Sink节点移动的无线传感网生存时间优化算法

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摘　要：

为提高网络最大生存时间，提出Sink节点移动的无线传感网生存时间优化算法(LOAMSN)。该算法分析Sink节点移动时的流量平衡约束、最大传输速率约束、节点能耗约束等约束条件，将生存时间优化问题转化成最优模型。提出Sink节点的移动方法，即Sink节点利用节点的度值构建其移动路径，按照此路径循环移动收集数据。将Sink节点的移动认为是离散运动，Sink节点移动的生存时间最优模型分解成若干个Sink节点静止的生存时间最优模型，采用牛顿法求解每个Sink节点静止的最优模型，获得网络最大生存时间和节点发送数据量的最优值。仿真结果表明：LOAMSN算法能减少Sink节点停留位置上的节点能耗，平衡网络负载和节点能耗，提高网络最大生存时间。在一定条件下，LOAMSN算法比Sink节点静止时更优。

关键词：无线传感网；生存时间；最优化方法；移动Sink节点

Lifetime Optimized Algorithm with Mobile Sink Node in Wireless Sensor Networks

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Abstract:

To prolong the network lifetime, lifetime optimized algorithm with mobile sink node (LOAMSN) is proposed. The constraint conditions with mobile sink node such as flow balance constraint, maximum transmission rate constraint and node energy constraint are analyzed. Then lifetime optimized problem is formulized into optimized model. The mobile method of sink node is proposed. Sink node uses the degree values of nodes to construct the mobile path and moves circularly to collect date following the path. The mobility of sink node is considered as discrete movement. Therefore, the lifetime optimized model of mobile sink node is divided into several optimized models of static sink node. Each optimized model of static sink node is solved by Newton algorithm. Finally the optimal values of network maximum lifetime and node transmission data amount are obtained. Simulation results show that LOAMSN algorithm can reduce the node energy consumption whose positions sink node stays in, balance network load and node energy consumption, and prolong the network maximum lifetime. Under certain conditions, LOAMSN algorithm outperforms the algorithm when sink node is static.

Keywords: Wireless sensor networks; Network lifetime; Optimization method; Mobile sink node

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