PERFORMANCE ISSUES ON AODV AND DSDV FOR MNAETS

R.BALAKRISHNA[1], S.JEYABALAN[2], Dr.U.RAJESWAR RAO[3], Dr.T.K.BASAK[4], Dr. V.CYRILRAJ[4]

[1]Professor Dept of CSE, Rajarajeswari Collge of Engg, Bangalore-74. & Research Scholar, SKU,
[2]Professor Dept of CSE, **,** Sri Balaji Chockalingam Engg college, Arni, Thiruvannamali, Tamilnadu**.**
[3]Dept of Mathamaticas and CS&T, Sri Krishna Devaraya University, Anatapur, Andhra Pradesh,
[4]Academic director in "KRISHNA ENGINEERING COLLEGE", GZB
[4] Professor and Head, Dept of CSE, Dr.M.G.R.Univeristy, Chenni.

ABSTRACT

Mobile Ad hoc NET work (MANET) is a self configuring network of mobile routers (and associated hosts) connected by wireless links – the union of which forms an arbitrary topology. The routers are free to move randomly and organize themselves arbitrarily, thus the wireless network topology may change rapidly and unpredictably. Such a network may operate in larger Internet. There are various routing protocols available for MANETs. The most popular ones are DSR, AODV and DSDV. This paper examines two routing protocols for mobile ad hoc networks– the Destination Sequenced Distance Vector (DSDV), the table-driven protocol and the Ad hoc On- Demand Distance Vector routing (AODV), evaluates both protocols based on packet delivery ratio and average delay while varying number of sources and pause time**.**

Keywords: *AODV, DSDV, Packet Delivery Fraction, MANET.*

1. INTRODUCTION

Issues in MANETs: If there are only two nodes to communicate with each other and are located very closely to each other, then no specific routing protocols or routing decisions are necessary. On the other hand, if there are a number of mobile hosts wishing to communicate, then the routing protocols come into picture, in this case some critical decisions have to be made such as which is the optimal route from the source to the destination which is very important because, the mobile nodes operate on battery power. Thus it becomes necessary to transfer the data with the minimal delay to loss less power. There will be kind of compression involved in which it could be provided by the protocol to loss less bandwidth. Further, there is need of encryption to protect the data from prying eyes. In addition to this, Quality of Service support is also needed so that the least packet drop can be obtained. The other factors which need to be considered while choosing a protocol for MANETs are as follows:

i. **Multicasting**: The ability to send packets to multiple nodes at once. This is similar to broadcasting except the fact that the broadcasting is done to all the nodes in the network. This is important as it takes less time to transfer data to multiple nodes.

ii. **Loop Free**: A path taken by a packet never transits the same intermediate node twice before it arrives at the destination. To improve the overall performance in the routing protocol to guarantee that the routes supplied are loop-free. This avoids any loss of bandwidth or CPU consumption.

iii. **Multiple routes**: If one route gets broken due to some disaster, then the data could be sent through some other route. Thus the protocol should allow creating multiple routes.

iv. **Distributed Operation**: The protocol should be distributed. It should not be dependent on a centralized node.

v. **Reactive**: It means that the routes are discovered between a source and destination only when the need arises to send data. Some protocols are reactive while others are proactive which means that the route is discovered to various nodes without waiting for the need.

vi. **Unidirectional Link Support**: The radio environment can cause the formation of unidirectional links. Utilization of these links and not only the bi-directional links improves the routing protocol performance.

vii. **Power Conservation**: The nodes in an ad-hoc network can be laptops and thin clients, such as PDAs that are very limited in battery power and therefore use some sort of standby mode to save power. It is therefore important that the routing protocol has support for these sleep-modes [1] [2].

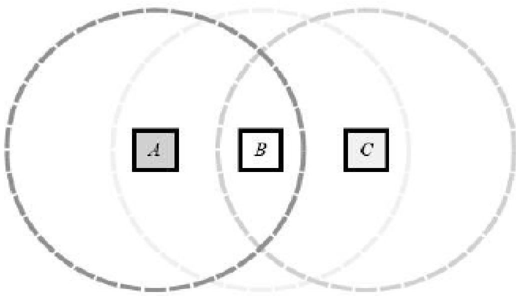

Fig1 : Simple Ad-hoc Network

In figure 1, let's suppose that node A wants to send data to node C but node C is not in the range of node A. Then in this case, node A may use the services of node B to transfer data since node B's range overlaps with both the node A and node B. Indeed, the routing problem in a real ad hoc network may be more complicated than this example suggests, due to the inherent non uniform propagation characteristics of wireless transmissions and due to the possibility that any or all of the hosts involved may move at any time [5]. One of the main difficulties in MANET (Mobile Ad hoc Network) is the routing problem, which is aggravated by frequent topology changes due to node movement, radio interference and network partitions. Many Routing protocols have been proposed in past and reported in the literature. The proactive approaches attempts to maintain routing information for each node in the network at all times, where as the reactive approaches only find new routes when required and other approaches make use of geographical location information for routing .

2. AODV

Ad-hoc On-demand distance vector (AODV) is another variant of classical distance vector routing algorithm, based on DSDV and DSR . It shares DSR's on-demand characteristics hence discovers routes whenever it is needed via a similar route discovery process. However, AODV adopts traditional routing tables; one entry per destination which is in contrast to DSR that maintains multiple route cache entries for each destination. The initial design of AODV is undertaken after the experience with DSDV routing algorithm. Like DSDV, AODV provides loop free routes while repairing link breakages but unlike DSDV, it doesn't require global periodic routing advertisements. Apart from reducing the number of broadcast resulting from a link break, AODV also has other significant features. Whenever a route is available from source to destination, it does not add any overhead to the packets. However, route discovery process is only initiated when routes are not used and/or they expired and consequently discarded. This strategy reduces the effects of stale routes as well as the need for route maintenance for unused routes. Another distinguishing feature of AODV is the ability to provide unicast, multicast and broadcast communication. AODV uses a broadcast route discovery algorithm and then the unicast route reply massage. The following sections explain these mechanisms in more detail. [5]

Route Discovery

When a node wants to send a packet to some destination node and does not locate a valid route in its routing table for that destination, it initiates a route discovery process. Source node broadcasts a route request (RREQ) packet to its neighbors, which then forwards the request to their neighbors and so on. Fig. 2 indicates the broadcast of RREQ across the network. To control network-wide broadcasts of RREQ packets, the source node use an expanding ring search technique. In this technique, source node starts searching the destination using some initial time to live (TTL) value. If no reply is received within the discovery period, TTL value incremented by an increment value. This process will continue until the threshold value is reached. When an intermediate node forwards the RREQ, it records the address of the neighbor from which first packet of the broadcast is received, thereby establishing a reverse path.

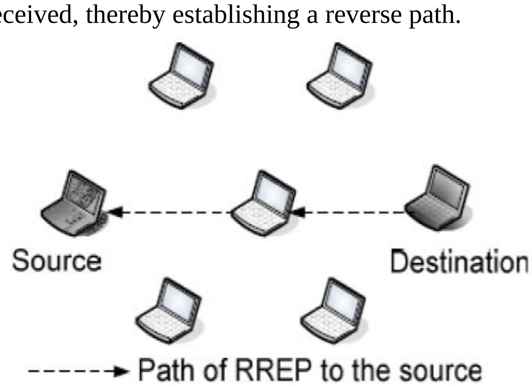

Fig2: Route Reply on RST and CST

When the RREQ is received by a node that is either the destination node or an intermediate node with a fresh enough route to the destination, it replies by unicasting the route reply (RREP) towards the source node. As the RREP is routed back along the reverse path, intermediate nodes along this path set up forward path entries to the destination in its route table and when the RREP reaches the source node, a route from source to the destination established. Fig. 3 indicates the path of the RREP from the destination node to the source node.[5]

Route Maintenance

A route established between source and destination pair is maintained as long as needed by the source. If the source node moves during an active session, it can reinitiate route discovery to establish a new route to destination. However, if the destination or some intermediate node moves, the node upstream of the break remove the routing entry and send route error (RERR) message to the affected active upstream neighbors. These nodes in turn propagate the RERR to their precursor nodes, and so on until the source node is reached. The affected source node may then choose to either stop sending data or reinitiate route discovery for that destination by sending out a new RREQ message.

3. DSDV

DSDV is one of the most well known table-driven routing algorithms for MANETs. It is a distance vector protocol. In distance vector protocols, every node *i* maintains for each destination *x* a set of distances $\{d_{ij}(x)\}$ for each node *j* that is a neighbor of *i*. Node *i* treats neighbor *k* as a next hop for a packet destined to x if $d_{ik}(x)$ equals $\min_j\{d_{ij}(x)\}$. The succession of next hops chosen in this manner leads to *x* along the shortest path. In order to keep the distance estimates up to date, each node monitors the cost of its outgoing links and periodically broadcasts to all of its neighbors its current estimate of the shortest distance to every other node in the network.

The distance vector which is periodically broadcasted contains one entry for each node in the network which includes the distance from the advertising node to the destination. The distance vector algorithm described above is a classical Distributed Bellman-Ford (DBF) algorithm [4][7]. DSDV is a distance vector algorithm which uses sequence numbers originated and updated by the destination, to avoid the looping problem caused by stale routing information. In DSDV, each node maintains a routing table which is constantly and periodically updated (not on-demand) and advertised to each of the node's current neighbors. Each entry in the routing table has the last known destination sequence number. Each node periodically transmits updates, and it does so immediately when significant new information is available. The data broadcasted by each node will contain its new sequence number and the following information for each new route: the destination's address, the number of hops to reach the destination and the sequence number of the information received regarding that destination, as originally stamped by the destination. No assumptions about mobile hosts maintaining any sort of time synchronization or about the phase relationship of the update periods between the mobile nodes are made.

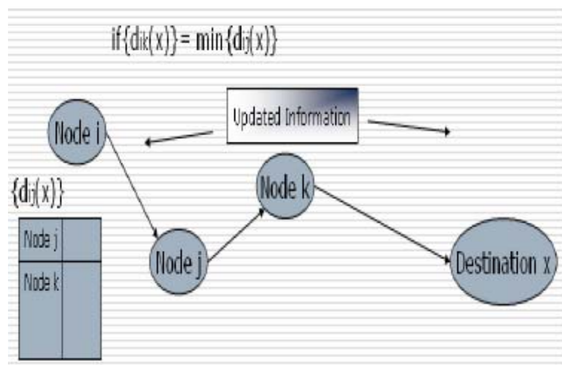

Fig3 : DSDV working concept

Following the traditional distance-vector routing algorithms, these update packets contain information about which nodes are accessible from each node and the number of hops necessary to reach them. Routes with more recent sequence numbers are always the preferred basis for forwarding decisions. Of the paths with the same sequence number, those with the smallest metric (number of hops to the destination) will be used. The addresses stored in the route tables will correspond to the layer at which the DSDV protocol is operated. Operation at layer 3 will use network layer addresses for the next hop and destination addresses, and operation at layer 2 will use layer-2 MAC addresses [7].While comparing two protocols, we focused on two performance measurements such as Average Delay, Packet Delivery Fraction.[8]

4. SIMULATION ANALYSIS AND PERFORMANCE

The network simulation are implemented using the Advent net simulation tool.

Simulation Parameter	Value
Simulator	Advent net
Node movement Model	Random way point
Speed	0-75 m/s
Trafic Type	TAODV & SAODV
Band width	4 Mbps
Transmission Range	500
Number Nodes	100

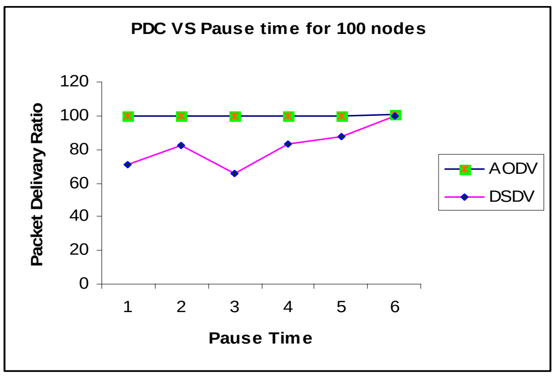

Fig 4a.

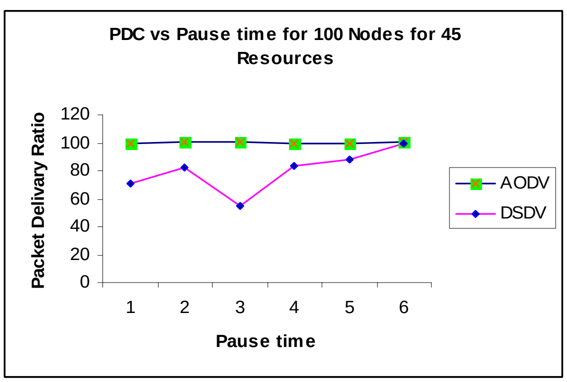

Fig 4b.

(i) Packet delivery fraction: The ratio of the number of data packets successfully delivered to the destinations to those generated by CBR sources. Packet delivery fraction = (Received packets/Sent packets)*100. Fig 4(a) & 4(b) shows a comparison between both the routing protocols on the basis of packet delivery fraction as a function of pause time and using different number of traffic sources.

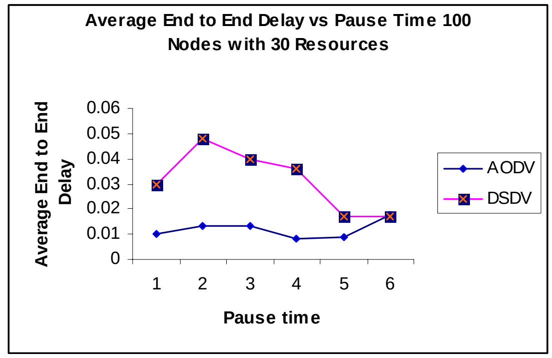

Fig 5a.

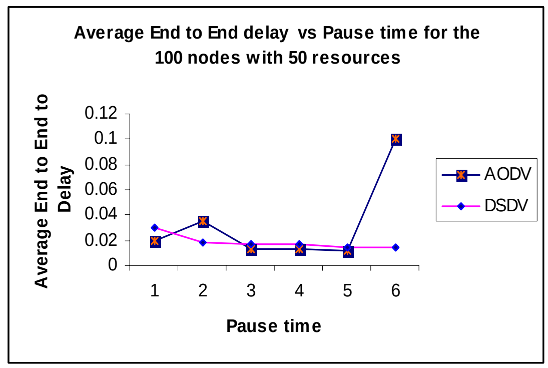

Fig 5b

(ii) Average End to end delay of data packets: The average time from the beginning of a packet transmission at a source node until packet delivery to a destination. This includes delays caused by buffering of data packets during route discovery, queuing at the interface queue, retransmission delays at the MAC, and propagation and transfer times. Calculate the send(S) time (t) and receive (R) time (T) and average it. Fig 5(a) & 5(b) shows a comparison between both the routing protocols on the basis of Average End to End delay as a function of pause time and using different number of traffic sources.

5. CONCLUSION

Simulation results show that both of the protocols deliver a greater percentage of the originated data packets when there is little node mobility, converging to 100% delivery ration when there is no node motion. The packet delivery of AODV is almost independent of the number of sources. AODV suffers from end to end delays. DSDV packet delivery fraction is very low for high mobility scenarios. We Conclude that the AODV protocol is the ideal choice for communication when the communication has to happen under the SAODV and TAODV protocol as the base.

ACKNOWLEDGEMENTS

The authors are thankful for the encouragement and support received throughout this research work to Management Moogambigai Charitable and Educational Trust, , Prof.Vijayanand, Controller, RRCE, Dr. M.S.Bhaghashekar, Head R&D, DBIT, Bangalore.

REFERENCES:

[1] Ahmed Al-Maashri and Mohamed Ould-Khaoua. "Performance Analysis of MANET Routing Protocols in the Presence of Self-Similar Traffic". IEEE, ISSN- 0742-1303, First published in Proc. of the 31st IEEE Conference on Local Computer Networks, 2006.

[2] Elizabeth M. Royer and C-K Toh. "A Review of current Routing Protocols for Ad-hoc Mobile Wireless Networks", IEEE Personal Communications, Vol. 6, No.2, pp. 46-55, April 1999.

[3] R. S. Sisodia, B. S. Manoj and C. Siva Ram Murthy, "A Preferred Link- Based Routing Protocol for Ad Hoc Wireless Networks," Journal of Communications and Networks, vol. 4, no. 1, march 2002, pp. 14-21.

[4] N Vetrivelan, Dr. A V Reddy "Performance Analysis of Three Routing Protocols for Varying MANET Size" Proceedings of the International MultiConference of Engineers and Computer Scientists 2008 Vol II IMECS 2008, 19-21 March, 2008, Hong Kong. [5] C. E. Perkins, E. M. Royer, and S. R. Das, "Ad Hoc On- Demand Distance Vector (AODV) Routing", Internet Draft, draft-ietf-manet aodv- 10.txt, work in progress, 2002.

[6] D. O. Jorg, "Performance Comparison of MANET Routing Protocols in Different Network Sizes", Computer Networks & Distributed Systems, 2003.

[7] S.Basagni, I. Chlamtac, V. R. Syrotiuk, and B. A. Woodward, "A distance routing effect algorithm for mobility (dream)," *in Proceedings of the IEEE/ACM international Conference on Mobile Computing and Networking (MOBICOM'98), 1998, pp. 76–84.*

[8] Staub.T., (2004). Ad-hoc and Hybrid Networks: Performance Comparison of MANET Routing Protocols in Ad-hoc and Hybrid Networks. Institute of Computer Science and Applied Mathematics, University of Berne, Switzerland, pp.1-38.

[9]. R.Balakrishna, M.Murali Mohan Reddy Dr.U.RajeswarRao,Dr.G.A.Ramachandra, "Routing Misbehavior Detection in MANET Using 2ACK", in IEEE Advanced Computing Conference, Thapur University, Patala,2008.

[10] R.Balakrishna, M.Murali Mohan Reddy, Dr.U.Rajeswar Rao, Dr.G.A.Ramachandra," detection of routing misbehavior in mobile ad hoc networks using enhanced 2ack (e-2ack)",in IEEE Advanced Computing Conference in at , Thapur University, Patal,2008.

[11].R.Balakrishna, Dr.U.Rajeswara Rao, Dr.N.Geethanjali, "Secure Key Exchage protocol for Credential Services", Published in Defence science Jounal in May 2009.

[12].R.Balakrishna, Dr.U.Rajeswara Rao, Dr.N.Geethanjali "A secured authenticated key exchange protocol for credential services", in 3rd International conference ICACCT-2008, Page 120-129,www.apiitindia.org/icacct2008.

[13] R.Balakrishna , Dr.U. Rajeswara Rao, Dr.N.Geethanjali,"Video Conferencing on Mobile Ad-hoc Network", in 2nd International Conference CCR2008,Page298-305.

[14].R.Balakrishna, M.V.Panduranga Rao, Dr.K.C.Shet," Development of Scheduler for Real Time and Embedded System Domain", in digital library at IEEE AINA-2008 International Conference, JAPAN,. The details about the conference is available at http://www.aina-conference.org/2008/

[15]. R.Balakrishna, Dr.U.Rajeswar Rao, Dr.G.A.Ramachandra "Relibailty in MANETS USING Enhanced double coverage broad casting algorithm", In.J.of Advanced Network Applications, Vol.3 and Issue 3. Page No 147 to 154.

AUTHOR PROFILES:

R.Balakrishna is an research scholar at Sri Krishna Devarya University, Anantapur, Andra pradesh, India. His research nterests are in the field of Wireless adhoc network, Sensor netowrk, Artificial Neural Networks, Data mining, Operating System and Security. He has published over 29 National and International Journals & Conferences various papers across India and other countries**.** He is the Life member of Indian Society for Technical Education and IAENG.

Prof. U.Rajeswar Rao obtained his PhD degree from Sri Krishna Devaraya University, Anantapur Andhra Pradesh, India. He has been working as a Professor in the Department of Computer Science and Mathematics, Sri Krishna Devaraya University, Anantapur, Andhra Pradesh, India, since 1983. He has published over 55 papers National and International Journals & Conferences in the area of Mathematics & Computers Science.

S.Jeyabalan , Professor, Dept of Computer science and Engg, Sri Balaji Chockalingam Engg college, Arni, Thiruvannamali, Tamilnadu. He Research Scholor in Jadavpur University, Kokatta. He is completed
B.E (CSE), Madurai Kamaraju University in 1989, M.E. Computer science , Madras University in 2003. He is having 21 years of teaching and research experience in technical institutions. He has published the 2 national Journals. He is member of MISTE, EDAS, IAENG.

Dr. Tapas Kumar Basak, Professor and Former Head of the Department, Electrical Engineering Department , Jadavpur University, Kolkatta.'At present academic director in "KRISHNA ENGINEERING COLLEGE", GZB. He is having 35 years of Teaching and Research Experience. National and International awards are 1. Jawaharlal Nehru Memorial Gold Medal from I.E.E.-India in 1979.2. Tata Rao Memorial Award from I.E.E. India in 1990. and International awards are 1. Third World Scientist Award from I.C.T.P., Trieste, Italy. 2. Worked with Prof. A.Glilozzi in the Dept. Of Bio Physics, University of Genoa, Italy in 1985. The author Publications national and international Journals and Conferences are more 100. The author has published the books in Amazon publishers. He is having various capacities in the different organizations like AICTE, ISTE, IEEE etc. The author has patent International Frequency Sensor Association (IFSA).

Dr V.CYRILRAJ, Professor and Head, Dept of CSE, Dr.M.G.R. Educational and Research Institute, Dr.M.G.R. University, Chennai. He is having 18 years of teaching and Research experience and in multinational Companies in India and abroad. Conducted and participated many national & international conference and symposia in India an in foreign countries. Published five books in the field of computer science and engineering. Published many papers in international and national journals / conference. He is member of ISTE,IAENG,EDAS. His research interest on Bio-Informatics, Computer Networks, Image processing, Software Engineering, Data mining, sensor networks.