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Performance Analysis of DSDV

Utpal Barman[1], Diganto Sahu[2]

Assistant Professor, CSE, GIMT, Guwahati, India [1]

M.Tech 4th Sem, CSE, GIMT, Guwahati, India [2]

Abstract: In ad hoc network where nodes both act as router and host, some protocols are implemented like DSDV (Destination Sequence Distance Vector). It is an extension of bellman-ford routing algorithms, which helps in communication between nodes in ad hoc networks. But the challenge lies with reliable communication between nodes. In this paper the DSDV performance analysis is done which also nullifies the looping problem faced by its previous version, that is, distance vector routing algorithms.

Keywords: MANET, Routing, Nodes, DSDV, Links.

1. INTRODUCTION

In today's world the communication is quite an important for all of us. Whether it is face to face or one point of the earth to other part. But the challenge relies on reliable communications between two ends. Lots of technologies evolved during the past years for communication, Mobile Ad-hoc is one of them, not for far distance but an infrastructure less nodes with its own property for communication with each other.

The wireless communication is far more efficient than the wired one. It don't require any pre-existing infrastructure for its communication. Ah hoc network follows the same path of this wireless network. Also no administration service is required every time it want to go for reliable communication.

But there is quite a difference between Ad hoc and other static wireless network. The topology of ad hoc keeps on changing dynamically. Also less effort needed by administrative. But ad hoc follows the nodes to be within the range of other nodes for communication while other mobile network relies on range of infra-red transceivers, which is static in position [3].

The other routing protocols for existing networks have not been designed specifically to provide the kind of dynamic, self-starting behaviour like as ad-hoc networks. Most protocols exhibit their least desirable behaviour when presented with a highly dynamic interconnection topology. Although we thought that mobile computers could naturally be modeled as routers. It was quite certain that existing routing protocols would place too heavy a computational burden on each mobile computer. Lastly, the wireless medium differs in important ways from wired media, which would require that we make modifications to whichever routing protocol we might choose to experiment with. For example, mobile computers may well have only a single network interface adapter, whereas most existing routers have network interfaces to connect two separate networks together. Besides, wireless media are of limited and variable range, in comparison to existing wired media. Since we have to make quite a change, it would be better if we decided to follow our ad-hoc network model as far as we could and come up with a substantially new approach to the classic distance vector routing.

2. OVERVIEW OF ROUTING IN MANET

In MANET routing is quite a challenge as compare to wired network. Nodes keeps changing there position with respect to time. Some protocol goes with maintaining table of every other node that is in connection with, while other prefers dynamic approach to send packets to its destination. Forwarding of messages in packets is by opening up the header file, and checking the destination node identifier, as like wired network. DSDV protocol is the table driven one, but there is two categories in respect to table maintenance and update process. One of them is Link state and other is Distance vector.

- Link State

In this protocol one node comes to know about every other node with the view of network topology. Every node has that network topology periodically broadcast messages to maintain the knowledge of the topology. This protocol doesn't usually maintain any table to find the metrics hop to its destination. Every node goes for shortest path algorithm to send messages to its respective destinations. But there is quite a chance of loop formation because of propagation delay, partitioned networks etc. This though might be short lived but may provide wrong view of network topology.

- Distance Vector

In this protocol table is formed which tells the node to which neighbor node, it should pass the packet to be received by its destination node. As the nodes keep changing its position, every node should periodically update its information to their respective neighbor nodes. However, it might cause both short-lived and long-lived loops, which can cause nodes to send information up to infinity with some wrong information. So for the solution DSDV comes in place, which helps distance vector to get rid of the looping and count to infinity problem.

3. DSDV (DESTINATION SEQUENCE DISTANCE VECTOR) ROUTING PROTOCOL [8]

Destination sequenced distance vector routing (DSDV) is an extension version of Distance vector. It adds sequence number for every packet transfer, in its table. Through which the routing don't go for sending unnecessary packets, which might create looping in the network.

In DSDV, every mobile node of a network maintains a routing table, which lists all available destinations, the metric and next hop to each destination and a sequence number generated by the destination node. Every node refer this table to send packet to other nodes. Each node of the ad hoc network updates the routing table periodically by sending some routing information or when addition or deletion of nodes is available to maintain the consistency of the routing table with the dynamically changing topology of the ad hoc network.

When network topology changes are detected periodically or immediately, each mobile node advertises routing information by sending their respective routing table update packet to every other node. The update packet starts out with a metric of one to direct connected nodes. This shows that each receiving neighbour is one metric (hop) away from the node. After receiving the update packet, the neighbours update their routing table with incrementing the metric by one and retransmit the update packet to the corresponding neighbours of each of them. The process gets repeated again and again until all the nodes in the ad hoc network have received a copy of the update packet with a corresponding metric. The update data is also kept for a while to wait for the arrival of the best route for each particular destination node in each node before updating its routing table and retransmitting the update packet. If a node receives multiple update packets for a same destination during that waiting time, the routes with more recent sequence numbers are always preferred for packet forwarding, but the routing information is not necessarily advertised immediately, if only the sequence numbers have been changed. If the update packets have the same sequence number with the same node, the update packet with the smallest metric will be used and the existing route will be discarded or stored as a less preferable route. In this case, the update packet will be propagated with the sequence number to all mobile nodes in the ad hoc network. The advertisement of routes that are about to change may be delayed until the best routes have been found. Delaying the advertisement of possibly unstable route can damp the fluctuations of the routing table and reduce the number of rebroadcasts of possible route entries that arrive with the same sequence number [8].

The contents in the routing table of each mobile node change dynamically to keep consistency with dynamically changing topology of an ad hoc network. To reach this consistency, the routing information advertisement must be frequent or fast enough to ensure that each mobile node can almost always locate all the other mobile nodes in the dynamic ad hoc network. Upon the updated routing information, each node has to relay data packet to other nodes upon request in the dynamically created ad hoc network.

In the process of routing information update, the original node tags each update packet with a sequence number to distinguish stale updates from the new one. The sequence number keeps on increasing with some unique value that uniquely identifies each update from a given node. So, if a node receives an update from another node, the sequence number must be equal or greater than the sequence number of the corresponding node already in the routing table, or else the newly received routing information in the update packet is old enough to be implement and should be discarded. If suppose the sequence number of one node in the recent received routing information update packet is same as the corresponding sequence number in the routing table, then the metric will be compared and the route with the smallest metric will be preferred[6].

Besides the sequence number and the metric for each entry of the update packet, the update route information contains also both the address of the final destination and the address of the next hop. Update packets are of two types, one is called full dump, which carries all of the available routing information. The other is called incremental, which carries the recently changed routing information, since the last full dump [7].

Each node in an ad hoc network must periodically transmit its entire routing table (full dump) to its neighbours most likely using multiple network protocol data units (NPDUs)[8]. The full dumps of the nodes can be transmitted relatively infrequently. Transmission takes place when little movement of mobile nodes occurs. Incremental update packets are transmitted between the full dumps for partial changes of the routing table. The incremental routing update should be fitted in one NPDU. With each incremental advertisement the mobile nodes are expected to determine the changes of routing information. When the significant changes increase with frequent varying of the network topology and the size of an incremental approaches the maximum size of a NPDU, a full dump is scheduled to make the next incremental become smaller.

There can be case where links can be broken when the mobile nodes move from place to place or have been shut down etc. The broken link may be detected by the communication hardware or be inferred if no broadcasts have been received for a while from their neighbors' node. The metric of a broken link is assigned infinity. When a link to next hop has broken, any route through that next hop is immediately assigned an infinity metric and an updated sequence number will be immediately broadcast an update packet and disclose the modified routes.

To indicate the broken links, any mobile node other than the destination node generates a sequence number, which is greater than the last sequence number received from the destination. This recently generated sequence number and a metric of infinity will be packed in an update message and will be broadcast over the network. To avoid nodes themselves and their neighbors' generating conflicting sequence numbers when the network topology changes, nodes only generate even sequence numbers for themselves, and neighbours only generate odd sequence numbers for the nodes responding to the link changes.

Establishment of the routes to a lost node will take place again when the lost node comes back to the network and broadcasts its next update message with an equal or later sequence number and a finite metric. The update message will be broadcast over the whole network to tell every other node that the broken links have come back into service again. In any case, the entry containing a finite metric and

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an equal or later sequence number will change the corresponding entry with a metric of infinity in the routing table of a node by the updated one.

[7]Talking about disadvantage, the main purpose of DSDV is to address the looping problem of the distance vector routing protocol and to make the distance vector routing more suitable for ad hoc networks routing. However, DSDV arises route fluctuation while doing that.

Damping Fluctuation is a general problem arising in DSDV due to the following reason of route updates:

Routes with newer sequence number are preferred and other stale sequence number is discarded.

After sequence number, priority comes for metric number. That is, for routes with same sequence, lowest metric is chosen.

The broadcasts of routing information by mobile nodes are not synchronous events. In the case of many mobile nodes independently transmitting update messages and having markedly different transmission intervals, it seen that a particular mobile node receives new update packets in a way that causes this mobile node to consistently change route back and forth between different next hops, even there is no network topology change has taken place. This fluctuation happens because of the above two route selection criteria. Conceivably, a mobile node can always receive two routes with equal sequence numbers or with a newer sequence number one after the other via different neighbours to the same destination, but the mobile node always gets the route with the worse metric first. This situation leads to the fluctuation with a continuing discard of new update packets. This can happen when there are many mobile nodes transmitting their updates irregularly.

4. PERFORMANCE EVALUATIONS

The main objective of our study is analyzing the performance of the DSDV routing protocols of MANET. Our simulations were conducted using ns-2. Here Constant bit rate (CBR) connections made with sources and sinks selected at random are the traffic scenarios considered during the simulation. Our simulation study deals with mobile nodes spread over an area of 500m x 400m. During simulation the protocols are evaluated by varying the number of nodes from 2 to 30. Also node mobility is varied from 900 to 9000 cm/sec.

The following metrics [2] were considered during the performance evaluation of DSDV routing protocols of MANET:

Packet Delivery Ratio: The portion of packets that were transmitted by the application and received at the receiving end.

Average End-to-end delay: Time taken by the information packet after it get transmitted by the sender to reach the receiving end. An average of all the packets received is then calculated over the entire simulation period.

Throughput: Total data received at the receiver end divided by the time at which the last information packet was received gives us the throughput.

Routing overhead: A total of the number of routing packets that were transmitted across the network for the discovery and maintenance of the routes is defined as the routing overhead.

Evaluation Based on Number of Nodes

Throughput

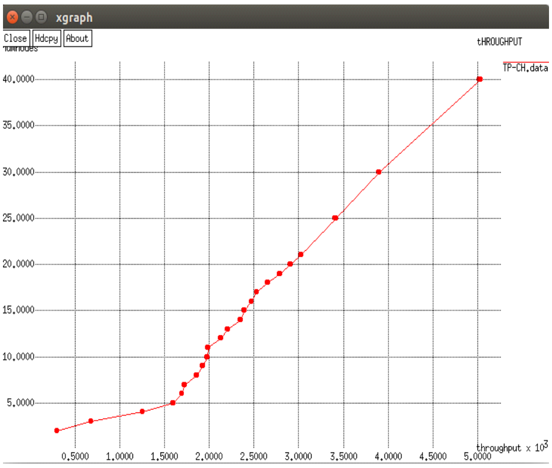

Fig 1: Throughput vs No. of nodes

Here we can see that DSDV with increase of number of nodes the performance of the throughput increase with CBR(constant bit rate) application. So we can say that even with the overload of table with growing network size the message delivery within less time increases.

Packet delivery fraction (PDF)

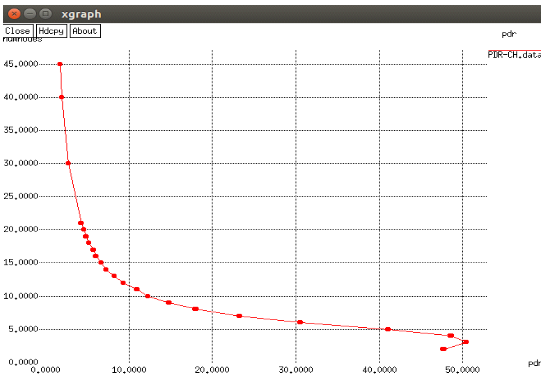

Fig 2: PDR vs No. of nodes

In PDR at first there is slight bit of increment of delivery ration with growing no of nodes then with growing number of nodes the delivery ratio decreases and eventually it turns to be constant with number of nodes. Here the loss of packet can be predicted as the number of nodes increases the receive packet by the nodes decreases. Also with increase of time interval of sending packets, the first increment of packet delivery increases.

End-to-End delay

Here with growing amount of node the average delay increases at first then changes take place by lowering the delay as the density increases with the number of nodes. This is because in later case once route is formed the possibility (link-breakage) is lesser as compared to the former case, where the probability of route formation is lower.

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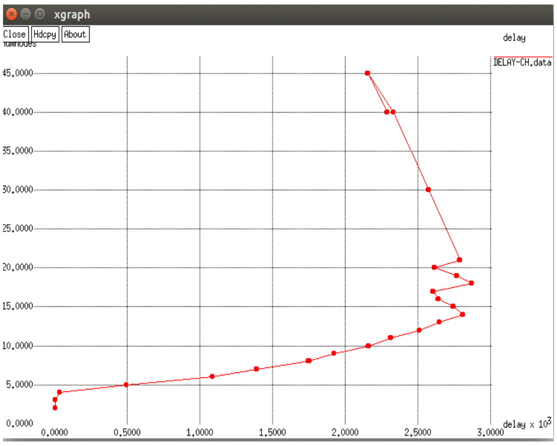

Fig 3: End to End delay vs No. of nodes

Routing Overhead

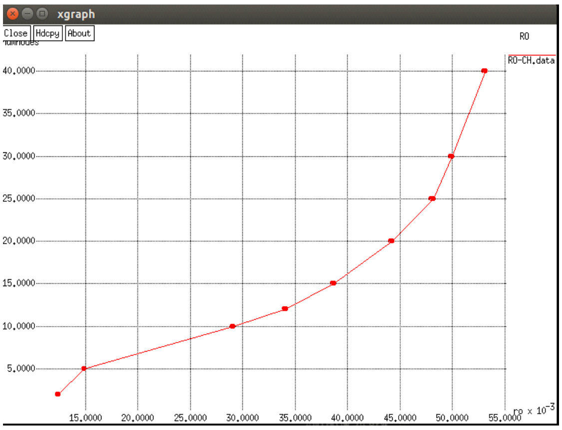

Fig 4: Control overhead vs No. of nodes

Here with the increase of number of nodes the overhead of routing information increases as the nodes density increases there will be more control information for nodes.

Evaluation Based on Mobility of Node
Throughput

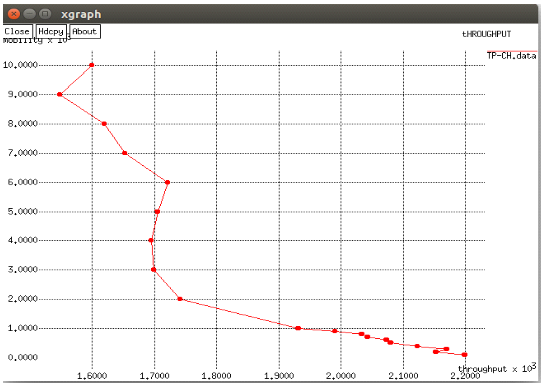

Fig 5: Throughput vs Speed of Node

With the increase of speed of node the throughput decreases as the sufficient time is not engulfed for traveling of message from one node to another .Also with the speed of node mobility some pause time decreases at the higher level so with that throughput decreases further.

Packet delivery fraction (PDF)

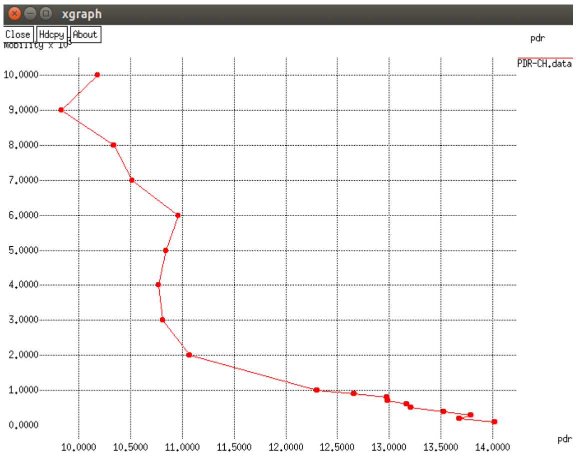

Fig 6: PDF vs Speed of Node

Here likewise throughput, the packet delivery also decrease the reason same is same, as not sufficient enough time used by the nodes.

End-to-End delay

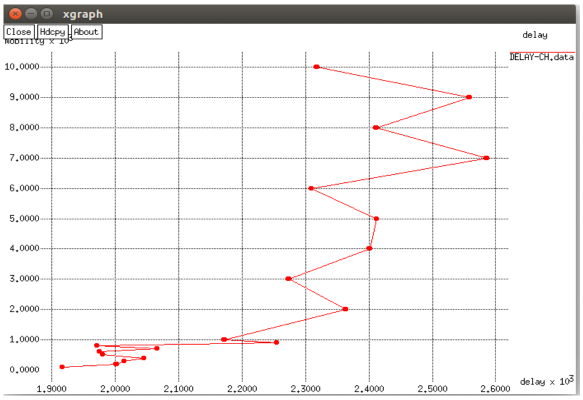

Fig 7: Delay vs Speed of Nodes

Here the Zigzag path is quite frequent with increase of speed as it tend to break the linkage quite often and also with load of routing the overall performance is delayed further following a constant increase .

Routing Overhead

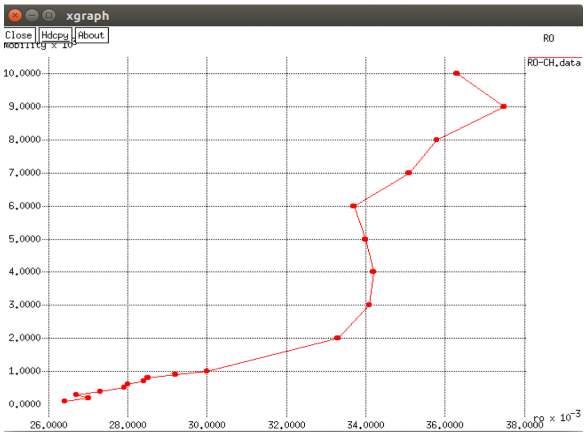

Fig 8: Control Overhead vs Speed of Nodes

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Here with the increase of speed of nodes the overhead of routing information increases as the size manipulative with speed changes frequently so there will be more control information for nodes.

5. CONCLUSION

Here In this paper we have analysed DSDV based on throughput, packet delivery, delay and also routing overhead on basis of number of nodes and node mobility. With this we have found that throughput is better with the increase of number of node again a delay is less. But it is not possible in case of node mobility. In future we are going to enhance the protocol on the basis of pause time of node mobility and QOS (quality of service) of nodes.

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REFERENCES

1. Mohandas, G; Silas, S; Sam, S. (2013): Survay on routing protocols on mobile adhoc networks. Proceedings of the International Multi Conference on Compressed Sensing (iMac4s), pp. 514-517.
2. Dina, S.G.; Janardana, S.; Jaya, J.; Sabreesaan, K.J. (2013): Implementation of network layer protocols in wireless
3. Networks for efficient routing. International Conference on.
4. Dr. Uwe Roth, "Highly dynamic destination- sequenced distance-vectorrouting", http://wiki.uni.lu/secanlab/Highly+Dynamic+Destination-Sequenced+Distance-vector+Routing. html.
5. P. Jacquet, P. Muhlethaler, A. Qayyum, A. Laouiti, L. Viennot and T. Clausen, "Optimized Link State Routing Protocol", Internet Draft, IETF MANET Working Group, draft-ietf-manet- olsr-04.txt, Mar. 2002.
6. R. G. Ogier, F. L. Templin, B. Bellur, M. G. Lewis, "Topology Broadcast Based on Reverse- Path Forwarding (TBRPF)", Internet Draft, IETF MANET Working Group, draft-ietf-manet-tbrpf- 05.txt, Mar. 2002.
7. G. Pei, M. Gerla, and T.-W. Chen, "Fisheye State Routing in Mobile Ad Hoc Networks", Proceedings of Workshop on Wireless Networks and Mobile Computing, Taipei, Taiwan, Apr. 2000.
8. Perkins, C.E., and P. Bhagwat, "Highly dynamic destination sequenced distance vector routing (DSDV) for mobile computers:, Computer Communications Review,1994, pp. 234–244.
9. Ching -Chuan Chiang, Hsiao-Kunag Wu, Winston Liu and Mario Gerla, "Routing in Clustered Multihop, Mobile Wireless Networks with Fading Channel," IEEE Singapore International Conference on Networks, SICON'97, pp. 197-211, Singapore, 16.-17. April 1997, IEEE.