Wireless M-Bus to Wired M-Bus with RC1180-MBUS

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Introduction

Radiocrafts offers the world's first wireless M-Bus module in the RC1180-MBUS, where a state-of-the-art radio with excellent range is combined with the Wireless M-Bus protocol. Several European countries are specifying Wireless M-Bus as the standard for reading gas-, water-, heat-meters and heat cost allocators. The RC1180-MBUS has all the features needed to comply with these national standards, including 128 bits AES encryption.

An M-Bus system will normally be either wired- or wireless, but occasionally there might be cases were the technologies are combined. Figure 1 shows a wired M-Bus extended to include a remote meter in a different location (other room or other floor). The new remote meter readings are done by the Master using a Wireless M-Bus bridge (dongle).

Extending the wiring to reach new meters could prove costly, so a better solution is to use Wireless M-Bus. Figure 1 below shows how the meter reading standard in the Netherlands specifies such a solution.

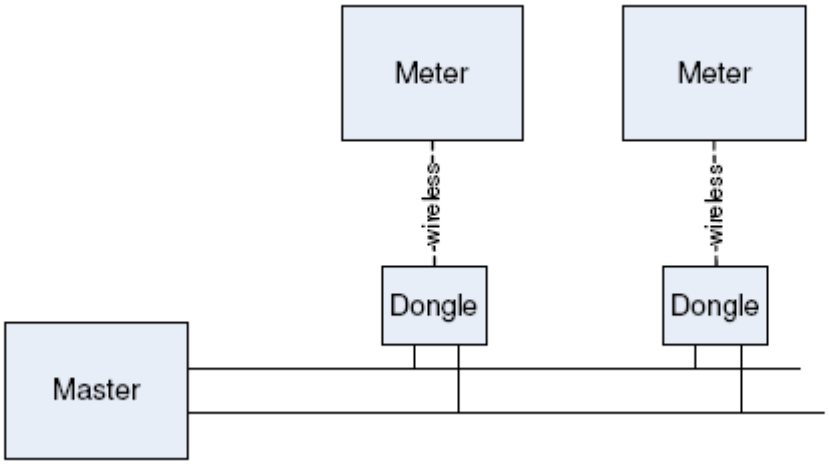

Figure 1. Bridge solution as specified in the "P2 Companion Standard, Dutch Smart Meter specification and tender dossier"

This Application Note describes how the Bridge (ref "Dongle" in figure 1) can be implemented with the RC1180-MBUS module. In some cases, the Bridge is located in an electricity meter which acts as a concentrator for one or more gas-, water and/or heat-meters.

Bridging Between Different Media

One of the most obvious conversions is between the physical media, the wired M-Bus being a high voltage bus and Wireless M-Bus being an ISM band radio. Therefore a bridge must of course include physical drivers for both.

The second difference to note is the access method. The wired M-Bus is based on a master polling the slaves. This means that the slaves are constantly listening for messages addressed to them on the bus.

Wireless M-Bus, on the other hand, have battery operated slaves that will be in sleep-mode most of the time. This makes it not feasible for the master to poll them. Instead the Wireless

M-Bus is based on slaves waking up at regular (or irregular) intervals to report status (meter reading) and check for new incoming messages (like valve control).

These fundamental differences means it is not possible just to forward messages from the wired bus directly to the wireless link and vice versa in real-time. The bridge must include both a wired M-Bus access-handler and a Wireless M-Bus access-handler, and store the messages locally between the different M-Bus accesses.

Protocol Converting

The frame format is also different between wired and Wireless M-Bus. So the frames cannot be reused between the two physical media. Wired M-Bus uses the format class FT1.2 of EN 60870-5-1 and a telegram structure defined in EN 60870-5-2, while the Wireless M-Bus uses format class FT 3. For the specific frame format, see EN13757-2, -3 and -4.

Meter Information Image for the Bridge

The solution to the bridge challenge is to use both a full wired M-Bus device and a full Wireless M-Bus device, like the RC1180-MBUS module. They must share a common memory where the meter information is stored. This memory location is referred to as Meter Information Image in figure 2.

The procedure for doing meter readings:

- RC1180-MBUS listen for meter slaves and store the meter reading data or install them (store their ID's when placed in a learning mode).
- Meter identification and meter readings are stored in *Meter Information Image*.
- The wired M-Bus slave device will then report this information the next time it is polled by its master.

If the wired M-Bus master wants to transfer data to the meter the following procedure is used:

- The wired M-Bus master polls bridge (believing its a normal wired M-bus slave) and the bridge replies according to the wired M-Bus standard.
- The wired M-Bus slave (Bridge) acknowledges over the wire and put info in *Meter Information Image* for later transfer to the Meter.
- The next time the RC1180-MBUS master device receive communication from the meter, the info is transferred with the bi-directional T2 or S2 mode.

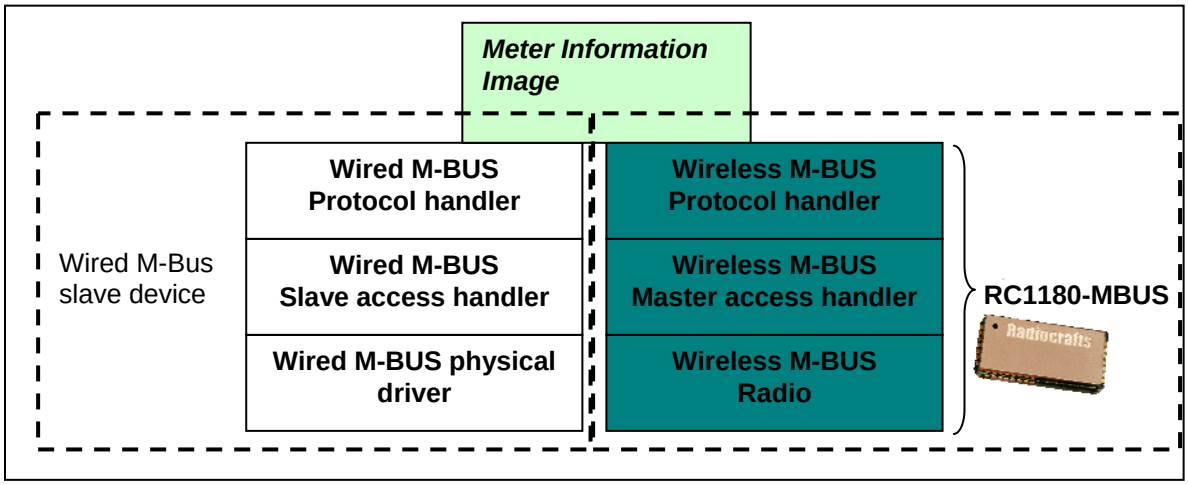

Figure 2. Building blocks for a Bridge as specified in the Netherlands

Hardware

The major hardware required to make a Bridge can be summarized:

- RC1180-MBUS module
- Antenna for 868 MHz
- Driver for wired M-Bus (for example the TSS721A from Texas Instruments)
- Power supply circuitry
- An MCU (for example an MSP430 from Texas Instruments) handling the wired M-Bus access and protocol. Communication between MCU and RC1180-MBUS will typically be serial (UART)

(The *Meter Information Image* can be stored in RC1180-MBUS or in the external MCU)

Document Revision History

Document Revision	Changes
1.0	First release

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