

Abstract

The objective of this thesis is to present the embedded software development process of a product (*hereafter, StickBee*) which meets market demands. StickBee acts as an *in-home display* informing customers in smart grid systems. In order to provide manufacturer-independent operation, StickBee uses the public *Smart Energy Profile* (SEP) of the *ZigBee* specification. I aim to give an overview about the ZigBee standards and present how to apply them.

The StickBee has to be able to connect ZigBee SEP networks, request data from the network devices, and display this data on a user interface. The StickBee does not include own display but uses a host display instead. StickBee connects to the host display via USB port and extends its capabilities with ZigBee functionality. StickBee comprises two microcontrollers. The central controller handles the USB and displays the data, the ZigBee controller handles the network and supplies data to the central controller. My role in the project is to design, implement and test the embedded ZigBee software. The communication between the two controllers is based on the ICP standard.

To solve the problem I am customizing the ICP and designing the matching between ZigBee SEP data representation and the data needed by the central controller. The application polls the metering devices in the network and handles the messages coming from the utility provider. The application is implemented on the *Freescale MC13226V* ZigBee platform. For the development I am using the Freescale ZigBee stack and the *IAR Embedded Workbench for ARM C* compiler.

In order to verify the application I am designing and setting up a test network. The testing is performed with *Perytons Protocol Analyzer*. After successful testing, StickBee may take active part of demos and pilot projects.

The next development stage is going to be preparation for mass production. The application should be adapted to a single-chip solution and the final StickBee should be a ZigBee Certified product.