Connecting to a MultiTech® Conduit™ Gateway

RM1xx Series

Application Note  v2.0

INTRODUCTION

The RM1xx series of LoRa/BLE modules adhere to the LoRa standard and are compatible with all LoRa gateways that are also adherent. For this example, we use one gateway, provided by MultiTech, to connect the RM1xx and transmit data over the LoRa protocol.

REQUIREMENTS

To complete this setup, you need the following:

- MultiTech Conduit LoRa gateway (AEP version with Node-RED software)
- UwTerminalX – Available from Laird (we recommend v1.03 or later)
- cmd.loramac.rm1xx.sb script – Available from the RM1xx GitHub sample applications page
- RM1xx-defs.h (H file) – Specific to each firmware version from the RM1xx GitHub sample applications page

MULTITECH GATEWAY SETUP

For the purposes of this guide, we assume that you have completed the initial hardware setup of the MultiTech Conduit gateway, the required LoRa mCard and the Ethernet connection as explained by MultiTech in their supporting materials.

When this is complete, you must configure the MultiTech gateway network server as follows:

1. Log in to the LoRa Network Server Configuration panel (Setup > LoRa network server).
2. Configure the server by doing the following:
   - Tick Public.
   - Set the Network EUI to 0123456789abcdef.
   - Set the Network Key dropdown to Key.
   - Set the Key text field to 0123456789abcdef0123456789abcdef.

These settings are illustrated in Figure 1. Note that Figure 1 below shows the setup page for the 915MHz radio and so would be only relevant to the RM191 module. For the RM186/868MHz option the setup page is different, mostly relating to the frequency channels configuration. However, for the purpose of this document only the 3 settings above need be applied.
With these settings configured, you must next set up the application server using Node-RED. Select **Apps** in the left menu to launch the Node-RED application. Configure Node-RED to send the message payload to the Debug window and also to echo the payload back to the end device. The following image (**Figure 2**) shows these settings configured in Node-RED.
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With the gateway configured, you must configure the RM1xx device to send data to the gateway.

First, set the Network ID, Device EUI, and Network Key. The Network ID and Network Key must match the settings we configured on the gateway in MultiTech Gateway Setup.

**Notes:** Different companies use different names for the various LoRa IDs and Keys. In this instance, Multitech have used the terms Network ID and Network Key for what the LoRaWan specification refers to as the Application Eui (AppEui) and the Application Key (AppKey) respectively.

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The Device EUI will be set by Laird in future revisions of the RM1xx. If you wish to use a custom device EUI, you may set the device EUI in smartBASIC with the `at+cfgex` command.

To configure the Network EUI, Device EUI, and Network key (in this order), complete the following:

1. Connect the RM1xx development board to your PC via the included USB micro-cable.
2. Power your development board.
3. Open UwTerminalX.
4. From the UwTerminalX’s Update tab, click **Check for Updates** to ensure you’re using the latest version of UwTerminalX with support for the RM1xx series.
5. Click the **Config** tab.

6. In the Device drop-down menu, select either **RM186** or **RM191** based on your setup.

7. Select the correct port to which your development board is connected.

8. Click **OK** to advance to the Terminal tab.

9. Hit **Enter** on your keyboard. If you see the return 00, you are connected successfully.

10. Enter the following commands, one at a time (this method is for an OTAA connection):

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>at+cfgex 1010 &quot;0123456789abcdef&quot;</td>
<td>To set the Network ID</td>
</tr>
<tr>
<td>at+cfgex 1011 &quot;0000000000000033&quot;</td>
<td>To set the Device EUI (if you wish to change from the Laird default EUI already set)</td>
</tr>
<tr>
<td>at+cfgex 1012 &quot;0123456789abcdef0123456789abcdef&quot;</td>
<td>To set the Network Key</td>
</tr>
<tr>
<td>atz</td>
<td>To reset the module</td>
</tr>
</tbody>
</table>

Now that the RM1xx module is configured correctly to connect to the MultiTech Conduit gateway, you must compile and run the `cmd.loramac.rm1xx.sb` script, which connects to the gateway and begins sending data packets.

**Notes:** These steps are for an OTAA (over-the-air activation) connection.

To compile and load the script, complete the following:

1. Right-click in the terminal window and click **XCompile + Load** in the context menu.
2. In the file selector window, select `cmd.loramac.rm1xx.sb` and click **Open**.
3. When the terminal displays 00 the compiler is successfully finished.
4. Type `at+dir` and press **Enter**. You should see `cmd` in the file list.
5. To run the GPS script, type `cmd` and press **Enter**.

The script begins running. To connect to the MultiTech Conduit gateway, type `lora join` and press Enter. The terminal confirms that the RM1xx has joined the network as shown in the following figure (**Figure 3**).
6. Once the RM1xx is connected to the network, type `lora send` and press enter. This sends a confirmed upstream packet on Port 1. The terminal reflects this as shown in the following image (Figure 4).

![Figure 3: RM1xx successfully joining the network](image)

**Figure 3: RM1xx successfully joining the network**

7. To send a Link Check request to the gateway, type `lora check` and press enter. The terminal displays the results as shown in the following figure (Figure 5).

![Figure 4: Sending "hello world" packet upstream to gateway](image)

**Figure 4: Sending "hello world" packet upstream to gateway**
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Figure 5: Successful link check request

REFERENCES

- Lora Alliance - LoRaWAN Specification version V1.0
- User Guide – RM1xx Series smartBASIC Extensions (documentation tab of RM1xx product page)
- User Guide - smartBASIC Core Functionality (documentation tab of RM1xx product page)
- Application Note – Connecting to Multitech Conduit Gateway (documentation tab of RM1xx product page)

REVISION HISTORY

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Notes</th>
<th>Approver</th>
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<tbody>
<tr>
<td>1.0</td>
<td>20 May 2016</td>
<td>Initial Release</td>
<td>Jonathan Kaye</td>
</tr>
<tr>
<td>1.1</td>
<td>26 Sept 2016</td>
<td>Updates to Requirements section</td>
<td>Jonathan Kaye</td>
</tr>
<tr>
<td>2.0</td>
<td>17 Nov 2016</td>
<td>Firmware version 17.4.1.0 and 18.4.1.0</td>
<td>Jonathan Kaye</td>
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