

Connect M2 Multi-Platform Gateway to The Things Network

The main building blocks of the public community LoRaWAN® network are gateways. This tutorial will guide you connecting your M2 Multi-Platform Gateway to The Things Network.

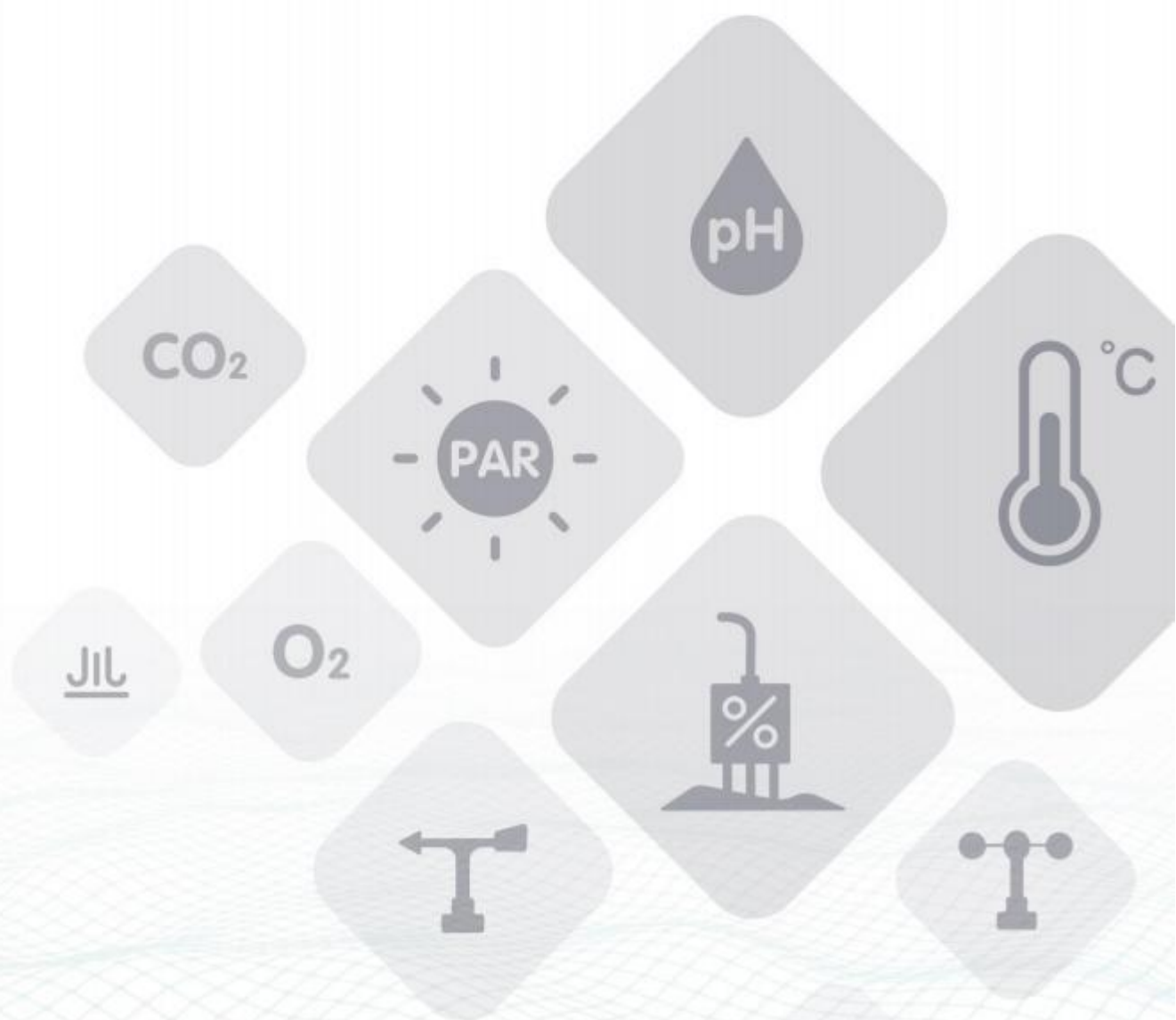


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There are two ways to connect to the Things Network: Packet forward and Basics™ Station. Choose a way to connect your gateway.

Semtech UDP Packet Forwarder is the original LoRaWAN® packet forwarder, connecting to servers through the Semtech UDP protocol.

LoRa Basics™ Station is the preferred way of connecting Gateways to The Things Stack.

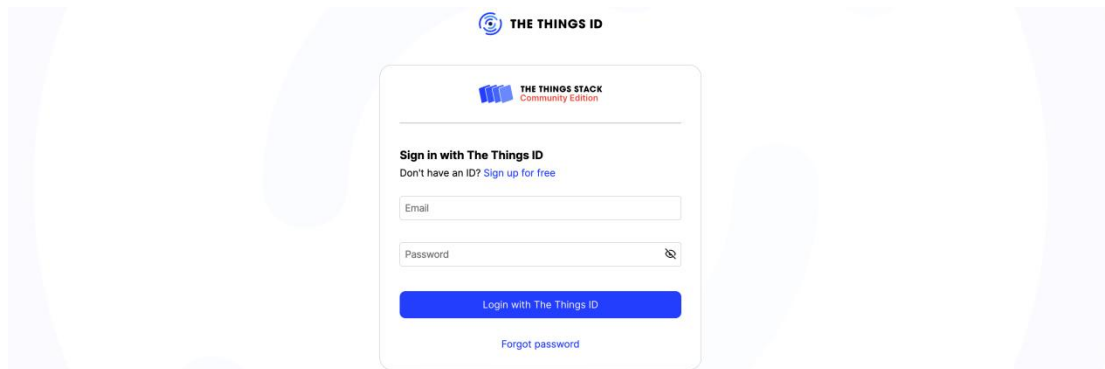
1. Connecting via Packet Forwarder

The Semtech UDP Packet Forwarder is the original LoRaWAN® packet forwarder, connecting to servers through the Semtech UDP protocol.

1.1 TTN Configuration

- **Step 1:** Log into [The Things Stack](#).

If you don't have a TTN account, please register first.



- **Step 2:** Register the gateway



Gateway EUI: Gateway EUI can be found on the device label or Local Console

Gateway ID: A unique identifier for your gateway(the ID must contain only lowercase letters, numbers, and dashes)

Gateway name: A name of your gateway

Frequency plan: Select the corresponding frequency according to your gateway version

The screenshot shows the 'Register gateway' form in the SenseCAP web interface. The form includes the following fields and options:

- Gateway EUI:** A text input field containing '2CF7F' and a 'Reset' button.
- Gateway ID:** A text input field containing 'eui-2cf7f'.
- Gateway name:** A text input field containing 'M2 MP'.
- Frequency plan:** A dropdown menu showing 'Europe 863-870 MHz (SF12 for RX2)'.
- Require authenticated connection:** An unchecked checkbox with a note: 'Choose this option eg. if your gateway is powered by LoRa Basic Station'.
- Share gateway information:** A section with two checked checkboxes: 'Share status within network' and 'Share location within network'.
- Register gateway:** A blue button at the bottom of the form.

You can check the Gateway in the overview after successful registration.

The screenshot shows the 'Gateway Overview' page for a gateway named 'M2 MP' with ID 'eui-2cf7f'. The page is divided into several sections:

- Header:** Shows the gateway name 'M2 MP' and ID 'eui-2cf7f', along with a 'Disconnected' status and '1 Collaborator'.
- General information:** A table listing details:

Gateway ID	eui-2cf7f
Gateway EUI	2CF7F1
Gateway description	None
Created at	Oct 8, 2022 11:33:37
Last updated at	Oct 8, 2022 11:33:37
Gateway Server address	eui.cloud.thethings.network
- LoRaWAN information:**
 - Frequency plan: EU_863_870
 - Global configuration: Download global_conf.json
- Live data:** A section with a timestamp '11:33:37' and a 'Create gateway' button.
- Location:** A world map showing 'No location information available'.

1.2 Gateway Configuration

Configure the gateway via the Web UI, please check the [Quick Start](#) to log into Luci page first.

● Step 1: LoRa Network Settings

Navigate to **LoRa > LoRa Network**



● Step 2: Set Mode to Packet Forward

The screenshot shows the 'LoRaWAN Network Settings' page. The 'Gateway EUI' is '2CF7F'. The 'Mode' is set to 'Packet Forwarder'. The 'Packet Forwarder Settings' section is expanded, showing 'General Settings', 'Intervals Settings', 'Beacon Settings', 'GPS Information', and 'Forward Rules'. The 'General Settings' tab is active, showing the 'Gateway EUI' as '2CF7F1', the 'Server Address' as 'eu1.cloud.thethings.network', and the 'Server Port (Up)' and 'Server Port (Down)' both set to '1700'. A 'Save & Apply' button is at the bottom right.

● Step 3: Packet Forwarder Settings:

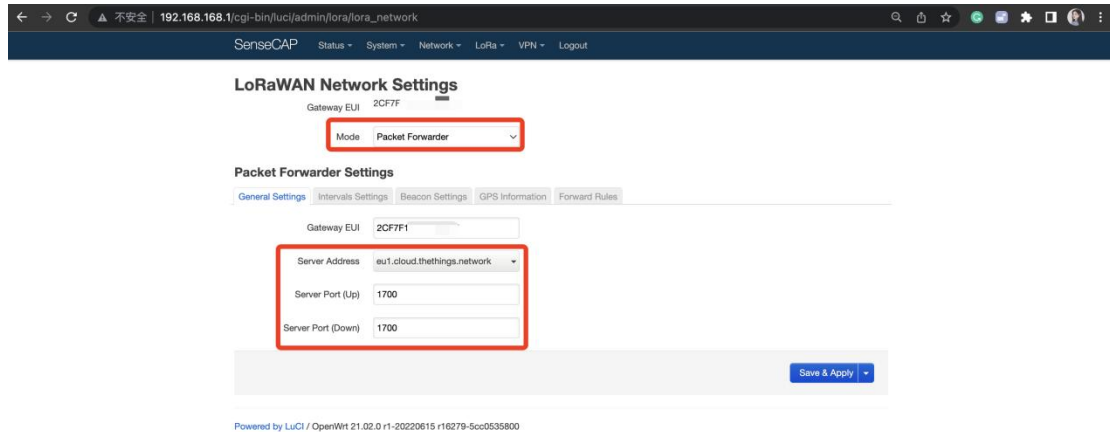
1) **Gateway EUI:** It will automatically get the EUI of the connected gateway.

2) **Server Address:** For Semtech UDP Packet Forwarder use <server-address>

The <server-address> is the address of your The Things Stack deployment. See [Server Addresses](#) for more info.

3) **Server Port(Up/Down)**: The Up Port and Down Port are typically 1700.

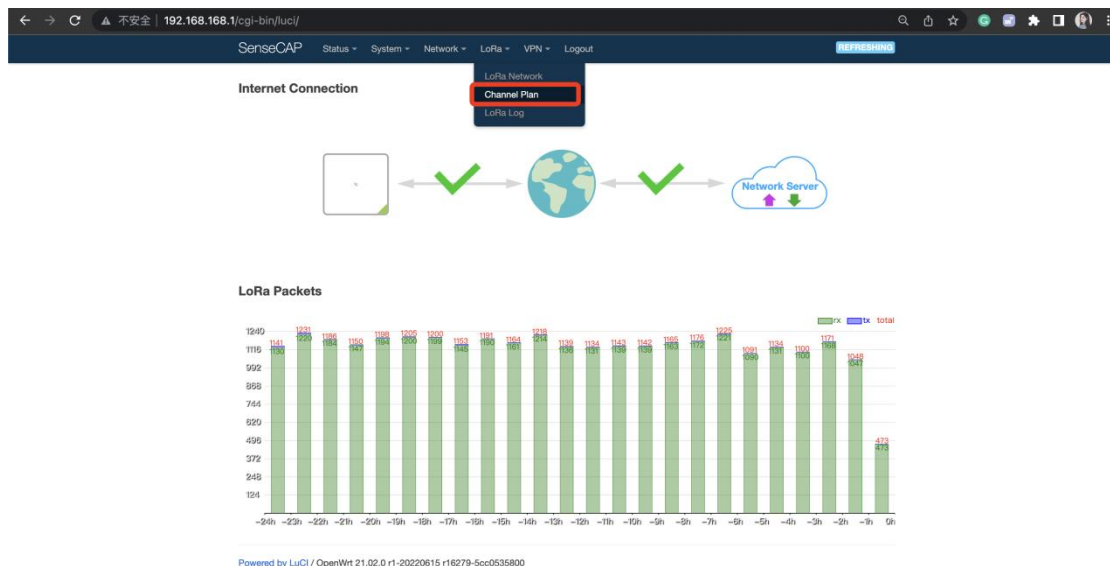
Other settings can be left as default, or can be changed to suit your requirements.



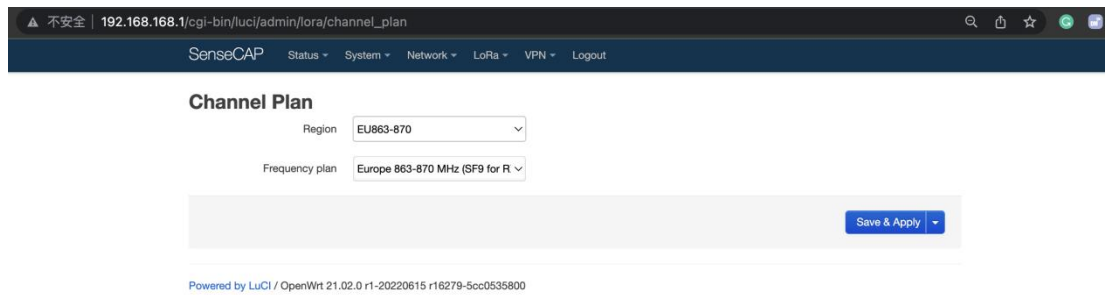
Click **Save&Apply** to apply your settings.

● Step 4: Channel Plan Settings

Navigate to **LoRa > Channel Plan**



Select the Region and Frequency plan according to the actual choice.



The screenshot shows a web browser window with the URL `192.168.168.1/cgi-bin/luci/admin/lorawan/channel_plan`. The page title is "Channel Plan". It features two dropdown menus: "Region" set to "EU863-870" and "Frequency plan" set to "Europe 863-870 MHz (SF9 for R)". A "Save & Apply" button is located at the bottom right of the form. The footer text reads "Powered by LuCI / OpenWrt 21.02.0 r1-20220615 r16279-5cc0535800".

After setting, click **Save&Apply**

2.Connecting via Basic Station

LoRa Basics™ Station is the preferred way of connecting Gateways to The Things Stack.

2.1 TTN Configuration

- **Step 1:** Register gateway



- **Step 2:** Enable Require authenticated connection

A screenshot of the 'Register gateway' form in the TTN console. The form includes fields for 'Gateway EUI', 'Gateway ID', 'Gateway name', and 'Frequency plan'. The 'Require authenticated connection' checkbox is checked and highlighted with a red box. Below this checkbox, there is a note: 'Choose this option eg. if your gateway is powered by LoRa Basic Station'. There are also checkboxes for 'Generate API key for CUPS' and 'Generate API key for LNS'. At the bottom, there is a 'Register gateway' button. The form also includes a section for 'Share gateway information' with checkboxes for 'Share status within network' and 'Share location within network'.

This will only allow a gateway to connect if it uses a TLS enabled Basic Station or MQTT connection.

● Step 3: Create an API key

Select a option to generate a API key for the CUPS or LNS service automatically, then you can authorize the gateway right away.

Register gateway

Register your gateway to enable data traffic between nearby end devices and the network.
Learn more in our guide on [Adding Gateways](#).

Gateway EUI ⓘ
2C F7 Reset

Gateway ID ⓘ *
eui-2

Gateway name ⓘ
My new gateway

Frequency plan ⓘ *
Europe 863-870 MHz (SF9 for RX2 - recommended)

☒ Require authenticated connection ⓘ
Choose this option eg. if your gateway is powered by [LoRa Basic Station](#)

☐ Generate API key for CUPS ⓘ
☐ Generate API key for LNS ⓘ

Share gateway information
Select which information can be seen by other network participants, including [Packet Broker](#)

☒ Share status within network ⓘ
☒ Share location within network ⓘ

Register gateway

Choose a Server according to your need, then click “Register gateway”

LoRaWAN Network Server (LNS)

LNS establishes a data connection between a LoRa Basics™ Station gateway and a Network Server (in this case, The Things Stack). LoRa® uplink and downlink frames are exchanged through this data connection. The LNS protocol is required for sending and receiving LoRaWAN data.

Configuration and Update Server (CUPS)

CUPS allows a Network Server to configure gateways remotely, and to update gateway firmware. CUPS is not required for sending and receiving LoRaWAN data, but it can greatly simplify the management of gateways. Configuring CUPS will also automatically retrieve LNS credentials and configure LNS on your gateway.

More information about LoRa Basics™ Station is available at [Semtech's Developer Portal](#).

2.2 Gateway Configuration

● Step 1: LoRa Network Settings

Navigate to **LoRa > LoRa Network**



● Setp 2: Set Mode to Basics Station

The screenshot shows the 'LoRaWAN Network Settings' page. The 'Basic Station Settings' section is expanded. The 'Gateway EUI' is set to '2CF7F115'. The 'Mode' is set to 'Basics Station'. The 'Server' is set to 'LNS Server'. The 'URI' is set to 'wss://ser:8887'. The 'Authentication Mode' is set to 'TLS Server Authentication and C'. A 'Save & Apply' button is visible at the bottom.

● Step 3: Basic Station Settings:

1) **Gateway EUI:** It will automatically get the EUI of the connected gateway.

2) **Server:** LNS or CUPS

Check the previous step for more details about the servers.

3) **URL:** CUPS uses the URI: `https://<server-address>:443`

LNS uses the URI: `wss://<server-address>:8887`

4) **Authentication Mode:** TLS server authentication and Client token

The Things Stack supports TLS server authentication and client token. This requires a `*.trust` file and a `*.key` file. .

5) **trust:** This is the [CA certificate](#) which secures your domain.

A `.pem` file containing common certificates is available in the [Root Certificates Reference](#).

Copy the data content of the certificate file (the certificate can be opened in text form).

6) **token:** Authorization: Bearer <Your_API_Key>

Other settings can be left as default, or can be changed to suit your requirements.

The screenshot displays the 'LoRaWAN Network Settings' page. At the top, there's a navigation bar with 'SenseCAP', 'Status', 'System', 'Network', 'LoRa', 'VPN', and 'Logout'. The main content area is titled 'LoRaWAN Network Settings' and includes a 'Gateway ELU' dropdown set to '2CF7F116'. Below this is a 'Mode' dropdown set to 'Basics Station'. The 'Basic Station Settings' section contains 'Gateway ELU' (2CF7F116), 'Server' (LNS Server), and 'URI' (wss://ser:8887). A note below the URI states: 'For example CUPS https://server-address:443, LNS wss://server-address:8887'. The 'Authentication Mode' is set to 'TLS Server Authentication and C'. The 'trust' field contains a large block of text representing a certificate. The 'token' field is set to 'Authorization: NNSXS.URG'. A 'Save & Apply' button is located at the bottom right of the settings area.

3. Check the Gateway Status

After the settings are completed, we can view the live data of your gateway. You can see that your gateway is connected to TTN now.

The screenshot shows the TTN SenseCAP web interface. The top navigation bar includes the SenseCAP logo, 'THE THINGS STACK Community Edition', and user information. The main interface is divided into a sidebar and a main content area. The sidebar contains navigation links: Overview, Live data (selected), Location, Collaborators, API keys, and General settings. The main content area is titled 'Gateways > M2 MP > Live data'. It features a table with columns 'Time', 'Type', and 'Data preview'. The table lists several 'Receive uplink message' events. The 'Data preview' column provides detailed information for each message, including the DevAddr, FPort, and various sensor data points such as txin, txok, rxin, rxok, rxfr, ack, and temp. The gateway is identified as 'M2 MP'.

Time	Type	Data preview
11:48:16	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:48:03	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:48:01	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:56	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:56	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:53	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:37	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:31	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:21	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:19	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:18	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:15	Receive gateway status	Metrics: { txin: 0, txok: 0, temp: 35.2, rxin: 4, rxok: 4, rxfr: 4, ack: 100 } Versions: { ttn-ls-gateway-server: "3.22.0-ucb-SNAPSHOT-9bce7962" }
11:47:04	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:47:03	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:46:53	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:46:49	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:46:45	Receive gateway status	Metrics: { txin: 5, txok: 4, rxfr: 4, ack: 80, txin: 0, txok: 0, temp: 35.2 } Versions: { ttn-ls-gateway-server: "3.22.0-ucb-SNAPSHOT-9bce7962" }
11:46:44	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97
11:46:39	Receive uplink message	DevAddr: 27 80 BE 80 FPort: 3 Confirmed uplink Data rate: SF78M125 SNR: 14 RSSI: -97