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RESEARCH ARTICLE

Implementation of High Power Routing Node for Minimizing Flooding in Manet

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Abstract— ***Broadcasting has been used widely in wired and wireless networks to understand the data and topology information. There are various routing protocols in MANETs rely on a flooding mechanism to broadcast data and control packets over the entire network for establishing routes between source destination pair. The simplest way of broadcasting a packet to all nodes in the network is basic flooding or blind flooding which allows each node to retransmit a packet to its neighbours, in case it has not received broadcast packet during earlier transmission. This work proposes a modified version of AODV termed as AODV_HPR where certain nodes are assumed to be high energy transmission nodes known as High Power Routing (HPR) nodes, utilized for routing. The route is established only through HPR nodes which are capable of communicating to long distance.***

Keywords*— AODV-HPR, Flooding, etc.*

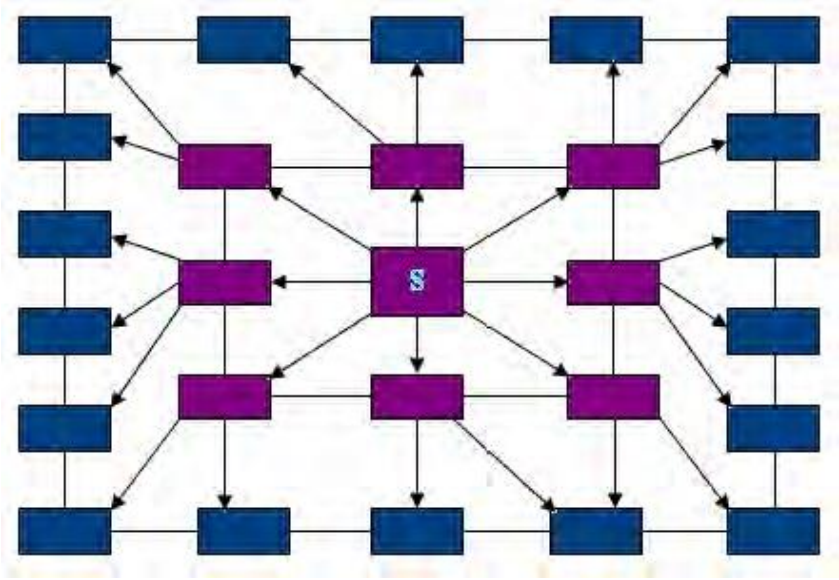
I. INTRODUCTION

MANET is a collection of dynamic mobile nodes which are self-organized and able to communicate without using a pre-existing network infrastructure. Each node acts as personal device and as a router and so it is able to forward data packet to other nodes. There are many types of routing protocols in MANETs rely on a flooding mechanism to broadcast data and control packets over the entire network for establishing routes between source destination pair. The easiest way of broadcasting a packet to all nodes in the network is basic flooding or blind flooding which allows each node to retransmit a packet to its neighbours, in case it has not received broadcast packet during earlier transmission. The rebroadcasting process continues until all nodes in

the network have received a copy of the packet. Since, topology packets pass through every possible path in parallel, it is assured that the flooding can always find the shortest path between various source and destination combinations.

However, the basic nature and characteristics flooding mechanism causes a large number of packets propagation in MANETs. This will eventually overload the network and traffic is congested, which is depicted in Figure 1.

In Figure 1, the centre node is the source node; nodes in the first inner circle are one-hop neighbours and the nodes in the outer circle are two-hop neighbours. While S, transmit out the packet, all the one-hop neighbours broadcast copies of the packet to all its two-hop neighbours of S at the same time. As a result, there is a heavy redundant rebroadcasting, which means same packet is being received more than once by some nodes, contention and collision that are referred to as the broadcast storm problem. There are various methods have been proposed for achieving efficient broadcasting to solve the broadcast storm problem. In general, these broadcast protocols can be categorized into three classes such as probability-based methods, area-based methods and neighbour knowledge methods. Figure 1- Sample Flooding Scenario. The probability-based methods are similar to basic flooding, except that each node rebroadcasts packets with a predetermined probability. This mechanism is found to be suitable in dense networks while multiple nodes with similar neighbour coverage. However, the effect of this approach is encouraging only in the sparse network. In area-based methods, the rebroadcast process depends on the distance between itself and the source node. While the distance between them is longer than a predefined threshold, the packet is rebroadcasted, so that a larger additional area can be reached. However, area-based methods do not consider whether some nodes actually exist within that additional area that leads to inefficient broadcasting. The neighbour knowledge methods are further classified as neighbour-designated methods and self-pruning methods. While a node in the neighbour-designated methods transmits packet with a specification to denote, which one of its one-hop neighbours should forward the packet and in self-pruning methods, the receiving node will decide whether the or not to transmit the packet by itself. Aim of the project is to design a method which will reduce the routing overhead in both route discovery and route maintenance, by reducing the flooding in route discovery process and to avoid broadcast storm problem



The heterogeneity of nodes makes traditional flat routing not useful and this disadvantage can be overcome by clustering the nodes. Here, we consider a single node having the highest power as the cluster head, which takes care of most routing functions. The overlapped clusters will have both low power nodes and high power nodes, which forms the cluster head.

II. LITERATURE REVIEW

Broadcasting is an important technique used to find the route to the destination. But the routing overhead associated with broadcasting is quite large in dynamic networks [1]. Williams et al proposed comparison of broadcasting technique for Mobile Ad Hoc networks. It uses simple flooding technique and counter based scheme. In this, source node blindly flood the RREQ packet to all the other nodes until it find the route to the destination. This technique failed to operate in congested networks. [2] Ad Hoc On-demand Distance Vector Routing. AODV uses the simple broadcasting technique. In this technique, source node broadcast RREQ packet

only to its neighbors. The neighbor of source node broadcast RREQ packet to its neighbors. It continues until it finds route to the destination. This technique is not suitable for more than 50 nodes. Zhang et al [9] proposed a probabilistic broadcasting scheme based on coverage area and neighbor confirmation. This technique uses the coverage area to set the rebroadcast probability. It also uses the neighbor confirmation to guarantee reach ability. Wu et al [6] proposed routing overhead as a function of node mobility modeling framework and implications on proactive routing. It uses proactive routing technique. The nodes maintain a table of routes to every destination in the network and periodically exchange messages. Every time the routes to destinations are ready to use. The disadvantages of this routing are every time routes to destinations are updated, even if it is not used. Johnson et al [2] proposed the dynamic source routing protocol for Mobile Ad Hoc networks. It uses DSR protocol. In DSR, every node is responsible for confirming the next hop in the source, until confirmation is received from the next hop. Route receives the packet. Each packet is only forwarded once by a node (hop-by-hop routing). If a packet cannot be received by a node, it is retransmitted. The disadvantage is that the same node will receives same RREQ packets again and again. [5] On the reduction of Counter-based Broadcast scheme for Mobile Ad Hoc networks. It uses counter based technique to find the route to the destination. In counter based technique, a counter threshold is chosen and initialize counter c=1, if the broadcast message is received for the first time. If the counter value is less than the counter threshold value, rebroadcasting continues. If the counter value is greater than the counter threshold value, rebroadcasting cannot be done. The disadvantage is every time node has to check whether it is less than the counter threshold value or not. Jing Jing Xia et al [1] proposed neighbor coverage based probabilistic rebroadcast for reducing overhead in MANETs. It uses the NCPR protocol. It considers the neighbor coverage knowledge. The disadvantage is that the same node will receives the same RREQ packet again and again. It creates routing overhead in Mobile Ad Hoc networks.

[8] Flooding technique is considered as a simple and direct approach to broadcast a message from one node to another node in the MANET. [7] Most of the well-known ad hoc routing protocols of MANET use flooding to ensure that all nodes receive the source message and it is assumed that the reach ability of this approach is approximately up to 100%. However, the flooding mechanism increases the number of packet and is unsuitable for MANETs [10]. Route discovery in wireless mobile ad hoc networks with adjusted probabilistic flooding [9], A New Probabilistic Broadcasting Scheme for Mobile Ad hoc On-Demand Distance Vector (AODV) Routed Networks, Performance evaluation of an efficient counter-based scheme for mobile ad hoc networks based on realistic mobility model and the broadcast storm problem in a Mobile Ad hoc Networks [3] debated that the broadcasting operation without using flooding technique can minimize the BSP and improve the MANETs performance in terms of low collision, overhead and end-to-end delay.

Consider a normal AODV route discovery process. For example, if the node S starts a route discovery process by broadcasting a RREQ message, then all the neighbours of S will receive the request and process the request. If a neighbouring node knows the route, then it will send a reply otherwise, it will forward the RREQ message by re-broadcasting it again [4]. In fact, all the nodes in the network will receive that RREQ message. If the message will reach the destination D, then D will send a RREP message.

Based on above discussion, it is noticed that most of the above mentioned protocols is applicable in multipoint MANET and all of them tries to minimize the number of messages. However, to achieve this it is observed that lot of energy is consumed or special hardware is required. Thus, it is imperative that a protocol is required to reduce the number of messages during broadcasting to avoid flooding.

III. MOTIVATION

I get motivation of this system from problems in broadcasting, In MANET, there are different protocols which rely on a flooding mechanism to broadcast data and control packets over the entire network for establishing routes between source destination pair. Basic nature and characteristics flooding mechanism causes a large number of packets propagation in MANETs. This will eventually overload the network and traffic is congested.

So to overcome this problem I am going to propose the High Power Node which will avoid the basic flooding mechanism which is use for broadcasting. By using HPR the network traffic load will be reduced.

IV. PROBLEM DEFINITION

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V. OBJECTIVE

The objective is to implement a method for improving the performance of Mobile Ad hoc Network (MANET) routing protocols under highly mobile time sensitive communication scenario. The performance is improved by identifying certain nodes as HPR nodes which involve in routing and the rest of the normal nodes which receive the routing packets are not allowed to process those requests. HPR nodes can be assumed as higher capability nodes which are having sufficient battery power and they may be deployed as HPR nodes and behave as HPR nodes during the entire life of the network. Only HPR node will be used for routing or route discovery if destination is not in neighbour list of source.

So, ultimate objectives here will be implementation of method to reduce routing overhead by using HPR nodes and design of header of HPR node.

VI. PROPOSED WORK

In proposed routing scheme, as shown in Figure 4, the HPR nodes only will be allowed to forward the RREP and RREQ messages. In other words, between S and D, a route can be established only through HPR nodes. Since the normal nodes will not rebroadcast the RREQ or forward RREP messages, it will reduce a lot of overhead as well as transmission power. Since the HPR nodes are capable of passing messages to longer distances, it will reduce the overall path length. The reduction in path length will reduce the end to end delay. Further, the normal nodes will only need to transmit up to the next nearest HPR node where the transmission (tx) power is reduced according to that distance, which reflects in the overall power consumption and reflects in reducing the routing overhead.

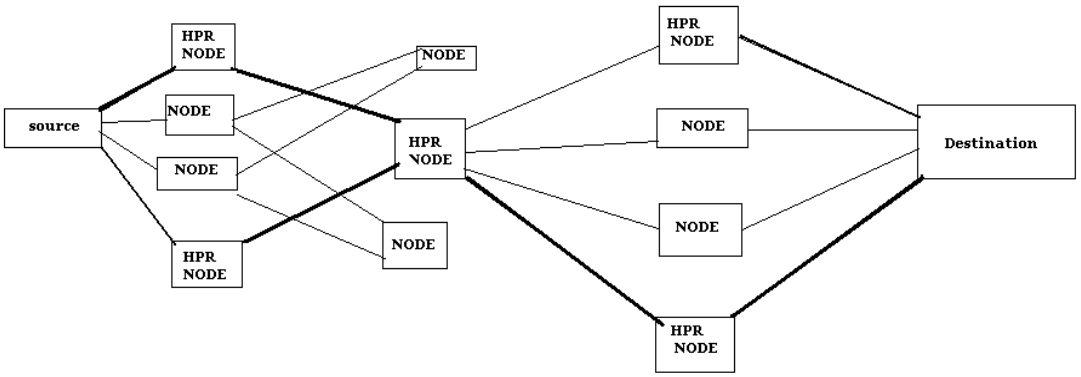

Figure 2. The proposed AODV-HPR method

The tx power to transmit packets from a HPR node to another HPR node will be constant and the established link will not be affected by a little mobility.

HPR Node Selection

HPR nodes can be assumed as higher capability nodes which are having sufficient battery power and they may be deployed as HPR nodes and behave as HPR nodes during the entire life of the network. On the other hand, even the status of a node can be changed as HPR node or normal node in a random dynamic fashion for balanced power consumption in all the nodes in a normal network of similar capability nodes. Anyway, a HPR node can transmit or allowed transmit to higher distance than normal nodes. HPR nodes can also be a source or destination node but anyway, a route can be established only through HPR nodes. Since there is no routing overhead for the normal nodes in the network, the end-to-end delay will be reduced very much. A route cannot be established through any arbitrary node in the network; hence the security in communication increases. In a typical MANET, mobility causes link failures and results in increased overhead and reduced performance. In the proposed AODV_HPR, the HPR nodes uses little bit of higher energy, so that it is resistant to mobility to

some extent. Since the HPR nodes are capable of communicating to high distance, little bit of mobility in individual nodes will not cause frequent link failures. Since the route is established only through HPR nodes, the other nearby normal nodes which will receive the routing packets will not process those requests and reduce the message overhead in a typical on-demand routing protocol.

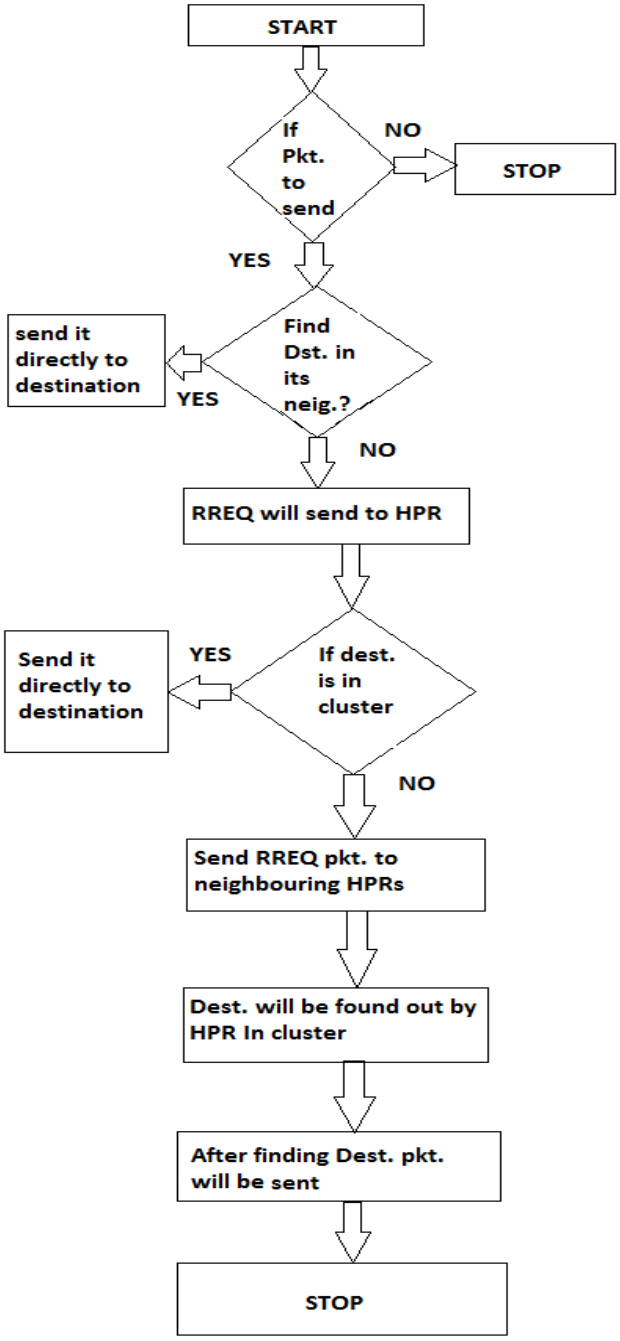

Figure 3. Flowchart of propose system

VII. CONCLUSION

The performance of proactive and reactive protocols is always questionable if used in a highly mobile short time communication scenario. Here, the routing protocols require certain time for achieving stable performance due to the periodic route discovery and maintenance mechanisms in their inherent design. In this paper, the performance of AODV is improved by identifying certain nodes as HPR nodes which involve in routing and the rest of the normal nodes which receive the routing packets are not allowed to process those requests acting as only the simple neighbouring nodes. HPR nodes can be assumed as higher capability nodes which are having sufficient battery power and they may be deployed as HPR nodes and behave as HPR nodes

during the entire life of the network. A HPR node can transmit or allowed to transmit to higher distance than normal nodes. HPR nodes can also be a source or destination node but, a route can be established only through HPR nodes. The modified AODV termed as AODV_HPR.

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