Clustering and A CHG Approach in MANET

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ABSTRACT

like other wireless technologies such as cellular networks, MANET face more difficult problems concerning management functions, routing and scalability . As the number of nodes increases complexity of MANET increases in various issues.As a solution to these complications, clustering schemes are proposed for MANET in order to organize the network topology in a ierarchical manner. Many clustering techniques have been developed. Clustering is a method which aggregates nodes into groups . These groups are contained by the network and they are known as clusters. By Increasing network capacity and reducing the routing overhead through clustering brings more efficiency and effectiveness to scalability in relation to node numbers and the necessity for high mobility. The manager node, in clustering has responsibility for many functions such as cluster maintenance, routing table updates, and the discovery of new routes within the network.   The other node named as gateway node communicate to the other cluster .

In this paper we remove the election and selection of cluster head (CH) and gateway node and given a new approach in which cluster head and gateway will be replaced by a single node which is known as cluster head gateway (CHG) . All the responsibilities of cluster head (CH) and gateway will be perform by the Cluster head gateway(CHG)   . Also   we introduces the prediction table in such a way that if CHG node moves or expire due to some reason or accidental then which node will act as the CHG. By having this approach we reduce overheads, energy and increase reliability of the network by maintaining the prediction table we can decide which node will work as CHG in future.

Keywords -MANET, Clustering,CHG**,** Overheads **,.**Energy

I. INTRODUCTION

Future information technology will be mainly based on wireless technology. Now a days, wireless technologies are becoming quite common in our daily lives. They have been gaining popularity with the use of portable devices like laptop computers, personal digital assistants, and mobile phones. order to use these devices some type of fixed infrastructure is normally required such as access points or base stations. This means that unless mobile users of wireless technologies have the possibility to access a static network, they will not be able to support their mobile devices services. Mobile ad hoc networks (MANET) propose a solution to these kinds of problems. MANET are autonomous systems consisting of mobile hosts that are connected by multi-hop wireless links[32,29]. The main idea of a MANET is that a network can be established without the need for any centralized administration or fixed infrastructure. MANET present many challenges to the research community because of dynamic topologies. In addition, link bandwidth and mobile nodes transmission power are scarce . Also Scalability is of particular interest to ad hoc network designers and users and is an issue with critical influence on capability and capacity. The scalability issue of MANET is addressed through a hierarchical approach that partition the network into clusters. A cluster is basically a subset of nodes of the network that satisfies a certain property . Clusters are analogous to cells in a cellular network. In this way the network becomes more manageable[32]. 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 [1.3,4, 5], is one of the technique to reduce the interference and providing the optimized solution. This infrastructure based 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 [1,2.32]. Adhoc wireless networks inherit the traditional problem of wireless and mobile communication, such as band width optimization, power control and transmission quality

II. RELATED WORK

Clustering has been found to be an effective means of resource management for MANETs regarding network performance, routing protocol design, Quality of Service (QoS) and network modeling .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 [9][10] 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[1].. Clustering presents several advantages for the medium access layer and the network layer in MANET [2]. The implementation of clustering schemes allow a better performance of the protocols for the Medium Access Control (MAC) layer by improving the spatial reuse, throughput, scalability and power consumption. On the other hand, clustering helps improve routing at the network layer by reducing the size of the routing tables and by decreasing transmission overhead due to the update of routing tables after topological changes occur [1][22][23]. Clustering helps aggregate topology information since the number of nodes of a cluster is smaller than the number of nodes of the entire network[9][13][14]. Therefore, each node only needs to store a fraction of the total network routing information [3][9].

In most clustering techniques nodes are selected to play different roles according to a certain criteria. In general, three types of nodes are defined: Ordinary nodes are simply members of a cluster ,other node is are called gateways node because they are able to listen to transmissions from another node which is in a different cluster[1] [21][31][30]. In most clustering techniques nodes are selected to play different roles according to a certain criteria. In general, three types of nodes are defined:one Ordinary nodes are members of a cluster which do not have neighbours belonging to a different cluster [1].Other Gateway nodes are nodes in a non-clusterhead state located at the periphery of a cluster. These types of nodes are called gateways because they are able to listen to transmissions from and third clusterheads .Most clustering approaches for mobile ad hoc networks select a subset of nodes in order to form a network backbone that supports control functions. A set of the selected nodes are called clusterhead(CH) and each node in the network is associated with one. Clusterheads are connected with one another directly or through gateway nodes[1]. The union of gateway nodes and clusterheads form a connected backbone. This connected backbone helps simplify functions such as channel access,bandwidth allocation, routing power control and virtual-circuit support [18].another node which is in a different cluster [8]. To accomplish this, a gateway node must have at least one neighbour that is a member of another cluster [26].

Cluster based routing [7] 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

base routing [9] aThe **headings** and **subheadings**, starting with "**1. Introduction**", appear in upper and lower case letters and should be **set in bold and aligned flush left**. All headings from the Introduction to Acknowledgements are numbered sequentially using 1, 2, 3, etc. Subheadings are numbered 1.1, 1.2, etc. If a subsection must be further divided, the numbers 1.1.1, 1.1.2, etc.
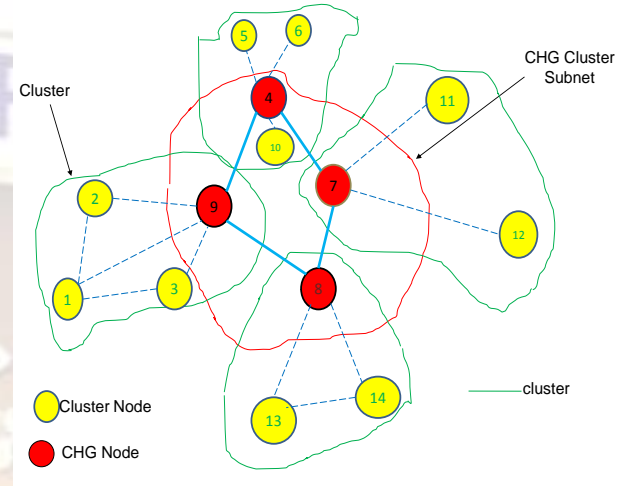
III. CHG APPROACH

Fig. 1 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	8-7-4	2	5,6,10
7	8-7	1	11,12
9	8-9	1	13,14

TABLE 2   CHG   DOMAIN MEMER LIST

Member node	Via	Distance in hop
1	8-13	1
2	8-14	1

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 3
PREDICTION TABLE

Member	Prediction time(PT) in minute	Time counter(CT)
1	--	10
2	12	5
n	10	0

- How many number of nodes are present in the cluster active or passive may be given as

(i). One who is leaving the network will send a dead signal to the CHG.

(ii). 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 sendt the routing table to other CHGs.

- When itself is expiring

(i) When the time of itself is expiring ask the prediction table for 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.

- 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.

IV. CONCLUSION

Clustering is a very good concept in Mobile Adhoc Network for larger network .In the give approach by CHG approach ,we have reduce the overheads, energy consumption and increase network reliability by reducing election and selection of cluster head and gateway. CHG terminal has to perform extra work of cluster head as well as gateway and maintaining the prediction table will reduce battery, efficiency and CHG itsels as a bottleneck and hence danger of loosing the particular cluster of the network.So keeping multicluster CHG may be consider in a single cluster as a future work

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