International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

A Survey on Broadcasting Probability to Enhance Mobile Ad-hoc Network Using NCPR

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Abstract: ***The growing demand of wireless portable devices and the recent advances in Mobile Ad-hoc Networks (MANETs) provide a facility that users can benefit from anywhere and in situation of unplanned collaboration and more suitable for disaster relief. MANET consists of collection of mobile nodes which can freely move without any fixed infrastructure and is dynamically self-organized network. In MANET, the nodes move freely in random topology, so there is a high chance of breakage of link between the nodes. This leads to route discoveries and routing overheads and thus for reducing the routing overhead it is imperative to design such a dynamic routing protocol that will reduce the routing overhead and improves the performance scalability. In MANET, there is also have the problem of packets loss, thus showing the limitation of MANET regarding security as there is no any lines of defense in MANET. Hence, providing a secure network for MANET is another challenge. This paper proposes a protocol that will show the objectives of less overheads and good performance. According to a recent survey, authors suggested various routing protocol such as AODV, DSR, AODV-DFR, but they too have some limitations. In the proposed NCPR system, it will help to reduce routing overhead and increase in performance. In NCPR, protocol need to calculate the two factors i.e. rebroadcast delay and rebroadcast probability. Additionally, it is proposed to implement the AES algorithm for security purposes i.e. use the security key. After sharing the key, the source node can encrypt the data by using AES algorithm. Encrypted data can be transferred from source to destination.***

Keywords: Wireless Ad-hoc network, Rebroadcast Probability, Rebroadcast Delay, RREQ, MANET.

1. Introduction

MANET is a Mobile ad-hoc network. MANET consists of collection of mobile nodes which is self-organizing network i.e. design random topology. This type of network consists of a set of wireless mobile nodes which can move around freely and can communicate with each other using wireless radios without having the need for ay centralized administration. At the same time, those nodes in ad-hoc network itself act as a sender, receiver or router thus enabling free movement without fixed infrastructure. Normally in MANET, the nodes form the new links and break the others, resulting in high possibility of link breakage. This is because nodes frequently move leading to breaking of links which in turn leads to frequently path failure and route discovery mechanism. For this purpose, various designs for routing protocol such as AODV (Ad-hoc on Demand Distance Vector), DSR (Dynamic Source Routing), DPR, DBR (Dynamic Reflector broadcast) and dynamic Connector Broadcast are referred to. Based on the overall survey, these routing protocols do suffer from some limitations. In conventional, on demand routing protocols use the concept of flooding to discover a route. In this phenomena by using the broadcast the route request (RREQ) packet to the network it suffers from broadcast storm Problem [1] [2].

The proposed design system is about NCPR (Neighbor Coverage-Based Probabilistic Rebroadcast Protocol). NCPR [7] gives better performance in routing reducing the overhead in ad-hoc network. To achieve the goal, two factors are being considered - rebroadcast delay and rebroadcast probability. Rebroadcast delay [8], [9] is calculated by the forwarding order. In this method, determine the more common neighbor node with the previous lower node and record the delay and by comparing to other nodes too. The more common neighbor node will know this detail information about previous node. Rebroadcast probability can be calculated by using knowledge about uncovered neighbor (UCN), connectivity factor and also by knowing about the local node density. Value of the rebroadcast probability [8], [9] can be known by combining the additional coverage ratio and connectivity factor.

Kim et al [4] mentions about the performance for four classes i.e. simple folding, probability based method, area based method and neighbor knowledge. Finally, he concluded that knowledge method is better suited for better performance than the area based method and the area based method gives better result than the probability based method. In Ad-hoc network, it is difficult to reduce the routing overhead and route discovery difficulty by using NCPR protocol. NCPR protocol gives the better performance in case routing overhead because it already has the knowledge about its neighbor nodes.

2. Literature Survey

The term broadcast is a successful mechanism but suitable for quite huge and especially useful in dynamic networks. Broadcast uses too much resources and that is not affordable in small scale network because of packets loss redundant and also due to retransmission of leads traffic in the network [6]. There are some limitations on demand routing protocol in the sense that it produces traffic by blindly flooding in the process of route discovery. In this survey, the different authors proposed different routing protocols with good performance but suffered from limitations.

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Perkins [1] discussed about routing protocol for MANET. He mentioned the table driven and on demand approach according to the Table-driven routing protocol. ASDU and OLSR maintain the record and update the routing information about the node. This node consists of information moving from each node to every other node in the network.

This table is classified according to routing strategy. At every possible destination, the node discovers and maintains route periodically. The routing protocol AODV and DSR discover routes as per requirement for source and destination route by node no need to keep a periodic routing table.

Johnson [2] mentioned about the conventional On Demand routing protocol. In this scheme, (RREQ) Route Request packets that broadcast immediate neighbor to the node which requires finding route toward the destination. This method where the node blindly rebroadcast RREQ packet until a route is not established is due to the continuous rebroadcast to the packet and leads to collisions in the network.

Kim [3] proposed about a probabilistic broadcasting method which is depending upon coverage area and neighbor confirmation. In this scheme, both combination of probabilistic approach with area based method is used. By dynamically adjusting the same value of the rebroadcast probability using its additional coverage in its neighborhood, this coverage consists of the distance from the sender.

Abdulai [4] discussed the routing protocol dynamic probabilistic route discovery (DPR); this scheme depends on the neighbor coverage. The node is determining the forwarding probability and can depend upon the number of its neighbors and those set of neighbors. That is covered by the previous node and there is no need to consider the neighbor receiving the duplicate RREQ packet.

Ni [5] discussed about the broadcasting protocol and simple packet flooding but found that the rebroadcast a packet is not required. So, the rate of incoming packets increases, which further results in increase of collision rate and also of channel contentions. In this approach, by combining the advantage of distance based and area based method, helps in reducing the rebroadcasting rate. So, it reduces the end to end delay and packets reaches to the destination and low redundancy is achieved, but here the need is to set the rebroadcast delay and make the neighbor knowledge much quicker.

3. Existing Systems

From the survey for the routing process in mobile Ad-hoc network authors used the various protocols like AODV, DSR, simple flooding, probability-based methods but each one has its limitations such as frequently failure in path discovery, collisions occurs in networks, packets not reach at destination within a given time period that's leads to delay.

4. Proposed System

For reducing rebroadcast overhead, there is a need to calculate the rebroadcast delay and rebroadcast probability for NCPR protocol. To measure the rebroadcast delay, used upstream coverage ratio of an RREQ packet received is calculated against received from the previous node. Rebroadcast probability is obtained by combining additional coverage ratio of the RREQ packet and the connectivity factor [6].

MANET is a network. MANET consists of collection of mobile nodes that freely move without any fixed infrastructure that is dynamically self-organized network. In MANET, because the nodes are freely moving in random topology there is a high probability of breakage of link between the nodes and thus leads to route discoveries and routing overheads. So for limiting the number of rebroadcasts effectively, it is proposed to use the different routing protocol but it suffers from some limitation. In this paper, hence it is proposed to use a neighbor coverage-based probabilistic rebroadcast (NCPR) protocol, for this implementation and the need to calculate a novel rebroadcast delay [7] so that helps to find out used defined rebroadcast order, and also to calculate a more accurate additional coverage ratio. Connectivity factor also plays an important role in maintaining the network connectivity and resists to retransmission of packets and helps defined how many neighbors should receive the RREQ packets. By combining the additional coverage ratio and the connectivity factor we get the rebroadcast probability, which can be used to reduce the number of rebroadcasts of the RREQ packet and to improve the routing performance Also, by implementing the flow diagram of NCPR protocol

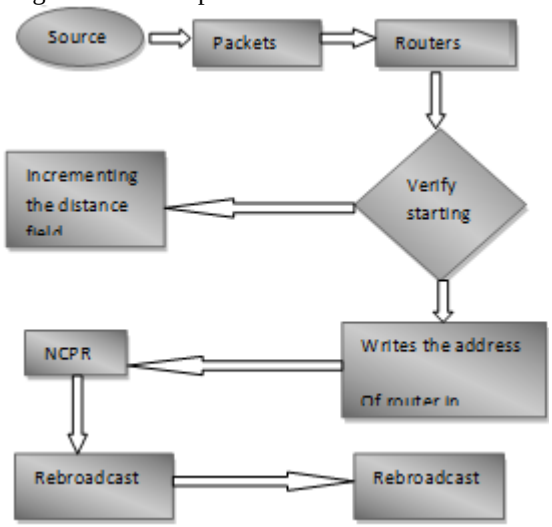

Figure : Flow Diagram of NCPR Routing Protocol

Comparison with AODV and DPR Routing Protocols

Routing protocol	*NCPR protocol*	
	AODV	*DPR*
Mac collision rate	Highly Reduced	Less Reduced
Routing overhead	Highly Reduced	Less Reduced
Delivery ratio	Decreases	Less than AODV
End to end	More	Less

Shows the comparisons NCPR with AODV and DPR protocols

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5. Conclusion

Mobile Ad-hoc Networks (MANETs) provides a facility that users can benefit from anywhere and in situation of unplanned collaboration and more suitable for disaster relief. MANET consists of collection of mobile nodes that move freely without any fixed infrastructure i.e. dynamically self-organized network. In MANET, because the nodes are freely moving in random topology, so there is a high chance of breakage of link between the nodes and thus it leads to route discoveries and routing overheads. So for reducing routing overhead, it is necessary to design such a dynamic routing protocol that will improve the performance scalability and reduce the routing overhead. NCPR is the routing protocol that is used for routing overheads by which it increases the delivery ratio and decreases the end to end delay.

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