International Journal of Technology Research and Management
ISSN (Online): 2348-9006
Vol 2 Issue 4 April 2015

Performance Analysis of Multicast Routing Protocol in MANET

Ms. Anjali Singh[1], Prof. Poonam Lilhare[2]
IES, IPS Academy Indore, MadhyaPradesh (India)[1,2]
anjali02singh@gmail.com[1], poonamlilhare@gmail.com[2]

Abstract: *ADHOC networking is a portable device that establishes the independent decentralized structure. It is quite easy to communicate between the users when the device is stationary. But, this case is far complicated when the device is changing its position in random way constantly with respect to a reference point or origin. Research work in this area has continued with a prominent study on routing protocol such as AOMDV .This work containing evaluates the dynamic network of MANETS with 25 and 9 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, Throughput, Average Jitter and Residual Energy.*

1. 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.

1.1 AD-HOC NETWORKS

Ad-Hoc networks have no infrastructure where the nodes are free to join and left the network. The nodes are connected with each other through a wireless medium. A node can serve as a router to forward the information to the neighbors' nodes. Therefore this kind of network is also known as infrastructure less networks. These networks do no formed centralized structure [8]. Ad-Hoc networks have the capacity to handle any malfunctioning in the nodes or any changes that its experience due to topology changes. Whenever a node in the network is leaves the network that causes the broken link between other nodes. The affected nodes in the network simply request for new routes and new links are established Ad-Hoc network can be categorized in to static Ad-Hoc network (SANET) and Mobile Ad-Hoc network (MANET).

Static Adhoc Network: In static Ad-Hoc networks the geographic location of the nodes or the stations are stable. There is no movement in the nodes of the networks, that's why they are known as static Ad-Hoc networks.

Dynamic Adhoc Network: Mobile Ad-Hoc network is shown Fig 3.1; it is an autonomous system, where communicating nodes are connected with each other through wireless links. There is no restriction on the nodes to join or leave the network, therefore the communicating nodes can join or leave path freely. Mobile Ad-Hoc network topology is dynamic that can change rapidly. This property of the nodes makes the mobile Ad-Hoc networks unpredictable from the point of view of scalability and topology.

2. Routing Protocol

The Ad Hoc routing protocol is further classified shown in with different protocols.

Proactive Routing Protocols: Proactive routing protocols are in addition called as table driven routing protocols. In this every node uphold routing table which contains information about the network topology even without requiring it. This feature although useful for datagram traffic, incurs considerable signalling traffic and power consumption. The routing tables are restructured periodically whenever the network topology changes. Proactive protocols are not appropriate for large networks as they require maintaining node entries for each and every node in the routing table of every node [11]. These protocols maintain different number of routing tables altering from protocol to protocol. Some of the proactive routing protocols are DSDV, OLSR and WRP.

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. show rote establishes in DSDV [10]. Each of the routing table contains the list of all available destinations and the number of hops to each. Each table entry is tagged with a sequence number (1, 2, 3, 4 and 5) which is originated by the destination node (6). Periodic transmissions of updates of the routing tables help maintaining the topology information of the network. If there is any new significant change for the routing information (between 1-to-6), the updates are transmitted immediately. DSDV protocol requires each mobile node in the network to advertise its own routing table to its current neighbours. The advertisement is done either by broadcasting or by multicasting. By the advertisements, the neighbouring 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 neighbours, where as in case of incremental update, only the entries that require changes are sent.

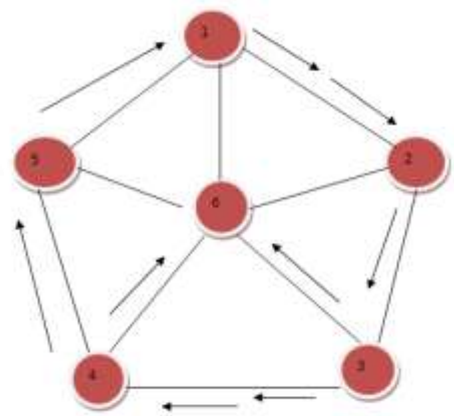

Fig. 1 Route established in DSDV

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 intermediate nodes to the route record in the packet. DSR was designed for multi hop networks for small Diameters. The Fig show route establishment of DSR It is a beaconless protocol in which no HELLO messages are exchanged between nodes to notify them of their neighbors in the network.

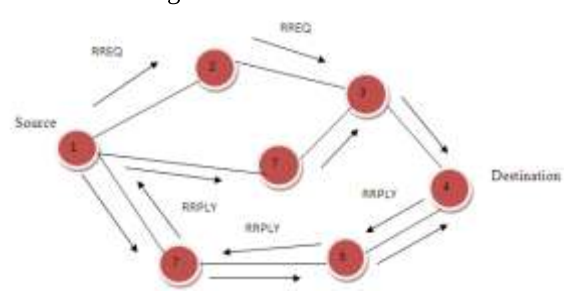

Fig.2 Route established in DSR

Ad hoc on demand multicasting distance vector (AOMDV): 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 node 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.

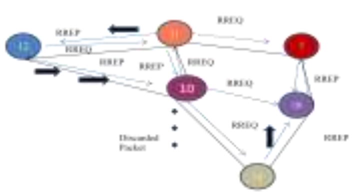

Fig.3 Route Establishment of AOMDV

3. Simulation Results

In this section, we are comparing the performance of AOMDV protocol under different scenario. Comparing the different method is done by simulating them and examining their behavior. Here dynamic scenarios used to analyze and to show communication in the network, due to mobility of nodes. The communication from a source node to a destination node can use intermediate nodes and alternative routes are not possible due to the separation among nodes. This thesis shows the creation of MANET Scenario for NS-2 and then to analyze AOMDV Protocol with the use of various performance matrices like Packet Delivery Ratio, Residual Energy, Throughput and average Jitter. In this work created scenario file for AOMDV which has to be used along with our TCL Script. In this report Dynamic nodes are consider with a range of node density 25 and 90 with different speed 5,15,20,25 (m/s) with TCP variant which is NEW RENO for Two Ray Ground model. 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.

3.1 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: Figures shows the PDR for 25 node and 90 node.

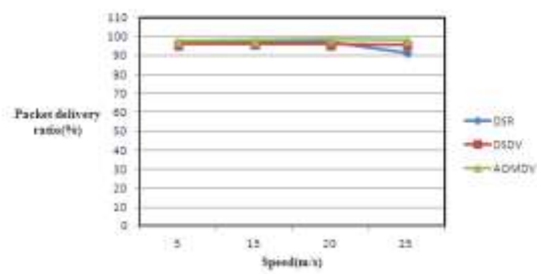

Fig. 4 Packet Delivery Ratio for 25 nodes

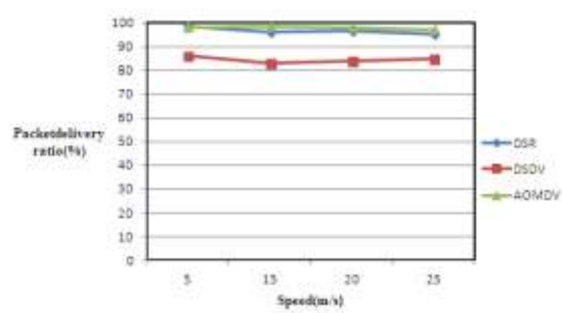

Fig. 5 Packet Delivery Ratio for 90 nodes

Jitter: It shows the distortion in the frequency. Jitter is a variation in time of packets arrival from source to destination It is caused due to change in topology and congestion in the network. It shows low performance in Ad hoc network.

Average jitter: Figures shows the jitter for 25 node and 90 node.

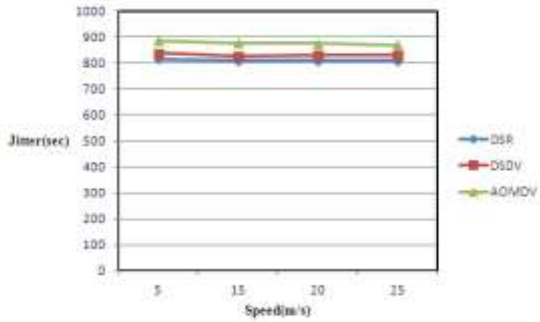

Fig. 6 Average jitter for 25 nodes

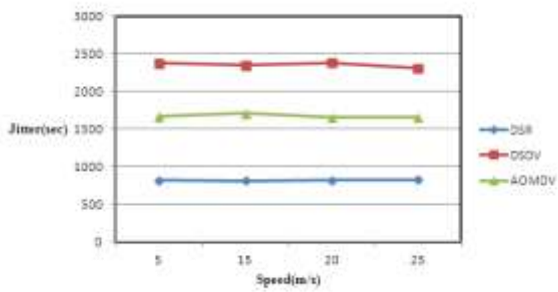

Fig. 7 Average jitter for 90 nodes

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: Figures shows the residual energy for 25 node and 90 node.

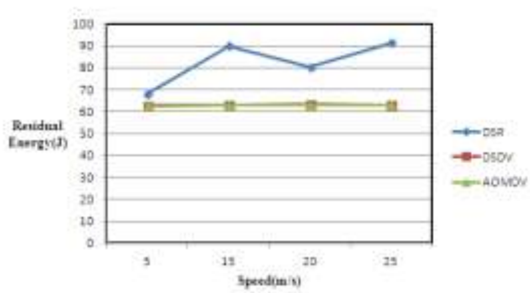

Fig. 8 Residual energy for 25 nodes

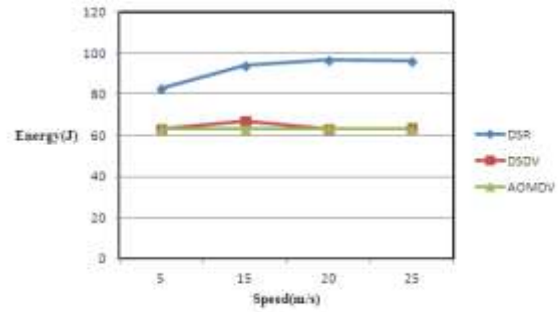

Fig. 9 Residual energy for 90 nodes

Throughput: The throughput is defined as the maximum number of packets received per time unit. It calculates the subtraction from the dropped and lost packet from received packet.

Throughput: Figures shows the Throughput for 25 node and 90 node.

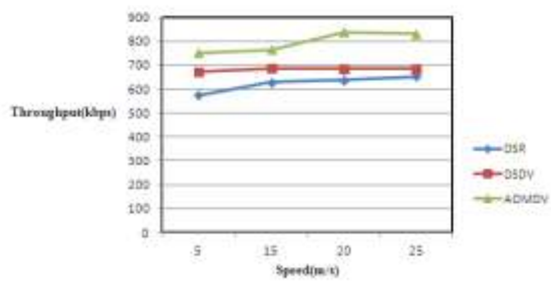

Fig. 10 Throughput for 25 nodes

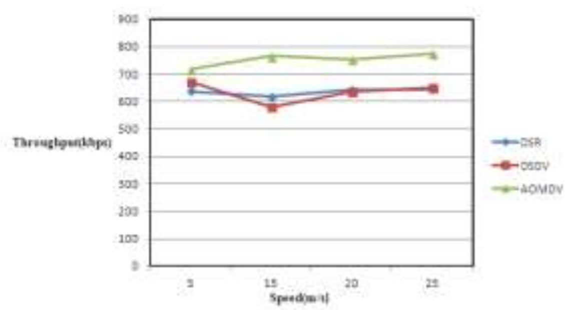

Fig. 11 Throughput for 90 nodes

4. Conclusion

The AOMDV protocol perform superior than DSDV and DSR in the Throughput and Packet Delivery Ratio performance metrics used in this research. It outperforms in the packet delivery ratio when deployed in low mobility and high load networks. AOMDV protocol has the worst performance in the Jitter. It is therefore well suited for high capacity networks in Residual Energy.

References

1. D. Kim, J. Garcia and K. Obraczka, "Routing Mechanisms for Mobile Ad Hoc Networks based on the Energy Drain Rate", IEEE Transactions on Mobile Computing. Vol 2, no 2, pp.161-173, 2003.
2. Mohammad Naserian, Kemal E. Tepe and Mohammed Tarique, "Routing Overhead Analysis for Reactive Routing Protocols in Wireless Ad Hoc networks," IEEE Conference on Wireless And Mobile Computing, Networking And Communications , pp. 87– 92, 2005
3. C.E. Perkins & P. Bhagwat, "Highly Dynamic Destination Sequence-Vector Routing (DSDV) for Mobile Computers", Computer Communication Review, Vol. 24, no.4, pp. 234-244, 1994.
4. Luo Junhai ; Chengdu ; Ye Danxia ; Xue Liu ; Fan Mingyu " A Survey of Multicast Routing Protocols for Mobile Ad-Hoc Networks Communications" Surveys & Tutorials, IEEE Volume 11-No.1,page 78 – 91,2009.
5. Rajgopal .GManikandan .KSivakumar .N "QoS Routing using Energy Parameter in Mobile Ad Hoc Network" International Journal of Computer Applications ,Volume 22– No.4, May 2011.
6. A. Zahary, A. Ayesh, "Analytical Study to detect Threshold number of Efficient Routes in Multipath AODV Extensions", proceedings of International Conference of Computer Engineering & Systems, ICCES, pp. 95 – 100,2007.
7. Lijuan Cao, K. Sharif, Yu Wang, T. Dahlberg, "Adaptive Multiple Metrics Routing Protocols for Heterogeneous Multi-Hop Wireless Networks", proceedings for 5th Consumer Communications and Networking Conference, IEEE, pp. 13 – 17,2008.
8. David B. Johnson and David A. Maltz. "Dynamic Source Routing in Ad Hoc wireless networks", Mobile Computing, Kluwer Academic Publishers, pp.153–181, 1996.
9. M. S. Corson, J. P. Maker and G. H. Cirincione "Internet-Based Mobile Ad Hoc Networking", IEEE Internet Computing, Vol. 3, no. 4, July-August, pp. 63-70, 1999.
10. T.Y. Wu, C.Y. Huang, and H.C. Chao, "A Survey of Mobile IP in Cellular and Mobile AdHoc Network Environments", IEEE Vol. 3, pp. 351-370, 2005.
11. Chen Jie,Chen Jiapin,Li Zhenbo, "Energy-efficient AODV for Low Mobility Ad Hoc Networks", Wireless Communications Networking and Mobile Computing, IEEE International Conference, Page 1512 -1515, 2007.