

Long-Term Clock Synchronization in Wireless Sensor Networks with Arbitrary Delay Distributions

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Abstract:

Clock synchronization is a crucial issue in the operation of wireless sensor networks. Although the existing synchronization algorithms under linear clock model assumptions perform well for short periods, they will become problematic for applications with long-term requirements. In this paper, we consider a more realistic and flexible relationship model for two clocks and exploit a Taylor expansion to approximate the relationship. Based on this model and a two-way time message exchange procedure, an estimation algorithm is proposed to recover the relationship and then achieve the synchronization. Finally, simulation results demonstrate that the proposed algorithm improves the accuracy of synchronization as compared to existing algorithms in many scenarios, and is also robust to different distributions of random delays.