论文与报告

基于协作MIMO的多跳WSN动态分簇选择算法研究

梁平元, 刘星成, 石春, 罗锡璋

1. 中山大学信息科学与技术学院 广州 510006

2. 吉首大学物理科学与信息工程学院 吉首 416000

摘要

为解决基于协作多输入多输出(Multi-input multi-output, MIMO)的同构无线传感器网络(Wireless sensor networks, WSN)能量节省与能耗均衡问题, 建立了多跳分布式WSN系统模型. 对协作MIMO通信中的簇间长传输距离与簇内短传输距离进行了分析, 找到与传统单输入单输出(Single-input single-output, SISO)传输相比更节省能量的距离门限. 根据分析提出了一种新的基于剩余能量与距离门限的动态分簇(Dynamic clustering based on remaining energy and distance thresholds, DCREDT)选择算法, 在节省能量的前提下, 使剩余能量较大的节点优先成为簇首, 实现了簇首与其他节点之间的能耗均衡. 最后分析了采用DCREDT选择算法进行多跳传输的总能耗, 并仿真验证了该算法的合理性与有效性.

关键词 无线传感器网络 协作多输入多输出 DCREDT选择算法 能耗均衡

分类号

Research on Dynamic Clustering Selection Algorithm of Multi-hop WSN Based on Cooperative MIMO

LIANG Ping-Yuan, LIU Xing-Cheng, SHI Chun, LUO Xi-Zhang

1. School of Information Science and Technology, Sun Yat-sen University, Guangzhou 510006

2. College of Physics Science and Information Engineering, Jishou University, Jishou 416000

Abstract

In order to solve the problem of energy saving and energy consumption balance in homogeneous wireless sensor networks (WSN) based on cooperative multi-input multi-output (MIMO), a multi-hop distributed WSN system model was built. The inter-cluster long transmission distance and intra-cluster short transmission distance in cooperative MIMO communication were analyzed, and the distance thresholds were found, with which more energy could be saved in communications than that in traditional single-input single-output (SISO) communications without the distance threshold condition. After that, a novel dynamic clustering based on remaining energy and distance thresholds (DCREDT) selection algorithm was proposed based on our analysis. Under the premise of saving energy, the nodes having more remaining energy would become cluster heads preferentially, so that energy consumption balances between cluster heads and other nodes were realized. Finally, by use of DCREDT selection algorithm, the total energy consumptions in multi-hop transmissions were analyzed. The reasonableness and validity of this algorithm were verified by simulations.

Key words Wireless sensor networks (WSN) cooperative multi-input multi-output (MIMO) dynamic clustering based on remaining energy and distance thresholds (DCREDT) selection algorithm energy consumption balance

通讯作者 刘星成 isslxc@mail.sysu.edu.cn

作者个人主页 梁平元; 刘星成; 石春; 罗锡璋

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