Power efficiency for multihop Wireless Sensor Networks

Background

Sensor networks, being small and not connected to any infrastructure, aim to enable new application domains and scenario e.g. of ubiquitous computing or controlling. But high flexibility comes with serious limitations. The most important one is the limited energy. Taking energy from the battery, sensor nodes must take care about the power efficiency in order to have longer live time.

Description

The measurement results showed that the radio consume the similar level of energy in the transmission and in the idle listening modes. Thus, the potential power saving is in the switching of the radio if it is not used and turning it on again if something is going to be sent or received. This technique is called 'duty cycling'. Three major strategies exist: general schema for switch off and on the radio (e.g. in Piconet), duty-cycle control through topology management (e.g. ASCENT) and low duty cycle combined with MAC protocols (TDMA protocols, e.g. Bluetooth and contention protocols, e.g. B-MAC). Thus, the power efficiency depends among other on the efficiency of a MAC protocol. In this thesis, IEEE 802.15.4 should be used on the MAC sublayer. ZigBee (IEEE 802.15.4) is a communication standard developed for low-data-rate, low-power-consumption, and low-cost applications. It is available almost on all existing sensor nodes.

Tasks

- Comparison and evaluation of existing techniques for power saving in multihop WSN
- Design of the power saving technique (e.g. using several power saving strategies)
- Performance evaluation in a simulator (preferable NS-2 with ZigBee module)
- Implementation and test on real nodes (MicaZ)

References

- Homepage of NS2: http://www.isi.edu/nsnam/ns/