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Receiver Based Multicast for AD-HOC Networks

C.Uma, S.Karthikeyan [2]

[1]Research Scholar,[1] Department of Computer Applications, Dr. M.G.R. Educational and Research Institute University, Chennai
Assistant Professor,[2]Department of Computer Applications, Dr. M.G.R. Educational and Research Institute University, Chennai
Email: umasureshkummar@gmail.com, karthik.mpr@gmail.com

Abstract- An Ad hoc network is a wireless device to communicate directly with each other and with the principle of multi-hop relaying in which messages are sent from the source to the destination through the intermediate hops. Multicasting is the delivery of a message or information to a group of destination computers simultaneously in a single transmission from the source. Multicast is referred as one sender to many receivers. In lusty system with eruption blockage, where eternity of silence are awaited between the surge of data, this multicast state sustainment includes a huge amount of interaction, processing and memory have no advantage to the relevance. Thus we have developed a protocol that is receiver based multicasting with their member address, packet headers to enable the acceptor to fix on the best path to move the multicast traffic. This protocol called Receiver-based Multicast, deed the knowledge of the geographic locations of the nodes to take off the need for expensive state conservation, making it ideally suited for multicasting in dynamic networks.

Keywords- Ad hoc networks, protocol, multicast, receiver-based

I. INTRODUCTION

Ad hoc Networks is a collection of mobile or static nodes equipped with both a wireless transmitter and receiver that communicate with each other. Nodes communicate with each other directly if they are within the same communication range. It does not need any fixed infrastructure, can be formed instantly at the time of necessity. This will provide protocol for data transmission without the packet loss. An ad hoc network is formed when wireless devices come within communication range of each other. Routing is the process of moving packets across network from one host to another. There are two types of routing they are, proactive routing and reactive routing. Proactive routing gathers information before hand itself and reactive routing take place only on demand. Ad hoc On demand Distance Vector (AODV) routing protocol is used for the route discovery phase. Ad hoc On-Demand Distance Vector Routing is a routing protocol for mobile ad hoc networks and other wireless ad hoc networks. It is jointly developed in Nokia Research Center, University of California, Santa Barbara and University of Cincinnati by C. Perkins, E. Belding-Royer and S. Das. Destination Sequenced Distance Vector (DSDV) is a reactive routing protocol, meaning that it establishes a route to a destination only on demand. DSDV is one the early algorithm. DSDV is one of the appropriate algorithms for small networks. DSDV is a table driven routing sachem for ad hoc mobile network based on Bellman-ford algorithm. It is developed by C. Perkins and P. Bhagwat in 1994. Main aim of the algorithm was to solve routing loop. Each node in the cluster are maintained by the header node. Once a node receives a multicast packet (from the application layer or from a previous hop node), it divides the network into multicast regions, and it will split off a copy of the packet to each region that contains one or more multicast members. This virtual nodes is used as an imaginary destination for the multicast packet in that region. This virtual nodes are not necessarily reachable. The idea behind this is that even if a virtual node does not exist, we can still find a route using the assumed receiver-based medium access control (MAC) protocol to get the packet closer to the location of the virtual node. RBMulticast supports multicast group management where nodes can join or leave any multicast group. Some nodes manage the multicast groups and act as the group heads.The tasks are initially performed by the node identification, where the node communicate with each other and provide that they are set for data transmission. The challenge made here is to overcome unnecessary transmission of data packets and reach the destiny. After the node identification, cluster are formed using token analysis. From the formed cluster region node and header node are identified. Now the source node transmit the data to its region node and region node communicate with the header node on its own cluster and checks for the destination node. Receiver-Based Multicast protocol, RBMulticast, which is a stateless crosslayer multicast protocol where packet routing, splitting packets into multiple routes, and the medium access of individual nodes rely solely on the location information of multicast destination nodes. RBMulticast includes a list of the multicast members' locations in the packet header, which prevents the overhead of building and maintaining a multicast tree at intermediate sensor nodes, because all the necessary information for routing the packet is included within the packet header. Additionally, the medium access method employed does not require any state information. Tree creation or maintenance or neighbor routing table maintenance is not required, making RBMulticast require the least state of any multicast routing protocol, and it is thus ideally suited for both static and dynamic networks.

II. RELATED WORK

RBMulticast uses geographic location information to route multicast packets, where nodes divide the network into geographic "multicast regions" and split off packets depending on the locations of the multicast members. RBMulticast stores a destination list inside the packet header; this destination list provides information on allmulticast members to which this packet is targeted. RBMuticast is a receiver-based protocol, which means that a sender can transmit packets without specifying the next hop node, because the potential receivers of this packet make the decision of whether or not to forward this packet in a distributed manner. RBMulticast was motivated by the cross-layer protocol, RBMuticast assumes a MAC protocol whereby receivers contend for channel access based on their assessed contribution towards forwarding the packet. Nodes with more energy and better links and nodes that make the most forward progress to the destination will contend earlier and hence a higher chance to become the next-hop node. In

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RBMulticast , we extend this idea for multicast routing by using the concepts of a "virtual node" and a "multicast region" for forwarding packets closer to the destination multicast members and determining when packets should split into separate routes to finally reach the multicast members. The cross layer protocol performs received based contention, local congestion control, and distributed duty cycle operation in order to realize efficient and reliable communication in WSN. Performance evaluation results show that the proposed cross-layer protocol significantly improves the communication efficiency and out performs the traditional layered protocol architectures. The protocol, termed ODMRP(On-Demand Multicast Routing Protocol), is a mesh-based rather than a conventional tree based, multicast scheme and uses a forwarding group concept (only a subset of nodes forwards the multicast packets via scoped flooding). It applies on-demand procedures to dynamically build routes and maintain multicast group membership. ODMRP is well suited for as hoc wireless networks with mobile hosts where Multicasting has emerged as one of the most focused areas in the field of networking. An ad hoc network is a group of wireless mobile nodes which self-organize into a network in order to communicate. Such networks can operate organize into a network in order to communicate. Such networks can operate without the need for existing infrastructure or configuration. Each mobile node in the network acts as a router and forwards packets on behalf of other nodes. This "multi-hop" forwarding allows nodes beyond direct wireless communication range of each other to communicate.

III. RBMULTICAST DESCRIPTION

Receiver Based Multicast Protocol

A Virtual distribution tree is formulated during transmission time and guided by the destination positions. In the end, all packets for all multicast regions are inserted in the MAC queue, and are then multicasted to the neighborhood. The node closest to the virtual node (within the available relay nodes as determined by receiver-based contention at the MAC layer) will take responsibility for forwarding the packet. The packets are received by either the region node or header node. Now the packets received by the header are sent to its region node in its cluster. Then they forwards the data packets. The routing protocol used are DSDV (Destination Sequenced Distance Vector). It mainly depend on its destination node rather than its intermediate nodes. It uses Greedy algorithm and finds that no other virtual node is found than its cluster. Then region and header communicates from the starting cluster and finds the destination node. When the destination node is found through header list then acknowledgement is sent to the source node and transmission at the cluster are stopped.

Group Management

In a newly initialized network, each node is a stranger and challenge is a process to other nodes to form cluster. The source node picks one of the neighborhood node and initiates the process. The neighborhood node now transfers the process to other nearby nodes. The output gives the identified nodes which are suitable for data transfer. Now the identified nodes undergoes token analysis to form the cluster.

Region Recognition

The cluster formed uses the Greedy-Face-Greedy algorithm for the recognition of region and header nodes. Region node is used to communicate with the other clusters within the MAC queue. Header node is communicate the all other nodes within the cluster. Now the source needs to send the multicast packets reliably to the group members. With the group management, the member zones are recorded by header node, while the local group members and their positions are recorded by the Region node. Multicast packets will be send along a virtual distribution tree from the source to the region nodes, and then along a virtual distribution tree form the header to group members.

IV. PERFORMANCE ANALYSIS

The RB Multicast protocol is designed in such a way that it provides better packet delivery ratio and throughput. Performance graphs were obtained based on the simulation parameters. The performance is analyzed by throughput and packet delivery ratio.

[a] Throughput

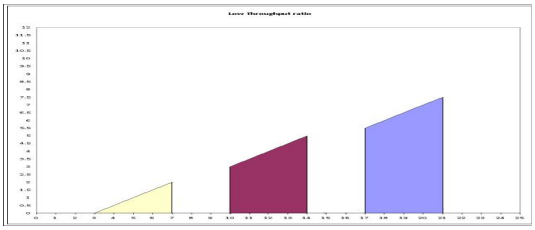
Throughput is the average rate of successful message delivery over a communication channel. The throughput is usually measured in bits per seconds, and sometimes in data packets per second.

[b] Packet Delivery Ratio

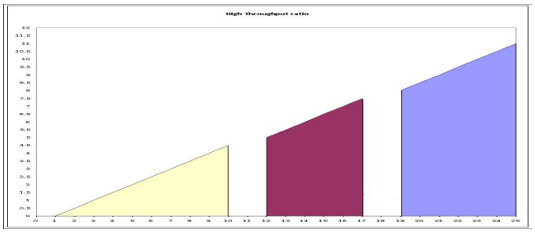
Packet delivery ratio is the ratio of the number of delivered data packets to destination. The packet delivery ratio is usually measured in number of data receive to the number of data send.

PERFORMANCE ANALYSIS

Data packets with High Throughput



Data packets with Less Throughput



Comparative Performance Analysis

Throughput is the average rate of successful message delivery over a communication channel. The throughput is usually measured in bits per seconds, and sometimes in data packets per second. Here the throughput is used as a metric to compare the two systems. The graph given below depicts the throughput of the thesis, where there is significant increase when RBMulticast routing protocol is being used, Hence the rate of delivery is high at destination when compared to that of earlier reachers.

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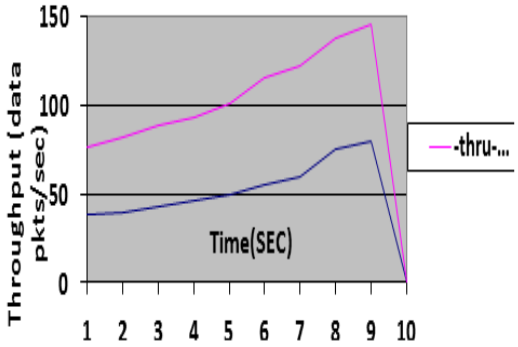
COMPARISON GRAPH



V. CONCLUSION AND FUTURE ENHANCEMENT

Ad-hoc network due to its dynamic nature has many challenges. Some of the major challenges are number of malicious node detected, destiny discovery and packet loss. RB Multicast protocol proved to be best in the case of destiny discovery and reduction in Unnecessary transmissions RB Multicast uses geographic location information to route multicast packets, where nodes divide the network into geographic "multicast regions" and split off packets depending on the locations of the multicast members. RB Multicast stores a destination list inside the packet header, this destination list provides information on all multicast members to which this packet is targeted. Thus, there is no need for a multicast tree and therefore no tree state is stored at the intermediate nodes. The sender node does not need a routing table or a neighbor table to send packets but instead uses a "Virtual Node" as the packet destination. The RB Multicast requires the least amount of state of any existing multicast protocol. The thesis simulation is carried out in the network simulator NS 2.34. The performance is analyzed by considering the following parameters network size and data packets. The performance of each scenario is recorded in the trace file from which we calculate the PDR and throughput.This scheme would be interesting to implement and evaluate our algorithm in a real-life network. Scenarios with higher number of mobile and static nodes should also be examined.

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