Implementation and Analysis of Enhanced Ad-Hoc on Demand Routing Protocol (EAODV)

Rashmi Devi[1] Om Prakash Yadav[2]
[2]Associate Professor
[1,2]Department of Computer Science Engineering
[1,2]United College of Engineering & Research, UPTU, Allahabad, India

Abstract— Mobile Ad-hoc networks do not communicate in any fixed infrastructure. In Mobile Ad-hoc networks All nodes are free to move randomly within the network and share information dynamically. Various routing protocol have been developed To achieve an efficient routing, all these routing protocol are different in nature and have their own salient properties. In this paper, we have discussed one of the latest protocols i.e. Enhanced Ad-Hoc on Demand Routing Protocol (EAODV), implemented and analysed its performance with some other similar protocols against different parameters values. Finally a comparison has been presented between all of them.

Key words: Mobile Ad hoc Networks, EAODV, AODV, DSR, DSDV

I. INTRODUCTION

A Mobile Ad hoc Network (MANET) is a collection of two or more autonomous nodes which communicate with each other without any centralized administrative node. MANETs contains few salient features such as limited storage dynamic topology, and bandwidth power and light weight features which make them attractive for certain applications but at the same time pose challenges to route packets efficiently and accurately to a particular destination. All the nodes have identical feature and similar responsibility hence it creates almost a symmetrical environment. MANET contains higher user density and large level of mobility of users. the efficiency of existing routing protocol by enhancing its performance in terms of various parameters like throughput, packet delivery ratio , etc.

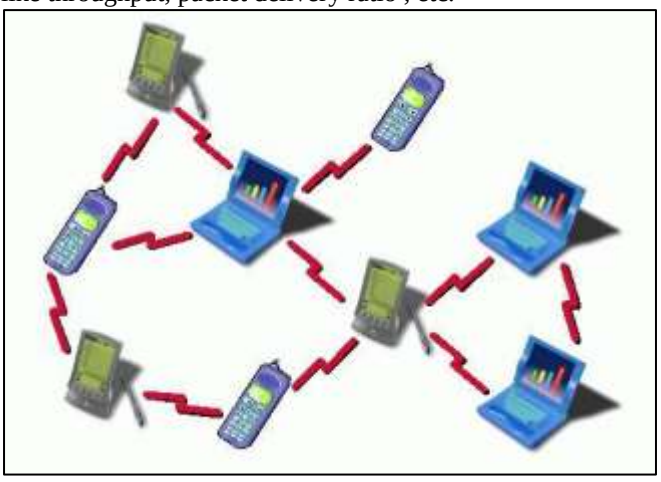

Fig. 1: Mobile Ad-Hoc Network Example

II. ROUTING PROTOCOLS

The network traffic is directed and transported through the network from source to destination by using mechanism of A routing protocols .These routing protocols may need to provide different levels of Quality of Service to support different types of applications. In wired networks two main conventional algorithmic are used: link-state & distance vector algorithms. In link-state routing, each node maintains network information periodically updated by broadcasting message of its neighboring nodes to all other nodes using flooding technique. Many routing protocols are proposed to overcome from the problems associated with the link-state and distance-vector protocols. These routing protocols are further classified in to three sub classes:

1) Routing.
2) Hierarchical routing.

Flat routing is further classified by two classes:

1) Reactive or On-Demand.
2) Proactive or Table-Driven. (This approach is similar to the connectionless approach of forwarding of packets)
3) Hybrid: It is combination of both reactive and proactive characteristics based on hierarchical routing.

III. ENHANCED AD-HOC ON DEMAND ROUTING PROTOCOL. (EAODV)

EAODV Routing protocol is an advancement of the existing AODV protocol. EAODV operating technic is similar to its predecessor i.e. AODV and does not add any extra modifications to the existing functionality but operation is moreover quite simpler. EAODV is a reactive protocol therefore it operates when required. EAODV is purely based on sequence numbers assigned to all the packets which allow the nodes to evaluate the freshness of routing information.

It does not create unnecessary traffic of HELLO messages .It is a based on On-Demand routing protocol which computes unicast routes on requirement basis. Due to sequence numbers it ensures loop freedom. It's basic operations are route discovery and rout maintenance. Route discovery is performed at source node to a destination to which it does not have a valid route on the other hand route maintenance is performed to avoid packet dropping in case of any route break.

A. Route Messages:

Mainly three EAODV messages namely Route Request (RREQ), Route Reply (RREP) and Route Error (RERR) are implemented during the routing operation.

1) RREQ message is used to discover a valid path from source to destination particularly.
2) RREP message is used to set up a connection between source destination and intermediate nodes.
3) RERR message It indicate an invalid route from any intermediate node to the destination node.

B. Route Discovery Process in EAODV:

Route discovery in EAODV is similar to AODV except path accumulation feature. If a source has no route to a destination, it broadcasts a RREQ message to its immediate neighbors and If a neighbor has an entry to the destination, then it reply back to source with an RREP message otherwise it broadcasts the RREQ message. Intermediate node will attach its address to the message during broadcasting of RREQ message, and every intermediate node that disseminates the message makes a note of the backward path. Each intermediate node having a valid path to the destination keeps on adding its address and sequence number to the RREQ packet similar node 2,6 and node10 .The source node waits for a RREP message The similar process takes place for backward path .The Destination replies with RREQ message. This makes sure that the forward path is built and every intermediate node knows a route to every other node along the path. RREQ may be resend in case source does not receive RREP within a specified Total transmission time. One of the special features of EAODV is that it is energy efficient. If a node having low energy, it has no has option to route discovery process. In such a case, the node will not forward any of the incoming RREQ messages

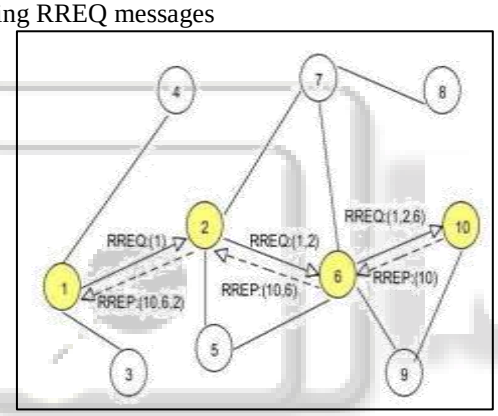

Fig. 2: EAODV Rout Discovery

1) Route Maintenance in EAODV:

Each node monitors links status continually and updates its routing table during routing operation .RERR message is sent by a node if a link is breaks between another node, and RERR message is received by the nodes which concerned by the link failure node. On the reception of a RERR message, the routing table is updated and the entry with the broken link is deleted. route discovery process needs to be initiated again if any of the nodes face a packet to the same destination after deletion of the route entry in the routing table

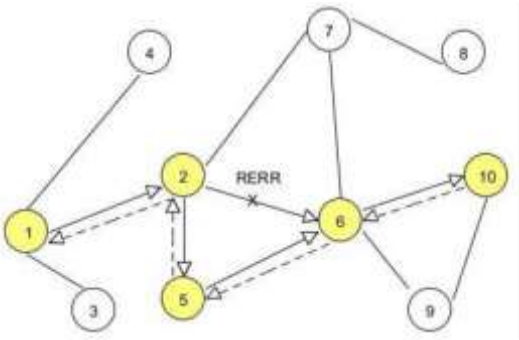

Fig. 3: EAODV Rout Maintenance

IV. ADVANTAGES AND DISADVANTAGES OF EAODV PROTOCOL

1) The protocol is very energy efficient for a very large and high mobility network.
2) Overhead decreases with increase is network size and mobility.
3) Routing table of EAODV consumes less storage than AODV.
4) EAODV performance is good when traffic is directed from one part to another part of network.
5) EAODV contains path path cumulative feature.
6) EAODV is easy to operate.
7) It does not give well performance in low mobility network.
8) The control message overhead for such scenarios is rather high and unnecessary.

A. Simulation Environment:

The EAODV routing protocol has been simulated and analyzed against different performance metrics. A network size of 40 nodes has been considered for simulations. Similarly data has been collected for other existing routing protocols such as AODV, DSDV and DSR to represent the comparison between these with EAODV. Matrix for all the protocols to calculate the effective values.

1) Average End-to-End Delay (AEED): The time interval between sending by the source and receiving by the destination, including processing time and queuing time.
2) Packet delivery Fraction (PDF): It is the ratio between the amount of data packets delivered to the destination and t data packets sent by the source.
3) Routing Overhead (RO): The total amount of routing packets transmitted at the time of simulation.
4) Throughput (TP): it refers to the amount of data transfer from source mode to destination node in a specified time period

B. Simulation Results:

Figure given bellow show the simulation result for all the above given matrices (PDF, AEED, RO, TP):

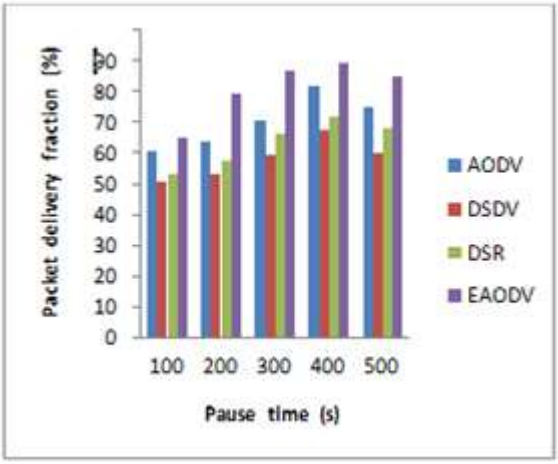

Fig. 4: Packet Delivery Fraction V/S Pause Time (S).

The performance of EAODV and AODV is better than DSR and DSDV protocol due to less packet drop and proper receiving of packets.

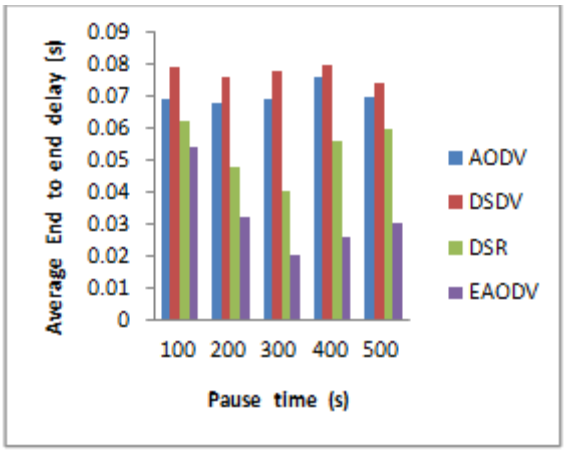

Fig. 4: Varying Pause Time with Average End-To-End Delay

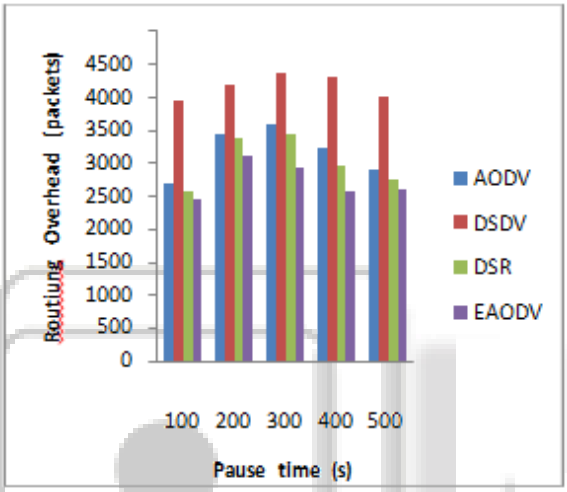

Fig. 5: Routing Overhead with Varying Pause Time.

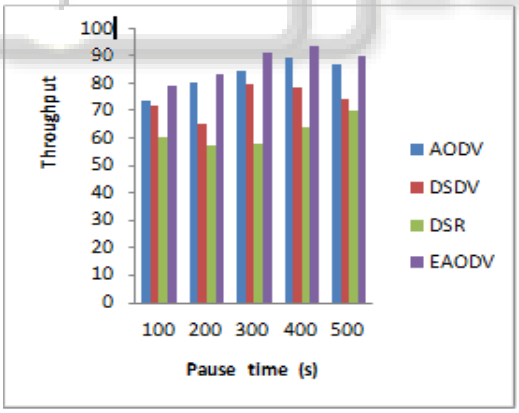

Fig. 6: Throughput with Varying Pause Time

C. Comparing the Performance between AODV, DSR, DSDV, EAODV:

It has been observed that EAODV has a high packet delivery and throughput and low average end to end delay but a low routing overhead. AODV is showing a medium performance in all the metrics And DSDV shows a large RO and delay thus having a low packet delivery and throughput values.

Performance matric	RO	TP	AEED	PDF
Very low	EAODV	DSR	EODV	DSDV
low	DSR	DSDV	DSR	DSR
medium	AODV	AODV	AODV	AODV
High	DSDV	EAODV	DSDV	EAODV

Table 1: Comparing Performance of Routing Protocols

V. Conclusions and Future Work

We have successfully simulated and analyzed existing EAODV based on various matric the routing protocol. It has been observed that EAODV being the successor of AODV performs better in all the terms. This paper will act as basis for many researchers worldwide to work upon the EAODV protocol and in future an effort will be done to enhance the performance of EAODV by using various artificial intelligence techniques and simulations will be performed under varying network scenarios.

VI. Acknowledge

I am grateful Asst. Professor Mr. Om Prakash Yadav sir, United College of Engineering & Research, Department of Computer science and Engineering, GBTU Lucknow for his support and help and for giving me the opportunity to carry out the thesis work by providing me with the necessary re-sources and materials.

References

[1] wikkipedia.com.
[2] N. Simulator, “2 (NS2),” URL: http://www. isi. edu/nsnam,.
[3] www.netlab.file.
[4] www.cs.duke.edu.
[5] Anuj K. Gupta, Harsh Sadawarti, Anil K. Verma, “Review of various Routing Protocols for MANETs”, International Journal of Information & Electronics Engineering (IJIEE),.
[6] Anuj K. Gupta, Harsh Sadawarti, Anil K. Verma, "Performance analysis of AODV, DSR and TORA routing protocols", International Journal of Engineering and Technology (IJET/).
[7] Anuj K. Gupta, Harsh Sadawarti, Anil K. Verma, “Performance Analysis of MANET Routing Protocols in Different Mobility Models”, International Journal of Information Technology and Computer Science (IJITCS).
[8] C. E Perkins, E. M. Royer, and S. Das, “Ad hoc On-demand Distance Vector (AODV),” RFC 3561, July 2003.
[9] Shailender Gupta, Chirag Kumar, Seema Rani and Bharat Bhushan, “Performance comparison of routing protocols using different mobility models”, IJMECS, vol. 4, no. 8, pp.54-61, 2012.
[10] www.cs..ucsb.edu.
[11] www.csd.uoc.gr.
[12] www.eecs.harvard.edu

