Multipath Routing Enhancement on the Basis of QoS with Various Node Density and Speed for MANET Environment

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ABSTRACT

Ad-hoc network is a wireless network that establishes the unbiased decentralized structure. It is a smooth information transmission medium among the nodes while the tool is stable, this work estimated the execution of AOMDV protocol and balance with the DSDV and DSR routing protocol with various nodes i.e. 25, 45 and 90 which assigns under various moving speed i.e. 5, 15, 20 and 25m/sec. AOMDV routing assigns suitable at movement of node with various node density and the simulation work from AOMDV protocol shows the apportion outcomes in various parameters of QoS like Packet Delivery Ratio, Average Throughput improve with increase in various number of nodes and node movement speed. It is clear that PDR is acquired 98% and Throughput is acquired 117.25kbps with soaring density of node as compared with the technic of DSR and DSDV Routing respectively.

Keywords:- Multipath Routing, Node Density, Node Movement Speed, AOMDV, DSDV, DSR, QoS.

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I. INTRODUCTION:

MANET stands for Mobile Ad hoc Network. It is a vigorous infrastructure less wireless network connected with wireless link. A MANET can be formed either by mobile nodes or via static nodes. Nodes are forming uninformed topologies. They operate as both routers and hosts. The means of mobile routers to self-configure makes this technology suitable for provisioning communication to, for incident, disaster-hit areas where there is no communication infrastructure, conferences or in emergency search and rescue operations where a network connection is urgently mandatory. The requirement for mobility in wireless networks necessary for the formation of the MANET [1] working group contained by The Internet Engineering Task Force (IETF) is for developing trustworthy IP routing protocols for both static and dynamic topologies.

In present era, we are surrounded by newest technologies of wireless systems or networks. Since in this vibrant era of wireless technologies there is required to establish a secure and fast system of communication network [2]. Here, we provide several routing protocols for users which are developed for wireless Ad hoc networks. Now, there is a thing that for better concern of network,

the protocol should perform under different aspects of parameters like bandwidth, frequency, time, distance etc. If we are talking about protocols the alternative of protocol will depend on performance needed of the different protocols work under node mobility, density.

II. MOBILE AD HOC NETWORK

A wireless ad hoc network is decentralized types of wireless network. The network is ad hoc because it does not based on a pre-existing infrastructure access point in infrastructure wireless network or the routers. Each node in the network are vigorously participate in the network for forwarding the data to the other nodes and so the determination of which nodes forward data is made dynamically based on the network connectivity. For the classical router, the ad hoc network uses the flooding for forwarding the data. Adhoc network refers to a method of operation of 802.11 wireless networks [6, 7] and also initial wireless ad hoc networks were the "packet radio" networks (PRNETs). As designed for the mobile operation, ad hoc network are basically peer-to-peer multi-hop mobile wireless networks, where data packets are transmitted in a store-and-forward behavior from a source to a random destination, via intermediate nodes. The Mobile Hosts (MH) move, the resultant change in network topology must be made acknowledged to other nodes so that outdated topology information can be updated or removed. Wireless networks can be classified based on the connectivity types of the various network elements, which are either Point to Point (PTP), Point to Multi-Point (PTM) or Multi-Point to Multi-Point (MPM) networks.

Wireless Mesh Networks (WMN):- A wireless mesh network (WMN) is a communication network prepared up of radio nodes organized to look mesh topology. Wireless mesh networks frequently consist of mesh clients, mesh routers and gateways, where nodes don't just send and receive data, but also provide as a hub for further nodes and each node collaborates in propagating data on the network. Laptops, cell phone and other wireless devices are the example of WMN. The coverage area of the radio nodes working as a single network is in addition called a mesh cloud.

Wireless Sensor Networks (WSN):- A wireless sensor network (WSN) consists of spatially distributed an autonomous sensor that monitors physical and environmental circumstances, such as temperature, sound, pressure, etc. and to considerately pass their data through the network to a main site. The progress of wireless sensor networks was provoked by military applications such as battlefield surveillance; today such networks are used in numerous industrial and consumer applications, such as industrial practice monitoring and control, machine health monitoring, and so on [9]. The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is linked to one sensor. Each such sensor network node has usually several parts:

a radio transceiver form connection with an internal antenna or to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy conservation.

III. ROUTING IN MANET

Routing protocols characterize a set of rules which governs the passage of message packets from source to destination in a network. In MANET; there are different types of routing protocols each one of them is functional according to the network circumstances.

Destination-Sequenced Distance-Vector Routing Protocol (DSDV):- DSDV is developed on the basis of Bellman–Ford routing algorithm with some modifications. In this routing protocol, each mobile node in the network keeps a routing table. The Fig.4.3 show rote establishes in DSDV [15, 16]. Each of the routing table contains the list of all available destinations and the number of hops to each. The advertisement is done either by broadcasting or by multicasting. By the advertisements, the neighboring nodes can know about any change that has occurred in the network due to the movements of nodes. The routing updates could be sent in two ways: one is called a "full dump" and another is "incremental". In case of full dump, the entire routing table is sent to the neighbors, where as in case of incremental update, only the entries that require changes are sent.

Dynamic Source Routing (DSR):- Dynamic Source Routing [8, 19] is a reactive protocol based on the source route approach. In Dynamic Source Routing (DSR), the protocol is based on the link state algorithm in which source initiates route discovery on demand basis. The sender determines the route from source to destination and it includes the address of in-between nodes to the route record in the packet. DSR was intended for multi hop networks for small Diameters. The Fig.4.4 show route establishment of DSR It is a beaconless protocol in which no HELLO messages are exchanged between nodes to alert them of their neighbors in the network.

Ad Hoc On Demand Multipath Distance Vector:- AOMDV is a multicast extension for AODV protocol. AOMDV adds multicast capability to the AODV protocol; multicast, unicast and broadcast features are rationalized into AOMDV. AOMDV protocol can be route information obtained when searching for multicast; it can also increase unicast routing knowledge and vice-versa. AOMDV protocol evaluates multiple loop free and disjoint paths. When a node desires to join a multicast configuration node or it has data to send to the nodes but does not has a route to that collection, it originates a route request (RREQ) message. Only the members of the collection of nodes are responding to the join RREQ. If an intermediate node receives a join RREQ for a multicast cluster of which it is not a member or it receives a route RREQ and it does not have a

route to that group, it rebroadcast the RREQ to its neighbors. But if the RREQ is not a join request any node of the multicast group may respond. The node members are the active that are able to join and leave at any time. A multicast node maintains the sequence number. Multicast members must also agree to be routers in the multicast structure. The RREQ is answered with a route reply (RREP) by a node. The RREP contains the distance of replying node of the members and the current sequence number more than the RREQ packet reply.

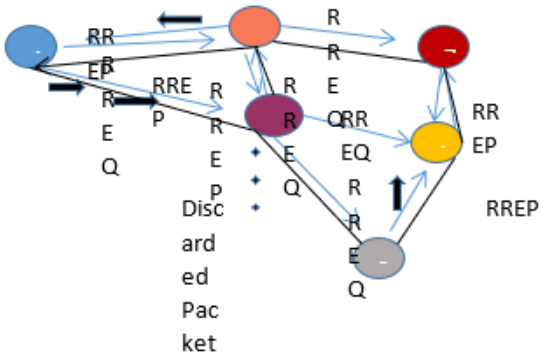

Figure 1: Route Establishment of AOMDV Routing Protocol

IV. SIMULATION RESULT

In this work setup the simulation environment using NS2. In this work consider DSR, DSDV and AOMDV protocol. The comparison of these protocols is done by simulating them under the MANET Scenario. Evaluations of these protocols are done under the varying node density of 25, 45, 90 nodes. The performance comparison is made with different speed 5, 15, 20 and 25 m/sec. In the NS2 we will use the AWK scripts to get the performance parameter from trace files (*.tr files) generated after the compilation of *.tcl files. The obtained results are recorded and ms-excel is used to generate graphs. For the result analysis, the obtained results are compared under the various performance parameter or performance metrics. These performance parameters are Packet Delivery Ratio Throughput and End to End delay.

Table.1 of collection of data's and dynamic node. In this section, scenarios are considered as different number of nodes with different speeds is compared with three different Routing Protocols i.e DSR, DSDV and AOMDV Routing protocols. The mobility model is considered to be two ray ground models. Simulation time is 150sec and the node mobility is Random way point model.

Table 1: Simulation Parameters

Simulation TOOL	Network Simulator-2.35

IEEE Scenario	MANET
Mobility Model	Two Ray Ground
No. of Nodes	25, 45, 90
Traffic Type	TCP
Antenna	Omni Directional Antenna
MAC Layer	IEEE 802.11
Routing Protocols	AOMDV, DSDV, DSR
Queue Limit	100
Queue type	Drop tail, CMU PriQueue
Channel	Wireless Channel
Speed(m/sec)	5, 15, 20, 25 (m/s)
Simulation time	150 sec
Node Mobility	Random

Packet Delivery Ratio (PDR): It is the ratio between the number of packets transmitted by a traffic source and the number of packets received by a traffic sink. It measures the loss rate as seen by transport protocols and as such, it characterizes both the correctness and efficiency of ad hoc routing protocols. It represents the maximum throughput that the network can achieve. A high packet delivery ratio is desired in a network.

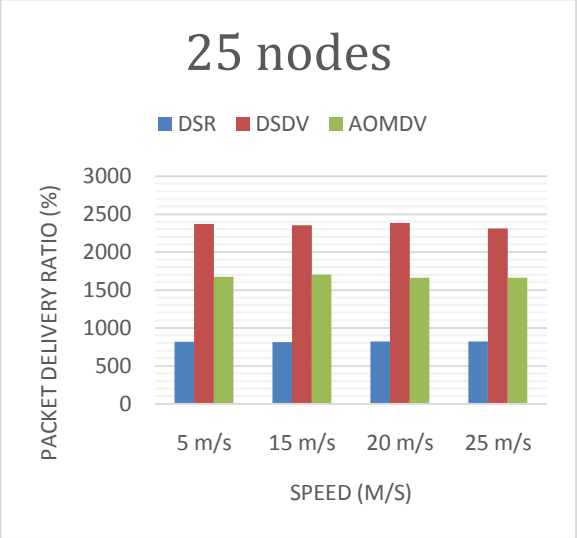

Figure 2: Packet delivery ratio of 25nodes with different speed

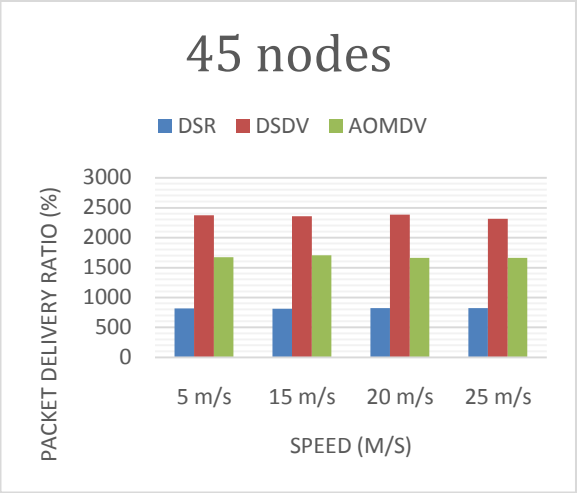

Figure 3: Packet delivery ratio of 45 nodes with different speed

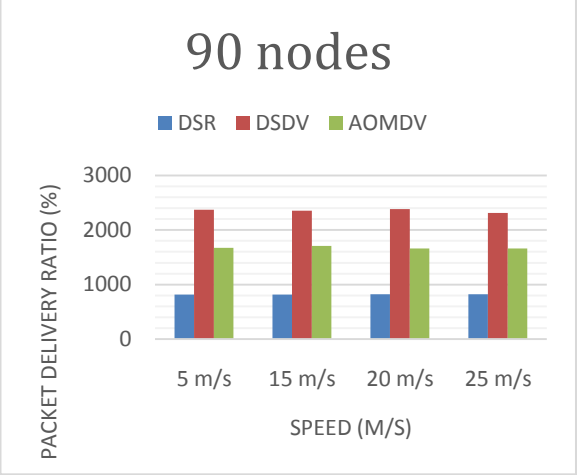

Figure 4: Packet delivery ratio of 90 nodes with different speed

Throughput: The throughput is defined as the maximum number of packets received per unit time. The amount of data transferred over the period of time expressed in kilobits per second (Kbps).

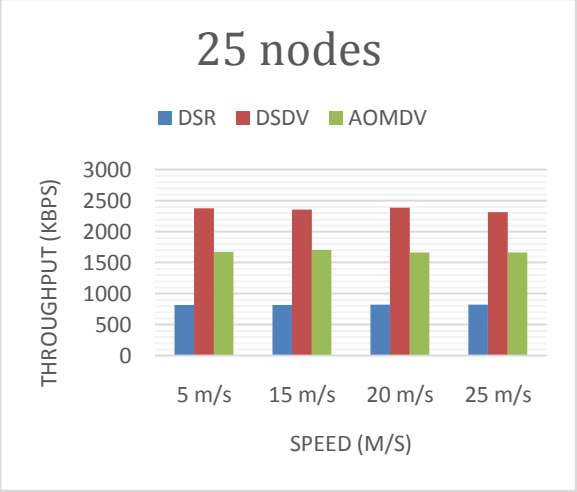

Figure 5: Throughput of 25 nodes with different speed

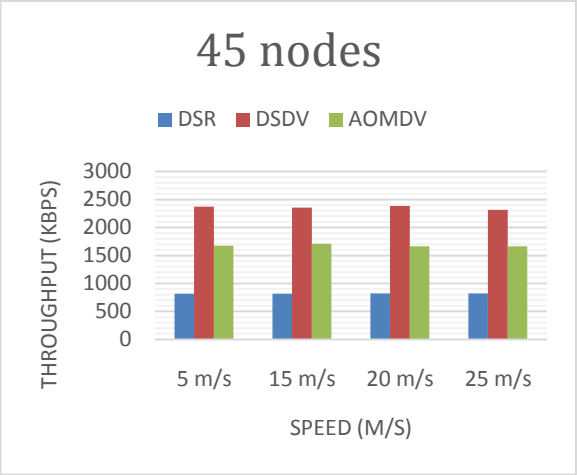

Figure 6: Throughput of 45 nodes with different speed

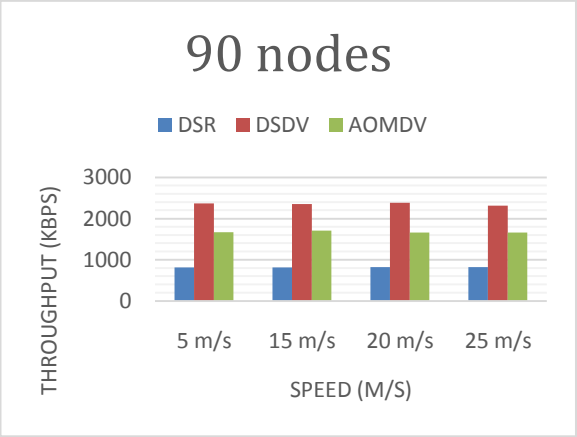

Figure 7: Throughput of 90 nodes with different speed

End-to-End Delay: The packet end-to-end delay is the average time that packets take to traverse the network. This is the time from the generation of the packet by the sender up to their reception at the destination's application layer and is expressed in seconds. It therefore includes all the delays in the network such as buffer queues, transmission time and delays induced by routing activities and control exchanges.

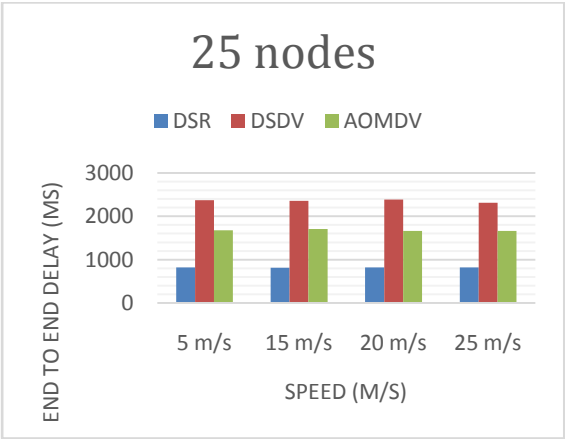

Figure 8: End to End Delay of 25nodes at different speed

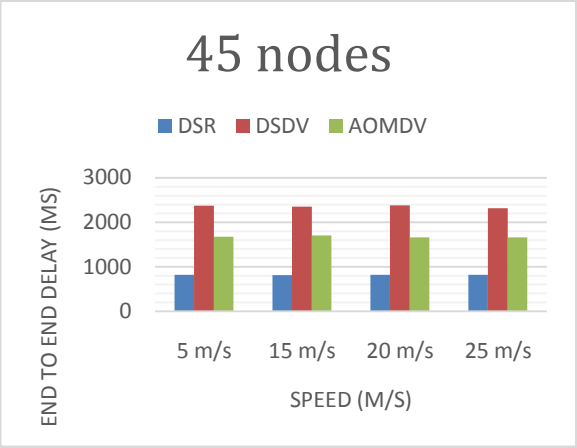

Figure 9: End to End delay of 45 nodes with different speed

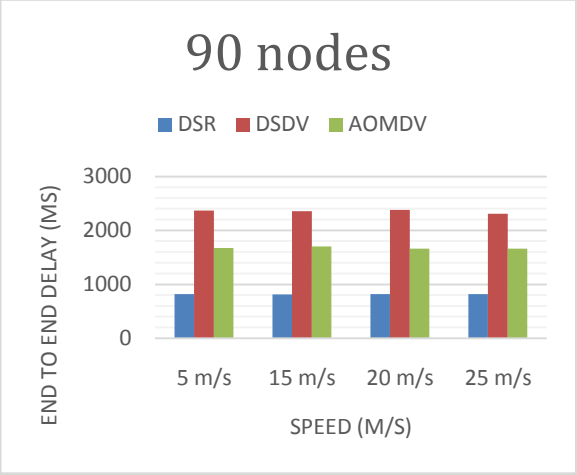

Figure 10: End to End delay of 90 nodes with different speed

V. CONCLUSION

In this work the overall performance of multipath routing is admirable as compared to other routing protocols in many facets such as Average Throughput, PDR. It looks prosperity with high bandwidth links. Multipath averts the underperform for delay and admirable in PDR. While multipath routing protocol act with abstinent result for End-to-End Delay. Multipath routing technique in Mobile Ad-Hoc Networks proposed with the help of Network Simulator. The QoS parameters used in this computation i.e. Average PDR, Throughput and End-to-End delay which shows the consistency of the routing protocol.

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