Research on Clustering Algorithm in Ad Hoc Network

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Due to recently advances in telecommunication technology, we had a variety of communication. There is an ad hoc network in one of new network technology.

An ad hoc network is a distributed system consisting of a number of wireless nodes that achieve communication without the assistance of a centralized administration or fixed network infrastructure. An effective way to manage network information is to divide the network into clusters. A cluster is a subset of nodes, which consists of a clusterhead and a number of ordinary nodes. The clusterhead is a node which manages local network information, and the ordinary nodes are internal nodes which are neighboring nodes of the clusterhead. Communication among nodes in the ad hoc network is achieved by relaying packets to the clusterhead.

In this paper we propose the "Two Clusterhead Algorithm". We succeeded in efficiently decreasing the number of total steps in clustering compared with DCA(Distributed Clustering Algorithm). DCA is suitable for clustering of "quasi-static" ac hoc network. Our algorithm creates *two* types of clusterhead: The master clusterhead and the slave clusterhead. We assume that the network topology does not change during the algorithm execution.

In the DCA, each node is assigned a random real number in the range (0,1]. This number is used as node ID. The node with the lowest ID is

selected as a clusterhead, and the cluster is formed by this node and all of its neighbors. In the Two Clusterhead Algorithm, a cluster consists of a master clusterhead, a number of slave clusterheads which are adjacent to master clusterhead, and a number of ordinary nodes which are neighboring nodes of the slave clusterheads. The number of steps to set up clusters in the DCA is compared, through simulation, to the number of steps taken by the Two Clusterhead Algorithm. We considered two different scenarios for clustering setup in the simulation. First, we consider a scenario in which all packet are correctly delivered and no collisions. Next, we consider a more realistic scenario in which collisions occur and packets may not be correctly delivered.

Suppose that the collision occurs in the transmission range, when the clusterhead and master clusterhead candidates broadcasted. In this is the case, clusterhead candidates become undecided nodes. Further all the nodes which belongs to these clusterhead candidates become undecided nodes either. Again they perform clustering in that region.

Our simulation results have shown that the Two Clusterhead Algorithm outperforms the DCA in both scenarios, aforementioned. However, the number of the nodes which participate in the re-clustering might increase when the master clusterhead candidate cancels its own role because the hierarchy in the cluster is deeper than DCA.