"A Survey On Quadrant Routing Protocol For Receiver Based Dynamic Multicast Adhoc Networks"

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Abstract— **Adhoc networks provide multicasting with the aid of multicast routing protocols. These protocol typically State full i.e. each node in the group should maintain the state information. To achieve this it requires high communication between the nodes and high processing. In dynamic network the topology is frequently gets changed which result in increasing control overhead, processing overhead and memory overhead. If there exists instability in routing table then it made the instability of multicast tree too as a result increases buffer time, packet loss and also increases packet retransmission. To overcome from these issues we have concentrated on stateless Receiver Based Multicast (RB multicast), where there is no need of maintaining state information. In this it simply appends the address of the multicast member node to the packet header and based on that information the packet is forwarded to the multicast traffic.**

Keywords-Multicast adhoc networks, RB multicast routing protocol, Multicast, QB multicast routing protocol.

I. INTRODUCTION

Multicasting is one of the major issue of wireless adhoc networks. Certain application like emergency search and rescue operation or military communication requires point to multipoint data delivery. In such situation multicast is necessary. Multicast is can be achieved with the aid of multicast routing protocols. In this it accomplishes the job in single transmisson and also manages nodes within the network and it considerably reduces the network traffic.Wireless adhoc networks are dynamic in nature it is due to the mobility of the nodes in the network. The movement of multicast member nodes changes the network topology dynamically in unpredictable form. Providing efficiency and robust multicast routing to the dynamic network is the major issue in designing multicast routing protocols and it should has minimum control overhead. Conventional multicasting like geocasting which makes use of geographical information for multicasting. Multicast reciever group is nothing but the nodes that are present in a particular geographical region. In this it may have either sender and intermediate nodes are dynamic and multicast recipients are fixed or all the nodes in the network are dynamic, in both the case the source node must know the location of destination nodes to support multicast services. This can be achieved by using service discovery protocol.This protocol automatically updates the location of the sink nodes to the source node in either the case (i.e,static sink nodes or dynamic sink nodes) like this the routing protocol gets the knowledge about sink nodes.Based on this knowledge we can achieve the design of stateless multicast routing protocol.

Our moto is to develop RB multicast protocol. It is completely stateless multicast protocol.Based on the location information it provides packet routing and spreads packet to multiple routes and also achieve medium access to the individual nodes[1].RB multicast encloses the location of multicast member nodes to the packet header. Based on this information it forwards the packet without creation and maintanence of multicast tree at intermediate sensor nodes. So it has low overhead. As we know RB multicast provides medium access,this does not require any state information i.e, the information about neighbour nodes and time synchronization. RB multicast does not require the creation of tree and maintanence of intermediate node routing table. Hence RB multicast is efficient routing protocol for dynamic networks because it requires least state information.

Multicast is a receiver based protocol, in these instead of sender the potential receiver will decide the packet transmission in a dynamic network.The crucial property of wireless adhoc network is energy management.In this each node has it's own battery life so finding the routes should consume minimum energy, for this the classical layer protocol dosen't provide any solutions. To overcome this, a unified cross layer protocol (XLM)[2] is developed in which it has both the information and functionalities of the communication layer in single protocol. In RB Multicast, it uses quadrant approach, as show in the below figure it devides the geographical area into four parts. Let us consider a sender,from that node it divides it into four regions. In this each node has their (x,y) values.Based on the (x,y) value it calculates virtual value. Virtual node is nothing but the next node to the sink node.

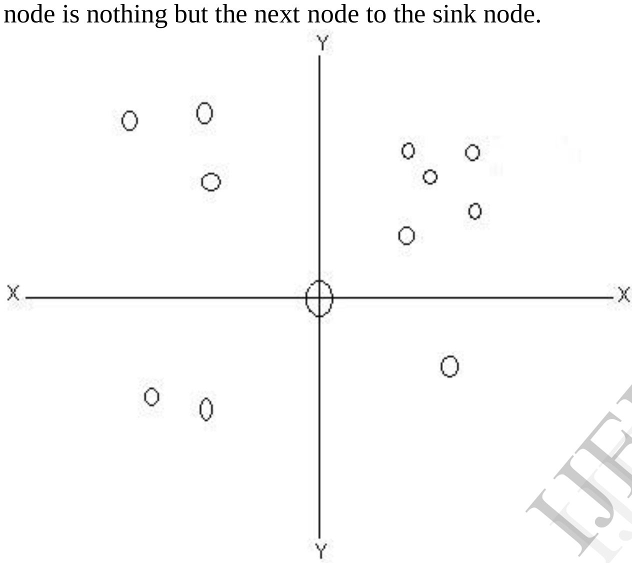

Fig 1. Quadrant approach

The RB multicast protocol performs very well when compared to the XLM protocol[3]. RB multicast protocol provides robustness and better efficiency, hence this protocol is well suited for multicast application in wireless adhoc networks.

2 RELATED WORK

Existing multicast protocols like Core Assisted Mesh Protocol(CAMP), Robust Multicasting in Adhoc Networks(ROMAN), Protocol for Unified Multicasting through annoncements(PUMA), Multicasting Over Direction Antennas(MODA), Adhoc On Demand Distance Vector Routing(AODV), Adaptive Demand Driven Multicasting Routing Protocol(ADMR) and Adhoc Muticast Routing Protocol Utilizing Increase ID-numbers(AMRIS) requires the creation of tree for connecting the multicast members[4][5][6][7]. For example in the selfish wireless network that needs to build Least Cost Path Tree(LCPT), the Pruning Minimum Spanning tree(PMST),Virtual Minimum Spanning Tree(VMST) and Steiner Tree for multicast routing. It also requires multicast routing algorithm to be maintained at the intermediate node. Based on that information the tree creation takesplace[8].In Location Based Multicasting, it performs multicasting based on the location of nodes in geographical area. For example in GMR which provides efficient forwarding but it suffers from the scalability issue where in HRPM it reduces the encoding overhead but it is energy inefficient[9]. In geocasting it consists the set of nodes within the specified geographical area, here nodes forwards the packet by calculating forward zone from the location information, it has high latency[10].Compare to the performance of location based multicast routing, RB Multicast provides better performance. Because it is completely stateless hence it does not require to maitain any costly state information. As a result it reduces the processing overhead which is needed to communicate with the neighbouring nodes, reduces memory overhead which is needed to store state information and also reduces the traffic that is needed to update the state information. In RB multicast it requires only the sender location and the location of their multicast members based on the location information packet forwarding takes place.

Below figure shows the architecture of existing stateless RB multicast protocol and it follows the following blocks.

2.1 Group Management

Group management provides the platform to the nodes to join or leave multicast member groups, here some nodes acts as a group head. Responisibility of the group head node is to manage other nodes of the multicast member group. If the node send "join" request to the group head, it can join multicat member group, If the node send "leave" request to the group head, it can leave the multicast member group. In this, group head periodically gets refreshed to update the node information(i.e join or leave) and it also uses time out function to remove the nodes from multicast member group once time out occurs. Here group head address is used for packet transmission(multicasting).

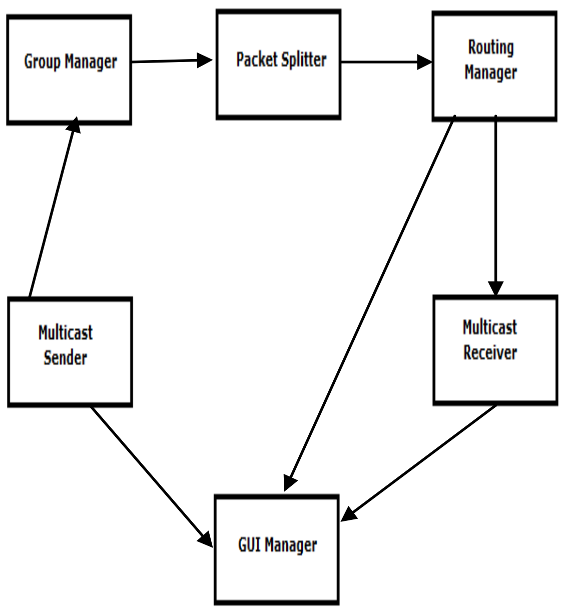

Fig 2. Block diagram of Existing System

2.2 Packet Splitter

In this packet is first broadcast to all reachable nodes. For the packet splitting it requires two algorithms to run at the sender side nodes and receiver side nodes[3]. In this packet splitting takes place at the relay nodes to forward the packet from sender to the receiver node. Packet splitting is necessary to send the larger size packets in reliable manner. Here packet splitter and reasembly takes place.

2.3 Routing Manager

In RB multicast protocol, we don't require routing table to be maintained at the intermediatory nodes to forward the packets. Hence we need find the virtual node. Virtual node is nothing but the temporary destination, In this we can find the virtual node by using the (x,y) values of multicast member group. To find this we need to take the geometric mean of the (x,y) values of the multicast member node.By that we can get the viraul node, if this node not destination then again we need to follow same procedure. This procedure is reapeated till we get the destination node. Routing manger responsibity is to find virtual node and forward packet to requested destination node.

2.4 Multicast Sender

In the RB multicast protocol, we are assuming that multicast sender is stationary, Here the responsibility of the multicast sender is to send the packets when it gets the request from the multicast receiver. Receiver sends the the request "send" packets to the sender after that ony sender can multicast the packets. If it fails to reach receiver due to packet drop or time out function, the responsibility of sender is to retransmit the packet once again.

2.5 Multicat Receiver

The RB multicast protocol is receiver based protocol, here packet forwarding is initiated by the potential receiver instead of sender. In this protocol we are assuming that the potential receiver is also stationary. The main disadvantage of this protocol is it doesn't work with the dynamic multicast member nodes. The potential receiver sends the "send" request when it needs packet, once it get the packet it should send acknowledment to the multicast sender.

2.6 GUI Manager

GUI provides the user interface, by that user can interact with the system. By this user can make nodes to join or leave the multicast member group. Once it join the multicast member group then it can send or receive pakets and it also shows the path that taken by the sender to receiver during the packet transmission.

3.PROPOSED SYSTEM

The existing protocol is not supporting for dynamic multicast member groups(i.e dynamic receiver), it assume that the multicast members are stationary during multicasting. To overcome this issue we propose new protocol called quadrant routing multicast protocol.In this protocol it supports dynamic receiver but it assumes sender as static and also supports for dynamic intermediate node as well as static intermediate nodes. Here also it does not required to maintain routing tables at the intermediatory nodes, So creation of the tree will not takes place. In this protocol we are using quadrant approach to find the virtual node. Virtual node plays an important role in forwarding the packets from source node to destination node. It supports dynamic multicast receiver with the help of virtual node, if the receiver moves from one quadrant to another quadrant, the virtual node will inform to the sender that the receiver has moved from one quadrant to another quadrant. So sender has to recalculate the virtual node with the help of (x,y) values of the receiver, with the help of new virtual node it sends the packet from source node to the destination node. The proposed quadrant routing protcol is well suited for dynamic adhoc networks.

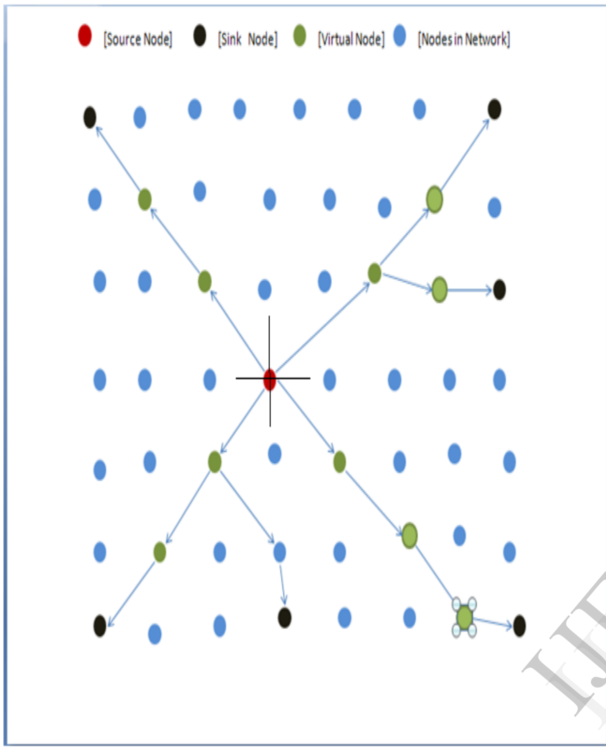

Fig 3. Proposed System Architecture

The fig 3 shows the architecture of the proposed qudrant based routing protocol. In this the red coloured node is sender, it is assumed as static. From that node we are applying quadrant approach in first quadrant it contains two sink nodes represented by black color. In second quadrant it as one sink node, third and fourth quadrants have two and three sink nodes respectively. Virtual node can be calculated by using the (x,y) values of the sink nodes. Virtual node is nothing but the temporary destination node.Virtual node is represented by green color. In the existing system it takes many routes to cover many sink nodes. With the help of virtual node we can cover near by sink nodes in single route. From the help of quadrant approach we can reduce the routing complexities. By this we can reduce hop count also, with the less numbers of hop count packet can reach the destination nodes.

4. CONCLUSION

The existing multicast protocols is completely statefull that is it requires state information to be maintained at the intermediate nodes for packet transmission. The stateless RB multicast protocol is completely stateless but it does not support to dynamic receivers.So we are implementing the quadrant based multicast protocol that can support to the dynamic receiver. It uses the geographic information to forward the packets from sender to multicast group. This protocol divides the geographic area into four quadrant, with this four routes we can cover many sink nodes. By this it reduces the routing complexities.This protocol is well suited for dynamic networks. Mobile sender creates a challenging problem for multicast protocol and it will be the future enhancement.

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