RESEARCH ARTICLE OPEN ACCESS

A Novel Approach for Reducing Routing Overhead In MANET

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Abstract
The main objective is to decreasing the routing overhead and makes the network stable. We uses the 2-ACK scheme. This scheme is used to reduce the routing overhead. This scheme is suitable for MANET. Mobile Ad hoc Network (MANET) is a collection of mobile nodes equipped with both a wireless transmitter and a receiver that communicate with each other via bi-directional wireless links either directly or indirectly. In existing system, the mobile ad hoc networks (MANETs), nodes usually cooperate and forward each other's data packets in order to enable out-of-range communication. However, in friendly environments, some nodes may refuse to do so, either for saving their own energy or for intentionally disrupting regular communications (i.e. selfish or malicious nodes).This selfish nodes start refusing to forward or drop data packets thereby degrades the performance of the network. This type of misbehavior is generally referred to as packet dropping attack or black hole attack, which is considered as one of the most critical attacks that leads to the network collapse. To avoid this drawbacks, the 2-ACK scheme is used for this project. These schemes is used for detecting the selfish nodes, eliminating them and choosing the other path for transmitting the data and also reduce the routing overhead. After choosing the other path for transmitting the data there is a huge routing overhead is generated. So, this project uses Novel Routing algorithm which helps in decreasing the routing overhead and makes the network stable. In MANETs, Novel routing algorithm will also check the confidentiality of data message.

I. INTRODUCTION

MOBILE ad hoc networks (MANETs) consist of a collection of mobile nodes. The nodes can move freely. These nodes can be dynamically self-organized into arbitrary topology networks without a fixed infrastructure. Due to high mobility of nodes in mobile ad hoc networks (MANETs), there exist frequent link breakages. It lead to frequent path failures and route discoveries. The overhead of a route discovery cannot be neglected. In a route discovery, broadcasting is a fundamental and effective data broadcasting mechanism. A mobile node blindly rebroadcasts the first received route request packets unless it has a route to the destination, and thus it causes the broadcast storm problem. The conventional on-demand routing protocols use flooding to discover a route. They broadcast Route REQuest (RREQ) packet to the networks, and the broadcasting induces excessive redundant retransmissions of RREQ packet and causes the broadcast storm problem, which leads to a considerable number of packet collisions, especially in dense networks. Therefore, it is indispensable to optimize this broadcasting mechanism. Some methods have been proposed to optimize the broadcast problem in MANETs. Alireza et al [1] proposed a method uses two novel deterministic timer-based schemes. They are Dynamic Reflector Broadcast (DRB) and Dynamic Connector-Connector Broadcast (DCCB). This technique is more robust to node failure. But they use a smaller number of nodes. Heinemann et al [2] proposed a paper that uses RBP protocol, This protocol requires only local information, and resides as a service between the MAC and network layer, taking information from both. It is very simple protocol because it reduce complexity. This paper have not considered mobility, which will greatly increase the rate of topology change. The method used to identify one-hop neighbors may need to be adapted to a smaller window proposed a paper which presents a mathematical framework for quantifying the overhead of proactive routing protocols in mobile ad hoc networks (MANETs). This paper used a framework to model the routing overhead. This protocol gives good estimate of routing overhead than the other method. This protocol does not stability when the nodes join and disjoin. In paper [4] probabilistic based coverage area and Neighbor Confirmation in Mobile Ad Hoc Networks the authors used a dynamic probabilistic broadcasting approach with coverage area and neighbors confirmation for MANETs, This scheme combines probabilistic approach with the area-based approach. This incurs lower broadcast collision without sacrificing high reachability. This approach combines the advantages of probabilistic and area based approach. This method needs additional technique for saving energy. In [5] The Broadcast Storm Problem in a Mobile Ad Hoc Network the authors proposed the Cluster Based technique to cluster method solve other problems in MANETs, This scheme to develop an approach based on graph modeling. In this paper several schemes is proposed to reduce redundant rebroadcasts and differentiate timing of broadcasts to alleviate this problem. A mobile host decides to rebroadcast a broadcast message to its neighbors, all its neighbors already have the message. The main contributions of this project are as follows: We propose a novel scheme to calculate there broadcast delay. The rebroadcast delay is to determine the forwarding order. The node which has more common neighbors with the previous node has the lower delay. If this node rebroadcasts a packet, then more common neighbors will know this fact. Therefore, this rebroadcast delay enables the the nodes have transmitted the packet spread to more neighbors, which is the key to success for the proposed scheme.

We also propose a novel scheme to calculate there broadcast probability. The scheme considers the information about the uncovered neighbors (UCN),connectivity metric and local node density to calculate the rebroadcast probability. The rest of the paper is organized as follows: In Section 2 the methodology is defined and Experimental results and Simulation results in Section 3and conclusion is in Section 4.

II. METHODOLOGY

To overcome the drawback of the existing system the proposed system is used. The proposed system uses a probabilistic rebroadcast protocol. It is based on neighbor coverage to reduce the routing overhead in MANETs. This neighbor coverage knowledge includes additional coverage ratio and connectivity factor. The proposed scheme to dynamically calculate the rebroadcast delay. It is used to determine the forwarding order and more effectively exploit the neighbor coverage knowledge. Additionally to increase the efficiency the replica node will be found.

A. Modules

- Uncovered Neighbors Set
- Rebroadcast Delay
- Rebroadcast Probability

Uncovered Neighbors Set

When node n_i receives an RREQ packet from its previous node s, it can use the neighbor list in the RREQ packet to estimate how many its neighbors have not been covered by the RREQ packet from s. If node n_i has more neighbors uncovered by the RREQ packet from s, which means that if node n_i rebroadcasts the RREQ packet, the RREQ packet can reach more additional neighbor nodes.

Where $n_{(s)}$ and $N(n_i)$ are the neighbors sets of node s andn_i, respectively is the node which sends an RREQ packet to noden_i, we obtain the initial UCN set. Due to transmission characteristics of an RREQ packet, node n_i can receive the duplicate RREQ packets from its neighbors node n_i receives more number of request and it can occur channel collision. To avoid channel collision each node should set a rebroadcast delay. The choice of a proper delay is the key to success for the proposed protocol because the scheme used to determine the delay time affects the broadcasting of neighbor coverage knowledge. When a neighbor receives an RREQ packet, it could calculate the rebroadcast delay according to the neighbor list in the RREQ packet and its own neighbor list. Calculate the rebroadcast delay$T(n_i)$.

Rebroadcast Delay

The rebroadcast delay is defined with the following reasons: First, the delay time is used to determine the node transmission order. To sufficiently exploit the neighbor coverage knowledge, it should be disseminated as quickly as possible.. We assume that node nk has the largest number of common neighbors with node s, node nk has the lowest delay. Once node nk rebroadcasts the RREQ packet, there are more nodes to receive it, because node nk has the largest number of common neighbors. Then, there are more nodes which can exploit the neighbor knowledge to adjust their UCN sets.

To development, whether node nk rebroadcasts the RREQ packet depends on its rebroadcast probability. The objective of the rebroadcast delay is not to rebroadcast the RREQ packet to more nodes, but to broadcast the neighbor coverage knowledge more quickly. After defining the rebroadcast delay, the node can set its own timer.

Rebroadcast Probability

The node which has a larger rebroadcast delay may listen to RREQ packets from the nodes which have lowered one. For example, if node $n_i$receives a duplicate RREQ packet from its neighbor n_i it knows that how many its neighbors have been covered by the RREQ packet from node n_i. Thus, node $n_i$could further adjust its UCN set according to the neighbor list in the RREQ packet from n_i. Then, the $U(n_i)$ can be adjusted. After adjusting the $U(n_i)$, the RREQ packet received from n_i is discarded.When the timer of the rebroadcast delay of node n_i expires, the node finds the final UCN set. The nodes belonging to the final UCN set are the nodes that need to receive and process the RREQ packet. If a node does not sense any duplicate RREQ packets from its neighborhood, its UCN set is not changed, which is the initial UCN set.

The nodes that are also covered need to receive and process the RREQ packet. As Ra becomes bigger, more nodes will be covered by this rebroadcast, and more nodes need to receive and process the RREQ packet, and, thus, the rebroadcast probability should be set to be higher. Combining the additional coverage ratio and connectivity factor we find rebroadcast probability. We can observe that when it is greater than Nc, and is less than 1. That means node ni is in the dense area of the network, then only part of neighbors of node ni forwarded the RREQ packet could keep the network connectivity.

And when the equation is less than Nc, probability is greater than 1. That means node ni is in the sparse area of the network, then node ni should forward the RREQ packet in order to approach network connectivity. Combining the additional coverage ratio and connectivity factor The parameter Ra reflects how many next-hop nodes should receive and process the RREQ packet, it does not consider the relationship of the local node density and the overall network connectivity.

B. Techniques

- RREQ protocol
- NCPR protocol

C. Algorithm Steps

- The node which has a larger rebroadcast delay may listen to RREQ packets from the nodes which have lower one.
- If node ni receives a new RREQs from s
- Compute the initial uncovered neighbors of node and set U
- Compute the rebroadcast delay Td from U
- Set a Timer according to rebroadcast delay Td
- While ni receives a duplicate RREQj from nj before Timer expires
- Adjust the uncovered neighbors
- When the ni did not receives the duplicate RREQj from nj
- Discard (RREQj)
- If the Timer Expires
- Compute the rebroadcast probability
- If the Rebroadcast Probability ≥ Random(0,1)
- Then Broadcast (RREQs)
- If the Rebroadcast Probability ≤ Random(0,1)
- Discard (RREQs)

III. EXPERIMENTAL RESULTS

We compared our algorithms with other related algorithms for ther outing overhead.

The following three major metrics were measured in the evaluation: 1) Normalized routing overhead 2) Average end-to-end delay, and 3) Packet delivery ratio. Normalized routing overhead**:** the ratio of the total packet size of control packets to the total packet size of data packets delivered to the destinations.

Average end-to-end delay**:** the average delay of successfully delivered CBR packets from source to destination node. It includes all possible delays from the CBR sources to destinations.

A. Packet delivery ratio:

The ratio of the number of data packets successfully received by the CBR destinations to the number of data packets generated by the CBR sources.

No of Nodes	AODV	DPR	NCPR
50	79.65	89.65	98.77
100	78.35	88.47	97.68
150	77.86	86.35	97.21
200	75.81	84.12	96.81
250	74.21	83.78	95.67
300	72.65	81.98	95.12

Table 1 Packet delivery ratio

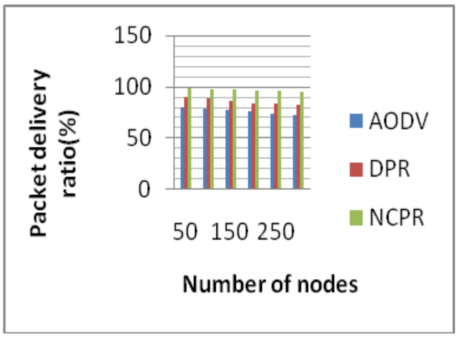

Figure 1 Packet delivery ratio

The packet delivery ratio with increasing network density. The Neighbor Coverage Probabilistic Rebroadcast (NCPR) protocol can increasing the packet delivery ratio because it can reduces the number of collisions in each node. This result shows that the NCPR protocol is the most efficient among the three protocols.

B. *Average end-to-end delay*

No of Nodes	AODV	DPR	NCPR
50	0.07	0.06	0.009
100	0.09	0.02	0.005
150	0.9	0.8	0.09
200	1.1	0.1	0.02
250	2.1	1.5	0.9
300	4.1	2.2	0.1

Table 2 Average end-to-end delay

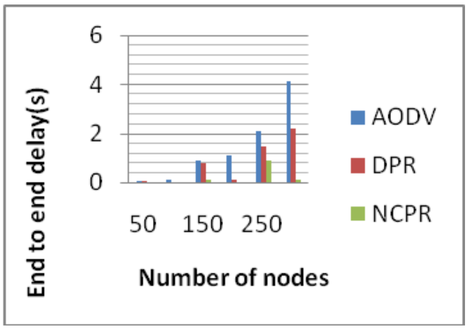

Figure 2 Average end-to-end delay

The NCPR protocol decreases the average end-to-end delay due to decrease in the number of dismissed rebroadcasting packets. This result shows that the NCPR protocol is the most efficient among the three protocols.

C. *Routing overhead*

The normalized routing overhead with different network density. The NCPR protocol can considerably reduce the normalized routing overhead experienced especially in dense network. This result shows that the NCPR protocol is the most efficient among the three protocols.

No of Nodes	AODV	DPR	NCPR
50	0.18	0.05	0.01
100	0.29	0.09	0.03
150	0.41	0.10	0.04
200	0.53	0.21	0.05
250	0.61	0.38	0.07
300	0.78	0.50	0.08

Table 3 Routing overhead

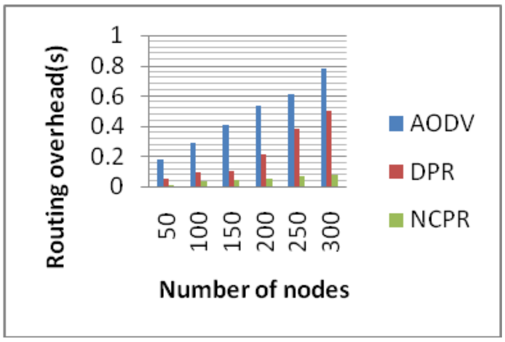

Figure 3 Routing overhead

The normalized routing overhead with different network density. The NCPR protocol can considerably reduce the normalized routing overhead experienced especially in dense network. This result shows that the NCPR protocol is the most efficient among the three protocols.

IV. CONCLUSION

We proposed a neighbor coverage probabilistic rebroadcast protocol lto reduce the routing overhead in MANETs. The neighbor coverage knowledge includes the ratio of the number of nodes that should be covered by a single broadcast to the total number of neighbors and the relationship of network connectivity and the number of neighbors of a given node. We projected a new scheme to calculate the rebroadcast delay according to the neighbor list in the RREQ packet and its own neighbor list. Simulation results show that the proposed protocol generates less rebroadcast traffic than the flooding and some other improved schemes Because of less redundant rebroadcast, the proposed protocol reduces the network collision and contention, so as to increase the packet delivery ratio, decrease the average end-to-end delay and decrease the routing overhead. The model results also show that proposed protocol has good performance when the network is in high density or the traffic is in heavy load. It also increases the efficiency by finding the replica node during routing in the MANET.

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