Bachelor Thesis

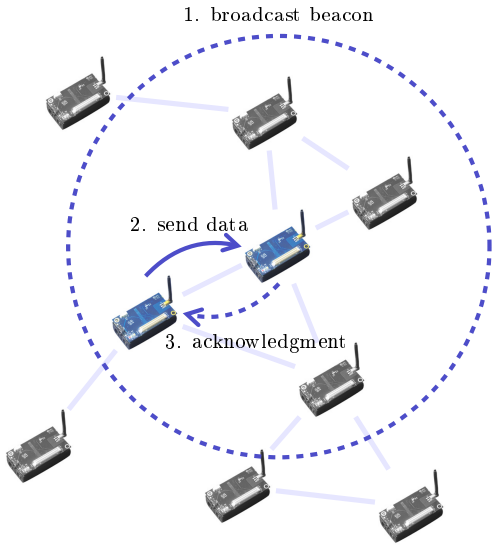
« Implementation of a Low-power MAC Protocol for Wireless Sensor Networks »

Background

Wireless sensor networks are an appropriate technology for large-scale, non-invasive observations of physical or ecological state variables like temperature. These networks consist of a large number of wireless, resource-restricted nodes, which transfer sensed data to predefined base stations. Here it is essential for most applications, that wireless sensor nodes conserve energy. In general, the main energy consumer is the transceiver, even if it is neither sending nor receiving, but solely listening on the channel. A common approach to reduce energy consumption is the use of sleep and awake cycles. Only in the latter case a node is allowed to transmit or receive data, whereas in the sleep cycle the transceiver is completely deactivated. Unfortunately this technique yields a poor responsiveness of the network, meaning that high delays in transferring data occur. Nevertheless, a trade-off between responsiveness and energy consumption can be achieved. Prominent Medium Access Control (MAC) protocols incorporating this technique are B-MAC, X-MAC, RI-MAC or indirect transmission in 802.15.4.

Work description

In this work a protocol similar to the RI-MAC protocol is to be implemented and evaluated using Crossbow's IRIS-platform. In RI-MAC the data transmission is initiated by the receiver, which periodically broadcasts an awake-beacon. Upon receiving the beacon a potential sender starts transmitting data. This procedure highly avoids idle-listening, because a receiver node is only active for a short period after transmitting the beacon. In this work the RI-MAC protocol shall be analyzed and compared to the default low-power MAC protocol of the IRIS-platform. Relevant metrics are energy consumption, latency and throughput.



Prerequisites

- basic knowledge of wireless networking
- experience in C programming

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