ISSN:0975-9646

Poomalar Selvan et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 5 (2) , 2014, 1981-1983

# Proposing an Efficient Multicast Group Management Algorithm for Ad Hoc Networks

**Poomalar Selvan**
*Information Security and Computer Forensic*
*SRM University*
*Kattankulathur, Chennai,*
*Tamil Nadu, India*

**Jeysree J**
*Assistant Professor,*
*Information Security and Computer Forensic*
*SRM University,*
*Kattankulathur, Chennai, Tamil Nadu, India*

**Abstract— Multicasting in ad hoc networks is done by most of the protocols which often uses multiple unicast method to forward the data packets. In existing mechanism, to reduce the costly state, maintenance like pre construction of routing trees and sharing them among nodes are avoided. Receiver based algorithm embed multicast nodes list and its location to its header packet. Using this header information, the potential receivers, which are along the path, forwards the data packets to its destination. Learning and sharing geographical location is done initially when each node joins in multicast region. Maintaining multicast groups is not easy, so to overcome this, we propose an idea to implement each node using anycast concept to efficiently update their location information to all their multicast group nodes. Term anycasting refers to the communication between a single sender and the nearest of several receivers in a group.**

**Index Terms—Mobile Ad hoc networks, receiver based Multicasting, Any casting in group management.**

## I INTRODUCTION

In wireless ad hoc networks Routing is not easy. Considering multicasting in real time applications where sending data to interested receivers, making routing decisions is difficult because nodes could be static or dynamic. In static nodes location may not change, so no need to update anything frequently. But in case of Dynamic topology where nodes location changes it adds burden to network traffic.

Receiver based multicast protocol [1] works on multiple unicast to attain multicasting. Protocol description states that in order to reduce the burden of the network traffic, it removes the costly state maintenance like prior tree construction of routing path etc. But routing is achieved in distributed manner, where potential receivers of each packet make the routing decision to forward the data with the help of provided multicast nodes list in the receiver based protocol packet header. Which means this routing approach does not need any routing tables. Where there are no routing tables to share among nodes, traffic is less, eventually nodes battery power has been saved. But source node must know the location of each nodes present in the network. This is achieved by service discovery protocol as of Receiver based multicast protocol [1].

Nodes make routing decision on each packet to forward along destination nodes with the help of location information. These location details are the geographical coordinates of each node which is calculated by the help of Gps device. Along with the routing multicast group management is efficiently maintained to reduce the network traffic with the help of anycasting mechanism, where no need of single dedicated node to sit and monitor the network and update the nodes with the information of nodes location and address. Explanation on how efficiently information among mobile nodes can possibly be shared and better routing performances are detailed in our research.

## II RELATED WORK

Multicasting protocol usually focuses on group management using a group header whenever a new node is added or an existing node is removed which adds an extra burden to the network traffic.

In XLM [2] protocol, the source node broadcasts packets with the geographic location of the destination in the header. Each and every receiver forwards the packet making use of different backoff times depending on the geographic distance to the destination. The EXOR [3] protocol is similar to XLM but here the receivers make use of different backoff times depending on the network distance instead of geographic distance to the destination. SOAR [4] uses the same ideas used above, but in addition supports multiple paths for selecting intermediate nodes. In receiver-based routing, decision making is delayed to the intermediate receivers, to make decisions distributed. All the above protocols make use of tree creation for packet routing and hence most of them require costly state maintenance. RB Protocol [1] resolves the above problem by introducing multicast group management thus resulting in efficient packet routing in distributed manner. The main drawback of this protocol is electing the group header for a group which is time consuming. To reduce the time taken, we make use of anycasting concept for updating the group information.

## III ANYCAST OVERVIEW

In IPV6, anycast is the communication between a single sender and the nearest of several receivers in a group. The term exists in contradiction to multicast; communication between a single sender and multiple receivers. Anycast is designed to let one host efficiently update the routing table for a group of hosts. IPV6 determines the closest gateway host and sends the packets to that host as though it were a unicast communication. In turn those hosts can anycast to another host in the group until all routing tables are updated.

## IV ANYCAST ROUTING MECHANISM

Network bandwidth utilization for control packets increases with anycast mechanism. The bandwidth utilization for messaging decreases as packets are delivered to their destinations via shorter routes. Reduction in messaging traffic of Anycast mechanism outweighs its increase in control traffic depending on the network load. Route availability in anycast is optimal. Anycast is inherently robust while providing simpler management and configuration for ad-hoc networks. In the case of packet delivery delay, anycast is efficient as it delivers packets via shorter routes.

Anycast mechanism plays an important role in locating, gathering, and retrieving information in ad-hoc networks. This mechanism makes the task of locating information that may be distributed among several higher-level services and/or applications easier. It allows the retrieval of information as it provides a server address for subsequent retrieval requests. The gathering and storing of information in a distributed, dynamic fashion is also made possible. If a source wants to route the packets to the destination from an anycast server, it broadcasts a route request (RREQ) packet including the destination anycast address. This packet takes multiple routes to multiple anycast servers. When anycast server gets the request, it includes its unique unicast address in a route reply packet (RREP). The source will hold information about all the anycast servers it receives from in its routing table and will use the traversing path with the smallest hop count. The routing entries in the routing table have a timer associated with it and when it expires, the route is removed from the routing table. Each anycast group consists of many anycast servers and several anycast groups which coexist with different services. Advantages of the protocol are that there will always be a route to any anycast server as the source keeps information about all the servers it receives. The timer for each route in the routing table keeps the routing information up to date.

Three metrics are used for the evaluation of this protocol: delivery ratio of packets, routing overhead and optimality. Simulation revealed that in most cases the packet delivery ratio is over 95%, and path optimality is above 80%. Since maintaining the routing tables becomes more frequent, routing overhead increases as mobility increases. Also, the fewer the number of servers in an anycast group the worse the performance. The number of source nodes in a network didn't seem to affect the performance. High rate of mobility affects the protocol's performance as discussed in Receiver based Multicast protocol and very low rate of mobility will deteriorate its performance. This occurs as a result of expiry of routes in the routing table as the table requires periodic broadcasts of RREQ packets that consume needless bandwidth. One way to resolve this is to have an exponential back off technique.

## V GROUP MANAGEMENT ALGORITHM

Modifying Rb multicast by using anycast method to efficiently update the nodes information requires a mac level algorithm to monitor the network. As seen before the advantages of the anycast mechanism, total network burden has been reduced but implementing for managing groups need to be analyzed very deep. Take a logic of anycast and apply by removing the node header in receiver based multicast which will improve the efficient in terms of network latency and communication times. Applying anycast in mac also promotes some strategies including channel listening and sensing putting the nodes in random back off preventing it from forwarding data while channel is already used by some other nodes. Packets namely Ready to Send (RTS) and Clear to Send (CTS) were mainly focused on channel sensing. Fixed back off timings are not suitable for all the time. Creating a random back off gives nodes an increased probability of sending data, corresponding to its attempting rates. Algorithm for updating the node follows,

**Algorithm**: Require to join a multicast group
**Limitation**: Nodes can't be more than 50 in a group.
**Ensure**: Make a connection with a node which is already belongs to a Multicast group
1. Get group info and also nodes list N from a multicast group node
2. **for** n in N group list **do**
3. ping with RTS packets as destination 'n'
4. **end** for
3. **add** all the reply CTS message into a Variable que Q
4. compare all the que packets for CTS timing
5. consider the shortest timing is neartest node 'p'
6. **send** following to p **{**
**7.** current node information including location
8. include N list into data **}**
9. P which receives does
10. **if** this.id matches in list which is received
11. Then repeat the same from 3 to 6
12. **end if**
13. Packet will be routed using same anycast manner till list becomes zero.
14. Everytime when a nodes receives this anycast packet, it check for checksum, if error then it discards the packet.
If the packet id not matching the group id, then also nodes will destroy the packets.

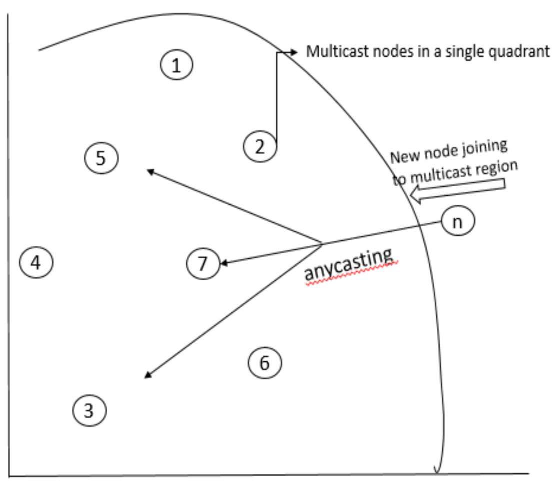


**Fig3:** Anycast among multicast nodes in a single quadrant

RB multicast enhancements, we assume that creating and maintaining the group without group heads, it helps nodes with low computational power as similar to sensor nodes which consume energy and gain in time from simulated latency. Group management in RB multicast is mainly stated as electing a group head with the help of some random election algorithm. But we suggest an idea to pause that head election. The job of group heads are to monitor the nodes, if any new nodes joins the network, it has to update the nodes list to all the existing multicast nodes, Which in turn helps the multicast routing as earlier discussed in distributed manner. But making the same possible without the help of group head is by implementing anycast method of data transfer. As mentioned by RB multicast assumption of 50 nodes per head is sufficient to validate the test result where even mac packet size limits this node list count.

To achieve high packet delivery ratio, at least one relay node should be awake and listening to the channel during an RTS packet transmission, this was described by Receiver Based multicast protocol. We use the same to our idea of implementation to increase the high delivery ratio for packets.

## VI Conclusion

In most of the multicast protocol major disadvantages are electing group header and tree creation, which are time consuming. In this paper we discussed anycast routing for an efficient group management using anycast client server methodology to maintain node information in all the neighbor nodes up to date. This algorithm helps to find smallest hop count in a group to forward data packets to all the nodes in the multicast group. Hence there is no need for tree creation, group header election, thus anycast is apt for both stationary and dynamic network communication devices.

## Reference


[1] Chen-Hsiang Feng, Yuqun Zhang, Ilker Demirkol and Wendi B. Heinzelman, "Stateless Multicast Protocol for Ad Hoc Networks", IEEE Transaction On Mobile Computing, VOL. 11, NO. 2 , Feb 2012.

[2] I. Akyildiz, M. Vuran, and O. Akan, "A cross-layer protocol for wireless sensor networks," in Proc. of CISS 2006, March 2006.

[3] S. Biswas and R. Morris, "Opportunistic Routing in Multi-Hop Wireless Networks", SIGCOMM Computer Comm. Rev.,vol. 34,no. 1, pp. 69-74, 2004.

[4] Dow, C.R. Hwang, S.F. "Design and Implementation of Anycast Protocols for Mobile Ad-hoc Networks" Advanced Communication Technology, 2006. ICACT 2006. The 8th International Conference

[5] E. Rozner, J. Seshadri, Y.A. Mehta, and L. Qiu, "SOAR: Simple Opportunistic Adaptive Routing Protocol for Wireless Mesh Networks", IEEE Trans. Mobile Computing, vol. 8, no.12,pp. 1622-1635, Dec. 2009.

[6] Receiver Based Multicasting depends on the Geographical Location of Region Anitha Jose, L. Lakshmanan & G. Samanth, 2319 – 2526, Volume-2, Issue-4, 2013

[7] Study on IP Anycast in Ad-Hoc Networks Husam Sarhan and Chansu Yu, Research paper.

[8] S.-J. Lee, M. Gerla, and C.-C. Chiang, "On-Demand Multicast Routing Protocol,"Proc. IEEE Wireless Comm. and Networking Conf.(WCNC '99),vol. 3, pp. 1298-1302, 1999.

[9] J. Garcia-Luna-Aceves and E. Madruga, "A Multicast Routing Protocol for Ad-Hoc Networks,"Proc. IEEE INFOCOM,vol. 2,pp. 784-792, Mar. 1999.

[10] Martin Mauve, Holger Fußler, Jorg Widmer, Thomas Lang", MobiHoc Poster: Position-Based Multicast Routing for Mobile Ad-Hoc Networks", Mobile Computing and Communications Review, Volume 7, Number 3.