MDB/ICP Firmware for GNU Taler Cashless Payment Device

GNU Taler is a free software payment system centered on data protection and fraud elimination. A MDB/ICP cashless payment peripheral allows users to use their wallet at any compatible Point-of-Sale systems such as vending machines.

Motivation

The acceptance of new technologies depends to a large extent on how easy they are to use and the ubiquity of opportunities to use them. A viable cashless payment device that is compatible with all vending machines worldwide is a significant milestone, both for widespread adoption and for quickly demonstrating the power of the payment system.
Current cashless payment systems provide extensive tracking of users by recording enormous amounts of data about their transactions. GNU Taler is technically designed in such a way that both tracking of user information and fraud are impossible. This makes GNU Taler digital cash without the possibility of hiding criminal activity.

Objectives

The primary goal of this thesis is to develop a standalone MDB/ICP (Multi Drop Bus/Internal Communication Protocol) — the communication standard for vending machine peripherals, firmware for a cashless payment device based on open hardware and free software. The firmware must be compliant with the MDB/ICP specification and provide a way to exchange data between the vending machine and a custom application.
The second goal of this work is to build a demonstrator of the GNU Taler MDB/ICP Cashless Device so that it can be set up at BFH and presented at exhibitions and trade shows.
The test setup must provide a QR code and NFC-based payment interface for the existing GNU Taler wallet application and be compatible with the existing GNU Taler infrastructure, including the taler-mdb vending integration for MDB/ICP compliant vending machines.

Results

This thesis attempted to build a fully self-designed embedded system and identified the remaining issues to achieve that goal. It also created a MDB/ICP Cashless Payment Device based on existing commercial open-hardware modules with a custom made MDB/ICP interface.
This system is based entirely on widely community and vendor supported open-source projects, such as Buildroot and the Linux kernel. It also allows any Linux-based application requiring a MDB/ICP interface to be implemented very easily, by providing access to a serial port.
A self-contained demo, based on a commercial MDB/ICP enabled coffee machine and the existing BFH GNU Taler infrastructure was also set up.

Outlook

The next step will be to finalize the fully self-designed embedded system for MDB/ICP Cashless Payment Device by solving the challenges this thesis identified. On the software side, extending the firmware to support data logging from the MDB/ICP bus and providing support for different kinds of devices (other than the Cashless Payment Device) are on the roadmap, along with maintenance of the software to remain aligned with development of the GNU Taler infrastructure.

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GNU Taler MDB/ICP interface