



Routing Over Low Power and Lossy Networks (ROLL)

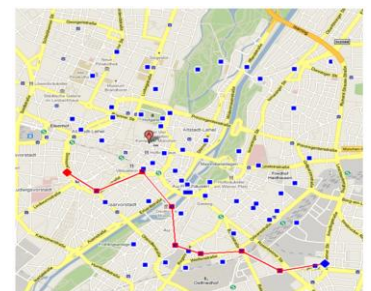
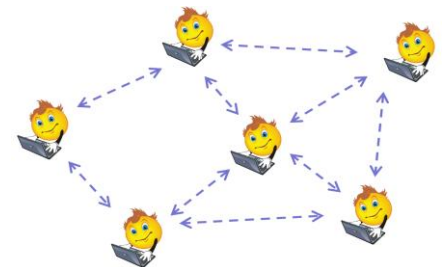
Motivation

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 implementation and 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. The simulation will be implemented with the OPNET Modeler network simulator and the results will be compared with measurements from a test bed with up to 20 sensor nodes.

Your Task

Your task consists of the following steps.

- 1) Get familiar with the OPNET modeler and the context of routing in wireless sensor networks
- 2) Implement the protocol and integrate it in the existing sensor network framework
- 3) Develop meaningful simulation scenarios and compare the performance of the protocol with other state-of-the-art routing protocols
- 4) Evaluation of the simulation results
- 5) Test bed measurements
- 6) Comparison of measurements and simulation results



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 simulation will be written in C. Thus, some knowledge of the C programming language will give you a clear advantage.

Keywords

Routing, Simulation, Wireless, Sensor, Network

