论文

无线传感器网络中跨层能耗优化模型及求解算法

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摘要：

采用跨层优化法,定量描述了网络层和数据链路层的能耗问题.首先用概率模型分析了CSMA机制下节点的传输能耗,并提出了路径累积能耗路由策略;通过建立最优化模型及其求解算法,说明所提出的路由策略在尽可能延长网络寿命的情况下,可使网络整体能耗最低;求解该最优化模型可以获得网络中各节点的传输总能耗,进而得到网络中随数据传输量增加而首先失效的节点;最后通过一个简单的网络算例说明了跨层能耗优化模型及求解算法是有效的.

关键词： 无线传感器网络　能耗　跨层分析　多跳传输

Cross-layer energy consumption optimal model and its solution algorithm in wireless sensor networks

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Abstract:

We propose a cross-layer optimal design for the two layers: medium access and routing. First, an energy consumption function is discussed based on CSMA transmission mechanism. Secondly, the path cumulative energy consumption routing policy is proposed based on CSMA transmission energy consumption. An optimal programming model is established, and it aims at not only minimization of the total energy consumption, but also maximization of the network lifetime. The amount of transmission at each node in the network can be achieved by solving the programming model and it is the basis of the calculation of the network lifetime. One numerical example shows that the cross-layer model is efficient.

Keywords: wireless sensor network　energy consumption　cross-layer analysis　multihop communication

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