

论文与报告

一种低能耗层次型无线传感器网络拓扑控制算法

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摘要

提出一种低能耗层次型拓扑控制算法(A low-power hierarchical wireless sensor network topology control algorithm, 简称LPH算法). 该算法是一种支持多跳网络、降低能耗的多级组网控制算法. 它将拓扑控制分为组网和拓扑维护两个阶段, 其中组网阶段包括选择簇头、标识簇头及簇内节点、优化拓扑三个任务, 算法在各个阶段、各个任务中都考虑了节能. 同时, 在簇头选择时考虑了簇头节点分布均衡问题, 通过优化拓扑降低簇内通信能耗. 其次, 通过静态地址与动态地址结合的方式提高网络层次及可维护性. 本文详细介绍了LPH算法及其思想, 给出算法的空间复杂度、时间复杂度及能耗分析, 并基于NS2仿真工具, 对LEACH、PEGASIS和LPH三种算法分别进行了模拟仿真, 说明LPH算法的性能与优势.

关键词 [拓扑控制算法](#) [多跳网络](#) [分簇拓扑算法](#) [低能耗](#) [网络生存期](#)

分类号

A Low-power Hierarchical Wireless Sensor Network Topology Control Algorithm

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Abstract

In this paper, a low-power hierarchical wireless sensor network (WSN) topology control algorithm, which is called LPH, is presented. LPH is a multi-level topology control algorithm. In this algorithm, the topology control is divided into two phases: network building and network maintaining. The phase of network building includes three tasks: cluster head election, cluster head and nodes identification, and topology optimization. LPH provides solutions to reduce energy consumption in every phase and every task. LPH also provides a solution to balance the distribution of the cluster head nodes. On the other hand, the algorithm extends the network-level and improves the maintainability of WSN by using combination of the static address and dynamic address. The paper analyzes space complexity, time complexity and energy consumption of LPH. Finally, this paper introduces the simulation of LEACH, PEGASIS and LPH algorithms based on NS2, and analyzes the simulation results.

Key words [Topology control algorithm](#) [multi-hop network](#) [clustered topology algorithm](#) [low power](#) [network life cycle](#)

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