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移动基站无线传感器网络参数的选取优化

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摘 要: 针对已有研究只讨论 $r \ll R$ (即发射半径远小于网络半径)且节点发射功率固定的网络, 推广到一般的网络: 即 r 与 R 可以是任意关系, 且节点的发射功率可变, 其最大发射半径是最小能量发射半径 r 的 k 倍的传感器网络。采用更精确的分析方法, 给出使得网络总能量消耗最小, 网络寿命最长时的缓冲区位置与能量发射级别参数的选取方法。研究结果表明: 传感器节点的能量发射级别可变时, 通过选择优化的发射功率, 与采用固定功率

发射方法相比能够提高网络寿命5倍以上; 当采用单跳网络时, 缓冲区中心到圆心的距离, 网络总能量消耗最小, 当 时, 网络的寿命最长, 证明以往研究认为多跳传感器网络最优的缓冲区位置位于 处是不准确的, 该位置与多个因素相关; 综合优化缓冲区位置与节点能量发射功率的方法, 可提高网络能量利用效益1个数量级以上。本文的研究结论对优化传感器网络具有较好的指导作用。

关键字: 传感器网络; 移动基站; 网络优化; 能量消耗均衡; 网络寿命

Optimization of parameter selection for wireless sensor network with mobile base station

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Abstract: Based on the fact that many researches only discussed the fixed node's transmitting power, the general WSN was extended so that r and R could be arbitrary, and the node transmission power was variable, its biggest transmitting radius is k times than the smallest radius r . A more accurate analysis was given to gain the optimal network parameters which included the smallest total energy consumption, and the location and energy level which made the longest life expectancy. The results show that the network life can be improved 5 times than that of fixed node's transmitting power only by selecting the optimal transmitting power. When the network hop is single, the location of buffer zone makes the minimum total energy consumption, when the network hop is single, the location of buffer zone makes the longest network life. The overall optimization algorithm is proposed by selecting the optimal of node's transmitting power and the location of the buffer zone. The algorithm can improve network efficiency of energy use more than one order of magnitude.

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