



# LoRaWAN Temperature & Humidity Sensor

UC11-T1  
V1.0



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# 1. Preface

Thank you for choosing Ursalink UC11-T1. This user guide will present in detail all the functions and features of the product. The UC11-T1 is designed for both industrial and commercial applications and helps devices stay connected. The product should be used under the guidance of this user manual, referring to parameters and technical specifications. The UC11-T1 is a compact, high-performance device server that offers LoRaWAN connectivity for remote access and easy management of machines and equipment over the LoRaWAN gateway.

We bear no liability for property loss or physically injury arising from abnormal or incorrect usage of this product.

## 2. Introduction

UC11-T1 is a smart wireless module, featuring LoRaWAN protocol, equipped with a high-precision temperature and relative humidity sensor. This sensor can measure temperatures from  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ , with accuracy of  $\pm 0.5^{\circ}\text{C}$  as well as air humidity from 0 to 100%, with accuracy of 2% RH.

The sensor is optimized for long battery life and excellent RF performance. It is fully configurable over the air by the user for custom applications, thresholds, trigger events and reports.

This user guide is intended to provide detailed technical specifications and explanations to basic users as well as the technically-minded groups. It is a live document, and will be updated from time to time. Please ensure that you have the latest version, by checking our website at: <https://www.ursalink.com/en/documents-download/>

### 2.1 Features

- Accuracy:  $\pm 0.5^{\circ}\text{C}$  typically from  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
- Customize temperature alert thresholds
- Accuracy:  $\pm 2\%$  RH , typically from 0% to 100% RH
- Powered by replaceable Li-ion battery: 8000mA
- Battery life: 4 years of operation for 1 uplink per 20minutes
- LoRaWAN compatible: Class A, uplink rate programmable from 5 minutes to 30 minutes
- Support Frequency: CN470 /EU868 / US915 / EU433 / AU915 / AS923 / KR920 / IN865
- LoRa wireless module included, up to 5-mile range

## 2.2 Parameters

Parameter Item	Reference Scope
Measuring Range	Temperature: -40° C to +70° C ( $\pm 0.5^\circ$ C) Humidity: 0% to 100% RH ( $\pm 2\%$ RH)
Frequency Band	EU 433, CN 470-510, EU 863-870, US 902-928, AU 915-928, KR 920-923
Antenna	Embedded Ceramic antenna
Operating Temperature	-40° C to +70° C (-40° F to +158° F)
Relative Humidity	0% to 100% (non-condensing)
Power Supply	Powered by replaceable Li-ion battery: 8000mAh/3.6V
Dimensions	86.44 x 61.65 x 33.66 mm
Waterproof Grade	IP65

## 2.3 Turn on/off the Sensor

Put a magnet close to the reed switch to turn on or turn off the sensor.

Buzzer rings for 2 seconds: power on.

Buzzer rings for 6 seconds: power off.

# 3. Configuration via PC

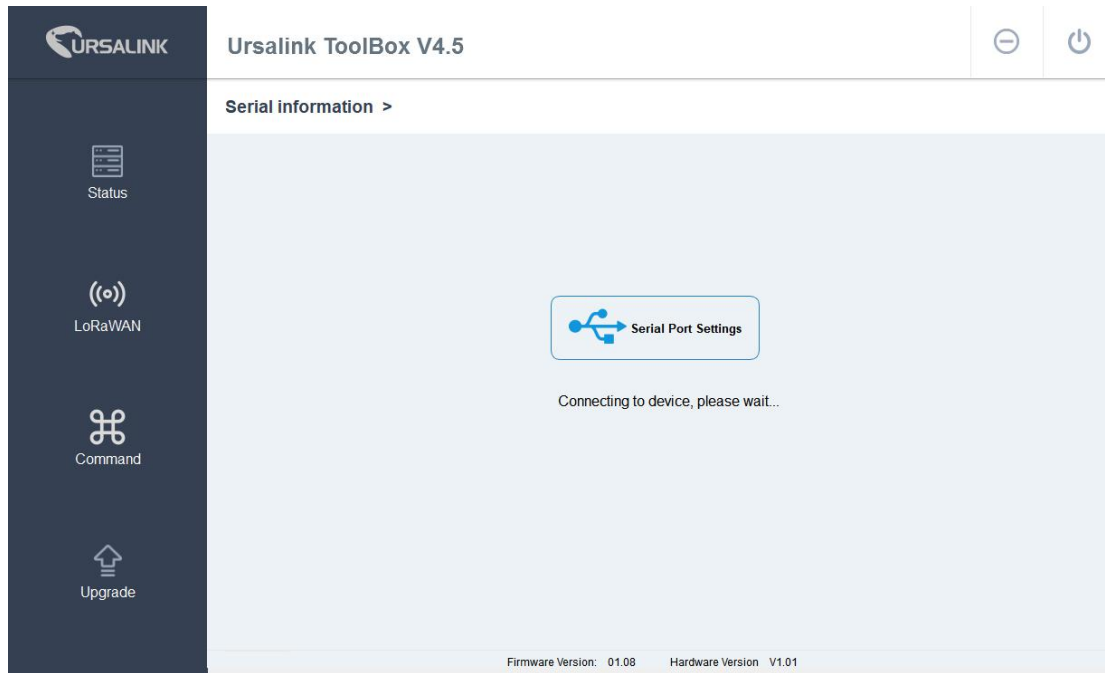
## 3.1 Configuration via ToolBox

Follow these steps:

Step 1: Connect the Ursalink UC11-T1 to PC via USB port.

Step 2: Power on the Ursalink UC11-T1.

Step 3: Run the Ursalink ToolBox.



When the Ursalink ToolBox displays: **Connecting to device, please wait...**

You can click **Serial Port Settings** to set the correct serial port parameters.

**Serial Port Settings**
✕

Serial port

Login password

Baud rate

Data bits

Parity bits

Stop bits

Serial Port Settings		
Item	Description	Default
Serial Port	Select the serial port for data transmission.	Null
Login Password	Enter the correct password to login.	Null
Baud Rate	Select from "9600", "57600", "115200".	57600
Data Bit	Select from "5", "7", "8".	8
Parity Bit	Select from "Even", "Odd", "None".	None

Stop Bit	Select from "1", "2".	1
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If the serial port parameter is correct, it will display: Serial port is connected.



## 3.2 Status

Click "Status" to see the basic status information of this device:

The screenshot shows the Ursalink Toolbox V4.17 interface. The left sidebar contains icons for Status, LoRaWAN, and Upgrade. The main content area displays the following status information:

Model:	UC11-T1
Serial Number:	611312345670
Partnumber:	EU868-0080
Firmware Version:	01.08
Hardware Version:	V1.01
Local Time:	2019-2-14 13:14:52 Monday
Join Status:	Activate
RSSI/SNR:	0/0
Temperature:	35°C
Humidity:	88%
Battery:	100%
Uplink Frame-counter	0
Download Frame-counter	0

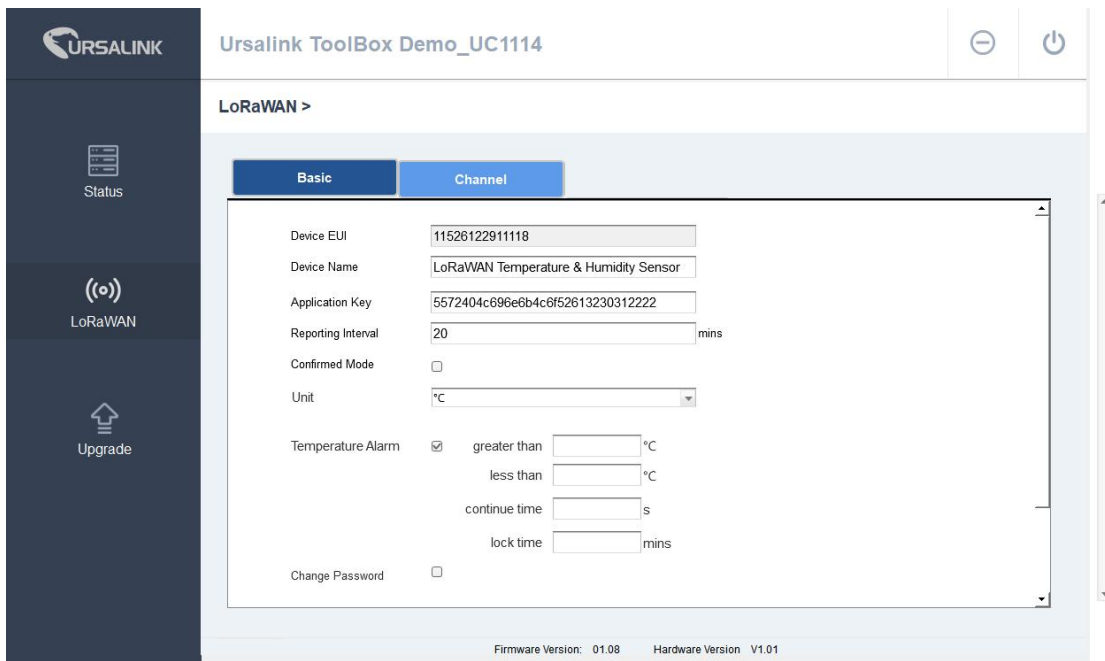
At the bottom of the status page, it shows: Firmware Version: 01.08 Hardware Version V1.01

Status	
Item	Description
Local Time	Show the time of the device.
Join Status	Show if the device join the network successfully.

	The "Activate" means the device has joined the network.
RSSI/SNR	Show the RSSI/SNR of received packet.
Temperature	Show the temperature value.
Humidity	Show the humidity value.
Battery	Show the battery level.
Uplink Frame-counter	The number of data frames sends uplink from UC11-T1 to the network server.
Downlink Frame-counter	The number of data frames sends downlink from the network server to UC11-T1.

### 3.3 LoRaWAN

#### 3.3.1 Basic



Basic Settings		
Item	Description	Default
Device EUI	Show the identifier of this device.	the identifier of this device.
Device Name	Enter the custom name of this device.	LoRaWAN Temperature & Humidity Sensor
Application Key	Enter the application key. Whenever an end-device joins	5572404c6

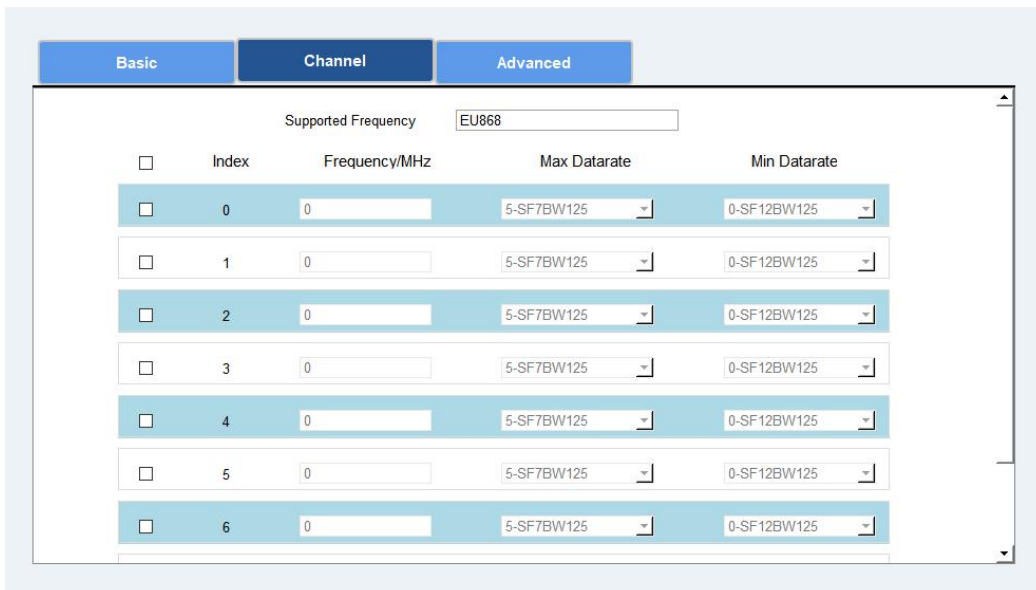
	a network via over-the-air activation, the application key is used to derive the Application Session key.	96e6b4c6f 526132303 13823
Reporting Interval	The UC11-T1 reports the temperature and humidity at regular intervals. Range: 5-30 (mins)	20
Confirmed Mode	Disabled: UC11-T1 will send uplink unconfirmed packet.  Enabled: The last packet sent from UC11-T1 to Network Server will be uplink confirmed packet.	Disabled
Temperature Alarm	Enable: The device will send an alarm notification to Network Server if the temperature goes above/below temperature thresholds.	Disabled
greater than	Enter the maximum temperature threshold.	Null
less than	Enter the minimum temperature threshold.	Null

**Note:** If you set a "lockout time" of 10s, a "continued time" of 5s, the alarm will be triggered as soon as the temperature goes above the maximum temperature threshold or goes below the minimum temperature threshold for 5s. It will then start checking the temperature again after 10s and be triggered once more if the temperature goes above/below temperature thresholds for 5s.

### 3.3.2 Channel

On this page, you can view all of the supported LoRa frequencies and setup the channel frequency used for receiving and sending data.

LoRaWAN >





**Note:** Make sure the you have configured the corresponding channel on the gateway.  
E.g. If you have configured a 923.2 MHz channel on UC11-T1, then you have to configure a 923.2 MHz channel on gateway as well.

Multi Channels Setting			
Enable	Index	Radio	Frequency/MHz
<input checked="" type="checkbox"/>	0	Radio 0	923.2
<input checked="" type="checkbox"/>	1	Radio 0	923.4
<input checked="" type="checkbox"/>	2	Radio 0	923.6
<input checked="" type="checkbox"/>	3	Radio 1	922.2
<input checked="" type="checkbox"/>	4	Radio 1	922.4
<input checked="" type="checkbox"/>	5	Radio 1	922.6
<input checked="" type="checkbox"/>	6	Radio 1	922.8
<input checked="" type="checkbox"/>	7	Radio 1	923.0

### 3.4 Upgrade

The screenshot displays the 'Ursalink Toolbox V4.5' interface. On the left is a dark sidebar with navigation icons for Status, LoRaWAN, Command, and Upgrade. The main area is titled 'Upgrade >' and contains a blue progress bar at the top. Below it, the 'Firmware Version' is shown as '01.08'. There is an 'Upgrade Firmware' section with a text input field, a 'Browse' button, and an 'Upgrade' button. A 'Restore Factory Defaults' section has a 'Reset' button. At the bottom, the status bar indicates 'Firmware Version: 01.08' and 'Hardware Version: V1.01'.

- Step 1: Connect UC11-T1 to PC via the usb port.
- Step 2: Install the battery to power on UC11-T1.
- Step 3: Run the Ursalink ToolBox and go to "Upgrade".
- Step 4: Click "Browse" and select the correct firmware file from the PC.
- Step 5: Click "Upgrade" and the device will check if the firmware file is correct. If it's correct, the firmware will be imported to the device, and the device will reboot after upgrading is completed.

**Note:** Any operation on Ursalink ToolBox is not allowed during upgrading, otherwise the upgrading will be interrupted, or even the device will break down.

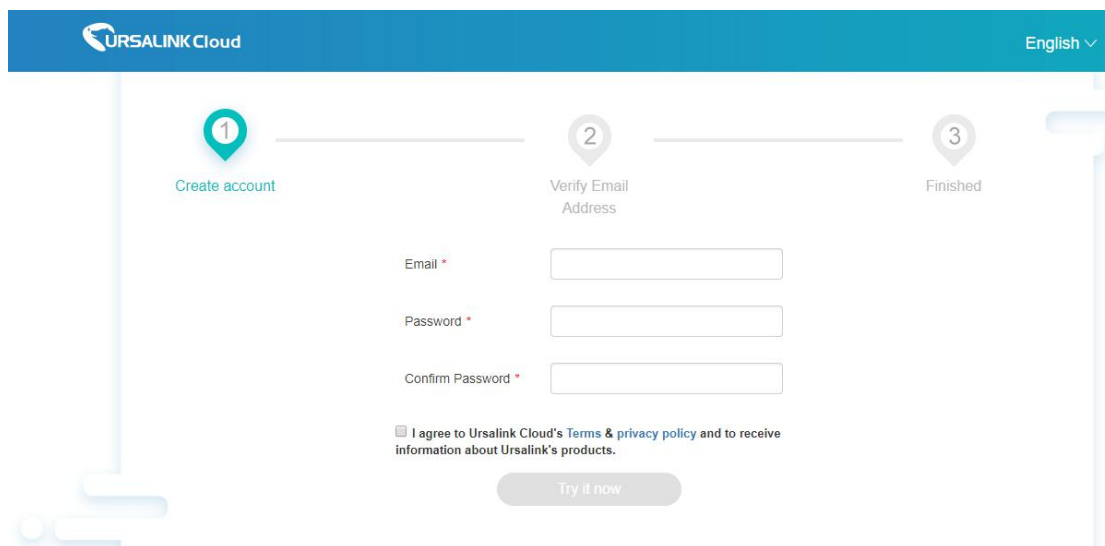
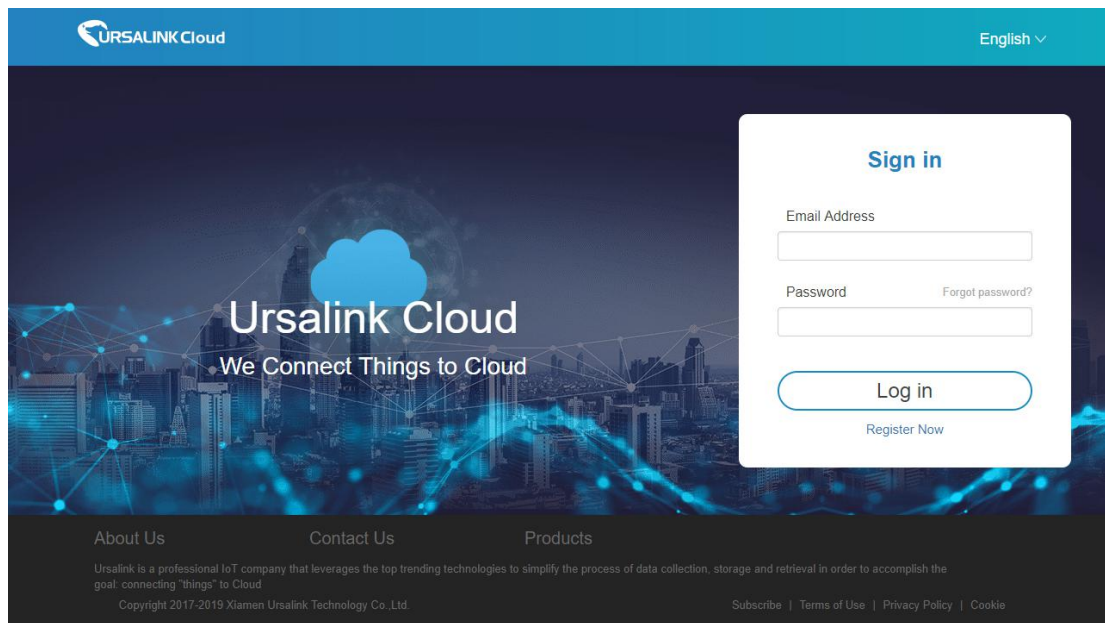
## 4.Configuration via Ursalink Cloud

### 4.1 Account Setup

To set up an account with Ursalink Cloud, follow these steps:

1. Go to : <https://cloud.ursalink.com/login.html> to register a Ursalink Cloud account.
2. Log in to Ursalink Cloud after the email has been verified.

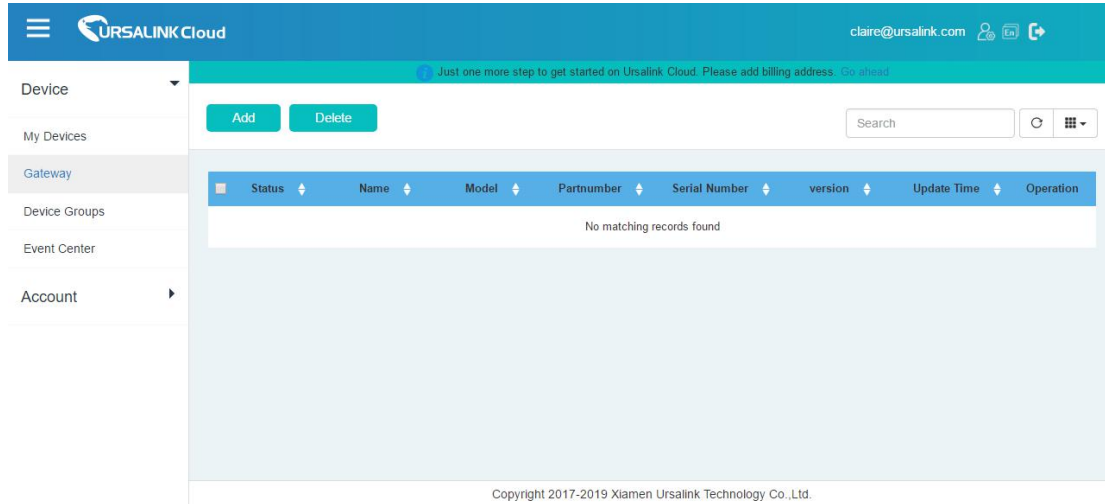
**Note:** It is important that you have access to the verified email address before proceeding.



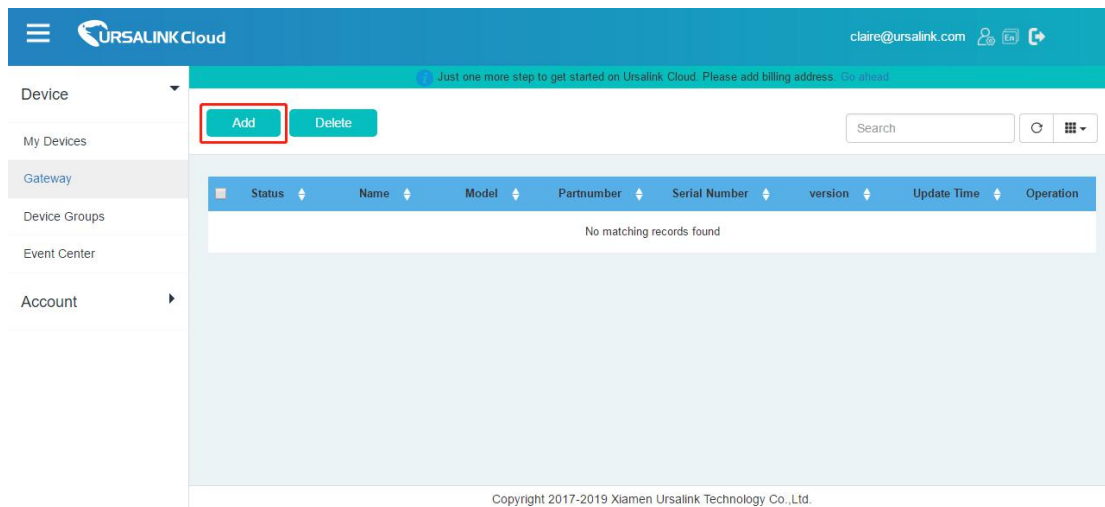
## 4.2 Add a Ursalink LoRaWAN Gateway

To add your Ursalink gateway to the Ursalink Cloud, please follow these steps:

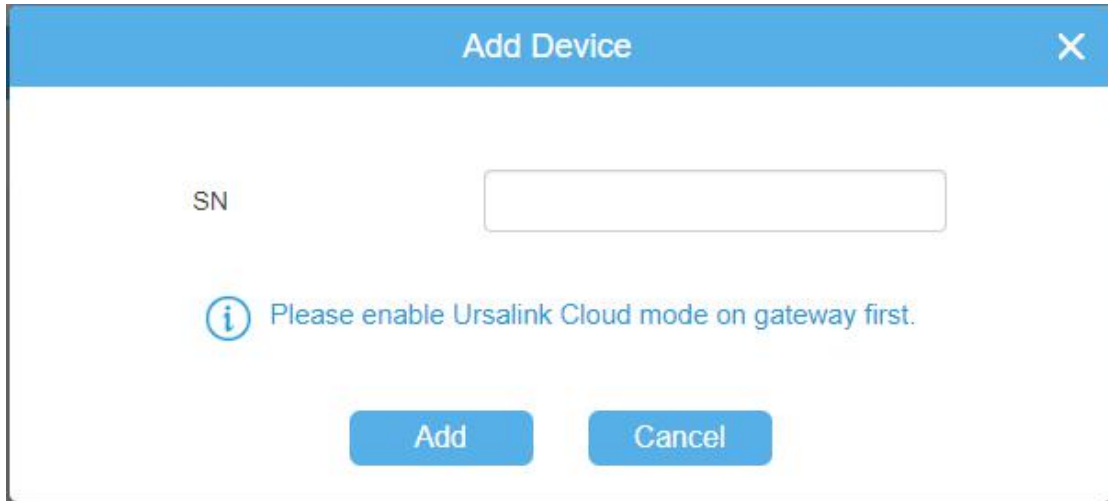
1. On the main page, click "Gateway".



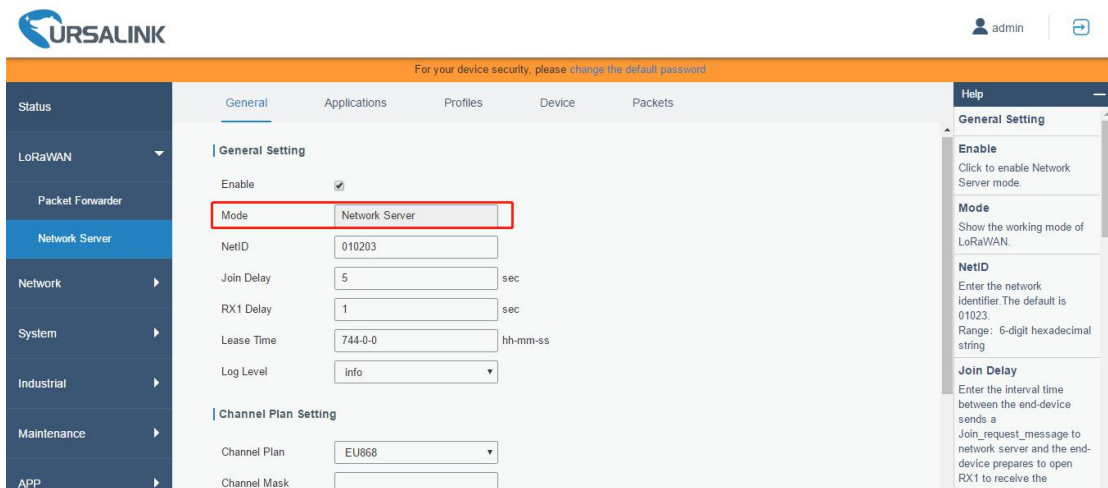
2. On the gateway page, click "Add" to add a gateway.



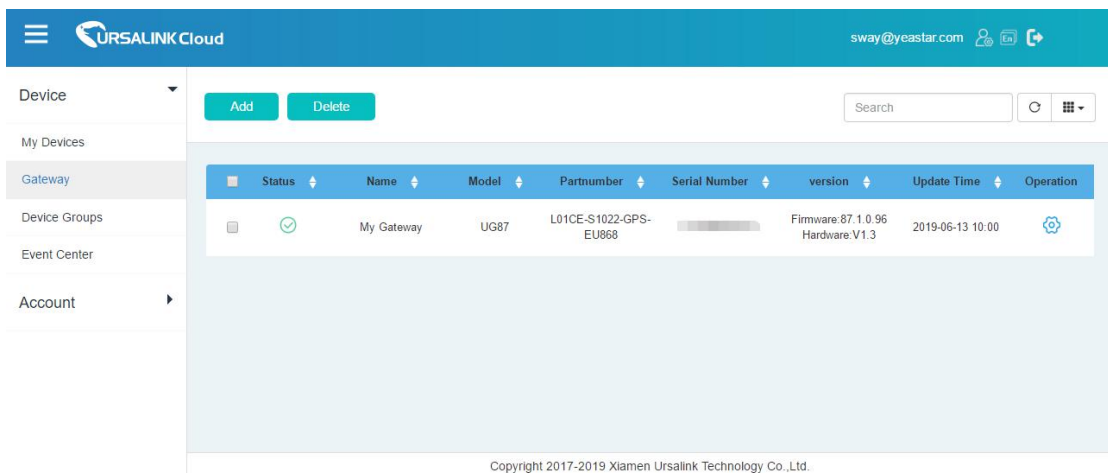
Enter the correct SN of the gateway and click "Add". You can find your gateway SN either on the label on the bottom of the device or on the web GUI .



**Note:** Please make sure the working mode of gateway is Ursalink Cloud.




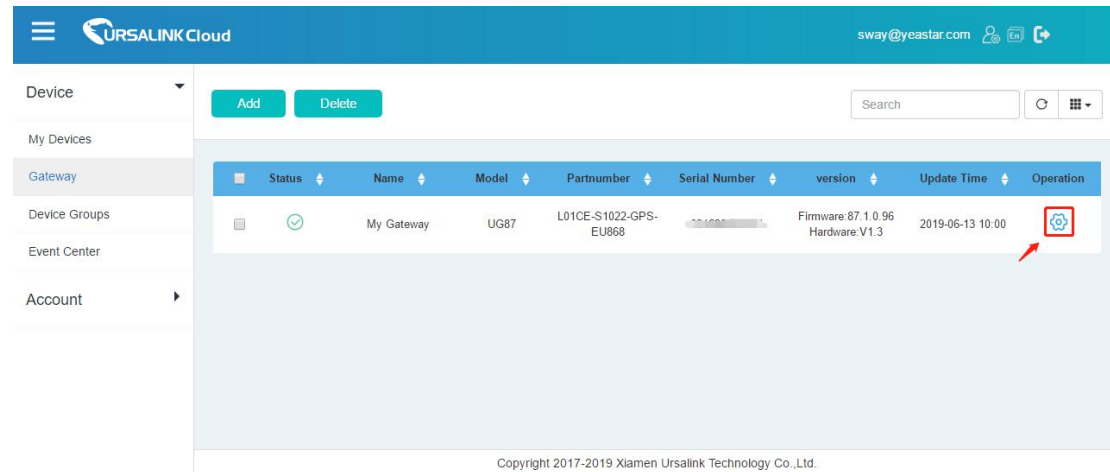
Once the device has been added successfully, You will see the device in the list.




## 4.3 Add Devices to Ursalink Cloud

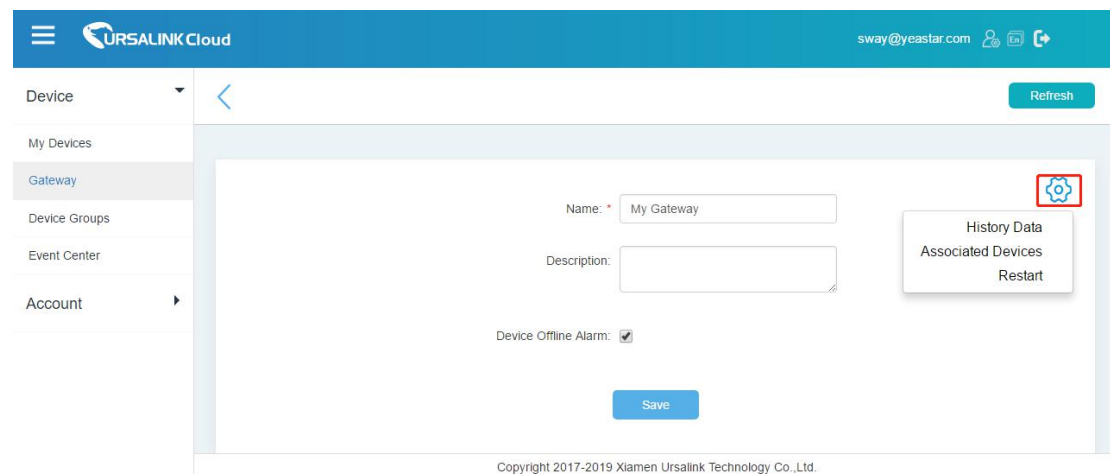
To add a UC11-T1 to Ursalink Cloud, please follow these steps:

1. Click  to go to the configuration page of this gateway.



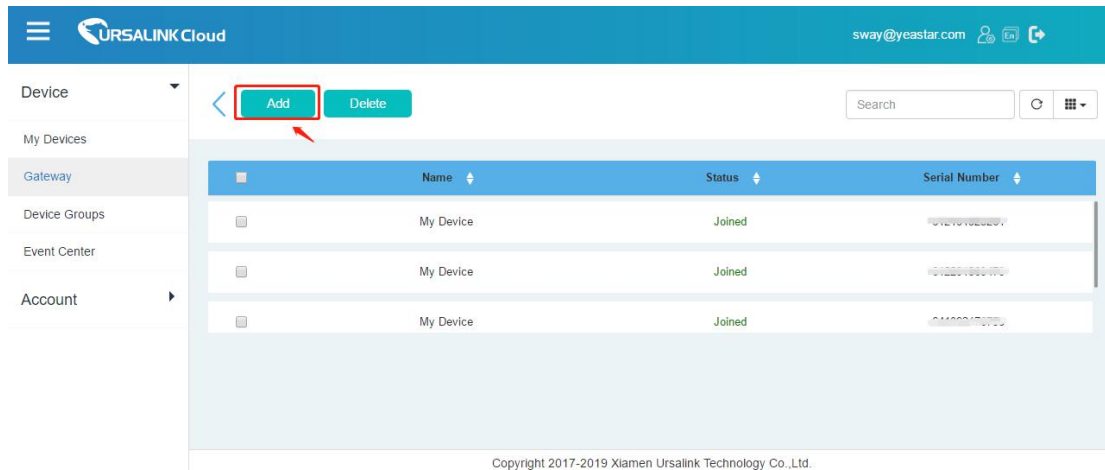
The screenshot shows the URSALINK Cloud interface. On the left is a navigation menu with options: Device, My Devices, Gateway, Device Groups, Event Center, and Account. The main area displays a table of devices. The table has columns: Status, Name, Model, Partnumber, Serial Number, version, Update Time, and Operation. One device is listed: 'My Gateway' with Model 'UG87', Partnumber 'L01CE-S1022-GPS-EU868', and Update Time '2019-06-13 10:00'. A red box highlights the gear icon in the 'Operation' column for this device.

2. Click  then click "Associated Devices".



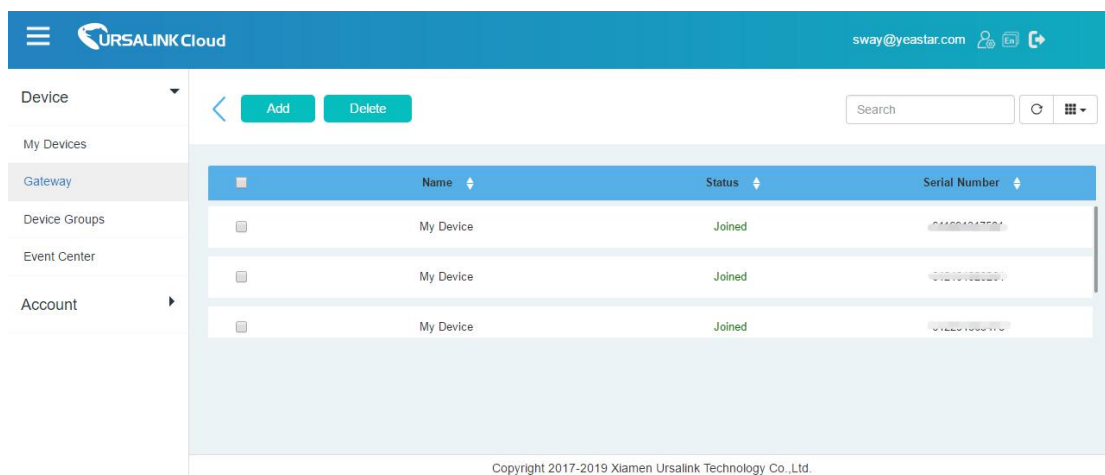
The screenshot shows the configuration page for a gateway. The left navigation menu is the same as in the previous screenshot. The main area contains a form with fields for 'Name' (My Gateway), 'Description', and a checked 'Device Offline Alarm' checkbox. A 'Save' button is at the bottom. In the top right corner, there is a gear icon and a 'Refresh' button. A red box highlights the gear icon.

3. Click "Add" to add a UC11-T1 to this gateway.



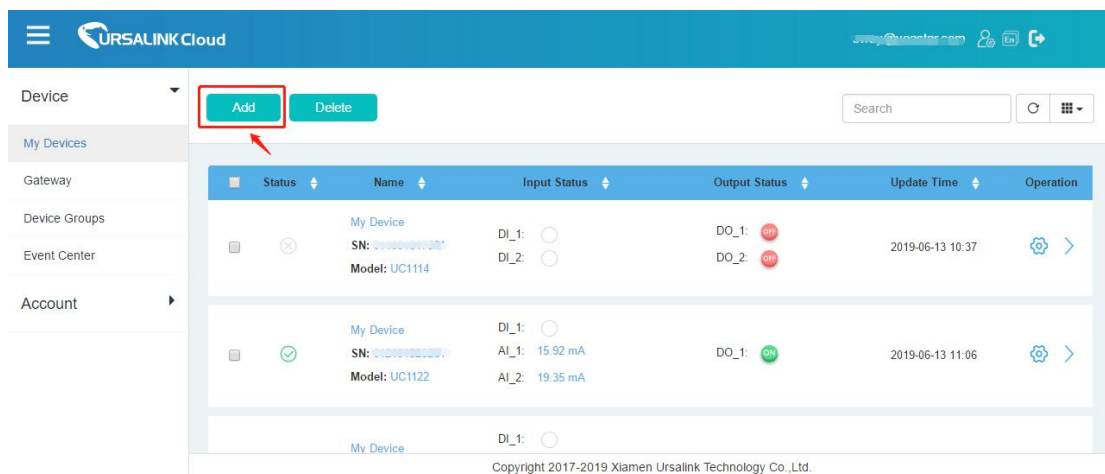
4. Enter the correct SN of the UC11-T1, and then click "Add". Sensor SN can be found on the bottom of the sensor.

5. Once the device has been added successfully, You will see the device in the list.



**You can also add UC11-T1 directly to the main page, please follow these steps:**

1. Click "Add" on the upper left corner.



2. Enter the correct SN of UC11-T1 and select the correct gateway. Then click “Add”.
3. Once the device has been added successfully, You will see the device in the list.

The screenshot shows the URSALINK Cloud interface with a sidebar on the left containing navigation options: Device, My Devices, Gateway, Device Groups, Event Center, and Account. The main content area displays a list of devices. The device UC11-T1 is selected, showing the following details:

- Model: UC1114
- My Device
- SN: [redacted]
- Model: UC1122
- DL\_1: [radio button]
- AI\_1: 15.92 mA
- AI\_2: 19.35 mA
- DO\_1: [green status]
- 2019-06-13 11:06
- Temp: 27.5 °C
- Humidity: 58.5 %
- 2019-06-13 10:58

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## 4.4 Check the Data of UC11-T1

Click “LoRaWAN”->”Network Server”->”Packets” to view the data transmission.

The screenshot shows the URSALINK Cloud interface with the 'Network Server' section selected. The 'Packets' tab is active, displaying a table of transmission data. The table has the following columns: Device EUI, Frequency, Datarate, SNR, RSSI, Size, Fcnt, Type, Time, and Details. The data is as follows:


Device EUI	Frequency	Datarate	SNR	RSSI	Size	Fcnt	Type	Time	Details
[redacted]	923400000	SF10BW125	-	-	17	0	JnAcc	2018-09-29T10:00:23+08:00	[info icon]
[redacted]	923400000	SF10BW125	10.8	-57	18	0	JnReq	2018-09-29T10:00:23+08:00	[info icon]
[redacted]	923400000	SF10BW125	-	-	17	0	JnAcc	2018-09-29T09:58:20+08:00	[info icon]
[redacted]	923400000	SF10BW125	11.5	-58	18	0	JnReq	2018-09-29T09:58:20+08:00	[info icon]
[redacted]	923200000	SF10BW125	-	-	17	0	JnAcc	2018-09-28T17:36:27+08:00	[info icon]
[redacted]	923200000	SF10BW125	11.2	-62	18	0	JnReq	2018-09-28T17:36:27+08:00	[info icon]
[redacted]	923200000	SF10BW125	-	-	17	0	JnAcc	2018-09-28T17:18:25+08:00	[info icon]
[redacted]	923200000	SF10BW125	9.8	-69	18	0	JnReq	2018-09-28T17:18:25+08:00	[info icon]
[redacted]	923200000	SF7BW125	-	-	0	2	DnUnc	2018-09-28T17:02:59+08:00	[info icon]
[redacted]	923200000	SF7BW125	8.2	-72	8	2	UpCnf	2018-09-28T17:02:59+08:00	[info icon]

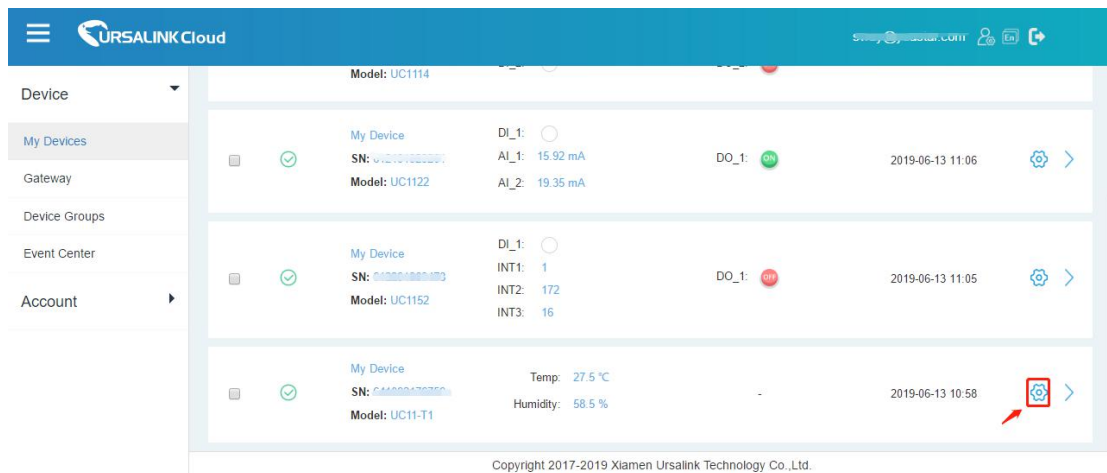
Showing 1 to 10 of 26 rows | 10 rows per page | Manual Refresh | Refresh

You can see the basic status of the UC11-T1 on the Ursalink Cloud main page.



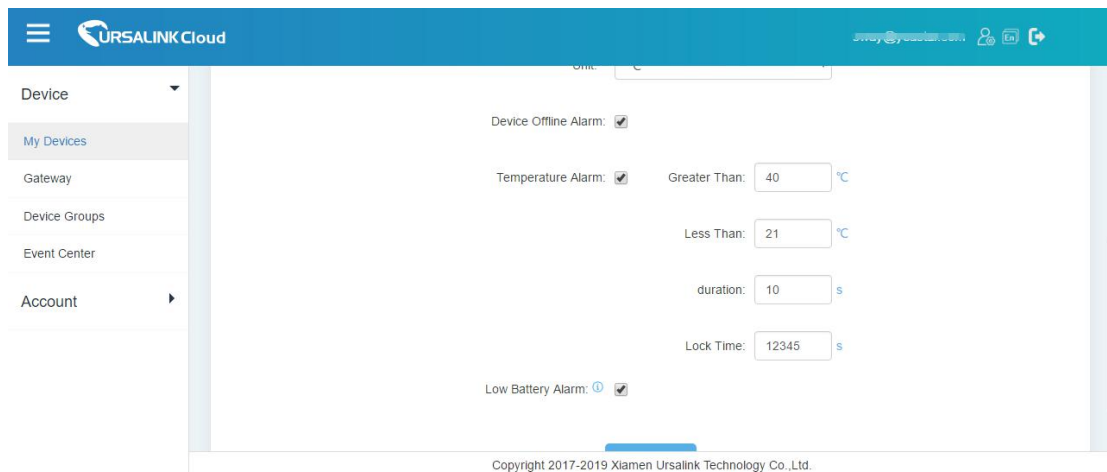
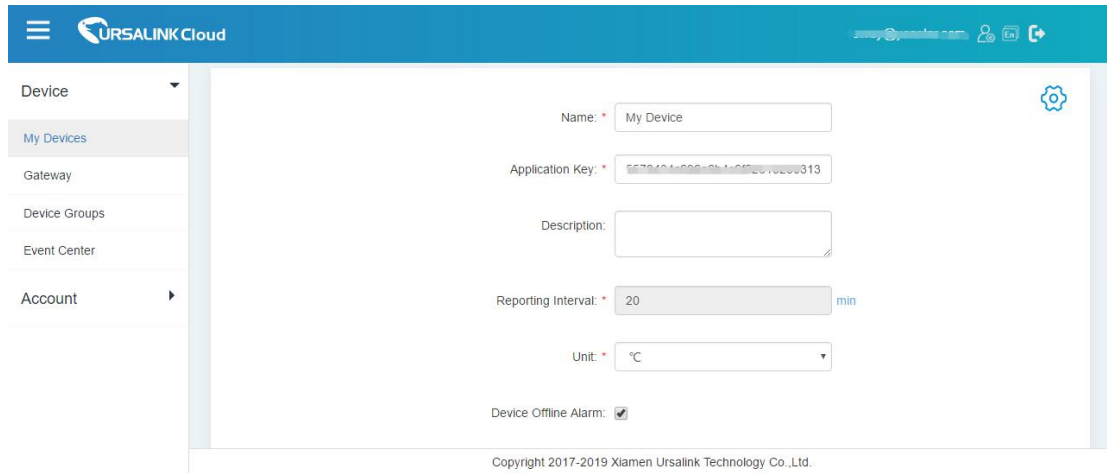
## 4.5 Configure UC11-T1 via Ursalink Cloud

Click  to go to the configuration page of UC11-T1. You can edit the basic information of the device on this page.





### 4.5.1 Basic Settings



Basic Settings		
Item	Description	Default
Device Name	Enter the custom name of this device.	LoRaWAN Temperature & Humidity Sensor
Application Key	Enter the application key. Whenever an end-device joins a network via over-the-air activation, the application key is used for derive the Application Session key.	5572404c6f96e6b4c6f52613230313823
Description	The description of the device.	--
Reporting Interval	The interval of sending data to Ursalink Cloud.	20min
Unit	Unit displayed on Ursalink Cloud.	°C
Device Offline Alarm	The device will send an alert if disconnected.	Enabled

Low Battery Alarm	The device will send an alert if battery is less than 20%.	Enabled
-------------------	--	---------

Temperature Alarm:  Greater Than:  °C

Less Than:  °C

duration:  s

Lock Time:  s

Basic Settings		
Item	Description	Default
Temperature Alarm	The device will send an alert to Ursalink Cloud if the temperature goes above/below temperature thresholds.	Disabled
greater than	Enter the maximum temperature threshold.	Null
less than	Enter the minimum temperature threshold.	Null

**Note:** If you set a "lockout time" of 10s, a "continued time" of 5s, the alarm will be triggered as soon as the temperature goes above the maximum temperature threshold or goes below the minimum temperature threshold for 5s. It will then start checking the temperature again after 10s and be triggered once more if the temperature goes above/below temperature thresholds for 5s.

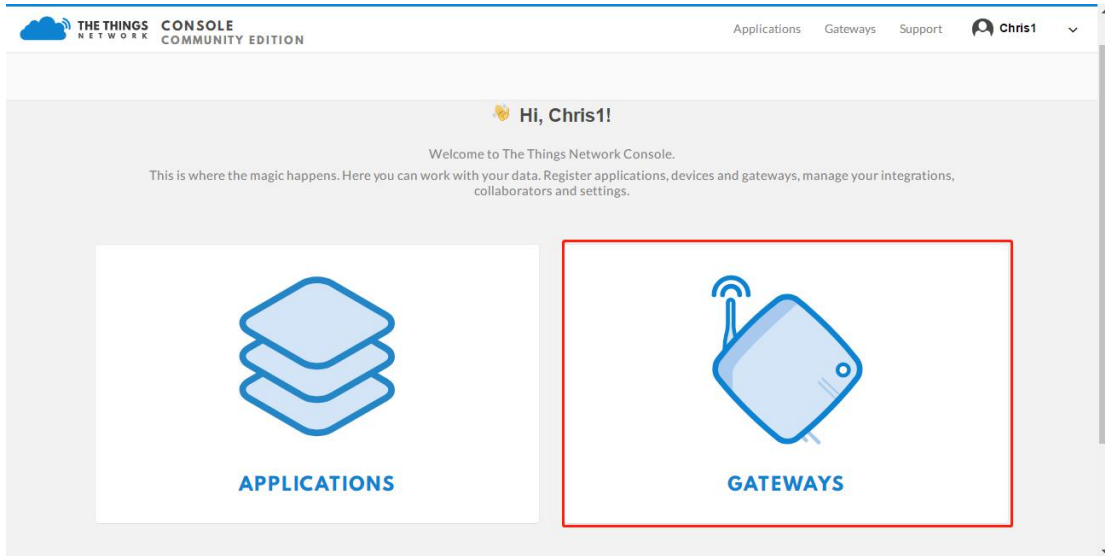
## 5.Configuration via TTN

### 5.1 Add a LoRaWAN Gateway to The Things Network

#### 5.1.1 Register Your Gateway in The Things Network

To register your gateway in the The Things Network, please follow these steps:

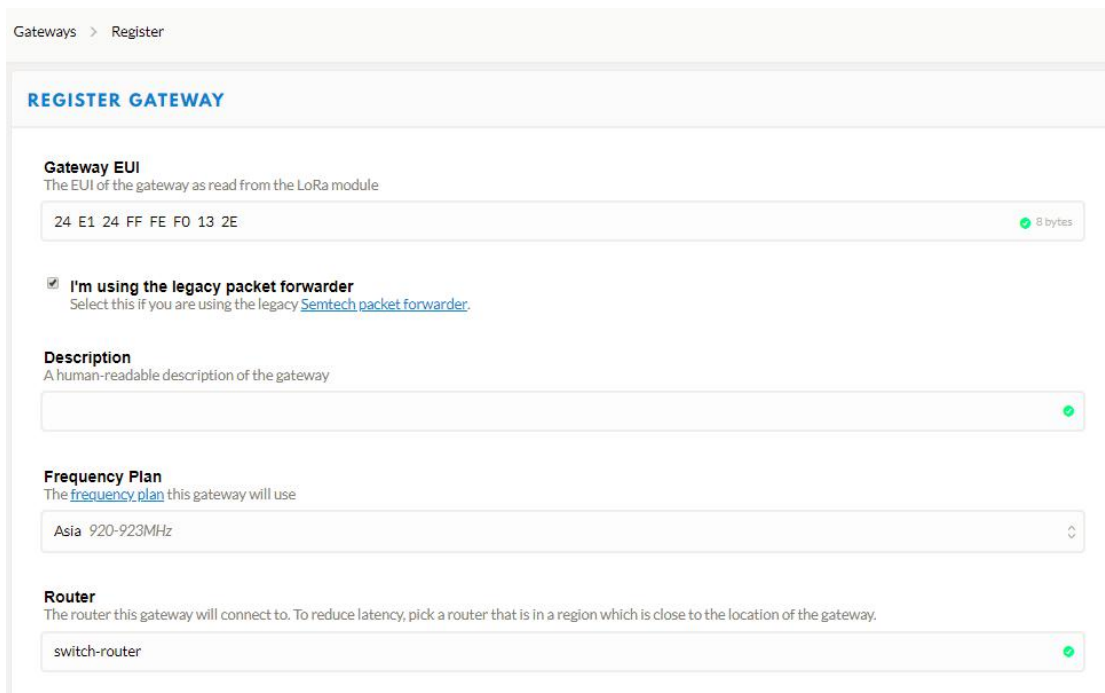
1. Click "GATEWAYS" on the console screen.



2. Click “register gateway”.



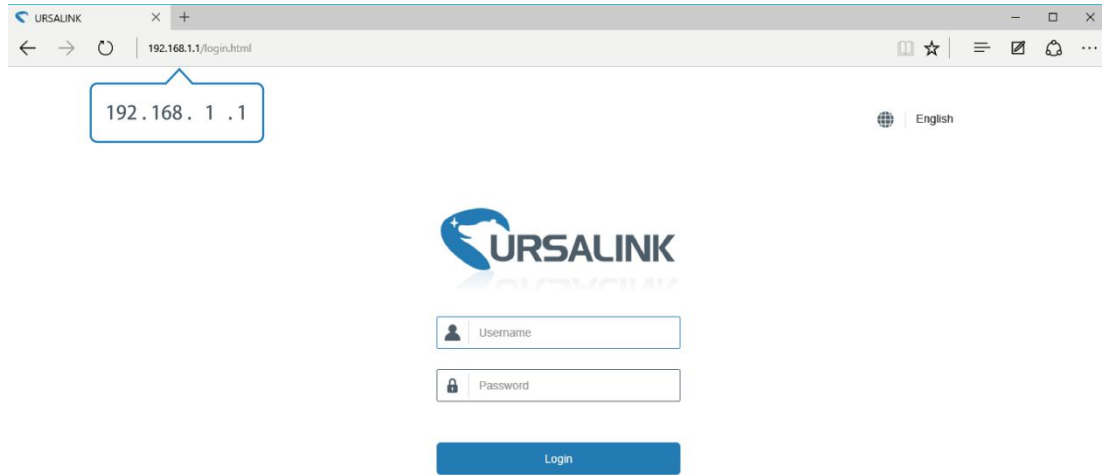
3. Enter the gateway information.



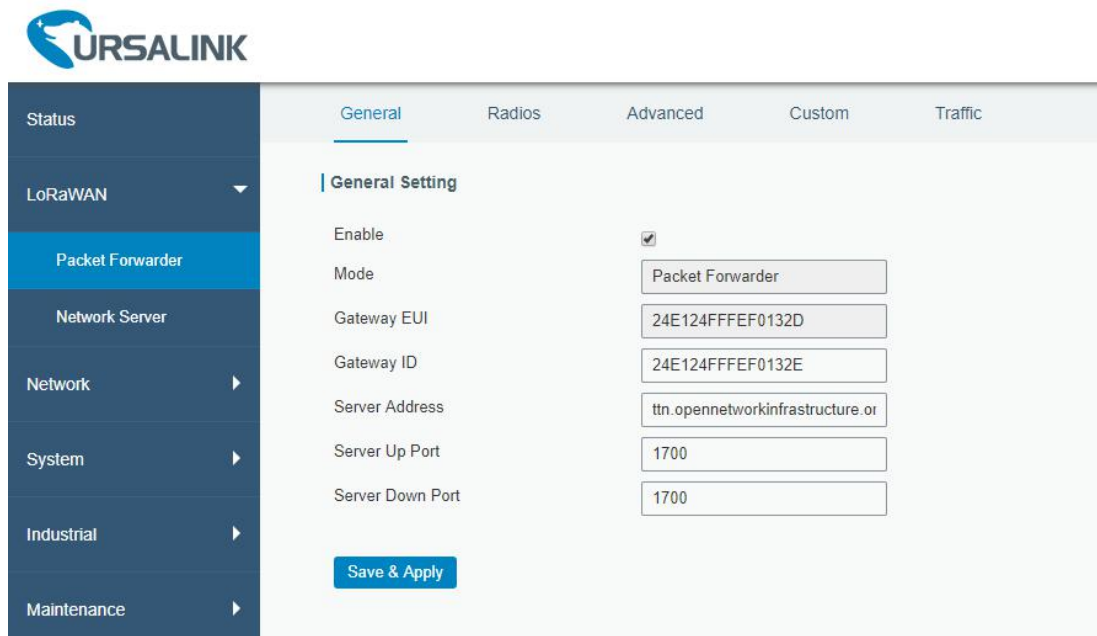
## 5.1.2 Connect Ursalink gateway to The Things Network

To connect your gateway to TTN , please follow these steps:

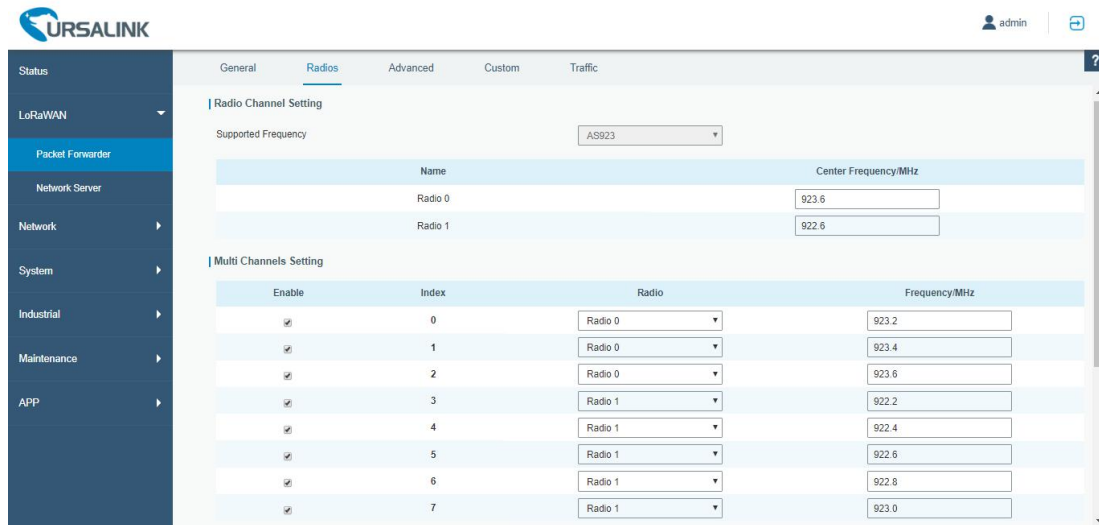
1. Log in gateway web GUI.



2. Click “LoRaWAN” → “Packet Forwarder” → “General” to configure the general setting.



3. Click “Radios” to configure the center frequency and channels.



The screenshot shows the URSALINK web interface. On the left is a navigation menu with items like Status, LoRaWAN, Packet Forwarder, Network Server, Network, System, Industrial, Maintenance, and APP. The main content area is titled 'Radio Channel Setting' and has tabs for General, Radios, Advanced, Custom, and Traffic. Under 'Radio Channel Setting', there is a 'Supported Frequency' dropdown menu set to 'AS923'. Below this is a table with two columns: 'Name' and 'Center Frequency/MHz'. The table contains two rows: 'Radio 0' with a center frequency of 923.6, and 'Radio 1' with a center frequency of 922.6. Below this is the 'Multi Channels Setting' section, which contains a table with four columns: 'Enable', 'Index', 'Radio', and 'Frequency/MHz'. The table has eight rows, each with an 'Enable' checkbox checked, an 'Index' from 0 to 7, a 'Radio' dropdown menu (set to 'Radio 0' for indices 0-2 and 'Radio 1' for indices 3-7), and a 'Frequency/MHz' input field with values ranging from 923.2 to 923.0.

## 5.2 Add UC11-T1 To The Things Network

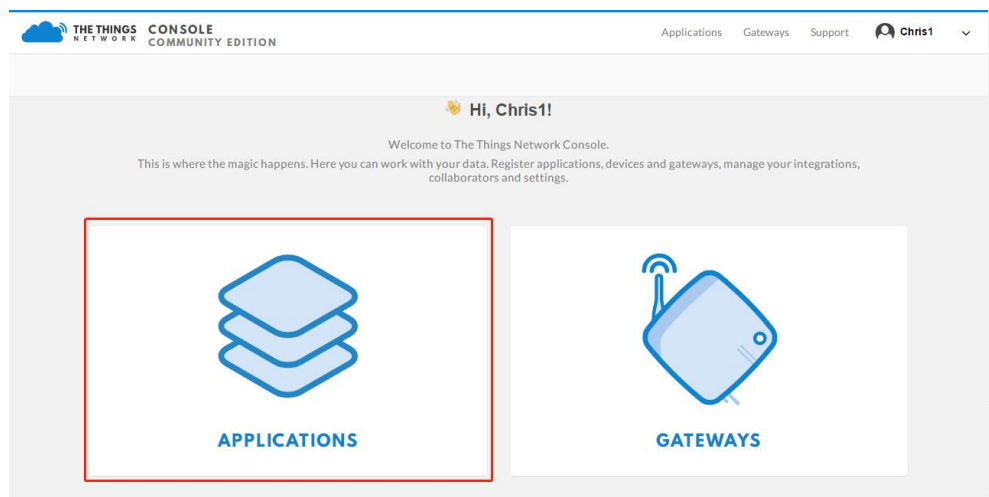
### 5.2.1 Create an Application in The Things Network

TTN server uses Applications to create groups of devices.

Gateways are associated with user account but not Applications. All gateways connected to TTN servers forward all LoRaWAN data traffic to the TTN message router. The TTN network server filters LoRa traffic by Application ID so that the data is routed to the correct user/application and users are only able to access data from devices registered to their account.

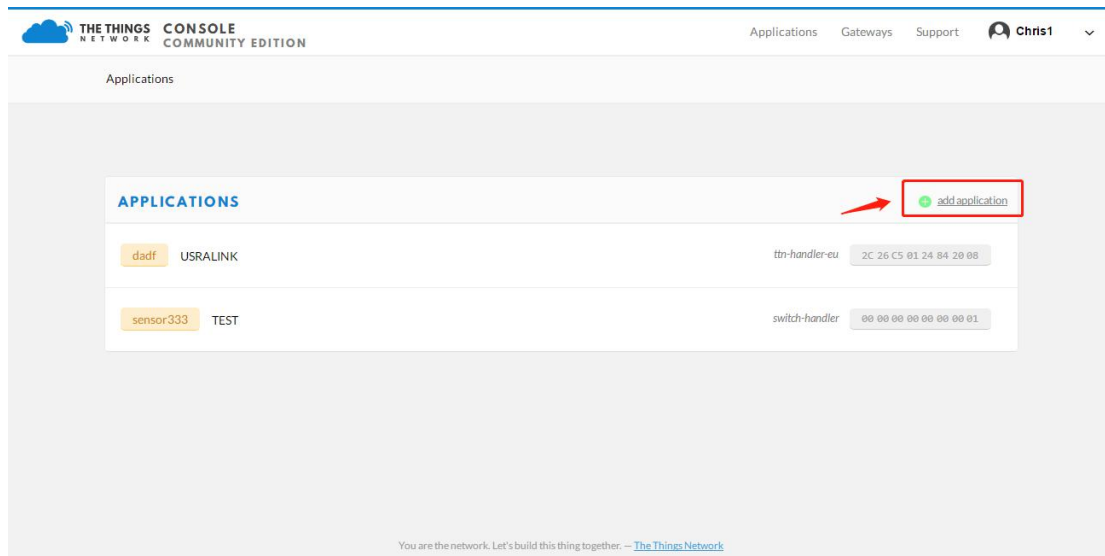
To add an application, follow these steps:

1. Click “APPLICATIONS” located on the Console page.



The screenshot shows the The Things Network Console page. At the top, there is a navigation bar with 'Applications', 'Gateways', and 'Support' links, and a user profile for 'Chris1'. Below the navigation bar, there is a welcome message 'Hi, Chris1!' and a sub-header 'Welcome to The Things Network Console.' followed by a paragraph: 'This is where the magic happens. Here you can work with your data. Register applications, devices and gateways, manage your integrations, collaborators and settings.' Below this text, there are two large buttons: 'APPLICATIONS' (highlighted with a red box) and 'GATEWAYS'.

2. Click “add application” .



3. Fill in the information of Application. Handler Registration is the same as previous in Gateway registration.

**Note:** Application EUI field is auto-generated by the TTN. This is required when setting up UC11-T1 that are associated to this application ID.

**ADD APPLICATION**

**Application ID**  
The unique identifier of your application on the network

**Description**  
A human readable description of your new app

**Application EUI**  
An application EUI will be issued for The Things Network block for convenience, you can add your own in the application settings page.

**Handler registration**  
Select the handler you want to register this application to

Cancel Add application

## 5.2.2 Add Devices to The Application

To add a UC11-T1 to the Application ID recently established, follow these steps:

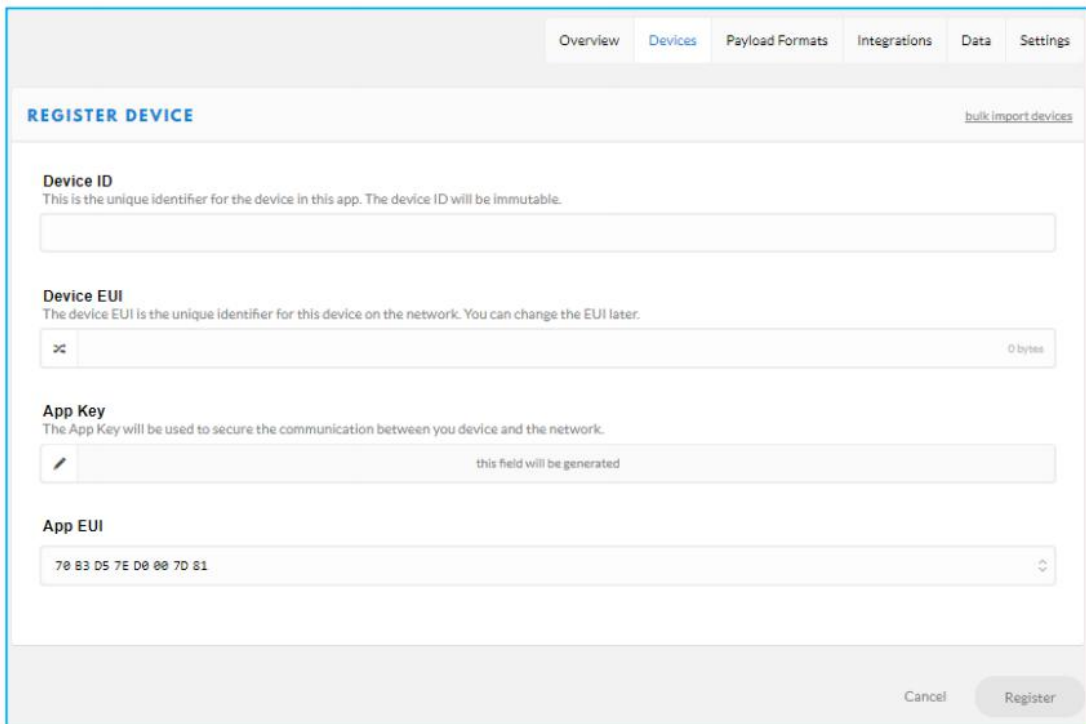
1. Click “Register Device” under Devices in the application overview page.

2. Enter the Device ID. This ID must be unique on the user's account.

We recommend using the convention dev (for device) followed by the Sensor Dev EUI. For instance, if the device has a Dev EUI of 0025ca000000000f then the Device ID is dev-0025ca000000000f.

3. Enter the Device EUI, App Key of UC11-T1.

**Note:** The App EUI field was previously auto-generated by the TTN network when the application ID was created. The application EUI is associated with the application ID and used by the TTN server to associate the device with the application ID.

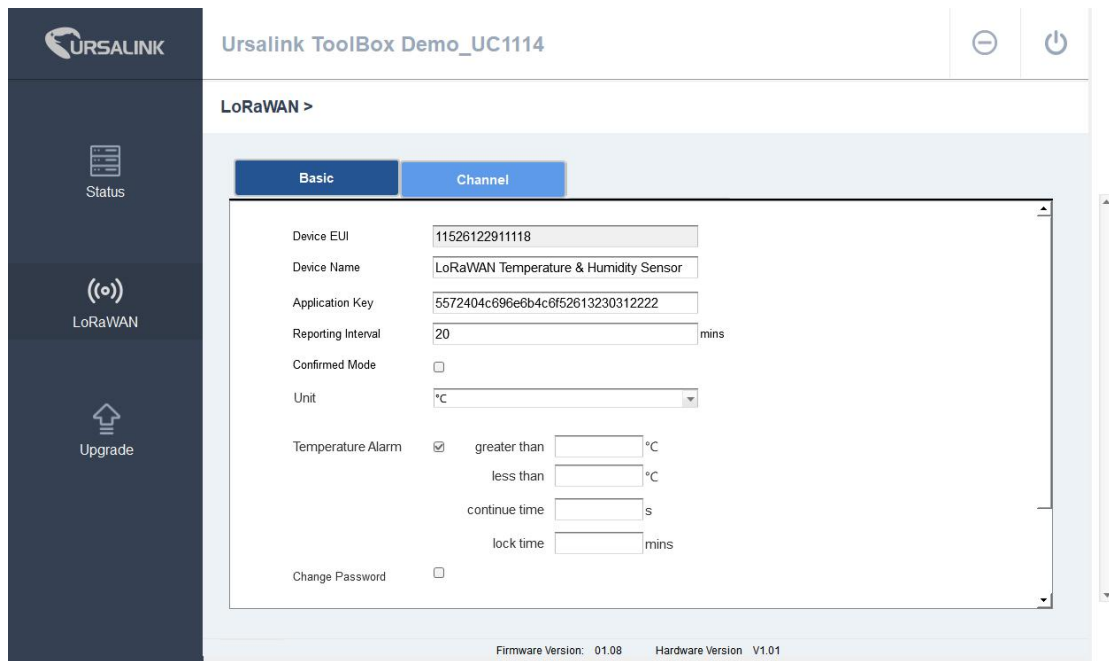


The screenshot shows the 'REGISTER DEVICE' form in the TTN console. The form is titled 'REGISTER DEVICE' and has a 'bulk import devices' link. It contains four input fields: 'Device ID', 'Device EUI', 'App Key', and 'App EUI'. The 'Device ID' field is empty. The 'Device EUI' field is empty and has a '0 bytes' label. The 'App Key' field is empty and has a 'this field will be generated' label. The 'App EUI' field contains the hexadecimal value '70 B3 D5 7E D0 00 7D 81'. At the bottom right, there are 'Cancel' and 'Register' buttons.

4. Click "Register" to complete registration.

## 5.2.3 Configure UC11-T1

Change the App EUI of UC11-T1 to the App EUI auto-generated by TTN.

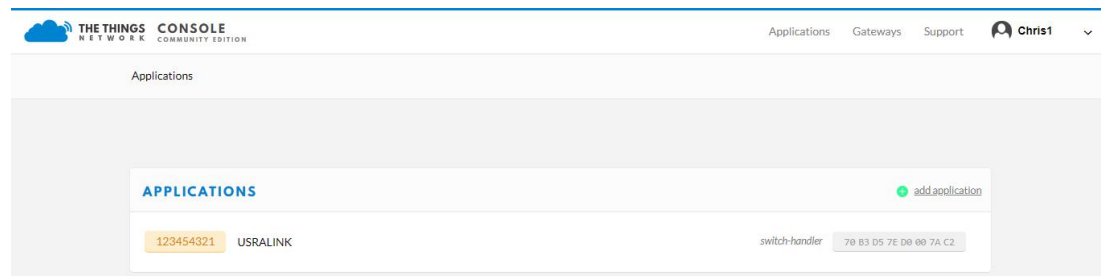


## 5.3 Check Data Transmission on The Things Network

1. Click “Gateways” to check the Gateways status.



2. Click “Applications” and select the Applications, then go to “Data”, you can find the data from UC11-T1.





THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support Chris1

Applications > 123454321 > Data

Overview Devices Payload Formats Integrations Data Settings

APPLICATION DATA pause clear

Filters uplink downlink activation ack error

time	counter	port	status	dev id	payload
14:23:03	0			ursalink	
14:23:01	3	8	retry confirmed	ursalink	53 01 00 00 01 00 00 64
14:22:57	0			ursalink	
14:22:55	3	8	retry confirmed	ursalink	53 01 00 00 01 00 00 64
14:22:52	0			ursalink	
14:22:50	3	8	confirmed	ursalink	53 01 00 00 01 00 00 64
14:22:43	0			ursalink	

-End-