Abstract

Multi-hop wireless sensor networks are mainly designed for environment monitoring. The lifetime of networks depends on the durability of the battery resource sensors, so it is crucial for sensors to efficiently use limited battery resource. The energy expended by sensor nodes in communication makes up a quantum of their total amount of energy consumption. In existing research, most of the energy-saving MAC protocols reduce energy consumption by putting periodically sensors to sleep mode. Such a regular active/sleep schedule fails to adjust individual sensor node sleep duration according to per-sensor node communication traffic loads, which causes unnecessary idle listening problem and low power-efficiency. In this paper, we
present an efficient energy-saving MAC protocol for saving energy in a multi-hop wireless sensor networks. This proposed protocol dynamically adjusts the active/sleep time duration of each sensor according to per-sensor node communication traffic load. Meanwhile, it can lead to much greater energy-efficiency by prolonging the sensor nodes sleeping duration, when in a network at per-sensor node communication traffic load is low. The basic idea of this proposed protocol is an analytical model for estimating the accurate per-sensor node communication traffic load in a multi-hop wireless sensor network and a grid-based quorum concept for regular active/sleep schedule.

References


**Keywords**
- Multi-hop wireless sensor networks
- per-sensor node traffic load
- grid-based quorum
- medium access control

**Index Terms**
- Computer Science
- Communication and Networks