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An Approach Towards Increasing The Throughput By Reducing Routing Overhead In MANET

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ABSTRACT
In MANET most of the time there is link breakage problem due to the mobility of the nodes which results in frequent route discoveries. Broadcasting is a basic and useful effective data transmission mechanism in a route discovery where a movable node blindly rebroadcasts the first received route request packet except it has a route to the destination, and thus it can cause the broadcast storm problem. To optimize the broadcasting, the number of rebroadcasts should be minimized which will decrease routing overhead and energy consumption. Here proposed approach is frequency based rebroadcasting with adjacent node information for reducing routing overhead.
Keywords:- MANET, Rebroadcasting, Route Discovery, RREQPacket.

I. INTRODUCTION

In MANET there are number of nodes which are mobile. Due to node mobility the topology of network frequently changes. The nodes are connected by wireless links. This network can operate with another network or connected to internet or alone. Ad hoc network are efficient for emergency configuration for quick deployment.

The existing routing protocols setup and maintains route between nodes, these routing protocols may be reactive or proactive. These routing protocols aim is to find the shortest path or minimum number of hops between the nodes. Between the nodes there may be single or many paths i.e. unipath or multipath. Finding the multipath is better than finding the unipath as if there is link breaks in one path, other path from available paths can be used for communication.

As there may be continuous movement of nodes, causing link breakage resulting in termination of end to end route. For resolving this link failure existing routing protocols broadcast the route discoveries packets to all its neighbours causing the excessive retransmission of route request packets (RREQPacket). This can cause the broadcast storm problem

Broadcasting protocols can be divided into four classes:

1) Probability Based Methods
2) Simple Flooding
3) Neighbour Knowledge Based
4) Area Based Methods

In high dense networks performance of neighbour knowledge is good than other three classes [3].

Hence by taking the advantage of neighbour knowledge, the proposed approach will be scalable, energy efficient, robust mainly will reduce the routing overhead by decreasing the number of redundant retransmissions of route discoveries packets.

II. LITERATURE REVIEW

Following are some existing studies and approaches related for optimization of broadcasting methods for improving the routing performance:

Redundant retransmission of route request packets consumes much network resources and which is very costly [1]. This retransmission causes more overhead on routing, leads to problems like collisions, contentions. Thus to avoid routing overhead optimization of broadcasting is an effective solution.

Where in the Gossip-Based Ad Hoc Routing [2] forwarding takes place with some probability at each node. This approach can save up to 35 percent overhead compare to the flooding of the packet. But, the improvement of this approach is limited, when the network density is high or the traffic load is heavy.

Probabilistic broadcasting approach based on coverage area and neighbour confirmation [3] uses the covering area of node to set the rebroadcast probability using the neighbour confirmation to guarantee ability of reaching the packet to its neighbour.

The Scalable Broadcast Algorithm (SBA) [4] scheme considers the fact of reaching packet to the more nodes according to that retransmit the received packet.

In Dynamic Probabilistic Route Discovery (DPR) [5] scheme is based on neighbour covering knowledge. In which forwarding of packet is take place according to the probability which is determined by considering the number of neighbours covered already by the packet along with number of its neighbour. However in DPR it only considers the nodes which are previously covered by the broadcast but ignoring the nodes which will receive the duplicate packets. Hence further optimization of DPR is necessary to increase the performance.

Also in the scheme [6] which combines AODV protocol with Directional Forward Routing (AODV-DFR) which takes the directional forwarding into AODV protocol used in geographic routing. When a route breaks, this protocol can automatically find the next-hop node for packet forwarding.

Practically, these approaches show the improvement in conventional routing schemes. However, to investigate and improve the throughput by reducing routing overhead further required to work, this imposes the next research problem of optimizing the rebroadcasting method in mobile ad hoc network.

III. PROBLEM STATEMENT

In MANET due to node mobility frequent link breakages may lead to frequent path failures which results in flooding of route discoveries. This could increase the overhead of routing protocols and reduce the packet delivery ratio with increasing end-to-end delay. Thus, reducing the routing overhead in route discovery is an essential problem.

IV. OBJECTIVES AND SCOPE

The main objective is to reduce the number of rebroadcasts which can effectively optimize the broadcasting in mobile ad-hoc network.

Objective of this approach are:

1) Reducing the routing overhead caused by the hello packets.
2) Reducing the overhead caused by rebroadcasting of route discoveries.

Scope:

Proposed approach is used not only for reducing the routing overhead but also to improve the overall throughput of MANET. The throughput of system can be improved by optimizing the rebroadcasting of route discovery packet in mobile ad hoc network.

V. PROPOSED METHODOLOGY

We proposed the frequency based approach of repeated broadcast with the effective application of covering neighbour information .This approach needs the computation of waiting time for each rebroadcast and rebroadcast frequency.

A. **Waiting time to rebroadcast:** The forwarding order can be determined by the Waiting time to rebroadcast. The node which has more common neighbours with the previous node has the lower waiting time to rebroadcast. If the node having lowest waiting time, rebroadcasts a packet earlier than node having higher waiting time. The neighbours which are more common will know this fact. Therefore, this approach makes it possible that information transmitted by the node as a packet is received by more neighbours.

B. **Frequency-based Rebroadcast:** This method considers the information about the uncovered neighbours (UCN), connectivity metric and local node density to calculate the frequency of rebroadcast.

The frequency-based rebroadcast is consists of two parts:

- Extended Coverage Ratio: Is the ratio of the number of nodes that are covered by a single broadcast to the total number of neighbors;

- Associativity Factor: This reflects the association of network connectivity and the number of neighbors of a given node.

This proposed approach combines the compensation of the neighbor coverage knowledge and the probabilistic mechanism, which can appreciably decrease the number of retransmissions so as to minimize the routing overhead, and can also enhance the routing performance.

The proposed frequency based rebroadcasting approach can be described as:

1. When node ($Node_i$) receives a Route Request packet from its neighbor node, it can use the neighbor list in Route Request Packet to find how many nodes (NCN) which are its neighbors(NB) are not covered by the received route request packet from its previous nodes($Node_v$)

$$NCN(Node_i) = NB(Node_i) – [NB[Node_i \cap NB(Node_v)] - Node_v \quad (1)$$

2. If node has more numbers of neighbors which are not covered by the route request packet received by from its previous node. Its meaning is that if node retransmits the route request packet, packet can be sent to more neighbors.

3. When a neighbor receives an Route Request packet it calculates waiting time(WT) to rebroadcast , considering the list of covering neighbors in Route Request and its own covering neighbors list.

$$D_r = 1 – [|NB(Node_v) \cap NB(Node_i)| / NB(Node_v)$$

$$WT(Node_i) = S_u * D_r \quad (2)$$

Where D_r - delay ratio
S_u - Small Fixed/Constant Delay

4. The timer for the retransmission of route request packet can be set node after calculating of the waiting time for rebroadcast.

5. When the same route request which is duplicate received node from its neighbor node. By extracting the rout request node will knows the number of neighbors which are covered by the route request packet. After that node will update the list of not covered neighbor set.

6. After determining of list of not covered neighbors, route request packet is discarded.

7. After the waiting time for retransmission of node expires it obtains last and final list of not covered neighbors.

8. Calculate the extended coverage ratio which is ratio of number of nodes that furthermore covered by this rebroadcast to number of neighbors of node.

$$ECR(Node_i) = | NCN(Node_i) | / | NB(Node_i) | \quad (3)$$

9. Also calculate associativity factor(AF) as,

$$AF(Node_i) = N / | NB(Node_i) \quad (4)$$

Where N is Connectivity Metric

10. Bringing together the extended coverage ratio and associativity factor, frequency based rebroadcast of node can be obtained to forward a packet.

11. Combining the additional coverage ratio and associativity factor, the rebroadcast probability of node can be obtained to forward the packets.

$$P_r(Node_i) = AF(Node_i) * ECR(Node_i) \quad (5)$$

The fig.1 shows the sample flowchart of proposed work for optimizing the broadcasting by taking the advantage neighbour covering information.

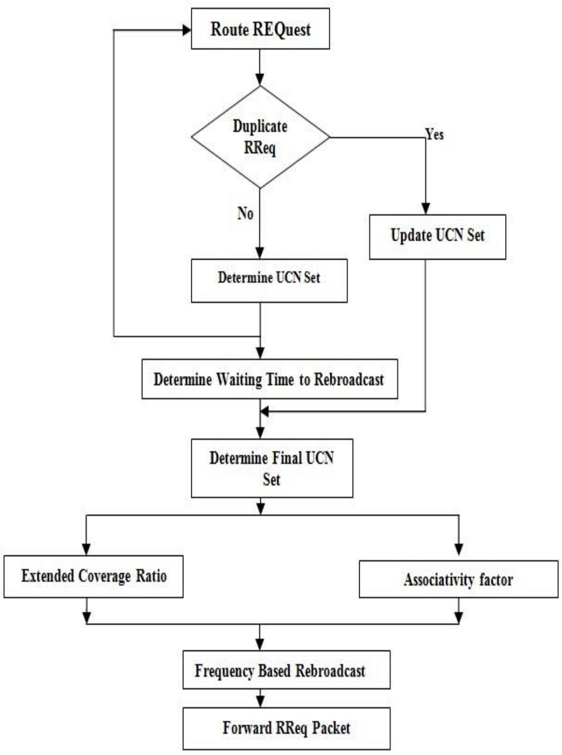

Figure. 1 Flow Chart For Proposed Approach

VI. CONCLUSION

In the MANET proposed approach introduces a frequency based rebroadcast protocol based on neighbour covering information to depreciate the routing overhead. This will generates less retransmission than flooding and some other optimized scheme studied in literature survey. By virtue of this network collision and contention minimized will results in increase in packet delivery ratio along with reduction of end to end delay which will give good performance in high density network.

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