



Performance Measurement of the Routing Over Low Power and Lossy Networks (ROLL) Protocol in Wireless Sensor Networks

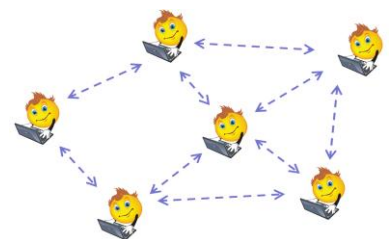
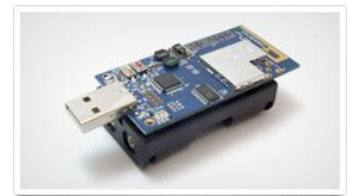
Motivation

Wireless devices suffer from communication issues, like interference, packet loss, limited sensing capabilities of transceivers and limited transmission range. These issues affect the communication such that a mobile device may not be able to directly communicate directly with a base station. Routing protocols for wireless networks address these problems by building a multi-hop topology in order to guarantee connectivity between a mobile device and a base station. However, building a topology is just the first step towards reliable multi-hop communication. Additional mechanisms are required since the conditions on the radio channel change frequently due to mobility or other communication issues. Therefore, routing protocols have to quickly detect changing network conditions to provide almost continuous connectivity to the base station. The focus of this thesis lies on the evaluation of the Routing Over Low Power and Lossy Network (ROLL) protocol which is part of the latest version of the operating system Tiny OS and currently strongly pushed by the IETF to become a new standard. You will evaluate the performance of ROLL in real sensor network test bed consisting of at least 20 sensor nodes. Furthermore, you will extend the protocol.

Your Task

Your task consists of the following steps.

- 1) Get familiar with TinyOS and the context of routing in wireless sensor networks
- 2) Get familiar with the ROLL protocol
- 3) Implement mechanisms to collect network statistics
- 4) Develop meaningful test scenarios and compare the performance of the protocol with different configurations
- 5) Evaluation of the measurements
- 6) Comparison of measurements and simulation results



Requirements

Previous knowledge of communication issues is useful but not required since you will be provided with the corresponding information and tutorials. The program code will be written in C. Thus, some knowledge of the C programming language will give you a clear advantage. Note that you will implement your code on real sensor nodes which makes this work a hands-on thesis.

Keywords

Routing, Measurements, Wireless, Sensor, Network

