

基于能量感知的无线传感器网络拓扑演化

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基金项目: 国家自然科学基金

摘要:

针对无线传感器网络中能源效率的问题, 引入复杂网络理论的研究方法, 提出基于能量感知无线传感器网络拓扑动态演化模型。本文在建模过程中考虑到无线传感器网络拓扑变化与节点的度数和剩余能量密切相关, 而且网络中节点和链路是有增有减的动态行为, 利用连续场理论推导出此模型具有无标度的特征, 无标度网络对于节点的随机故障具有较高的鲁棒性。数值计算与实验仿真结果显示, 算法可以有效地改善整个网络的结点均衡能耗。

关键词: 无线传感器网络; 能量感知; 复杂网络; 拓扑演化

Topology Evolution based on Energy-aware in Wireless Sensor Networks

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Abstract:

For energy efficiency in wireless sensor networks, complex networks theory is introduced in this paper. A dynamic topology evolving model based on energy-aware for WSNs is proposed. We not only consider the node connectivity and remaining energy of each sensor node, but also introduce the addition of new links and the reduction of some old links. Using the continuum theory, the expression of the scale-free degree distribution for WSNs is obtained. Scale-free network has good robustness against the random attack. Numerical calculations and simulation results show that our proposed topology model make the energy consumption in the whole network more balanced.

Keywords: wireless sensor network; energy-aware; complex network; topology evolution

投稿时间: 2010-06-01

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