



How to Connect Radio Bridge LoRaWAN Sensors

VERSION 1.2
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1. OVERVIEW

1.1. Introduction

The wireless sensors designed and manufactured by Radio Bridge provide full sensor to cloud solutions for Internet of Things (IoT) applications. Radio Bridge LoRaWAN sensors can connect to a variety of LoRaWAN compliant network servers, located either on a local gateway or as a cloud-based network server. From there, the sensor messages can be sent to the Radio Bridge web-based console or a third-party application. This document provides instructions for connecting LoRaWAN sensors using several different methods.

For more information on the web-based console, visit <https://console.radiobridge.com>

1.2. Stand-Alone vs Network Provider

A network provider for LoRaWAN will set up LoRa base stations and charge for accessing their network much like a cell phone provider will charge to connect your phone to their network. In some cases, however, it may be desirable to set up a stand-alone gateway that does not use a network provider. Reasons for this may include lack of coverage in remote area or simply reducing the cost when there are many sensors in the field.



1.3. Revision History

Table 1 Revision History

Revision	Date	Description
1.0	August 2018	Initial release of the document
1.1	September 2018	Added section for general gateways
1.2	January 2019	Added support for TTN

1.4. Document Conventions

Table 2 Document Conventions

Font / Icon	Meaning
	Important notes
	Warnings and cautions

2. THE THINGS NETWORK (TTN)

The Things Network, also referred to as TTN, is a collaborative global LoRaWAN network. The TTN network server is located in the cloud and the gateways act as simple packet forwarders. Instructions for setting up a gateway and adding devices are provided on the website <https://www.thethingsnetwork.org> and are not repeated here. This section describes the setup required to link your TTN account with the Radio Bridge Console.



Do not add devices to TTN directly. After this integration is set up, adding devices to the Radio Bridge console will automatically add devices to your TTN account.

2.1. Create Access Key on TTN

Go to your application on TTN and select Settings -> Access Keys -> Generate New Access Key. Name the new key "console" and select all three boxes: settings, devices, and messages. Click Generate Access Key.

2.2. Add Integration to the Console

Go to the Radio Bridge Console and select the Integrations tab -> The Things Network. Add the TTN application ID to the Application ID field and the access key generated in the last step to the Application Access Key field. Note that the Application Access Key is not the name of the key, but the randomly generated string that was created. Click Update.

2.3. Add Integration to TTN

Go to the TTN application and select Integrations -> add integration -> HTTP Integration. Enter the fields as shown in the following table.

Table 3 Parameters for TTN integration

Parameter	Description
Access Key	Select the access key that was created in the previous steps
URL	Use the URL from the TTN tab on the Radio Bridge Console
Method	POST

Authorization	Use the Authorization string from the TTN tab on the Radio Bridge Console
Custom Header Name	Use the Custom Header Name from the TTN tab on the Radio Bridge Console
Custom Header Value	Use the Custom Header Value from the TTN tab on the Radio Bridge Console

2.4. Add Devices to Console

Your Radio Bridge Console should now be connected to your TTN account. When you add devices in the Console, select LoRa -> The Things Network and add the device. Adding and deleting devices in the Console will now be reflected in your TTN account, and messages coming through TTN will appear in the Console.

3. MACHINEQ

machineQ is a LoRaWAN connectivity service from Comcast. The machineQ network server is located in the cloud, and the machineQ gateways forward packets between the network server and the LoRaWAN sensors. There is no configuration required on a machineQ gateway, just plug it in and it is ready to go.

3.1. Using Radio Bridge Console

If the Radio Bridge console is used to monitor and configure sensors, simply log into the console and select the Devices tab on the left side of the page and click “Add New Device”. From there follow the prompts to select LoRa and the machineQ service. Once the device has been added, you will see sensor messages appear in the console.

3.2. Without Using Radio Bridge Console

If the Radio Bridge console is not used, and sensor messages will be sent directly from the end customer’s machineQ account to a third-party application, please refer to the table below for the parameters required to add the device to the machineQ back end.

Table 4 Parameters for machineQ Setup

Parameter	Description
Dev EUI	The Device ID listed on your sensor

App EUI	Enter 0101010101010101
App Key	Enter the Key listed on your sensor
Device Profile	LoRaWAN 1.0.2 Class A 20dBm
Decoder Type	Use "Unknown"
DevAddr Assign	Dynamic

4. STAND-ALONE MULTITECH MULTICONNECT® CONDUIT AP/AEP

This section describes the steps necessary to connect a stand-alone Multitech Multiconnect Conduit AP or AEP LoRa gateway to the Radio Bridge console. In the stand-alone configuration, the network server is located on the local gateway and messages are sent to the Radio Bridge console using a custom configuration in Node-Red.



A cloud-based network server is highly recommended vs a stand-alone setup. If you wish to use this method, we recommend contacting our support to discuss your application further.

4.1. Add Gateway to the Console

This first step is to create security credentials for a new stand-alone gateway so that it can connect to the Radio Bridge console.

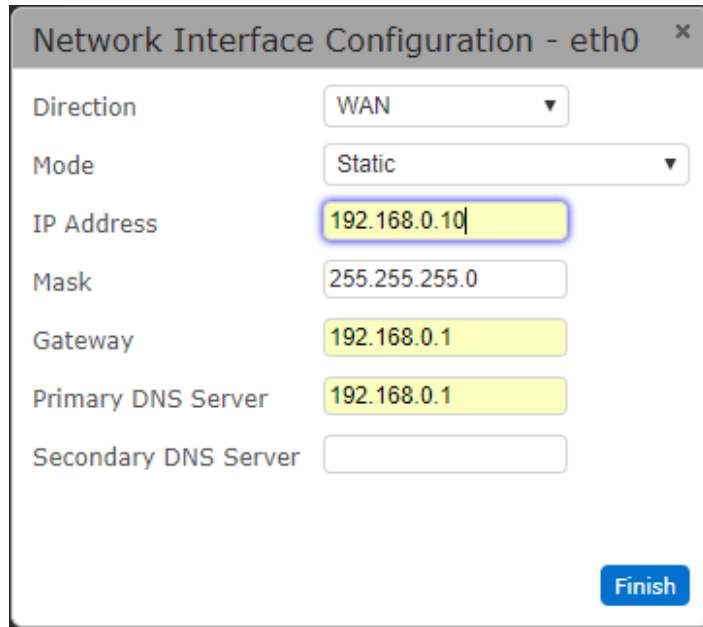
Log into the Radio Bridge console at console.radiobridge.com, select the Gateways tab on the left side, and click "Add Gateway".

Follow the menu to select the correct gateway model, in this case the Multitech Multiconnect AP/AEP gateway.

4.2. Bring the Gateway Online

To bring the gateway online, refer to the standard setup instructions from Multitech. Note that the gateway may default to a static IP of 192.168.2.1.

In this case, we are assigning the static IP address 192.168.0.10 with the Gateway and DNS server set to the local DHCP server. After configuring the network settings, an https:// may be required to access the gateway.



4.3. Update Gateway Firmware

Verify that the gateway is running firmware version 1.4.17 or later. If it is not, follow the Multitech instructions for upgrading the system firmware before proceeding to the next steps.

4.4. Enable the LoRa Network Server

Navigate to the LoRaWAN tab on the left side of the screen, select network settings, and under Mode select "Network Server".

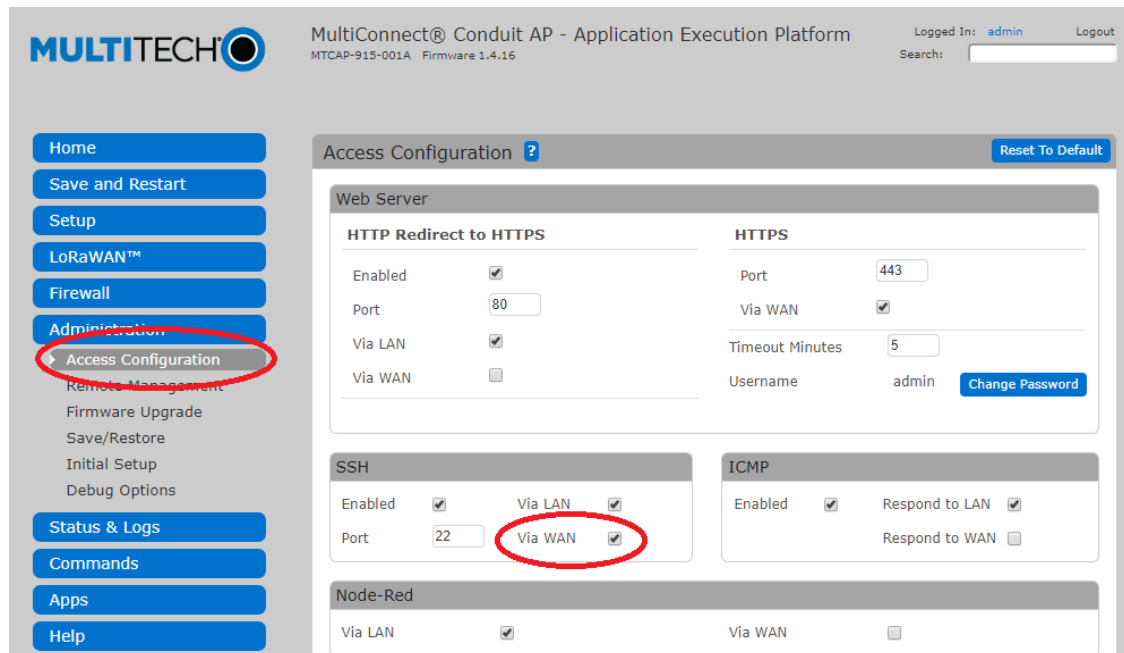
The default settings should be in the correct state, but double check that the Channel Plan is "US915" and the network mode is set to "Public LoRaWAN"

The screenshot shows the MultiConnect® Conduit AP web interface. On the left is a navigation menu with buttons for Home, Save and Restart, Setup, LoRaWAN™, Network Settings (highlighted with a red circle), Firewall, Administration, Status & Logs, Commands, Apps, and Help. The main content area is titled 'LoRaWAN Networking' and contains two sections:

- LoRa Mode:** A table with columns for configuration and status. The 'Mode' dropdown is set to 'NETWORK SERVER' (circled in red). Other entries include Packet Forwarder (3.1.0-r11.0), Network Server (2.0.19), Lens Server (2.0.19), and FPGA Version (N/A). The status for the Network Server is 'DISABLED'. A 'Restart LoRa Services' button is present.
- LoRaWAN Network Server Configuration:** A form with various settings. The 'Channel Plan' dropdown is set to 'US915' (circled in red). The 'Network Mode' dropdown is set to 'Public LoRaWAN' (circled in red). Other settings include Frequency Band (915), Frequency Sub-Band (1), Lease Time (00-00-00), Address Range Start (00:00:00:01), Address Range End (FF:FF:FF:FE), and Queue Size (16).

Click on Submit.

Click on Administration -> Access Configuration and check the box "Via WAN" under the SSH heading. Click Submit.



Click Submit.

Go to Firewall->Settings and check the box “Allow Inbound”.

Click Save and Restart.

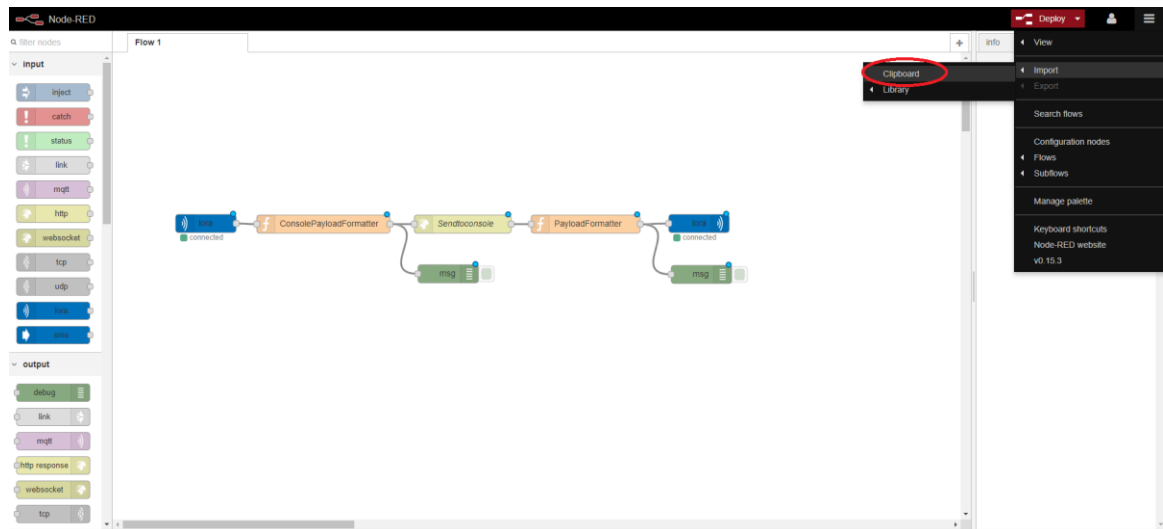
4.5. Configure Node-RED

Log into the gateway and select Apps -> Launch Node-RED. If the gateway says Node-RED is not enabled, check the enable box. If the link does not connect, verify that “Allow Inbound” is selected under Firewall->Settings.

Go to the Radio Bridge Console and navigate to the gateway that was created in previous steps. Click the “Gateway Setup” button and copy the Node-RED configuration data to your clipboard.

Back in Node-RED, go to the top right menu and select Import->Clipboard. Paste the configuration that you copied in the last step and click Import.

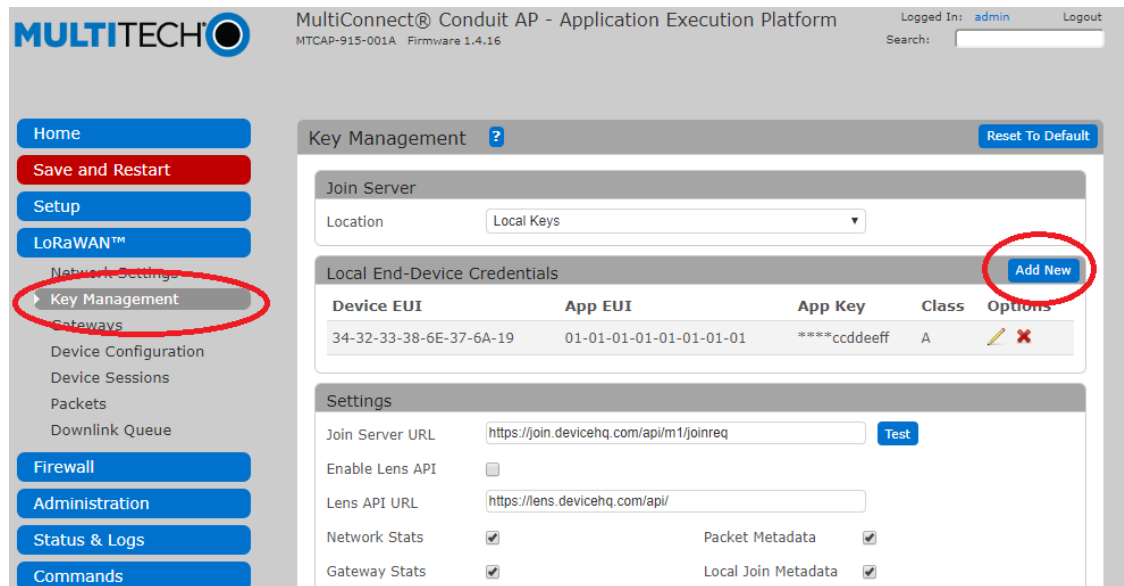
Note that the Node-RED configuration will contain different authentication information for each gateway.



Click on the new tab along the top that was created to view the flow. Click on the red “Deploy” button in the upper right. After a few seconds, the input and output nodes will show that they are connected.

4.6. Add Devices to Gateway

Log into the gateway and go to LoRaWAN -> Key Management. Under Local End-Device Credentials click Add New.



Enter the fields as shown in the following table.

Table 5 Parameters for TTN Setup

Parameter	Description
Dev EUI	The Device ID listed on your sensor
App EUI	Enter 0101010101010101
App Key	Enter the Key listed on your sensor

Click Finish.

Once you have added all of your devices click on Submit then click Save and Restart.

Note that this only adds the devices to the gateway, they will still need to be added to the Radio Bridge console. Adding a device to the gateway does not automatically add to the console, and adding to the console does not automatically add them to the gateway, so they must be added separately.

4.7. Add Devices to the Console

As mentioned in the previous step, even though the devices have been added to the gateway, they will still need to be added to the Radio Bridge console.

Log into the console and select the Devices tab on the left side of the page and click “Add New Device”. Select “Stand-Alone Gateway” in the Select Network screen. For the ID and Key, use the numbers found on the sensor label which is the same ID/Key pair entered on the gateway.

Radio Bridge sensors can now connect to the console through the stand-alone gateway. Try creating sensor events and verify that you see messages in the console.

5. GENERAL THIRD-PARTY NETWORK SERVER

This section provides the information required to connect the LoRaWAN sensors to a third party LoRaWAN network server not otherwise described in this document. The network server may reside on the gateway itself or in the cloud, and the server may push the data to the Radio Bridge console or another third-party application.

5.1. Sensor to Network Server

The LoRaWAN network server must use the connectivity parameters shown in the following table.

Table 6 LoRaWAN Parameters

LoRaWAN Parameter	Description
Activation Method	OTA (over the air activation). The sensor will send a join request and expect a join accept before any other messages can be sent.
Device EUI	This is the ID on the label located on the sensor itself. The barcode provided can also be used to read the Device EUI.
Application EUI	By default this is set to: 0101010101010101. This can be customized in the factory for production orders, but most customers simply use this default.
Application Key	This is the Key on the label located on the sensor itself. The barcode provided can also be used to read the Application Key.

The sensors will send a join request when the battery is inserted, and if the join fails it will try again once per hour. To force a new join request, remove the battery and replace it. Often it takes a few minutes for LoRaWAN network servers to boot, so if it doesn't connect on the first attempt, wait a few minutes before replacing the battery again.

5.2. Network Server to Radio Bridge Console

The network server may pass data to the Radio Bridge console application or directly to a third-party application. The advantage of the Radio Bridge console is simple provisioning, automatic decode and interpretation of sensor data, a downlink interface for reconfiguring the sensors, database with message history, health status, and a simple API interface. This section describes the steps required to connect a gateway not specifically listed in this document to the Radio Bridge console.

The first step is to create security credentials for a new stand-alone gateway so that it can connect to the Radio Bridge console. Log into the Radio Bridge console at console.radiobridge.com, select the Gateways tab on the left side, and click "Add Gateway". Follow the menu to select the gateway type "Other Gateway".

After the gateway has been created, select "Gateway Setup". Use the API provided with a POST or GET call to send data from a gateway to the console. The response from this call will contain any downlink (sensor configuration information) if a new configuration message is pending. Note that the call has an authorization key that is unique to this gateway.

When adding a new LoRa device, select “Third Party Gateway” and select the name of the gateway you just created. The gateway is now authorized to send sensor data to the console.

6. TRADEMARKS AND COPYRIGHT

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7. DISCLAIMERS, WARRANTY, AND CUSTOMER SUPPORT

7.1. Disclaimers

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7.2. Warranty

To view product warranty information, go to the following website: www.radiobridge.com

7.3. Customer Support

Radio Bridge offers free technical support at:

www.radiobridge.com/forums

Radio Bridge also offers technical support plans and service packages to help our customers get the most out of their Radio Bridge products.

For information on Technical Support plans and pricing, visit us at www.radiobridge.com.