A novel clustering algorithm for mobile ad hoc networks based on determination of virtual links' weight to increase network stability

ABSTRACT

The stability of clusters is a serious issue in mobile ad hoc networks. Low stability of clusters may lead to rapid failure of clusters, high energy consumption for reclustering, and decrease in the overall network stability in mobile ad hoc network. In order to improve the stability of clusters, weight-based clustering algorithms are utilized. However, these algorithms only use limited features of the nodes. Thus, they decrease the weight accuracy in determining node's competency and lead to incorrect selection of cluster heads. A new weight-based algorithm presented in this paper not only determines node's weight using its own features, but also considers the direct effect of feature of adjacent nodes. It determines the weight of virtual links between nodes and the effect of the weights on determining node's final weight. By using this strategy, the highest weight is assigned to the best choices for being the cluster heads and the accuracy of nodes selection increases. The performance of new algorithm is analyzed by using computer simulation. The results show that produced clusters have longer lifetime and higher stability. Mathematical simulation shows that this algorithm has high availability in case of failure.

Keyword: Mobile ad hoc networks; Network stability; Algorithm