

A Cluster Head Gateway Approach for Deciding the Cluster Head in Mobile Adhoc Network

Ahmad Anzar¹, Joshi Pankaj¹, Rathi Vikas¹, Bagwari Ashish¹, SC Gupta², IIT Roorkee, (India)

Abstract—Due to insufficient frequency band and tremendous growth of mobile users and number of services demanded by the users inspires the researches to find out the new aspects of wireless communication. As the number of nodes increases complexity of MANET increases in various issues. For this reason various approaches has been produced to reduce the complexity such as cluster head technique and dominating set based gateway technique introduced. In our paper we remove the limitation from the above mentioned approaches and given a new approach in which cluster head and gateway will be same and that node is known as cluster head gateway (CHG) ,in which all the responsibilities of cluster head and gateway will be perform by the CHG and we introduces the prediction table concepts in such a way that if CHG node moves or left the network then which node will act as the CHG, because if without giving the responsibilities of CHG to any node the rest of the node of that cluster has strong chances to loss the network. By applying this approach we will reduce the overhead for deciding the cluster and gateway for an adhoc network and by maintaining the prediction table we can decide which node will work as CHG in future.

Keywords—MANET,CHG, Overheads,. Mobility

I. INTRODUCTION

FUTURE information technology will be mainly based on wireless technology. Infrastructure based cellular and mobile networks are still limited by the need of infrastructure such like base station, allocation of frequencies .to fulfill the demand of users various approaches are given such as frequency reuse concepts, clustering technique, sectoring technique, and assignment of conflict free channels. Deciding the cluster size on behalf of co channel interference ratio [4, 5], is one of the technique to reduce the interference and providing the optimized solution. This infrastructure based communication fulfills the desire of users, but we are still lag behind to use the full advantage of wireless communication, think about the area where war is going on and a natural disasters area, a defense application, where there is no infrastructure, to serve the such kind of application mobile adhoc network based communication is introduced, Adhoc networks are key to the evolution of wireless networks [6]. Adhoc networks are typically composed of equal nodes

that communicate over wireless links without any central control. Although military tactical communication is still considered the primary application for adhoc networks, commercial interest in this type of networks continues to grow [1,2]. Adhoc wireless networks inherit the traditional problem of wireless and mobile communication, such as band width optimization, power control and transmission quality enhancement. In addition topology is highly dynamic and random and very hard to predict. Physical security is limited.

II. RELATED WORK

Routing is one of the major challenges in MANET. Routing in MANET has three major goals. [7]

- Provides the maximum reliability by selecting alternatives route if a node fails
- Route network traffic through the path with least cost in the network by minimizing the actual length between source and destination through the least number the least number of intermediate nodes.
- Give the nodes the best possible response time and throughput. This is specially important for the interactive session between user application.

Routing can be classified in MANET as proactive and reactive. In proactive routing routers attempts continuously the routes within the network. In reactive protocol invoke the route determination procedure only on demand. Cluster based routing [8] is a convenient way for routing in MANET. In MANET nodes are very close to each other normally one hop or two hop distance, each cluster has one or more gateway node to connect to other cluster in the network. Back bone routing [9] and spine based routing [10] uses a similar approach.

III. PROBLEM FORMULATION AND CHG APPROACH

In our approach CHG has the following responsibilities:

To maintain the routing table of all CHG. As in our case for the CHG 9 has to maintain the routing table for other CHGs.

TABLE I
ROUTING TABLE FOR OTHER CHGS

CHG	Via	Distance	Member list
4	9-4	1	5,6,10
7	9-4-7	2	11,12
8	9-8	1	13,14

TABLE II
CHG DOMAIN MEMER LIST

Member node	Via	Distance in hop
1	9-1	1
2	9-2	1
3	9-3	1

Ahmad Anzaar (Research Scholar), Graphic Era University, Dehradun(India) (+919634321293) ; email : anz.hmd@gmail.com.

Joshi Pankaj (M.Tech), Graphic Era University, Dehradun (India) ; email : pankajjoshi@rediffmail.com

Rathi Vikas(M.Tech), Graphic Era University ,Dehradun
email : vikas.rth@gmail.com

Bagwari Ashish,(M.Tech) Graphic Era University ,Dehradun
(India) ; email : Ashishbagwari@gmail.com

SC Gupta, IIT Roorkee, (India)

To maintain the prediction table: at the time of joining the cluster for a node CHG will demand that how much time you will stay here this is not mandatory but recommended to node to send the information, as mobility is unpredictable.

TABLE III
PREDICTION TABLE

Member	Prediction time (PT) in minute	Time counter(CT)
1	—	3
2	—	4
a	10	0

- How many nodes are present in the cluster, two approaches are given
 - (i). One who is leaving the network will send a kill signal to the CHG.
 - (ii). Second at the time when any CHG is demanding to connect the host & it is unable to reach. Then node not reachable signal is given to the CHG & CHG will delete the entry of that node and broadcast the routing table to other CHGs.
- When itself is leaving
 - (i) When the time of itself is expiring ask again to the node which is longer to stay, and sends the routing table and prediction table to that node and that cell will broadcast the new entry to other CHGs and its node.
 - (ii) At emergency ,before shutting down or leaving the node it sends the information to the node without asking
- Within the cluster
 - (i) Each node should maintain the table of sibling node (SN). So that they can direct communicates with each other to reduce the load of cluster head.
 - (ii) Suppose a node b is under the range of 2 then 2 will maintain it in its routing table and sends the required information to the CHG.

IV. CONCLUSION

Mobile Adhoc Network is the future technology, a very little work is done in this direction .In the given approach we have reduce the election of cluster head and election of suitable gateway with the CHG approach. Obviously the CHG terminal has to perform extra work. Maintaining the prediction table will reduce overhead work of deciding the CHG and reducing the danger of losing the host of particular cluster.

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