possible to say clearly that the Residual Energy and End to End delay decreases or increases with respect to various node mobility.

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