

LoRaWAN Temperature & Humidity Sensor

UC11-T1 V1.2





Contents

1. Preface	3
2. Introduction	3
2.1 Features	3
2.2 Parameters	4
2.3 Turn on/off the Sensor	4
3. Configuration via PC	4
3.1 Configuration via ToolBox	4
3.2 Status	6
3.3 LoRaWAN	7
3.3.1 Basic-OTAA	7
3.3.2 Basic-ABP	9
3.3.3 Channel	12
3.4 Upgrade	13
4.Configuration via Ursalink Cloud	14
4.1 Account Setup	14
4.2 Add a Ursalink LoRaWAN Gateway	15
4.3 Add Devices to Ursalink Cloud	17
4.4 Check the Data of UC11-T1	20
4.5 Configure UC11-T1 via Ursalink Cloud	20
4.5.1 Basic Settings	21
5.Configuration via TTN	23
5.1 Add a LoRaWAN Gateway to The Things Network	23
5.1.1 Register Your Gateway in The Things Network	23
5.1.2 Connect Ursalink gateway to The Things Network	24
5.2 Add UC11-T1 To The Things Network	26
5.2.1 Create an Application in The Things Network	26
5.2.2 Add Devices to The Application	27
5.2.3 Configure UC11-T1	28
5.3 Check Data Transmission on The Things Network	29



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 $^{\circ}$ C to + 70 $^{\circ}$ C, as well as air humidity from 0 to 100%.

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

- Customize temperature alert thresholds
- 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
- Compatible with multiple third-party platforms and Ursalink Cloud
- Support Frequency: CN470 /EU868 / US915 / EU433 / AU915 / AS923 / KR920 / IN865
- LoRa wireless module included, up to 11 km range



2.2 Parameters

Parameter Item	Reference Scope		
	Temperature: ±0.3°C from 0°C to + 70°C,		
Measuring	±0.6°C from -40°C to 0°C		
Range/Accuracy	Humidity: ±3% RH from 10% to 90%,		
	±5% RH below 10% and above 90%		
Frequency Band	EU 433, CN 470-510, EU 863-870, US 902-928, AU		
	915-928, KR 920-923		
Antenna	Embedded Ceramic antenna		
Operating	-40° C to +70° C (-40° F to +158° F)		
Temperature	-40 6 10 170 6 (-40 1 10 138 1)		
Relative Humidity	0% to 100% (non-condensing)		
	Powered by replaceable Li-ion battery:		
Power Supply	8000mAh/3.6V		
Dimensions	111 x 92 x 33 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.

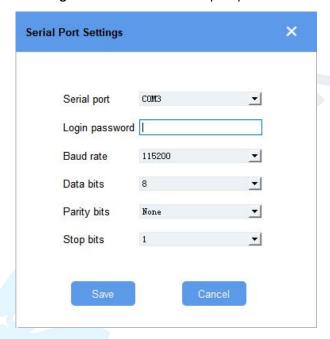
Step 2: Power on the Ursalink UC11-T1.

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		
Item	Description	Default
Serial Port	Select the serial port for data transmission.	Null
Login Password	Enter the correct password to login.	123456
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



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:



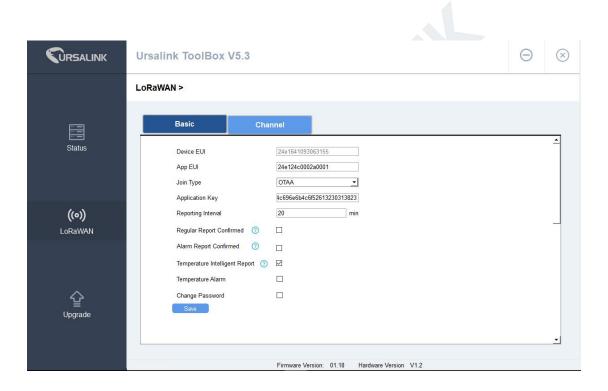
Status		
Item	Description	
Local Time	Show the time of the device.	
Join Status	Show if the device join the network successfully. The "Activate" means the device has joined the network.	
RSSI/SNR	Show the RSSI/SNR of received packet.	

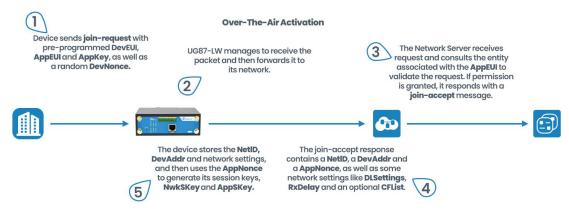


Temperature	Show the temperature value.
Humidity	Show the humidity value.
Battery	Show the battery level.
Uplink Frame-counter	The number of data frames sends uplink from UC11-T1 to the network server.
Downlink	The number of data frames sends downlink from the network
Frame-counter	server to UC11-T1.

3.3 LoRaWAN

3.3.1 Basic-OTAA







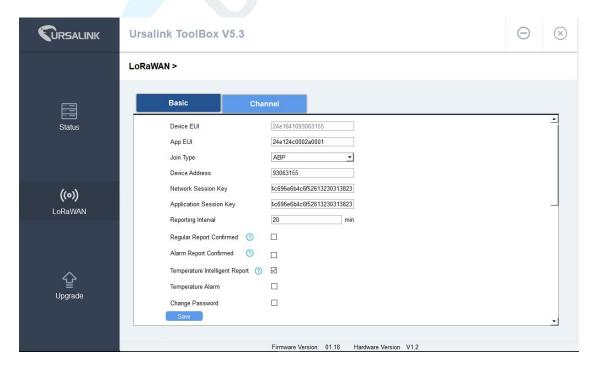
Basic Settings-OTA	AA	
Item	Description	Default
Device EUI	Show the identifier of this device.	the identifier of this device.
App EUI	Enter the application EUI.The Network Server receives request and consults the entity associated with the APP EUI to validate the request.If permission is granted, it responds with a join-accept message.	24e124c00 02a0001
Join Type	Select from: "OTAA" and "ABP". OTAA:Over-the-Air Activation. For over-the-air activation, end-devices must follow a join procedure prior to participating in data exchanges with the network server. An end-device has to go through a new join procedure every time it has lost the session context information. ABP: Activation by Personalization. Under certain circumstances, end-devices can be activated by personalization. Activation by personalization directly ties an end-device to a specific network by-passing the join request - join accept procedure.	ОТАА
Application Key	Enter the application key. Whenever an end-device joins a network via over-the-air activation, the application key is used to derive the Application Session key.	5572404c6 96e6b4c6f 526132303 13823
Reporting Interval	The UC11-T1 reports the temperature and humidity at regular intervals. Range: 5-30 (mins)	20
Regular Report Confirmed	After sending the regular report packet to the network server, if the device does not receive ACK bit from the network server, then the device will resend the packet. Note: If the device doesn't receive ACK for a long time, the device will resend regular report confirmed packets 3 times at most.	Disabled
Alarm Report Confirmed	After sending the attribute package or alarm packet to the network server, if the device does not receive ACK	Disabled



	bit from the Network Server, then the device will resend the packet.	
	Note: If the device doesn't receive ACK for a long time, the device will resend regular report confirmed packets 3 times at most. However, the device will resend attribute package all the time.	
Temperature Intelligent Report	When the temperature changes beyond 2 $^{\circ}\!$	Enabled
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 Basic-ABP





Activation By Personalisation



The Network Server is also preconfigured with the device's

DevAddr, AppSKey and

NwkSKey so it recognises its transmissions.











Basic Settings-AB	P	
Item	Description	Default
Device EUI	Show the identifier of this device.	the identifier of this device.
App EUI	Enter the application EUI. The Network Server receives request and consults the entity associated with the APP EUI to validate the request. If permission is granted, it responds with a join-accept message.	24e124c00 02a0001
Join Type	Select from: "OTAA" and "ABP". OTAA:Over-the-Air Activation. For over-the-air activation, end-devices must follow a join procedure prior to participating in data exchanges with the network server. An end-device has to go through a new join procedure every time it has lost the session context information. ABP: Activation by Personalization. Under certain circumstances, end-devices can be activated by personalization. Activation by personalization directly ties an end-device to a specific network by-passing the join request - join accept procedure.	OTAA
Device Address	Enter the device address. The device address identifies the end-device within the current network.	The last 8 digits number of SN
Network Session Key	Enter the network session key of the device. The network session key specific for the end-device. It is used by the end-device to calculate the MIC or part of the MIC (message integrity code) of all uplink data messages to ensure data integrity.	5572404c6 96e6b4c6f 526132303 13823



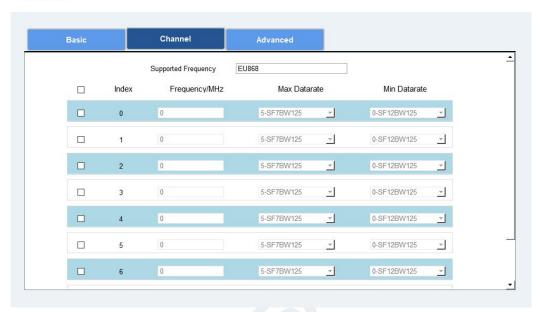
Enter the application session key of the device. The AppKey is an application session key specific for the end-device. It is used by both the application server and the end-device to encrypt and decrypt the payload field of application-specific data messages.		5572404c6 96e6b4c6f 526132303 13823
Reporting Interval	The UC11-T1 reports the temperature and humidity at regular intervals. Range: 5-30 (mins)	
Regular Report Confirmed	After sending the regular report packet to the network server, if the device does not receive ACK bit from the network server, then the device will resend the packet. Note: If the device doesn't receive ACK for a long time, the device will resend regular report confirmed packets 3 times at most.	Disabled
Alarm Report Confirmed	After sending the attribute package or alarm packet to the network server, if the device does not receive ACK bit from the Network Server, then the device will resend the packet. Note: If the device doesn't receive ACK for a long time, the device will resend regular report confirmed packets 3 times at most. However, the device will resend attribute package all the time.	Disabled
Temperature Intelligent Report	When the temperature changes beyond 2 $^{\circ}\!$	Enabled
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



3.3.3 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 >

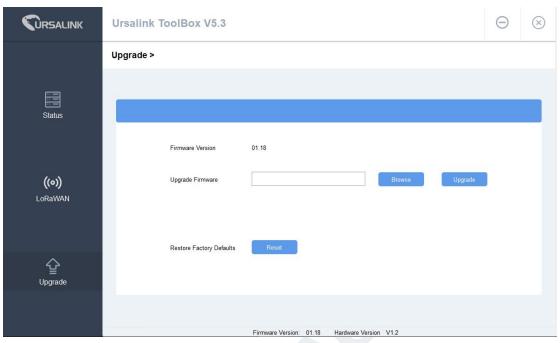


Note: Make sure the you have configured the corresponding channel on the gateway. E.g. If you have configured a 923.2 MHz channel on UC11-T1, then you have to configure a 923.2 MHz channel on gateway as well.





3.4 Upgrade



- 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.



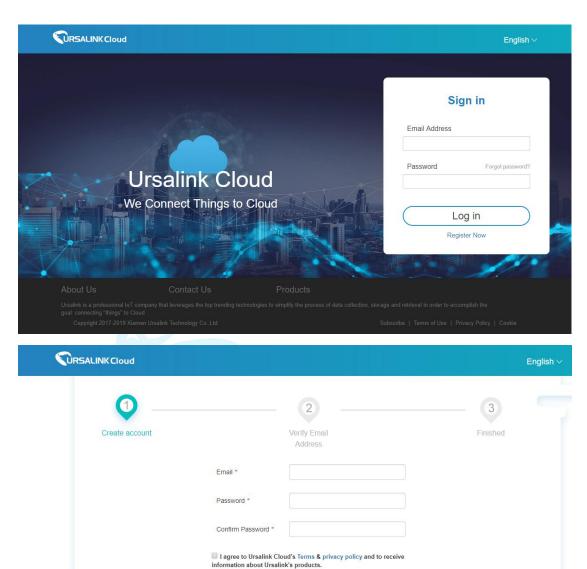
4. Configuration via Ursalink Cloud

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.

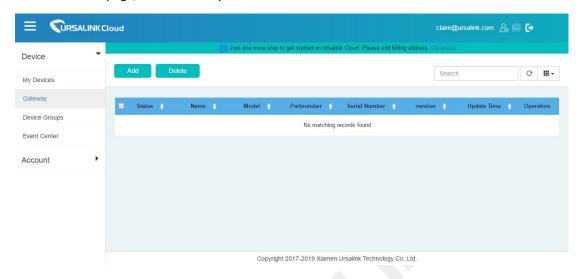




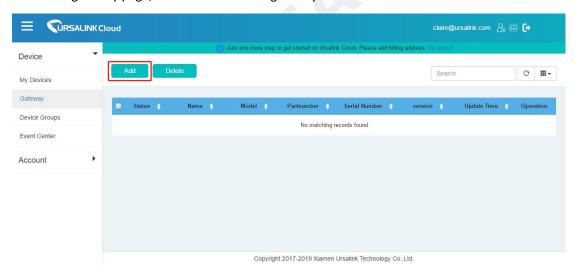
4.2 Add a Ursalink LoRaWAN Gateway

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.

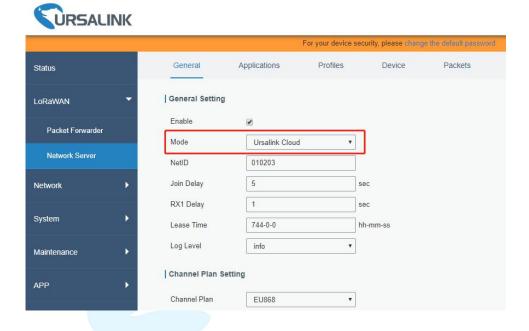


Enter the correct SN of the gateway and click "Add". You can find your gateway SN either on the label on the bottom of the device or on the web GUI.

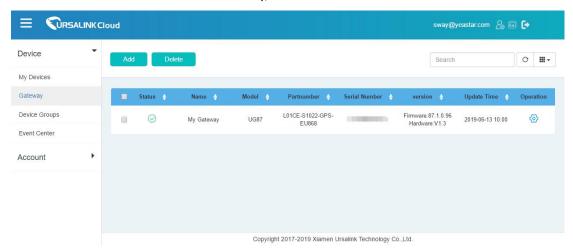




Note: Please make sure the working mode of gateway is Ursalink Cloud.



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

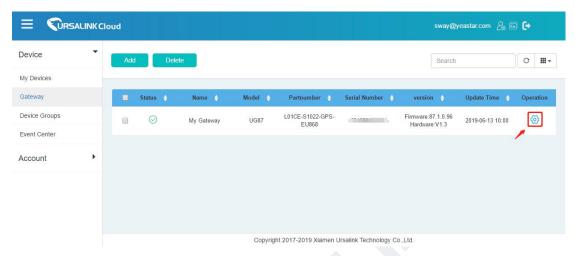




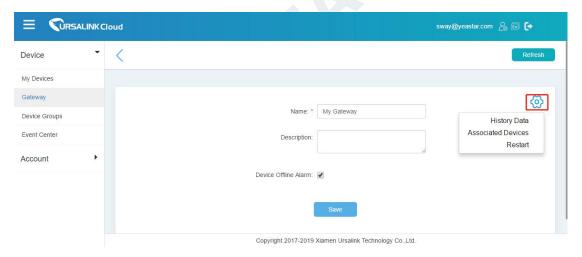
4.3 Add Devices to Ursalink Cloud

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

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

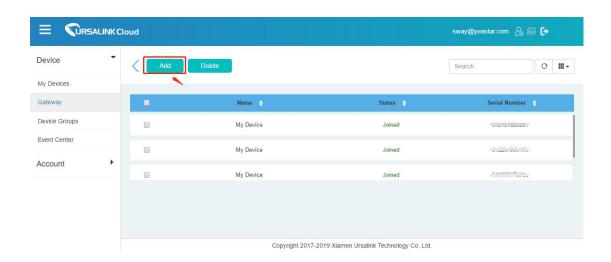


2. Click then click "Associated Devices".

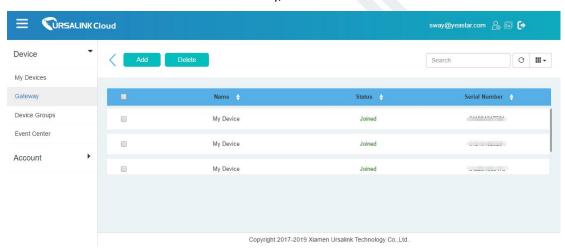


3. Click "Add" to add a UC11-T1 to this gateway.





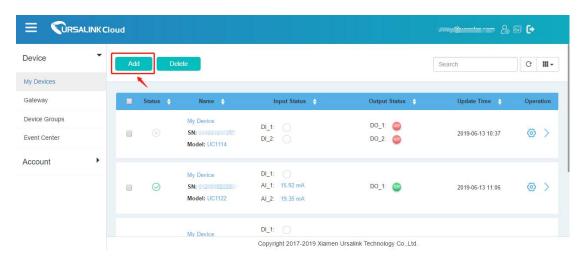
- 4. Enter the correct SN of the UC11-T1, and then click "Add". Sensor SN can be found on the bottom of the sensor.
- 5. Once the device has been added successfully, You will see the device in the list.



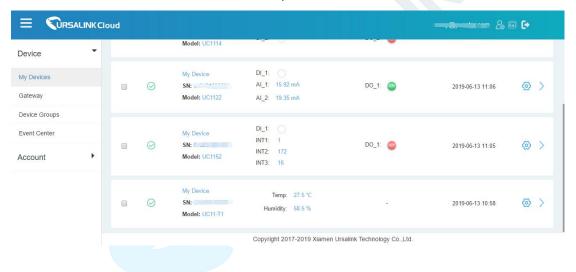
You can also add UC11-T1 directly to the main page, please follow these steps:

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





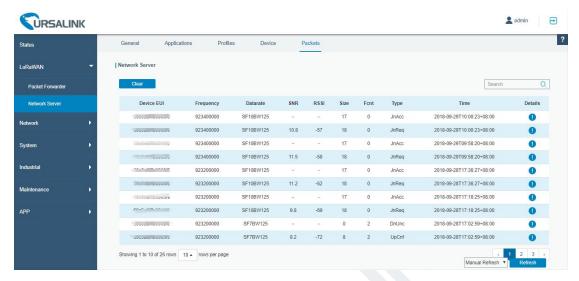
- 2. Enter the correct SN of UC11-T1 and select the correct gateway. Then click "Add".
- 3. Once the device has been added successfully, You will see the device in the list.





4.4 Check the Data of UC11-T1

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



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



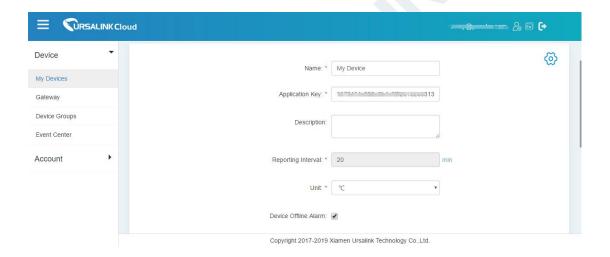
4.5 Configure UC11-T1 via Ursalink Cloud

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
		Temperatu
		re &
		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.	5572404c6
		96e6b4c6f
		526132303
		13823



Description	The description of the device.	
Reporting Interval	The interval of sending data to Ursalink Cloud.	20min
Unit	Unit displayed on Ursalink Cloud.	$^{\circ}$ 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:	40	°C
	Less Than:	21	°℃
	duration:	10	s
	Lock Time:	12345	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.



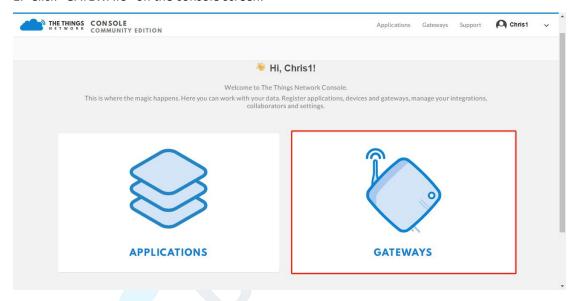
5. Configuration via TTN

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.

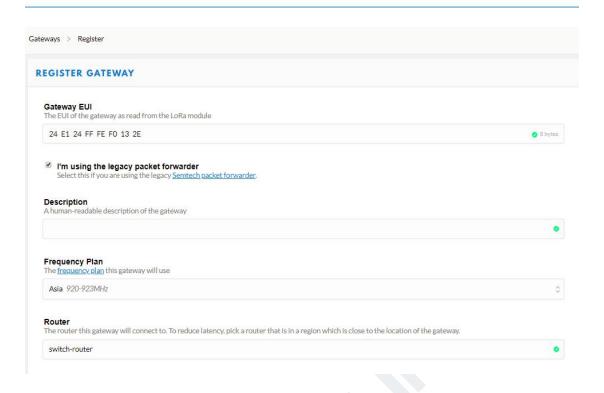


2. Click "register gateway".



3. Enter the gateway information.

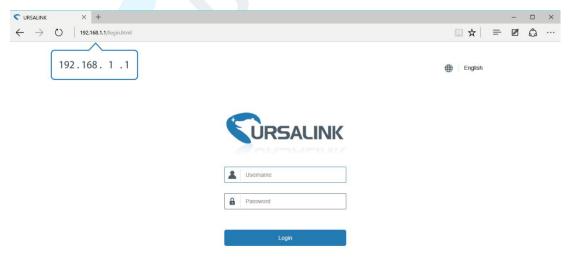




5.1.2 Connect Ursalink gateway to The Things Network

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

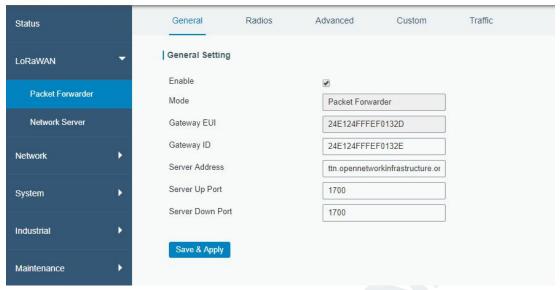
1. Log in gateway web GUI.



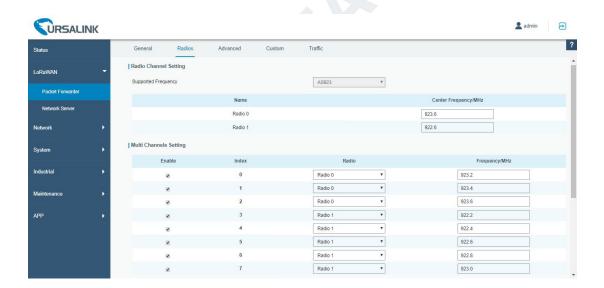
2. Click "LoRaWAN" \rightarrow "Packet Forwarder" \rightarrow "General" to configure the general setting.







3. Click "Radios" to configure the center frequency and channels.





5.2 Add UC11-T1 To The Things Network

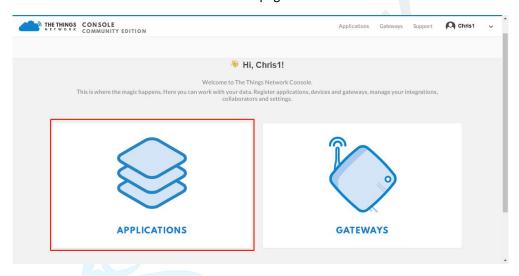
5.2.1 Create an Application in The Things Network

TTN server uses Applications to create groups of devices.

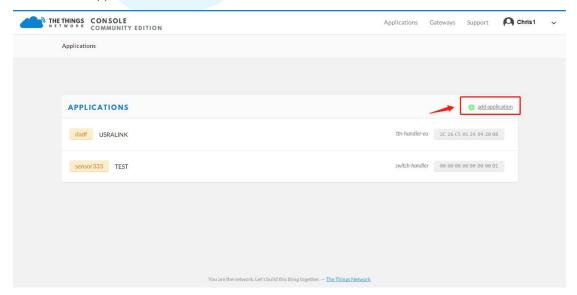
Gateways are associated with user account but not Applications. All gateways connected to TTN servers forward all LoRaWAN data traffic to the TTN message router. The TTN network server filters LoRa traffic by Application ID so that the data is routed to the correct user/application and users are only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

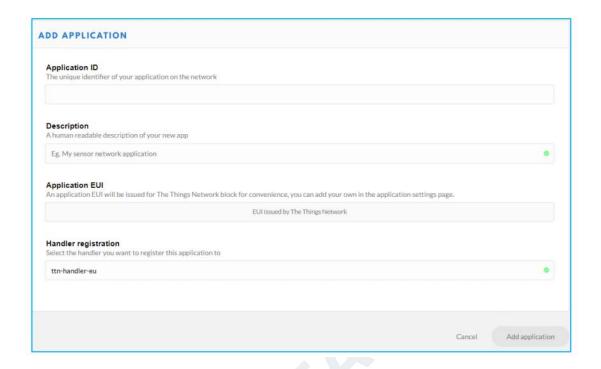


2. Click "add application".





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



5.2.2 Add Devices to The Application

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

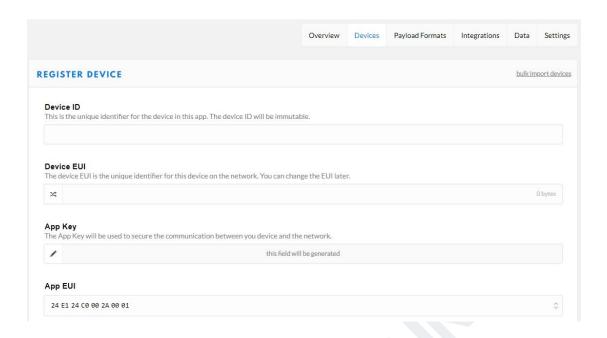
- 1. Click "Register Device" under Devices in the application overview page.
- 2. Enter the Device ID. This ID must be unique on the user's account.

We recommend using the convention dev (for device) followed by the Sensor Dev EUI. For instance, if the device has a Dev EUI of 0025ca00000000f then the Device ID is dev-0025ca000000000f.

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

Note: Please go to "APPLICATION -> settings -> EUIs" to add UC11-T1 App EUI.

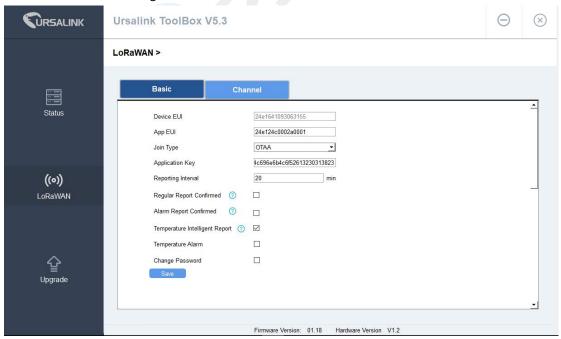




4. Click "Register" to complete registration.

5.2.3 Configure UC11-T1

Connect T1 to PC and configure it via Toolbox.





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.



