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REVIEW OF AODV AND DSDV ROUTING PROTOCOLS IN MANET

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***Abstract* - MANET stands for Mobile ad hoc network and is a infrastructure-less network and it is having ability to configure itself. The topology of network changes dynamically. It consists of wireless mobile nodes which communicate with each other without any centralized administration. In MANET different types of routing protocols are introduced. These protocols can be categorized into reactive, proactive and hybrid routing protocols. This paper gives the review of reactive (AODV), proactive (DSDV) routing protocols. Analysis of these protocols in terms of packet delivery ratio, throughput, average time delay is studied. The performance of AODV is better than DSDV in terms of throughput.**

Index Terms - AODV, DSDV, MANET, Proactive, Reactive

I. INTRODUCTION

MANET is a collection of mobile nodes which dynamically establishes short-lived networks in the absence of fixed infrastructure. Each mobile node is equipped with wireless transmitter and a receiver with an appropriate antenna. These mobile nodes are connected to other nodes by wireless links and they act as routers for all other mobile nodes in network. Nodes in mobile ad hoc networks are free to move in the network and they can organized themselves in an arbitrary manner. These features make MANETs very practical and its deployment is easy in places where existing infrastructure is not capable enough to allow communication, for instance, in disaster zones, or infeasible to deploy locations. MANETs are the short term temporary spontaneously wireless networks of mobile nodes communicating with each other without intervention of any fixed infrastructure or central control. It is an autonomous system of mobile nodes, mobile terminals, or mobile stations serving as routers interconnected by wireless links. As the nodes move or adjust their transmission and reception parameters, MANET topology may change from time to time.

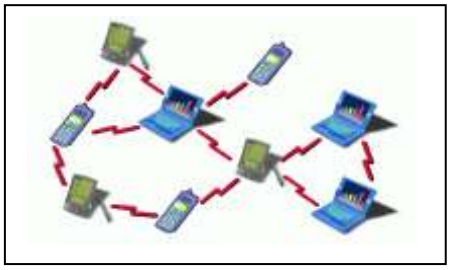

Fig. 1 Mobile ad-hoc network

II. ROUTING PROTOCOLS

An ad-hoc routing protocol controls the routing of packet in MANET. In MANET, initially nodes are not aware of topology of network, they need to discover that. An ad-hoc routing protocol can be classified in reactive (on-demand), proactive (table-driven) protocol and hybrid protocol.

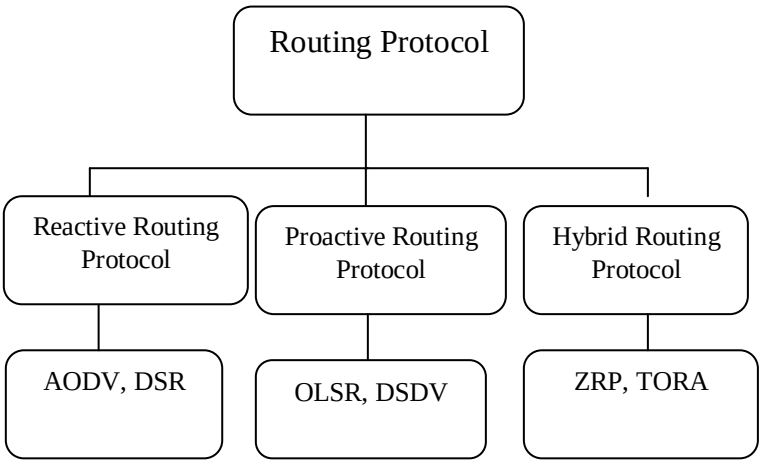

Fig.2 Routing protocols in MANET

A. Proactive (table-driven) Routing Protocol

The proactive routing is also called table-driven routing protocol. In this routing protocol, routing information is broadcasted by mobile nodes to the neighbors. Each node needs to keep their routing table which not only contains the information of adjacent nodes and reachable nodes but also the number of hops. In other words, all of the nodes have to find their neighborhoods as long as the network topology has changed. Therefore, the disadvantage is that the overhead increases with increase in the network size. However, the advantage is that from network status it is possible to find malicious attacker. The most familiar type

of the proactive type is destination sequenced distance vector (DSDV) routing protocol.

1) Destination-Sequenced Distance-Vector (DSDV) Protocol

In DSDV, a routing table is maintained by each mobile node of an ad hoc network, which contains information about available destinations, the metric and next hop to each destination and a sequence number generated by the destination node. Hence, routing table which is stored in each mobile node, is used to transmit the packets between the nodes of an ad hoc network. In ad hoc network, each node updates the routing table periodically or when significant new information is available in case of dynamically changing topology to maintain the consistency of the routing table with the of the ad hoc network. When changes in the network topology are detected, each mobile node advertises routing information by broadcasting or multicasting a routing table update packet. The update packet is send to directly connected nodes with a metric of one. This means that each receiving neighbor is one metric (hop) away from the node. Once the neighboring nodes receive the update packet, they update their routing table by incrementing the metric by one and retransmit the update packet to the next neighbors of each of them. The process is repeated until all the nodes in the ad hoc network have received a copy of the update packet with a corresponding metric. If a node receives multiple update packets for a same destination, then routes with more recent sequence numbers are always preferred for packet forwarding decisions. The update packet with the smallest metric will be used when the update packets have the same sequence number with the same node and the existing route will be discarded or it is stored as a less preferable route. In this case, the update packet will be propagated to all mobile nodes in the ad hoc network with the sequence number. The advertisements of routes which are about to change may be delayed until the best routes have been found. The elements in the routing table of each mobile node change dynamically to maintain consistency with dynamically changing topology of an ad hoc network. To achieve this consistency, the advertisement of routing information must be made frequently or quickly in order to ensure that each mobile node can locate all the other mobile nodes in the dynamically changing ad hoc network. Depending upon the updated routing information, each node has to relay data packet to other nodes upon request in the dynamically created ad hoc network. [14]

B. Reactive (on-demand) routing protocol

This type of protocol finds routes by using the route request packet. It is a bandwidth efficient on-demand routing protocol for Mobile Ad-Hoc Networks. The protocol deals with two main functions of Route Discovery and Route Maintenance. The discovery of new route is decided by Route Discovery function and the detection of link breaks and repair of an existing route is decided by Route Maintenance function.

Reactive or on-demand routing protocols route is discovered when required. Distribution of information is not required in reactive protocols. One of the reactive protocols is AODV. These protocols do not maintain permanent route table. Instead, routes are established by the source depending on demand in network.

1) Ad Hoc On-demand Distance Vector Routing (AODV) protocol

In AODV Route Discovery, when source node wants to communicate with destination and if path is not available to destination then source broadcasts RREQ i.e. demand packet to all its neighbors in the system. This RREQ message contains source and destination node's IP address RREQ ID. [12]

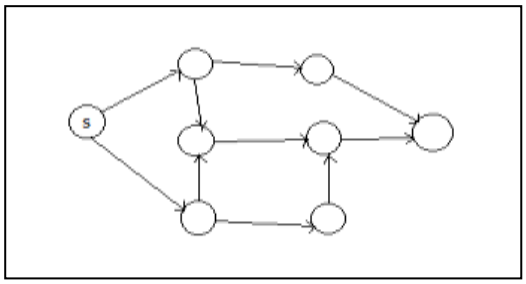

Fig. 3 RREQ Broadcast

When intermediate node receives RREQ, it first of all checks whether, valid route to destination is available or not. If, valid route is available then another condition must satisfied that is sequence number of intermediate node, should be at least as great as destination sequence number in the RREQ packet. If both conditions are satisfied, then RREP i.e. reply packet is generated by that node. If valid route is not available then RREQ is further forwarded. Hop count is incremented when RREQ is forwarded. While sending RREQ, there is no more dynamic route or link breakdown has occurred. [12]

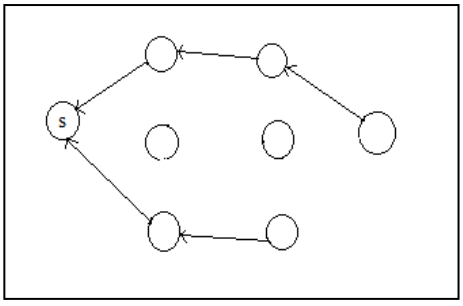

Fig. 4 RREP Propagation

As MANET is dynamic network i.e. topology of nodes varies constantly or connections between node may break down. In AODV Route Maintenance, when path break down occurs, both the nodes inform their end nodes who were

using path about link failure, by sending RERR i.e. error message [12] as shown in fig.

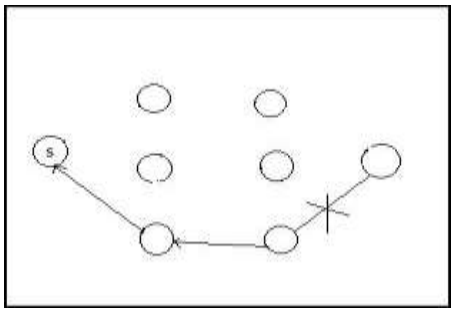

Fig. 5 RERR Message

III. Performance Analysis Routing Protocols

A. Simulation parameters for AODV, DSDV Routing Protocol

This analysis includes the simulation of 10, 21, 50 nodes in terrain area of 700m x 700m. Total simulation time is 400 sec. i.e. time between the starting of simulation and ending of the simulation. Traffic type is Constant Bit Rate. [1]

B. Performance Metrics

1. Packet Delivery Ratio (PDR) - The number of data packets sent from the source to the number of data packet received at the destination.

   PDR = (control packets sent-delivery packet sent) /

   (control packets sent). [8]

2. Average Time Delay- Average time delay (seconds) is the average time it takes a data packet to reach the destination.

3. Throughput - The rate of successfully transmitted data per second in the network during the simulation. [8]

A. Packet Delivery Ratio

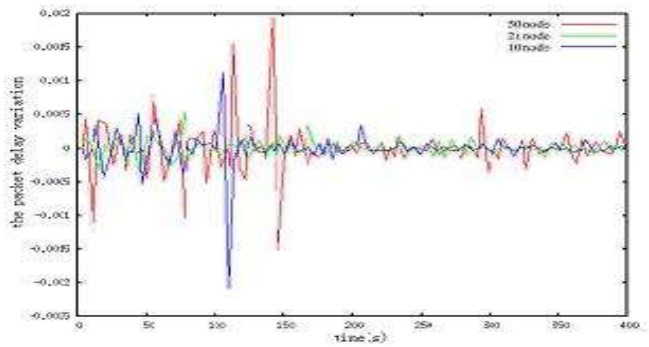

Fig. 6 PDR of AODV [1]

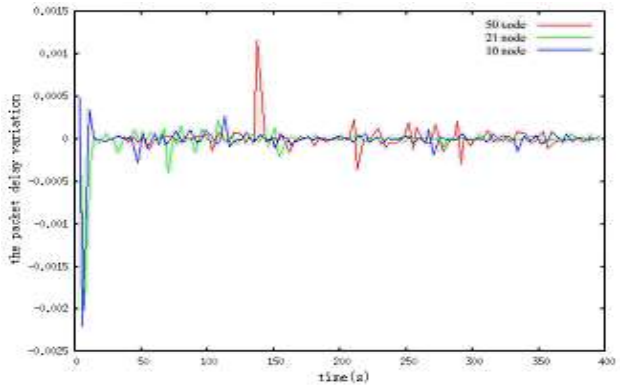

Fig. 7 PDR of DSDV [1]

DSDV is a proactive routing protocol which required to send a large number of packets to maintain routing tables. Whereas AODV is a reactive routing protocol which only deliver necessary packets when there is a demand of communication among nodes and hence it reduces the network pressure caused by the heavy overload. DSDV are more likely to cause the heavy overload and congestion problems.[1]

B. Throughput

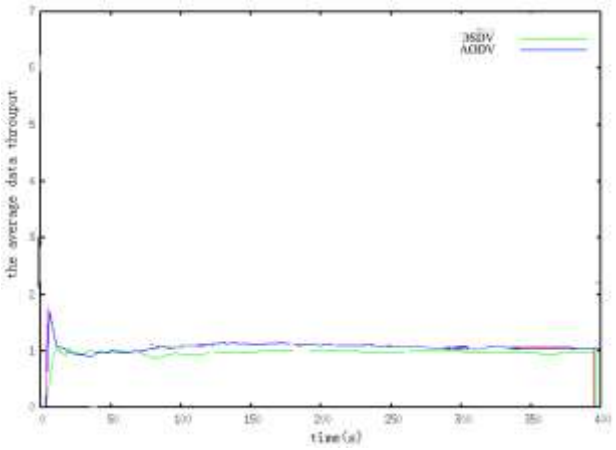

Fig. 8 Throughput of AODV and DSDV [1]

Throughput is successful transmission of data in network. As the table driven protocols, DSDV requires extra time to set up routing tables before delivering packets and AODV delivers a packet on demand. Hence the average throughput of AODV is larger than DSDV. [1]

C. Average time delay

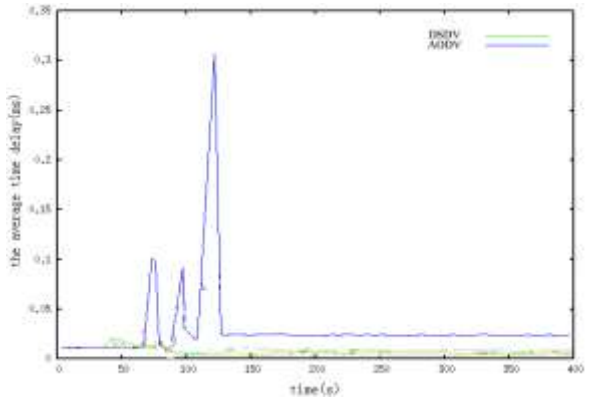

Fig. 9 Average time delay of AODV and DSDV [1]

Performance of AODV is better than DSDV in terms of throughput. Average time delay of DSDV is less than AODV.

REFERENCES

[1] Qian Feng, Zhongmin Cai, Jin Yang, Xunchao Hu, "A Performance Comparison of the Ad Hoc Network Protocols",in Second International Workshop on Computer Science and Engineering,2009 IEEE, Publication Year: 2009

[2] Anil Kumar Sharma and Neha Bhatia, *"Behavioral Study of MANET Routing Protocols by using NS-2"*,in IJCEM International Journal of Computational Engineering & Management, Vol. 12, April 2011; Publication Year: 2011

[3] Z Fan-Hsun Tseng, Li-Der Chou, Han-Chicj Chao, *"A survey of black hole attacks in wireless*,Human-centric*mobile ad hoc networks"* Computing and Information Sciences, 2011; Publication Year: 2011

[4] G. Jose Moses, D. Sunil Kumar Prof.P.Suresh Varma N.Supriya, *"A Simulation Based Study of AODV, DSR, DSDV Routing Protocols in MANET Using NS-2"*,in International Journal of Advanced Research in Computer Science and Software Engineering Volume 2, Issue 3, March 2012; Publication Year: 2012

[5] Meenakshi, Vinod Kumar Mishra, Kuber Singh, *"Simulation & Performance Analysis of Proactive, Reactive & Hybrid Routing Protocols , in MANET"* in International Journal of Advanced Research in Computer Science and Software Engineering, vol2, July 2012; Publication Year: 2012

[6] G. RAJKUMAR, DR. K. DURAISAMY, *"A Review of Ad Hoc On-Demand Distance Vector Routing Protocol for Mobile Ad Hoc Networks"*,inJournal of Theoretical and Applied Information Technology, Vol. 36 No.1, 15th February 2012, Publication Year: 2012

Average time delay of DSDV is less than AODV. [1]

IV. CONCLUSION

MANET is a collection of mobile nodes, dynamically establishing short-lived networks in the absence of fixed infrastructure. This paper presents a description of AODV and DSDV routing protocols which are proposed for ad-hoc mobile networks.

In DSDV routing protocol, mobile nodes periodically broadcast their routing information to the neighbors. Each node needs to maintain their routing table. AODV protocol finds routes by using the route request packet and route is discovered when needed.

[7] V.RAJESHKUMAR, P.SIVAKUMAR, *"Comparative study of AODV, DSDV and DSR Routing Protocols in MANET Using Network Simulator-2"*,International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 12, December 2013; Publication Year: 2013

[8] Deepak Kumar Patel, Rakesh Kumar, A.K.Daniel, *"Performance Analysis and Behavioural Study of Proactive and Reactive routing protocols ,in MANET"* in InternationalJournal of Advanced Research in Computer Science and Software Engineering, vol 2, April 2013; Publication Year: 2013

[9] Harjeet Kaur, Varsha Sahni, Dr. Manju Bala, "A Survey of Reactive Proactive and Hybrid Routing,in Protocols in MANET: A Review" International Journal of Computer Science and Information Technologies, Vol. 4 (3) , 2013, 498-500; .Publication Year: 2013

[10] Pankaj Rohal, Ruchika Dahiya, Prashant Dahiya, *"Study and Analysis of Throughput, Delay and Packet Delivery Ratio in MANET for Topology Based Routing Protocols (AODV, DSR and DSDV)"*,in Internatioal Journal For Advance Research in Engineering and Technology, Vol. 1, Issue II, Mar. 2013, Publication Year:2013

[11] M. Swathi, B. Pravallika, N. V. Muralidhar, *"Implementing And Comparison of MANET Routing*,in *Protocols Using NS2"* International Journal of Emerging Technology and Advanced Engineering; Volume 4, Issue 2, February 2014; Publication Year: 2014

[12] Kanchan Ubnare , Prof. Navneet Manghi , Prof. Vimal Shukla, *"A Comparative Study of Routing Protocols in Mobile Ad-hoc Networks" ,in International Journal of Emerging Technology and Advanced Engineering; Volume 4, Issue 3, March 2014 Publication Year: 2014*

[13] PriyaDharshini.R, Prabhu.V,Rajes Singh .S, *"Research on Implementation and Comparision of Routing Protocols in MANET Using* in*NS2",*International Journal of Science and Research, Volume 3, Issue 4, April 2014, Publication Year: 2014

[14] Guoyou He, "Destination-Sequenced Distance Vector (DSDV) Protocol".