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SIMULATION AND ANALYSIS OF DSDV PROTOCOL IN MANETS

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With the advancements in computers and wireless communication technologies, mobile ad hoc networks (MANET) is expected to see increasingly widespread use and application. A MANET is an autonomous collection of mobile users that communicate over wireless links. Proactive protocols in MANETS like DSDV, OLSR, TBRPF are table driven and actively determine the layout of the network. A complete image of the network is maintained at every single node by a regular exchange of network topology packets between the nodes of the network. In this paper, we simulate and analyse the Destination-Sequenced Distance-Vector (DSDV) protocol for various parameters like throughput, average end-to-end delay by varying the number of nodes in MANET. The results indicate that the throughput decrease as the numbers of node increase.

Keywords: MANETS, DSDV.

1. Introduction

A MANET is an autonomous collection of mobile users communicating over a relatively bandwidth-constrained wireless link with limited battery power with highly dynamic environment [1]. The network topology, due to the mobility in the network, is dynamic and may change rapidly and unpredictably over time. Hence, the connectivity among the nodes may vary with time because of node departures, new node arrivals, and the possibility of having mobile nodes. To maintain communication between the nodes in the network, each node works as a transmitter, host, and, a router.

In proactive (table-driven) protocols like DSDV, nodes periodically search for routing information within a network. The control overhead of these protocols is foreseeable, because it is independent to the traffic profiles and has a fixed upper bound. This is a general advantage of proactive routing protocols [2].

In Section 2, we describe DSDV protocol. Followed by the simulation of DSDV with varying number of nodes and finally we conclude the results of simulation and discuss about the future work.

2. Related Work

The Destination-Sequenced Distance-Vector (DSDV) [3] Routing protocol is based on the idea of the classical Bellman-Ford Routing Algorithm [5] with certain improvements such as making it loop-free. The DSDV is the foundation of many other distance vector routing protocols such as AODV that is addressed later. The distance vector routing is less robust than link state routing due to problems such as count to infinity and bouncing effect. Consequently, the proactive routing protocols prefer link state routing because additional route calculation of link state routing doesn't contribute to delay.

In DSDV, a sequence number is linked to a destination node, and usually is originated by that node (the owner). The only case that a non-owner node updates a sequence number of a route is when it detects a link break on that route. An owner node always uses even-numbers as sequence numbers, and a non-owner node always uses odd-numbers. With the addition of sequence numbers, routes for the same destination are selected based on the following rules:

1) a route with a newer sequence number is preferred;
2) in the case that two routes have a same sequence number, the one with a better cost metric is preferred. [4]

The list which is maintained is called routing table. The routing table contains the following:

(1) All available destinations' IP address
(2) Next hop IP address
(3) Number of hops to reach the destination
(4) Sequence number assigned by the destination node
(5) Install time

The sequence number is used to distinguish stale routes from new ones and thus avoid the formation of loops. The stations periodically transmit their routing tables to their immediate neighbors. A station also transmits its routing table if a significant change has occurred in its table from the last update sent. So, the update is both time-driven and event-driven.

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3. PROPOSED WORK

Proactive protocols maintain the routing information even before it is needed. Routes information is generally kept in the routing tables and is periodically updated as the network topology changes. The destination sequenced distance vector routing protocol is a proactive routing protocol which is a modification of conventional Bellman-Ford routing algorithm [5]. This protocol adds a new attribute, sequence number, to each route table entry at each node. Routing table is maintained at each node and with this table; node transmits the packets to other nodes in the network. This protocol was motivated for the use of data exchange along changing and arbitrary paths of interconnection which may not be close to any base station. DSDV has advantages that it guarantees loop free path and count to infinity problem is also reduced.

In this paper, we simulate and analyse Destination Sequenced Distance Vector routing protocol. We perform comparative analysis on the basis of various parameters like packets sent, packets received, throughput, end to end delay when the network grows larger. what changes happen in these four parameters when we increase the number of nodes while implementing DSDV.

We use NS2 simulator for the simulation of DSDV. NS [6] is an event driven network simulator developed at University of California at Berkeley, USA, as a REAL network simulator projects in 1989 and was developed at with cooperation of several organizations. On the basis of results of *.nam file and *.tr file [7] [8], the analysis is being done. We also evaluate the performance of DSDV by taking number of nodes as a parameter. The simulation is divided in four parts basis on the number of nodes that vary:

1. DSDV with 5 nodes.
2. DSDV with 10 nodes.
3. DSDV with 15 nodes.
4. DSDV with 25 nodes.

Figures 1, 2, 3, 4, 5 shows the throughput results with varying number of nodes.

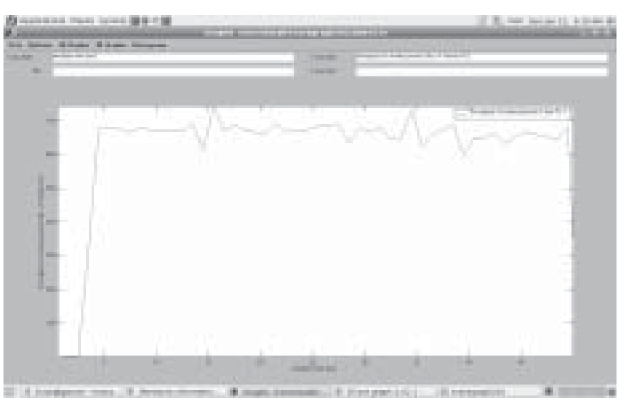

Figure 1: Throughput of 5 nodes

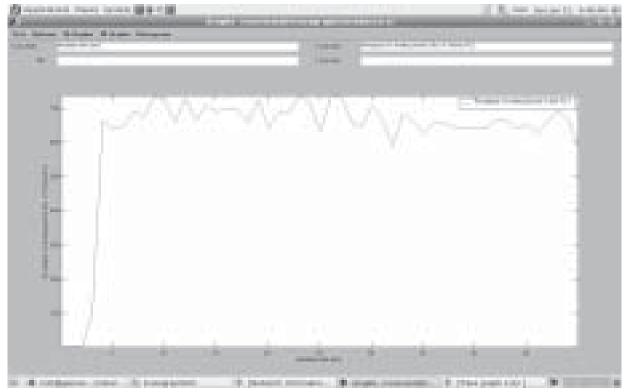

Figure 2: Throughput of 10 Nodes

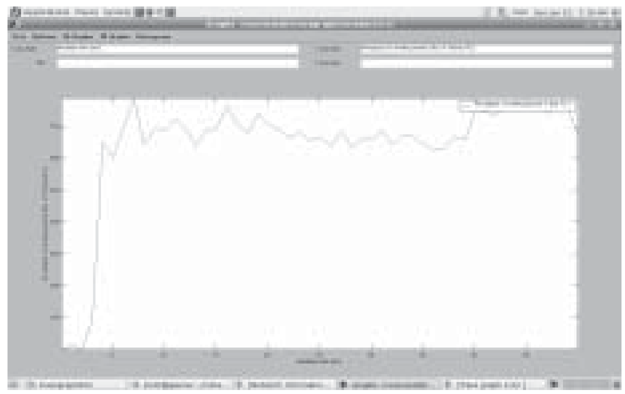

Figure 3: Throughput of 15 nodes

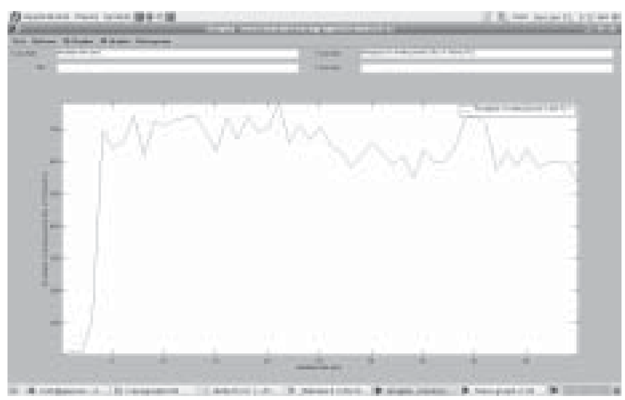

Figure 4: Throughput of 25 nodes

Figure 5: Average Delay of 5 Nodes

Figures 6, 7, 8 shows the throughput results with varying number of nodes.

Figure 6: Average Delay of 10 Nodes

Figure 7: Average Delay of 15 nodes

Figure 8: Average Delay of 25 Nodes

Table 1 shows comparison of various parameters like packets sent, packets dropped, packets received, throughput and average end-to-end delay versus number of nodes.

Packet Size	512
Simulation Time	50 sec

Table 1
Comparison of Various Parameters v/s No. of Nodes

No. of Nodes Parameters	*5*	*10*	*15*	*25*
Packets Sent	31233	31418	32310	30704
Packets Lost	2392	1890	2700	2846
Packets Dropped	617	1160	1401	2439
Packets Delivered	28224	28368	28209	25419
Throughput	0.904	0.902	0.873	0.827
Average end-2-end delay	0.381	0.525	0.504	0.493

Figure 9 shows the graphical representation of throughput versus number of nodes of DSDV protocol. From the Figure and the Table above, we came to know that as the number of nodes increases, the throughput of DSDV protocol decreases from 0.904 to 0.827. This means that the packet delivery ratio goes on decreasing when numbers of nodes are increased in DSDV protocol.

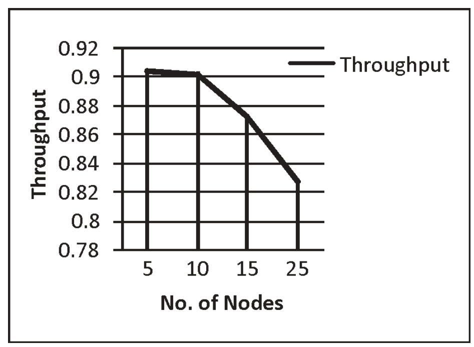

Figure 9: Throughput v/s No. of Nodes

Figure 10 shows the average end-to-end delay graph plotted against number of nodes. Average end-to-end delay, at the starting increases when numbers of nodes are increased to 10 from 5, but after that decreases as we further increase the number of nodes to 15 and 25. This means that the average time to reach its destination taken by a packet is decreased as the number of nodes increases. That is, more the number of nodes, less time will be taken by a packet to reach its final destination from the source.

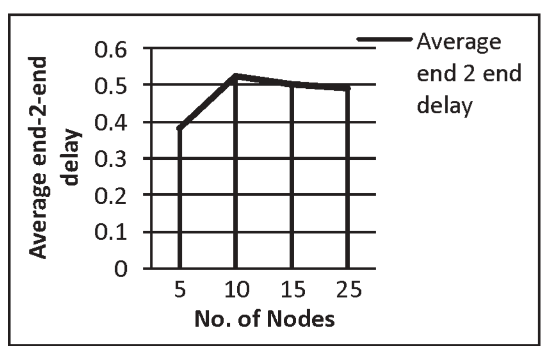

Figure 10: Average end-to-end delay v/s No. of Nodes.

4. Conclusion & Future scope

In the presented work, the performance of DSDV is studied against various parameters such as, throughput, and average end-to-end delay while increasing the number of nodes. Our analysis of the result guides us to conclude that:

- The throughput of the DSDV protocol decreases with the increase in number of nodes. The ratio of packets delivered to packets sent is low when the number of nodes is large.
- The average end-to-end delay i.e. the average time that a packet takes to reach its destination is less for large number of nodes. DSDV behaves well in terms of average delay when number of nodes is increased.
- DSDV works well when the number of nodes are less. With larger number of nodes, its efficiency decreases. In the presented work, we have made a simulation study; it would be interesting to note and analyze the behaviour of a MANET on a real-life test-bed. Further, we can also investigate the behaviour of other proactive routing protocols such as–FSR, OLSR and TBRPF.

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