Abstract

For wireless ad hoc network no fixed infrastructure or centralized management, a Minimum Matching Dominating Set (MMDS) has been proposed as the virtual backbone. The MMDS of a graph representing a network has a significant impact on an efficient design of routing protocols in wireless networks. This problem has been studied extensively in Unit Disk Graphs (UDG), in
which each node has the same transmission range. However, in practice, the transmission ranges of all nodes are not necessary equal. In this paper, we model a network as a disk graph and introduce the MMDS problem in disk graphs. We present three constant approximations algorithms to obtain a minimum MMDS of a given network. These algorithms can be implemented as distributed algorithms. Furthermore, we show the size relationship between a maximal independent set and a MMDS as well as the bound of the maximum number of independent neighbors of a node in disk graphs. The theoretical analysis and simulation results are also presented to verify our approaches.

Reference

- Minimum connected dominating sets and maximal independent sets in unit disk graphs, Weili Wu et al.
- Strongly Connected Dominating Sets in Wireless Sensor Networks with Unidirectional Links, Ding-Zhu Du et al.
- K.M. Alzoubi, P.-J. Wang, and O. Frieder, ”Message-Optimal Connected Dominating Sets

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