FAODV, DSR, DSDV PERFORMANCE ANALYSIS FOR BROADCASTING IN MANET

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Abstract

Ad hoc On-demand distance vector protocol always finds the highest route from the node to node to transmit the message. Our recommended approach is Flooding based Ad hoc On Demand Vector (FAODV) major find the endpoint node through path request packet message and path success packet message. Later receiving path success packet to foundation node now set data transmission to endpoint. FAODV can broadcast the message from the endpoint to nodes cover in their environments of other network area. We compare the analysis for FAODV, DSR, DSDV performance in MANET. This routing protocol mainly concentrates for the message broadcasting.

Keywords: - DSR; FAODV; AODV; Broadcasting, MANET; Routing; Message Broadcasting.

I. INTRODUCTION

Mobile ad hoc network are temporarily forming the group of network without any base centralized nodes (infrastructure less). Mobile ad hoc network is one of the wireless ad hoc networks and it is a self-configuring mobile network. MANET have only temporary network within their region of nodes, there is no centralized administrative work and there is no communication infrastructure. In mobile ad hoc network domains where a set of nodes which are combined host and routers themselves form a group of network routing infrastructure in an ad hoc network models. Mobile ad hoc network (MANET) is the most important field in the area of wireless networks. In MANET have mobile devices which are generally called as nodes. Each node has equipped with both transmitter and receiver. Every node act as a router to forward data messages or packets to other nodes whenever required [3]. There are no separate or dedicated routers, base stations, servers, access points.

II. LITERATURE SURVEY

Davesh singh som, et.al [1] focuses on the performance analysis between AODV, DSR and TORA routing protocols through simulation model in the MANETs. Author discusses about three performance metrics ie average end-to-end delay, throughput, and packet delivery ratio. Performance differentials are discussed using varying number of nodes in the simulation model.

Energy efficient routing is discussed in various ways for broadcasting message in MANET area [2], [4]. Gagangeet singh aujla, et.al [6],[8],[7] discusses about comparative analysis of AODV, DSR, GRP, OLSR

and TORA routing protocols. In this paper routing protocols are analysed by varying number of nodes with FTP and HTTP applications over MANETs. In this analysis considered for email, video conferencing, traffic applications over MANET.

Performance metrics analysed with throughput, packet end-to-end delay, load, data dropped.[3],[5] analysed performance metrics throughput, delay, load and data dropped for the comparison between DSR, AODV, GRP, OLSR, TORA. As per conclusion AODV and OLSR shows low data dropped. AODV shows highest throughput compare with OLSR and GRP protocol. This simulation analysis mainly compared for the video conferencing. Simulation result [12] shows the AODV protocol gives highest throughput when http usage DSR shows least throughput in all scenarios using FTP.The simulation performance analysis and comparison of three protocols i.e. AODV, DSR and TORA routing protocols [11].

Harjeet kaur, et.al [9] focus on the survey of proactive, reactive and hybrid routing protocol like OLSR, AODV and ZRP. In this paper discuss about AODV less connection delay and loop free OLSR and ZRP provides framework to other routing protocols.

Jaya Jacob, et.al [10], [14] evaluates the performance of various ad hoc routing protocols such as AODV, TORA, DSDV, DSR and AOMDV. Routing protocols are analysed in terms of energy efficiency. Energy or power consumption is governed by the number of processes and overheads required to maintain connectivity. Simulation parameters are considered for these analyses are packet delivery ratio, energy consumption, end-to-end delay, throughput, number of packets dropped. [15] Results are obtained as AOMDV providing better performance compared to AODV, TORA, DSR and DSDV protocols.

Pradeep singh, et.al [13], [16], [17] have shown comparison analysis, summary of different routing protocols under proactive, reactive and hybrid routing. In this paper discussed about how the black hole attacks that can be mounted against a MANET and proposed a feasible solution to the AODV protocol. Sivakumar, at.al [18], [19] focuses early congestion detection for path discovery. Efficient route discovery process mainly analysed with important performance metrics for evaluation packet discovery ratio, end-to-end delay, routing overhead compared with EDAODV, EDAPR, EDCSCAODV routing.

Study of performance comparison analysis for AODV, DSDV, OLSR and TORA are routing protocols using NS2 simulation with several parameters like delay, packet loss, load and throughput [20-21]. [22] focuses about the secure and efficient routing in mobile wireless ad hoc network. Simulation results are analysed for secure routing through four metrics i.e. packet delivery ratio, byte overhead, packet overhead, median latency.

III. AD HOC ON-DEMAND DISTANCE VECTOR (AODV)

AODV is a reactive routing protocol which does not maintain a route until it required or requested by other nodes. AODV compare with other distance vector protocols by using sequence number on route update. AODV will react quickly to the changes in the topological network and update only that particular host may be affected by the change using the Route request (RREQ) message. Mainly two messages are involved for the route discovery. Route request (RREQ) is used to initialize the route for finding easiest path between source and destination. Router Response (RREP) message is used to response from the destination node. AODV ensure the routes through sequence numbers for easy identification of the preferred route [7-17]. Figure 1. shows discovering a route in the MANET area through AODV routing protocol.

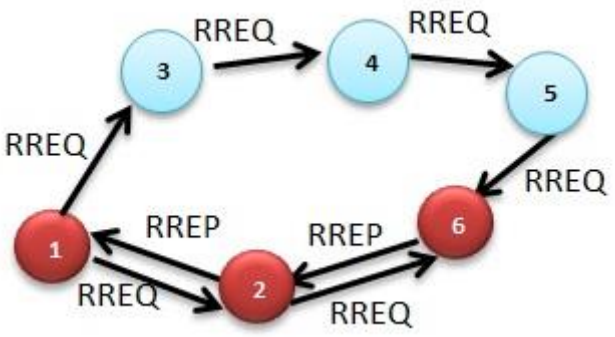

Figure 1.AODV route discovery process

When a source node initialized a route to destination for which already it does not have a route to the source. Now source can broadcast a route request packet or message across the network. Every node is receiving this message or packet update their details for the source node in the route information tables. In additionally to the source node address, current sequence number, route request and broadcast identifier. A node getting this route request message may send a response to the corresponding node. If it is may either the destination node or if it may be a route to the destination node. If this node is the end in the MANET region then response message back to the source node. Otherwise it re-broadcast the route request message till the destination node identify. Nodes can keep track the route request messages and broadcast their node broadcast id. Once source node receives route response message then it can prepare for send the data packets to the destination node.

IV. FLOODING BASED AD HOC ON-DEMAND DISTANCE VECTOR (FAODV)

Initially FAODV is an unicasting model for finding path between source to the destination node. When a source node initialized a route to destination for which already it does not have a path to the source. Source node send path request packet (PRP) to neighbour's node. Figure 2 (a) shows PRP message initialize from source node to destination node and PSP reply from destination to source. Path request packet is used to initialize the route for finding easiest route between source and destination. Each node receives this packet and verifies the destination address update their details for the source node in the route information tables. A node getting this PRP message may send a response to the corresponding node. If it is may either the destination node or if it may be a path to reach the destination node. If it is not match with the current node address to destination address then again retransmit that PRP packet to its neighbours. If this node is the end in the MANET region then reply message back to the source node. Otherwise it re-broadcast the route request message till the destination node identify.

When the PRP reaches the destination node, now destination node can transmit the path success packet (PSP) to the source node. Path success packet is used to reply from the destination node to source node. After the destination node identification data transmission is started between source to the destination node with flooding packet. Figure 2 (b) shows message transmission towards broadcast area from source to destination. FAODV having destination sequence number is mainly used to update the path information when dynamic changes. FAODV ensure the paths through sequence numbers for easy identification of the scheduled route.

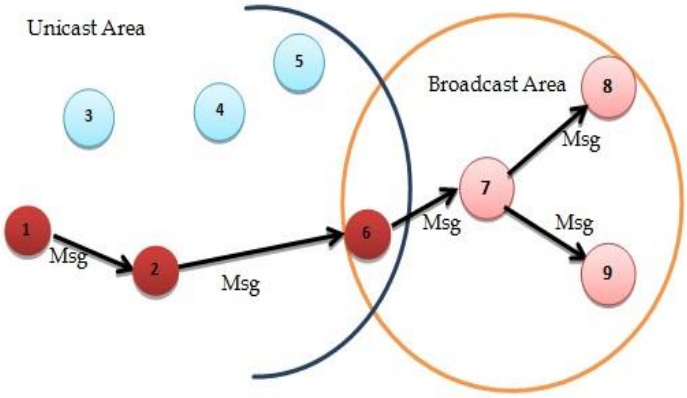

Figure 2. FAODV route initialization & message broadcast

Algorithm 1: FAODV Algorithm for Route Discovery & Message Delivery

```
1.  Begin
2.  //Discover message broadcasting path
3.  For each node pair (sa,da,PRP,seq,ttl)i receive
4.  /* when i=1 to n-1, da=2,3,4..n */
5.  Forward PRP to each node
6.  If (dst is da) /* dst match with destination address (da) */
7.  {
8.      Route=true
9.      Call procedure pathsuccess(sa,da,PSP,pid,seq,ttl)
10.     Call procedure transmit(sa,da,pid,seq,fid,ttl)i
11. }
12. else if
13. {
14. Forward PRP to neighbours node
15. }
16. else
17. {   /* Respond to source, neighbour node is not available */
18.     Route=false
19. }
20. End if
21. End loop
```

In additionally to the source node address, current sequence number, route request and broadcast identifier. Nodes can keep track the route request messages and broadcast their node broadcast id. FAODV is flexible to dynamic network topology and large-scale network. In the FAODV algorithm (Algorithm 1), mainly path finding towards broadcast area to deliver the packet from source.

V. SIMULATION EVALUATION PERFORMANCE ANALYSIS

The simulations were performed by the network simulator-2 (NS-2). Different simulation model parameters used for this comparison results were specified in Table 1. For all the simulations, the simulation time was fixed at 150 sec. Simulation mobile nodes are varied by 10 and 100 nodes.

Table 1: Common simulation parameters

Simulator parameters	
Channel	Wireless Channel
Propagation model	TwoRayGround
Mobility model	Dynamic network
Queue length	50
Network type	IEEE 802.11
Interface length	DropTail/PriQueue
Scenario parameters	
Topology area	400 * 400
Number of mobile nodes	10, 100
Simulation time	150s

A. Message Delivery Rate (MD)

The message delivery ratio is calculated between the number of packet messages originated by the source node and the number of packet messages received at the destination within the routing area. S = number of packet messages received at destination node, d = number of packet messages sent by source, MD = delivery ratio

(1)

B. Loss of packets (LP)

Packet lost is minimum number of loss using FAODV protocol compared to TORA protocol. Packet loss is always less in the AODV compared with other routing protocols. Some certain conditions may cause loss of packets such as packets corruption, bandwidth insufficient, link disruption, packet buffering and many issues. In such situations, packets may be dropped either drop in the intermediate hop or node itself.

C. Delay between end-to-end (DEE)

Time to taken for the entire packet to completely reach at the destination from source node.

$$DEE = \sum_{i=0}^{n} (BT^{i-n} + MTT^{i-n} + WT^{i-n} + DP^{i-n}) \quad (2)$$

Evaluation of delay between end-to-end is depends upon the parameters like broadcast time (BT), message transmission time (MTT), waiting time (WT), delay in processing (DP).

VI. RESULT ANALYSIS

In FAODV based routing can provide less delay over AODV. FAODV performance analyses are compared with 100 nodes. Performance parameter for delay is reduced from 7% to 11%. Message delivery ratio is increased from 8% to 12%.The highest end-to-end delay in TORA protocol compared to other routing protocols, delay caused while re-transmission of packets lost when collision, due to broadcast time. It also responds quickly to the active routes when topological changes. FAODV based DR performance as increased gradually when nodes are increased. Figure 4 shows that message delivery ratio between FAODV, DSR and DSDV. FAODV Message delivery ratio is best compare with other routing protocols. Figure 5 shows that total number of packets loss between FAODV, DSR and DSDV. FAODV have less number of packet drop / loss compare with other routing protocols. Figure 6 shows that average throughput between FAODV, DSR and DSDV. Figure 7 shows that average delay between end-to-end for FAODV, DSR and DSDV. FAODV have less delay between source-end to destination-end compare with other routing protocols. Figure 8 shows simulation graph for window versus time FAODV and AODV are better in route updating process and maintenance process in transmission path. Connection establishment is easy and Lower delay for new path establishment in FAODV.

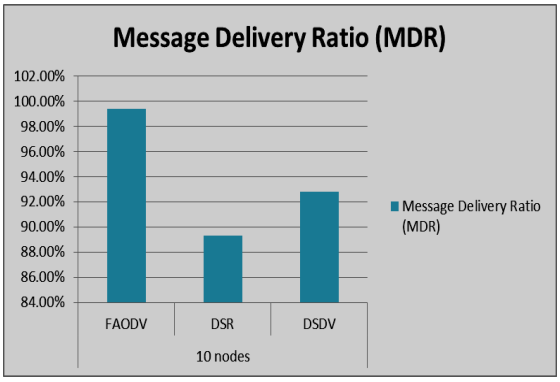

Figure 4. Message Delivery Ratio (MDR) results

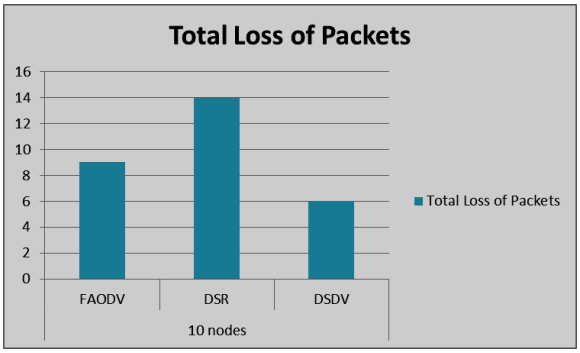

Figure 5. Loss of Packets results

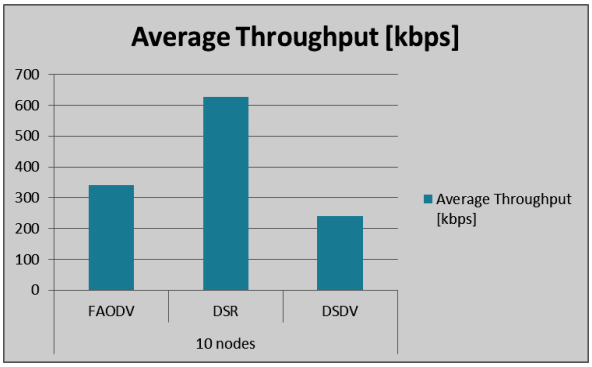

Figure 6. Average Throughput results

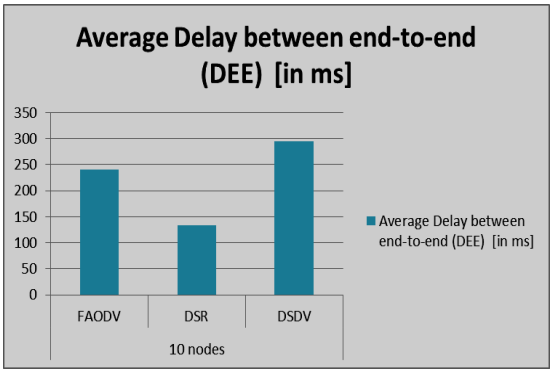

Figure 7. Average Delay between end-to-end results

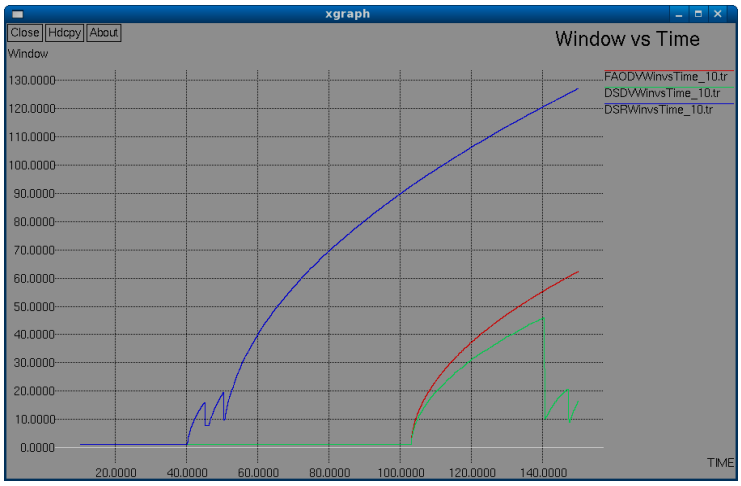

Figure 8. Window versus Time results

Table 2

NS-2 Simulation results

Metrics	100 nodes		
	FAODV	DSR	DSDV
Generated Packets	5679	16254	3736
Received Packets	5619	15831	1503
Message Delivery Ratio	98.9%	97.4%	40.3%
Total Dropped Packets	25	15	37
Average End-to-End Delay[ms]	346.37	193.40	262.48
Average Throughput [kbps]	165.42	465.99	243.39
StartTime	10.0	10.3	103.0
StopTime	149.9	150.0	128.7
sendLine	5679	15902	1569
recvLine	5619	15831	1503
fowardLine	11061	6133	1526
Ratio	0.98	0.99	0.95

VII. CONCLUSION

In this work we considered the four performance measures in an ad-hoc network by varying parameters i.e. message delivery ratio, loss of packets, average end-to-end delay and throughput with different number of nodes (100 nodes), different speed of nodes. From results reported in chapter 7 concluded that FAODV protocol is the best in terms of average MDR. Large numbers of packets are loss as well as large number of packets dropped when a DSDV routing protocol apply for this networks. Message packets loss and dropping the packets when a transmission occurs are based on variety of nodes, with in their region. FAODV works with less packet losses than other routing techniques. Our ns-2 based simulation has confirmed that the advantages of FAODV and demonstrated for the improvement of packet delivery, reduction of delay in end-to-end, throughput are compared with DSR, DSDV.

In future, energy metrics to be considered with these performance measures for design such a protocol that can be provide best data delivery in high random mobility network. Analyse the energy metrics for QoS applications for better routing and broadcasting the message.

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