Abstract

The goal of my thesis is the design of a network of smart-meters and the implementation of their software. The network can measure and store the consumption data of household electricity and enables further services through an extension with central server communication. The network that is created between the smart-meters uses Wireless M-Bus physical layer, which is a European standard designed specifically for smart-meters.

The standard does not specify the network layer, therefore designing it is part of the work of my thesis. A smart-meter network is similar to a wireless sensor network, therefore the solutions and algorithms used for wireless sensor networks in terms of routing, synchronization and encryption can be studied and applied here as well.

During the design of the network, the goal is to create a robust multi-hop network, which can eliminate the short range of indoor radio communication, as well as enables normal operation even if a smart-meter malfunctions or is not available. Another goal of the design is expandability. Encryption is an important aspect of the network, because falsified communication or data can cause major harm for both the provider and the end user.

In the thesis, the firmware of the network devices responsible for the operation of the network and the software running on the embedded Linux operating system is implemented. The latter software processes the messages transmitted on the network, it communicates with the central server through a GSM connection and it is also responsible for central data processing.