Technische Universität München
Lehrstuhl für Netzarchitekturen und Netzdienste
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Thesis (B.Sc./M.Sc.)

Implementation and Evaluation of Medium Access Control Protocols for Wireless Sensor Networks

Motivation

Wireless sensor nodes are built by using low-power chips which have certain characteristics that affect the wireless communication. Especially, the transceivers (transmitter/receiver chips) are very limited in sensing the medium. Due to the low-power design the chips require a long period of time to detect a busy radio channel. Thus, there is a high probability that several nodes access the medium at the same time since they are not aware of other ongoing transmissions – if these transmissions have started shortly before their own transmission. New approaches rely on preamble-based medium access where the preamble is used as a reservation signal in order to clearly indicate a transmission. However, the transmission of preambles increases the interference and the utilization of the radio channel. The aim of this thesis is to implement a preamble-based MAC protocol on the sensor nodes. Moreover, the performance of the protocol will be evaluated by measurements in a testbed.

Your Task

Your task consists of the following steps.

1) Get familiar with TinyOS

2) Implement the preamble-based MAC protocol in TinyOS

3) Create challenging testbed scenarios

4) Perform measurements and evaluate the performance of the protocol in terms of reliability, delay and jitter

Depending on the project's scope, this part will be more (MSc, Diplom) or less in depth (BA)
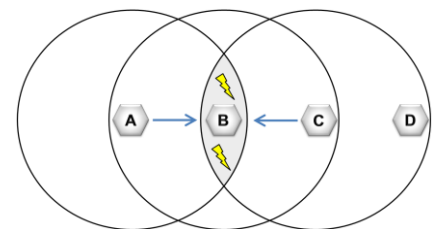
Hidden Node Problem
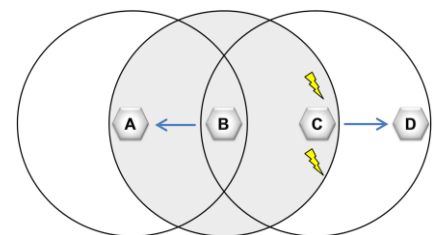
Exposed Node Problem

Requirements

Previous knowledge of communication issues and Discrete Event Simulation (DES) is useful but not required since you will be provided with the corresponding information and tutorials. The protocol will be implemented in nesC. Thus, some knowledge of C will give you a clear advantage.

Medium Access Example

Keywords

Medium Access Control, Wireless, Sensor, Network, Testbed, Measurement

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