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## AM093 – LoRa and Wireless Meter-Bus Bridge Application

### App note TD0045

This document serves as an introduction on how to use the bridge demonstration application to use AMIHO's AM093 LoRa® and Wireless Meter-Bus radio module as an unidirectional bridge between the two protocols (LoRa and WM-Bus) and the two 169 and 868MHz bands.

### Instructions and requirements

The AMIHO modems have the advantage of providing a rapid way to switch between different radio modes, making our modules a unique solution. The AM093 modules, supporting both WM-Bus and LoRa, have the capability to work as a unidirectional bridge between devices that operate in different modes. A common example would be a meter working in a WM-Bus mode, where the range would need to be extended to communicate with the concentrator. In this arrangement the AM093 can be set-up as bridge between those two devices, using WM-Bus to communicate with the meter and LoRa to communicate with the concentrator.



Smart meter

M-Bus  
wireless



AM093  
Bridge

LoRa



AM093

In the following document we describe step by step, how to setup the bridge application. In order to perform that demonstration you will require the following material:

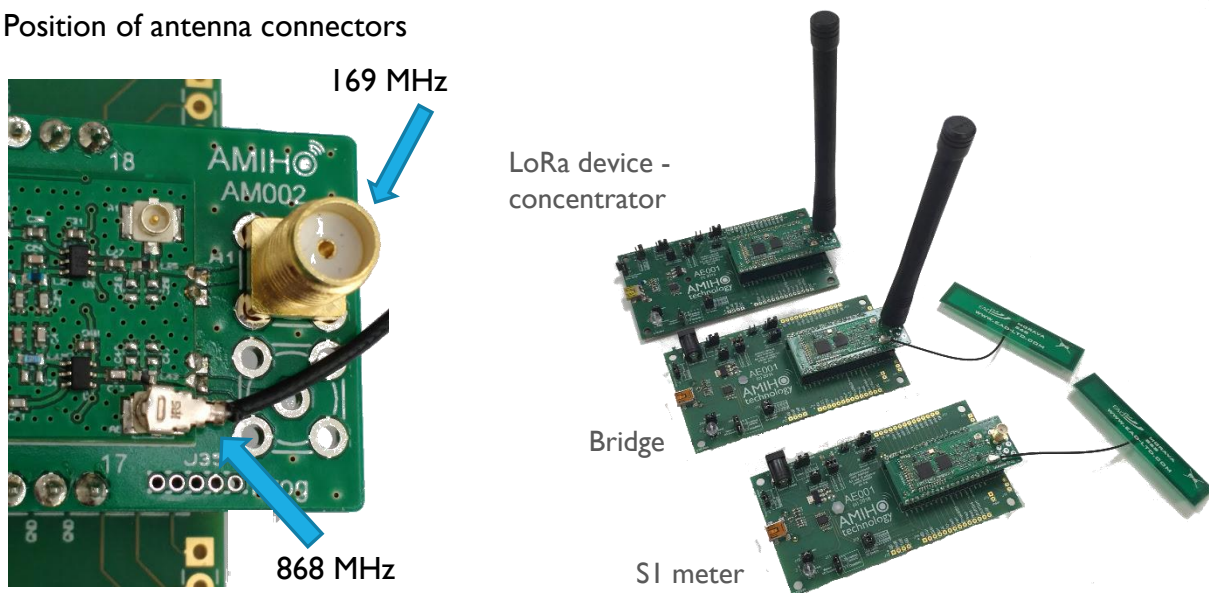
- PC with PC Demo.exe (provided on the CD-Rom from your Evaluation Kit)
- 2x AMIHO modules (at least one AM093 to act as a bridge)
- 1x WM-Bus meter or an AMIHO module used as a third source
- The AMIHO SW Stack on your AM093 bridge module (version 2.35 or higher)
- 2x mini USB cables (or 3x if using an AMIHO module as a WM-Bus meter)
- 1x 868MHz antenna (or 2x if using an AMIHO module as a WM-Bus meter)
- 2x 169MHz antenna

## Setting up the demo

For the purpose of the demo, we are going to assume that the meter (SI meter), the bridge (Bridge), and the concentrator (LoRa Device) functions will be performed using AMIHO modules. However AMIHO modules are not necessary to simulate the WM-Bus meter and/or the concentrator.

1. To set-up the LoRa device, referred to as **concentrator**, connect a 169 MHz antenna to the SMA socket. **The bridge** will need an 868 MHz antenna as well as 169MHz. If using a third AMIHO module as a **SI meter**, connect one 868MHz antenna the UFL socket. (See Picture below)

Position of antenna connectors



2. Once you have connected all the proper antennas to the modules, you will need to connect the modules to your PC with the mini USB cables.
3. Open the application **pcdemo.exe** given in the CD two (2x) or three times (3x), depending on the number of modules used, as we need one terminal window for each module. To establish a connection between each terminal window and its dedicated module, **select the COM** ports by going to **Settings/Port Setup**. You can recognize which board is assigned to each COM port by pressing the **“Identify”** button in PCTool. Clicking the identify button will make the green LED blink on its assigned board. If you want to make the distinction easier, you can change the name of the PC Tool window by going to **Settings/Window Name** and change the names to ones you can recognise e.g. “SI meter”, “Bridge” and “LoRa conc”.

4. Configuration of the individual boards:

(a) Configure the “**SI meter**” board to communicate in WM-Bus SI mode by clicking the Manual button and writing **smode 1** in the terminal.

(b) Configure the “**LoRa conc**” board to communicate in LoRa 169MHz by clicking the Manual button and writing **sloramode 2** in the terminal.

(c) Configure the “**Bridge**” board to receive the packets in WM-Bus SI mode and automatically send them in LoRa 169 by introducing manually: **sbridge 08 A2**. Note that 08 stands for SI concentrator mode and A2 for LoRa 169 MHz mode. **See Additional Notes for more information.**

5. Start the demo by entering manually the command **sdemo 4** in the Bridge PC Tool. To restart the board click the manual button marked ‘reset’. You should see “IDN: AM093 (bridge demo)...” if it has successfully rebooted. **Now the bridge is ready to work.**

6. On the “**SI meter**” click on “**Send**”, write the desired text, then click “**Ok**”. This message must be **received** in the “**LoRa conc**” board. **Press the “Rec” button** to check the message has been received.

7. To **finish the demo** restore the “**Bridge**” board to the original state by entering with the manual button **resetp** and **reset**. You should see that the module responds with “**IDN: AM093 (modem) ...**”.

The whole process is illustrated in the following screenshots:

**Meter**

```
$123456
OK00>sendb 06
$123456
OK00>sendb 06
$123456
OK00>sendb 06
$123456
OK00>sendb 06
$123456
OK00>
```

**Bridge**

```
IDN: AM093 (modem)
EXECUTIVE VER:2.42 BUILD:20161004 172436 (UNRELEASED)
RF STACK VER:2.42 BUILD:20161004 172433 (UNRELEASED)

OK00>sbridge 08 A2

OK00>sdemo 4

OK00>reset

IDN: AM093 (bridge demo)
EXECUTIVE VER:2.42 BUILD:20161004 172436 (UNRELEASED)
RF STACK VER:2.42 BUILD:20161004 172433 (UNRELEASED)
OK00>
```

**Concentrator**

```
IDN: AM093 (modem)
EXECUTIVE VER:2.42 BUILD:20161003 165758 (UNRELEASED)
RF STACK VER:2.42 BUILD:20161003 165752 (UNRELEASED)

OK00>sloramode 2

OK00>geta
123456
OK00>autorx 1

OK00>
123456
123456
123456
```

## Additional notes

The bridge **can be established between any of the WM-Bus or LoRa** modes supported. The send and receive modes are set with the *sbridge* command, where the first parameter is the receive mode. This must be a mode that is able to receive: that means, any concentrator or bidirectional mode is valid, but not the meter unidirectional modes (01, 02, 04 or 11).

All WM-Bus modes are referenced with the hexadecimal code explained in the document **TD0014-AT Command Set** which is also provided with the evaluation kit. In the case of LoRa, A1 and A2, are used to reference LoRa 868 MHz (*sloramode 1*) and LoRa 169 MHz (*sloramode 2*).

From the 2.36 version of the stack, it is also possible to set one configuration for the bridge (input or output mode) with a configuration saved from the flash (for more information about saving configurations in the modem, please also refer to the **TD0014-AT Command Set** document). This is done by using the byte code F0 for one of the setting parameters of the bridge. For example, if we would like to have the bridge listening on the saved mode and retransmitting in the default LoRa 169MHz, the bridge would need to be configured with:

```
OK00>sbridge F0 A2
OK00>sdemo 4
OK00>reset
IDN: AM093 (bridge demo)
EXECUTIVE VER:2.36 BUILD:20160812 160739 (UNRELEASED)
RF STACK VER:2.36 BUILD:20160812 160739 (UNRELEASED)
OK00>
```

**At this point the bridge is already working with the desired settings.**

Version no.	Date	Update
1.0	12/07/16	Initial version
1.1	12/08/16	Added NVRAM configuration
1.2	25/10/16	Bridge diagram was changed

For more information and product ordering please contact us as per the details below.