

网络、通信、安全

无线传感器网络中多跳时间同步算法的研究

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摘要 提出了一种基于簇型的多跳时间同步算法——CBTS。利用Leach算法将网络划分成不同的簇,在此基础上把节点间的时间同步分为水平同步和垂直同步两个阶段来完成。在水平同步阶段,通过构建基站与簇头节点的层次拓扑结构,采用双向消息交换同步机制来完成簇头节点与基站的时间同步。在垂直同步阶段,采用双向消息交换和参考广播相结合的同步机制,来完成簇头节点和簇成员之间的时间同步,并利用最小方差线性拟合的方法估计了节点的时钟偏差,提高了时钟同步的精度,最终实现了整个网络节点的时间同步。经过仿真测试,证明该算法具有较低的消息交换开销和不错的同步精度。

关键词 [无线传感器网络](#) [时间同步](#) [多跳](#) [分簇](#)

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Research on time synchronization algorithm for multi-hop in wireless sensor networks

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Abstract

This paper presents a Cluster-based Time Synchronization (CBTS) algorithm for multi-hop wireless sensor networks. It starts from the Leach algorithm which distributes the network into different clusters. Based on the partition, the algorithm works in two phases: Horizontal time synchronization phase and vertical time synchronization phase. In the horizontal synchronization phase, it adopts traditional pair-wise packet exchange mechanism to finish the time synchronization between the base station and cluster heads through establishing a hierarchical topology structure. In the vertical synchronization phase, it adopts pair-wise packet exchange and unidirectional reference broadcast mechanism to finish the time synchronization between cluster heads and cluster members. Moreover, it uses linear least square to estimate the clock offset of nodes which achieves a good precision. Finally, the local clocks of all nodes in the network can synchronize with each other. The results of which simulated on NS-2 show that CBTS has a good precision and low message cost.

Key words [wireless sensor network](#) [time synchronization](#) [multi-hop](#) [cluster-based](#)

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