

Proactive Routing Algorithm for Reducing Overhead in Mobile Ad Hoc Networks

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Abstract — In MANETs route discovery is frequently done due to the path discontinuation caused by movement of the mobile nodes. Path discoveries occur frequently in Ad hoc networks due to the mobility of nodes, and it could not be avoided. Broadcasting is the major method used to discover the path in MANETs which uses delay to rebroadcast to determine rebroadcast order which uses all its neighbor nodes to calculate delay. In this, location of nodes and selecting the boundary nodes are added before calculating delay for rebroadcasting request packets to proceed further for path discovery, which reduces time utilized for rebroadcasting. Previous recent path utilized is accessed to reduce time for discovering path by rebroadcasting. Rebroadcasting adds advantage of neighbor coverage knowledge and for calculating the probability for rebroadcast. This aims in reducing time for rebroadcasting and in reducing the routing overhead by getting neighbor knowledge and decrease number of transmission through selective node rebroadcast.

Index terms — Neighbor coverage, Mobile Ad hoc networks, rebroadcast delay, location

I. INTRODUCTION

Mobile Ad hoc networks (MANETs) are networks which does not have any infrastructure and the nodes present are able to move. These nodes are self configurable which have the routing and forwarding capabilities. The vital part in MANET is to form the route between nodes which requires routing protocols for transmission of data. By this the objective is in reducing the routing overhead and end to end delay and also in maintaining path for data transmission.

Various protocols aim in reducing overhead in routing. Ad hoc On-demand Distance Vector Routing (AODV) and Dynamic Source Routing(DSR) could improve the scalability of MANETs by limiting the routing overhead when a new route is requested. This is due to the mobility of nodes in the Ad Hoc networks which results in end to end delay and may reduce the packet delivery ratio.

Broadcasting is the method that is used to send the Route Request packet to the network for the path formation between the nodes. Each node will retransmit these packets until path is established. Storm problem can occur when redundant transmissions are made at each node.

II. LITERATURE REVIEW

In order to overcome the problem of broadcast storm problem[4] which occur due to the continuous rebroadcast of request packets at each node. So that various protocols are proposed to overcome this which are categorized by Williams and Camp[7]. Due to the neighbor based protocols are used for broadcasting as it seems better than that of other they are used. Kim and Zhang used protocols based on coverage area and neighbor confirmation[3] for route formation that utilized coverage area of each node along with neighbor data for broadcasting based on probability.

Zhang and Wang used estimated distance based protocol[10] to calculate distance by using received request packet. Path selection is made by eliminating weak path on reception of weak strength packet. Xue and Kumar[8] used number of neighbors that needed to form the path between the nodes. By using this neighbor based protocols Zhang limited the number of rebroadcast of request packets of each node. Using this protocols neighbor knowledge is determined and probability of rebroadcast is calculated[9]. By this delay calculated for each node so that each node rebroadcast is ordered so that avoiding storm problem can be made. As this procedure done for all uncovered nodes of each node this may take time to attain the route. Congestion occurrence can be reduced when number of uncovered nodes taken for delay is reduced. This minimizes end to end delay and noticeable increase in packet delivery ratio can be obtained.

III. PROPOSED METHODOLOGY

In this paper, certain characteristics are included to the nodes which include intimation of neighbor nodes with its location while giving response with certain time basis. These nodes are made to store recent path made through respective nodes for certain time. For redundant transmissions through same path this path storage is used. Whenever these nodes receive the packet from previous node which broadcasts, they receive packet with signal strength. By using this signal strength of received packet distance can be calculated between the nodes. So that selecting path with small distance can be made. when the threshold value is set for the signal strength, the respective

nodes are made selected for the rebroadcast to be made. By these nodes that have minimum threshold value are selected that are away from the node. This reduces frequent node handling that create packet loss. This reduces the time consumption for transfer of route request packet. when the previous path is not accessed or lost, broadcasting of Route REQuest (RREQ) packets done and delay calculated for nodes having threshold signal strength, location and its uncovered neighbors.

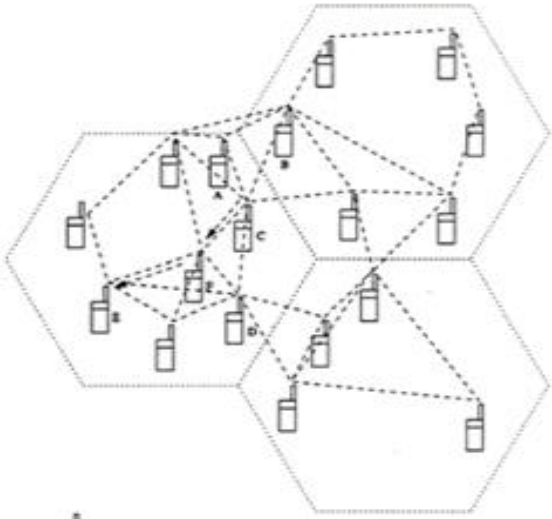


Fig. 1. Ad Hoc architecture without topology, with each node communicate with neighbor.

By this whenever a node receives RREQ packet from the previous it checks the neighbor node list of previous node from the received packet to the current node neighbors. If such nodes receives packet from a node, these nodes check their neighbor nodes that are coverable. If the particular node covers more new nodes than the neighbor node delay is set for rebroadcasting. Nodes that have more uncovered neighbor nodes are set with less delay. As limited nodes are selected by threshold value and its location, only these nodes are taken into account to set delay and to proceed to rebroadcast.

Rebroadcast delay determines the forwarding order to rebroadcast. The node which has more common neighbors with the previous node has the lower delay. Along with this rebroadcast probability is calculated for these nodes by using parameters such as additional coverage ratio and connectivity factor. In addition to this neighbor coverage-based probabilistic rebroadcast (NCPR), certain procedures are included such as getting location of neighbor nodes and storing last accessed path and usage of threshold strength to choose the path. With these included, time consumption is reduced in forming path and nodes that are handled are minimized so that loss is minimized so that packet delivery ratio can be increased which simultaneously reduce end to end delay. Instead of selecting all uncovered neighbor nodes, nodes with certain threshold value and based on its location are made to rebroadcast to forward the request packet further. Then these nodes are made implemented for

calculating delay using NCPR and forwarding order is maintained for these selected nodes.

The received RREQ from the previous node consists of information about the previous node and its neighbors. When the packet is sent to another node it checks its own neighbors and the previous node neighbors. If the received node neighbors are uncovered by the previous node then these are said as uncovered neighbor nodes.

By getting the uncovered neighbor list for each node, calculation of rebroadcast delay is done for each. By setting up the rebroadcast delay for each node, they are made to send the RREQ packet in an order to the neighbor nodes. Thus by delaying the broadcasting of the RREQ packets from each node the broadcast storm problem is made to overcome.

With the coverage ratio as the factor for each node, this form vital part in calculating the rebroadcast probability. This gives total number of nodes that are covered additionally to receive and process the RREQ packet.

Connectivity factor reflects the relationship of network connectivity and the number of neighbors of a particular given node. Combining the additional coverage ratio and the connectivity factor rebroadcast probability is determined. If this probability is nearly to one or greater than one, the particular node is made to rebroadcast the RREQ packets to the other neighbor nodes around.

The rebroadcast probability is made to be near to one or greater than one. Particular node is not made to rebroadcast RREQ packets when rebroadcast probability less than one. The connectivity factor is inversely proportional to local node density.

When local node density is low, the connectivity factor further increases the rebroadcast probability and also increases the efficiency of NCPR in the dense area. This shows that the local node density of node is so low that the node must forward the RREQ packet.

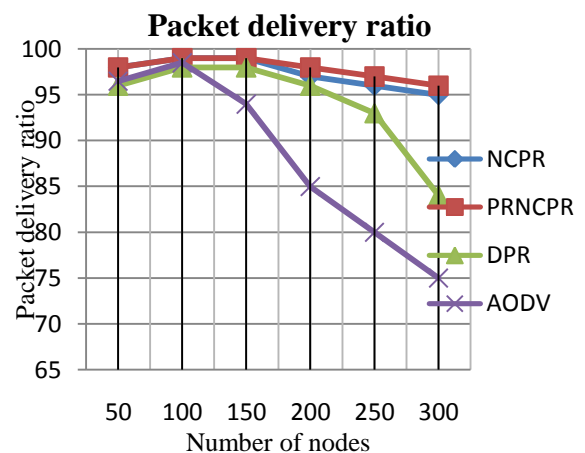


Fig 2. Packet delivery ratio with varied number of nodes

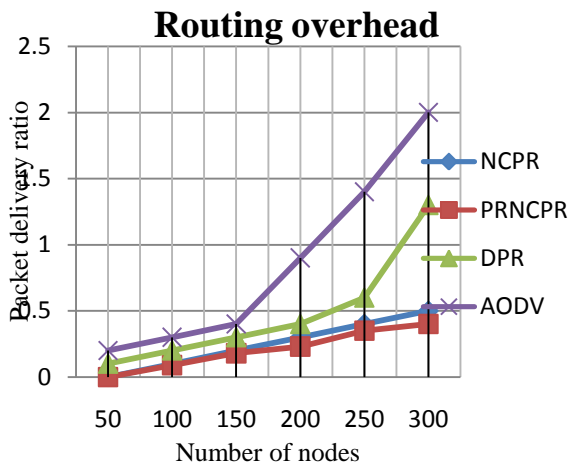


Fig 3. Routing overhead with varied number of nodes

IV. CONCLUSION

In this paper it was proposed that increasing the node functionalities with respect to location intimation and storage of recent path help in faster path formation using request packets. Delay is calculated and probability for rebroadcast is made for selective nodes that undergoes above conditions. So that packet delivery ratio can be increased nearly about 2% and end to end delay can be reduced about 30% when compared with NCPR. So that the better path discovery made in Ad hoc networks.

V. FUTURE ENHANCEMENT

Packet delivery ratio can be increased by reducing end to end delay in dense networks. Future work can be made to produce more packet delivery ratio in less dense networks.

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