

An Energy-Efficient Distributed Schedule-Based Communication Protocol for Wireless Sensor Networks

ABSTRACT

In WSN, the energy of the sensor nodes is a very scarce resource and it is desired to decrease the energy consumption in sensor nodes. The sensor node consumes energy when it is in transmitting, receiving, or idle listening state. In this paper, we discuss the design of an Energy-Efficient Distributed Schedule-Based Communication Protocol for Wireless Sensor Networks. We decrease the energy consumed by decreasing the amount of time a sensor node in idle listening state. The proposed protocol is intended for applications with periodic data traffic where event reporting is initiated from the sensing node. In the proposed protocol, the time is divided into rounds and every round is composed of three phases: Building the tree, Building the schedule and Data transmission. In the first phase of each round, an energy-aware tree is built. A TDMA schedule is constructed in a distributed manner during the second phase. This schedule will be used for data transmission in the third phase. To ensure a reliable communication tree for the whole sensor network, at the beginning of each round the tree will be rebuilt, and a new TDMA schedule will be constructed. We evaluate the proposed protocol in the context of network lifetime, aggregate throughput and energy consumption. The simulation results show how the proposed protocol can provide signification improvements when it is compared with Energy Aware Data centric routing protocol (EAD) and the well known LEACH protocol for different network configurations.