工程与应用

管道泄漏监测传感器网络的路由路径算法研究

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摘要　　分析管道流量泄漏监测的传感器网络特点，对传感器节点数据流量进行建模分析，如何保障在线监测网络设施的可用性，而链路通信质量随时空变化很大，并且有5%到15%的非对称链路存在。链路层服务不但可以发现邻居传感器节点，测量和预测邻居节点间的链路通信质量，而且还能提供链路数据转发机制减轻单向链路对其他协议的影响。为了提高路由路径的可靠性和减少能量损耗，利用链路层服务和分布式算法，为每个传感器节点建立到汇聚节点的最可靠路由路径，理论分析该算法的性能，在模拟器TOSSIM上进行仿真，实验结果表明基于链路层服务的最可靠路由路径建立算法，可充分利用单向链路建立更可靠的路由路径，有多于17%的节点建立更可靠的路由路径，路由路径的可靠性提高2%到51%。

关键词　　传感器网络　链路层服务　链路数据转发机制　路由路径算法

分类号

Routing path algorithm research based on pipeline leak monitoring sensor networks

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Abstract

　Analysis of pipeline flow monitoring leakage characteristics of the sensor network，the sensor node data flow model of how to protect on-line monitoring network facilities availability.A recent study in wireless sensor networks has found that the link quality varies significantly with spatial and temporal factors and approximate 5% to 15% of all links are asymmetric links.The link quality services are used to measure and estimate the link quality between neighbors and provide the link layer relay mechanism to mitigate the effects of the unidirectional links.In order to provide the best reliable routing tree and reduce energy consumption，a distributed algorithm is developed to build the best reliable routing tree for every node using the link layer services.From statistic analysis and simulation using TOSSIM，the algorithm can prevent from building a broken routing tree and build a more reliable routing tree.More than 17% nodes have built more reliable routing tree and the percentage of the improved reliability is about 2% to 51%.

Key words　sensor networks　link quality services　link relay mechanism　algorithm to build routing tree

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