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A Survey on Reducing Routing Overhead in MANET by using various Techniques

Prajkta Nagrare, Vaishali Sahare
Department of Computer Science and Engineering, RTMNU
G.H Raisoni Institute of Engineering and Technology for Women
Maharashtra, India

Abstract— Mobile ad hoc network is nothing but a set of mobile nodes that dynamically forms a momentary network and able to communicate with each other without the use of a network infrastructure. MANET due to rapid increase in wireless communication problems like route discovery and path failure occurs. The existing system deals with the problem of route discovery using NCPR protocol. The NCPR protocol exploits neighbour coverage knowledge which gives an additional coverage ratio, also provide node density adaptation. By combining these two factors, it sets a reasonable rebroadcast probability. But the existing system does not mention any solution for path failure. In MANET nodes are mobile in nature which causes path failure, thus communication link may break. To avoid such path failure problem we need some mechanism which not only maintains continues communication and also improve efficiency of the system. In this proposing technique AMRIS protocol is used which deal with problem of path failure.

Keywords— Mobile ad hoc network, Neighbor Coverage, Probabilistic Rebroadcast, Routing overhead, NCPR, AMRIS

I. INTRODUCTION

Mobile ad hoc network (MANET) is nothing but a set of mobile nodes that dynamically forms a momentary network and able to communicate with each other without using any network infrastructure. Nodes are mobile in MANET. Due to its dynamic nature the topology of the MANET is ever changing and a source and destination pair create by communication link which may vary with time. It is a big challenge to design dynamic routing protocols with high-quality performance and minimize overhead for MANET. The router is accountable for creation, maintenance and updating of the dynamic routing table. The dynamic routing protocol increases the routing performance, but it causes routing overhead. Due to the fast movement of nodes in MANETs frequent link breakages takes place which leads to frequent path failures and route discoveries. Thus, overhead gets increase, end to end delay and packet delivery ratio decrease.

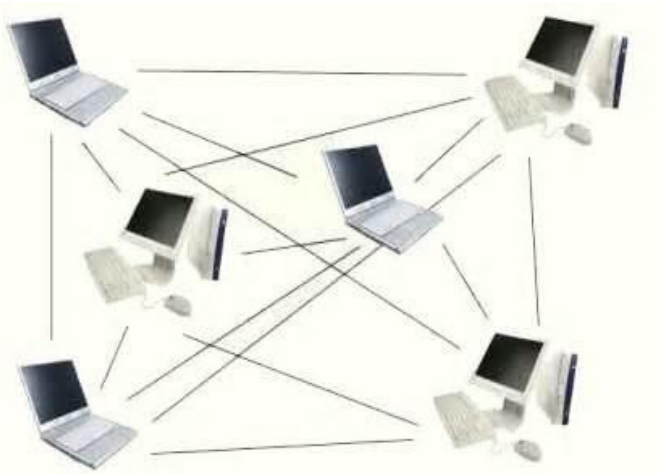

Fig. 1 mobile ad hoc network src: www.cacitches.com

The existing routing protocols in ad hoc networks are categorized into Proactive, Reactive and Hybrid. Ad Hoc On-Demand Distance Vector Routing (AODV) and Dynamic Source Routing (DSR) are the examples of Reactive routing protocols. Ad Hoc On-Demand Distance Vector Routing (AODV) and Dynamic Source Routing (DSR) [2] improve the scalability of MANET by reducing the routing overhead when new route is requested. Broadcasting [3] is a basic method for route discovery. Broadcasting creates a broadcast storm problem in which the mobile node without knowing the route to destination, it rebroadcasts the first received route request packets. Broadcast storm problem leads to a significant number of packet collisions. Therefore, it is important to optimize this broadcasting mechanism.

Previously, there were various methods have been proposed to optimize broadcast problem in MANETs. Broadcasting protocols classified into four classes: simple flooding, probability based methods, area-based methods, and neighbor knowledge methods. Neighbor knowledge broadcasting method is better as compared to both area based and probability based broadcasting. NCPR, use to improve the routing performance and to reduce routing overhead, by combining two methods neighbor coverage knowledge and probabilistic.

In this paper we have suggested a new path repairing process by using AMRIS protocol. AMRIS will repair path locally with low end-to-end delay and improve the packet delivery ratio.

II. RELATED WORK

In MANETs frequent link breakages occur due to quick movement of mobile nodes, which creates frequent failures of the path and discoveries of route the route discovery overhead cannot be ignored. Broadcasting is a common mechanism for route discovery and it increases the number of overhead and thus problems like broadcast storm get occur. *Xin et al.* [1] proposed a neighbour coverage-based probabilistic rebroadcast protocol for reducing routing overhead in MANETs. It minimizes the number of retransmissions so as to decrease the routing overhead, and get better routing performance.

D. Johnson*et al*. [2] proposed the Dynamic Source Routing protocol (DSR) is a easy and efficient routing protocol designed particularly for use in multi-hop wireless ad hoc networks of mobile nodes. The protocols composed of the two main mechanisms of "Route Discovery" and "Route Maintenance", which work together to allow nodes to discover and maintain routes to arbitrary destinations in the ad hoc network. Advantages of the DSR protocol consist of simply assured loop-free routing, operation in networks containing unidirectional links, use of only "soft state" in routing, and very quick recovery whenroutes in the network vary.

In a mobile ad hoc network (MANET) Broadcasting is a common method which resolves many issues in the network. Simply straight broadcasting is very costly and increase the number of overhead and thus problems like broadcast storm get occur. N. Karthikeyan*et al*. [3] proposed some schemes to reduce redundant rebroadcasts and separate timing of rebroadcasts to improve this problem, thus routing performance get better.

Kim *et al.* [4] addresses a probabilistic broadcasting scheme based on coverage area and neighbour confirmation. This scheme uses the coverage area to set the rebroadcast probability, and uses the neighbour confirmation to guarantee reachability.

L.M. Mackenzie*et al.* [5] proposed a dynamic probabilistic broadcasting scheme for mobile ad hoc networks where nodes move according to way point mobility model. The proposed approach dynamically sets the value of their broadcast probability for every host node according to the neighbour's information.

As there are various optimization of flooding, out of which many routing massages are unwantedly. Haas *et al*. [6] proposed a gossiping-based approach, where messages are sent on the basis of probability, this approach minimizes overhead of the routing protocols. For large network the gossiping protocols use fewer messages by 35% as compared to flooding and thus improve performance.

Abdulai*et al.* [7] approaches a scheme of Dynamic Probabilistic Route Discovery (DPR) which is based on neighbour coverage. In this approach, each node determines the set of neighbours which are covered by the previous broadcast and this scheme only consist the coverage ratio by the previous node.

Deterministic, timer-based broadcast schemes to only assurance full reachability over an optimistic lossless MAC layer; it provides strength against node failure. Keshavarz-Haddad *et al.* [8] proposed deterministic timer-based broadcast schemes: Dynamic Reflector Broadcast (DRB) and Dynamic Connector- Connector Broadcast (DCCB).

Stann*et al*. [9] proposed a Robust Broadcast Propagation (RBP) protocol to give near great reliability for flooding in wireless networks, and this protocol also has a good efficiency.

Network topology changes often and suddenly due to the random movement in nodes of the MANET. Thus, this leads to frequent path failures and route reconstructions, which causes an increase in the routing control overhead. Zhang et al. [10] proposed an estimated distance (Estd) -based routing protocol (EDRP) to guide a route discovery in the general direction of a destination, which can limit the propagation range of route request (RREQ) and reduce the routing overhead.

III. ROUTING OVERHEAD

In a mobile ad hoc network (MANET) Broadcasting is a common method which resolves many issues in the network. The broadcast storm problem occurs mainly due to redundant rebroadcast, collision problem, and contention problem. The rebroadcast is costly in broadcasting, increases routing overhead and consumes much network resources [3].

Here each node forwards a packet with a particular probability. In a simple gossiping approach each process periodically and randomly selects a partner with whom it exchanges recently observed information. Information disseminated by gossiping protocol spreads quickly and reliably with high probability. For large network the gossiping protocols use fewer messages by 35% as compared to flooding and thus improve performance. The gossip based approach is scalable and robust against failure. This approach fails if the network density is too high or if the traffic load is heavy, then the improvement of gossip based approach is limited. Also the natural redundancy of gossip protocol makes them less efficient than other approaches [6].

The Dynamic Source Routing protocol (DSR) is easy and efficient routing protocol designed particularly for use in multi-hop wireless ad hoc networks of mobile nodes. The protocols composed of the two main mechanisms of "Route Discovery" and "Route Maintenance", which work together to allow nodes to discover and maintain routes to

arbitrary destinations in the ad hoc network. Advantages of the DSR protocol consist of simply assured loop-free routing, operation in networks containing unidirectional links, use of only "soft state" in routing, and very quick recovery when routes in the network vary.

In Dynamic Probabilistic Route Discovery (DPR) approach, each node determines the forwarding probability according to the number of its neighbours and the set of neighbours which are covered by the previous broadcast. This scheme only considers the coverage ratio by the previous node, and it does not consider the neighbours receiving the duplicate RREQ packet. Advantages of DPR high performance, less end to end delay, reduces overhead and route discovery is the main problem[7].

A neighbour coverage-based probabilistic rebroadcast protocol is used to calculate the rebroadcast delay and rebroadcast probability. In sort to successfully use the neighbour coverage knowledge, a novel rebroadcast delay to find out the rebroadcast order, and then can get a more correct additional coverage ratio. Network connectivity is used to reduce the redundant retransmissions; a metric named connectivity factor is used. A rebroadcast probability is set, by combining additional coverage ratio and connectivity factor which is used to reduce the number of rebroadcasts of the RREQ packet, to improve the routing performance. Advantages of NCPR have very less routing overhead and less end to end delay [1].

TABLE I COMPARATIVE ANALYSIS OF PROTOCOLS

Protocol	**Parameters**		
	Routing overhead	**End-to-end delay**	**Schemes**
AODV	High	High	Combination of DSR & DSDV
DSR	High	Average	Source routing
DPR	Less	Less	Route discovery
NCPR	Very less	Very Less	Combination of neighbor coverage knowledge & probability mechanism

IV. NEIGHBOR COVERAGE BASED PROBABILISTIC REBROADCAST PROTOCOL

A neighbor coverage-based probabilistic rebroadcast protocol is used to calculate the rebroadcast delay and rebroadcast probability. In sort to successfully use the neighbor coverage knowledge, a novel rebroadcast delay to find out the rebroadcast order, and then can get a more correct additional coverage ratio. Network connectivity is used to reduce the redundant retransmissions; a metric named connectivity factor is used. A rebroadcast probability is set, by combining additional coverage ratio and connectivity factor which is used to reduce the number of rebroadcasts of the RREQ packet, to improve the routing performance. It has very less routing overhead and less end to end delay [1].

The rebroadcast probability can be considered of containing two parts:

A. Additional coverage ratio:

Additional coverage ratio defined as, the ratio of the number of nodes covered by a single broadcast to the total number of neighbors.

B. Connectivity factor:

Connectivity factor, which reflects the relationship of network connectivity and the number of neighbors of a given node.

This scheme uses a rebroadcast delay which helps us to identify the forwarding order and more efficiently exploit the neighbor knowledge. Creates less rebroadcast traffic than flooding and other schemes. Because of less redundant broadcast it mitigates network collision and contention and so increases the packet delivery ratio and decreases average packet end-end delay. Also has high performance when the network density is high or heavy traffic load. Calculation of distances to all neighbors does not rely on trustworthy nodes. This suit, static sensor networks and it requires several nodes to exchange information on the signal emitted by the node whose location has to be verified. This approach forces a node to collect several data on its neighbor movements before a decision can be taken, making the solution, not fit too many situations where the location information is to be obtained and verified in a short time span. Moreover, an adversary can fool the protocol by simply announcing false positions that follow a realistic mobility pattern.

V . PROPOSED WORK

AMRIS (Ad hoc Multicast Routing protocol utilizing increasing id-numbers) is a source initiated multicast routing protocol in which a common tree is constructed to support multiple sources and receivers. The main idea in this protocol is that each node has a session specific multicast session member identifier (MSM-ID) which indicates its logical height in the shared tree. The purpose of MSM-ID is to avoid any loop formation and repair the broken links locally.

These are following modules:

A. Module 1: Route discovery process and network formation

In this we will create network by using the NS2 simulation tool. NCPR protocol will be used for neighbor discovery process, route request broadcast, and route reply process.

B. Module 2: Link failure occurrence

Only if retransmission results, then in a failure, a Route Error message is sent to the initiator that can remove that Source Route from its Route Cache. So the initiator can check his Route Cache for another route to the target. If there is no route in the cache, a Route Request packet is broadcasted.

C. Module 3: Path recovery process

In order to reduce the retransmission of the routing process, the proposed method called node repairing process is enhanced using FRV (fuzzy relevance value), which is enhanced through AMRIS protocol. The node which gets fault is repaired by neighbor node which has the highest fuzzy value.

VI. CONCLUSIONS

In this paper, a survey is carried out to reduce the routing overhead in MANETs by comparing different protocols. The comparative analysis is based on parameters such as scheme, routing overhead, and end to end delay.Comparitive analysis shows that the NCPR protocol has less routing overhead and end to end delay.For path failure which is cause due to mobility of nodes in MANET, here AMRIS protocol is suggest. AMRIS protocol will be improve the efficiency of system.

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