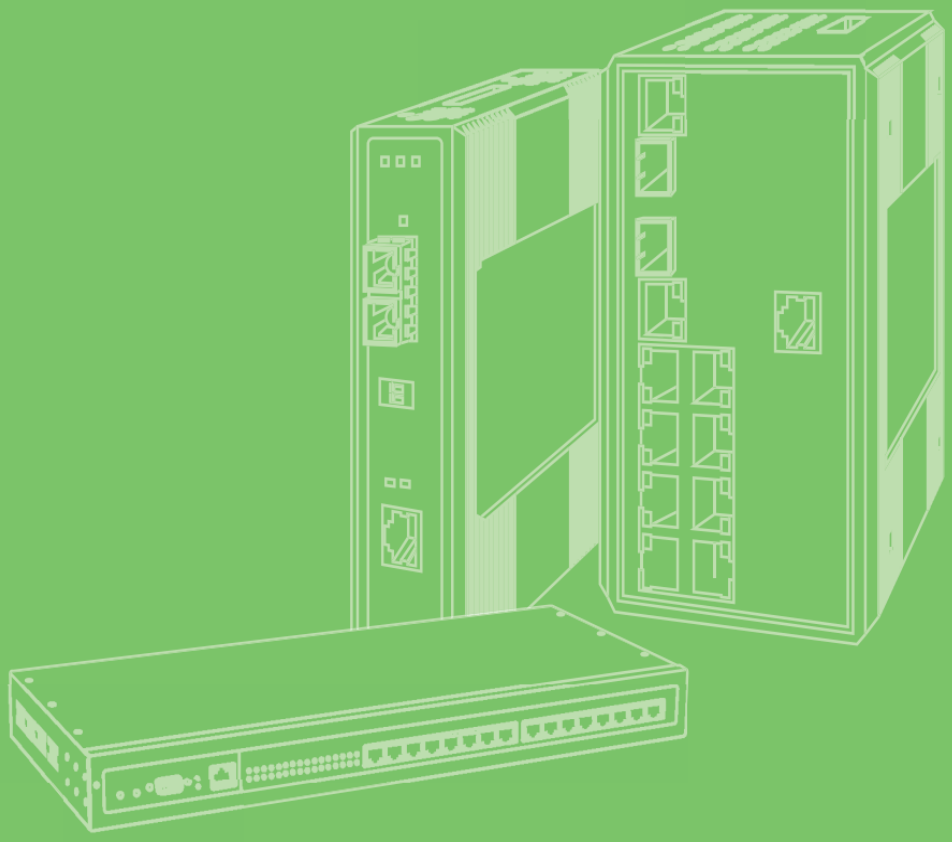
User Manual



Advantech LoRaWAN Service

ADVANTECH

Enabling an Intelligent Planet

Contest

Chapter 1

Introduction

1.1 Overview

Advantech LoRaWAN Service is a service developed by Advantech, offering a LoRaWAN Network and Advantech Application Server. This service is very easy to set up and use. Users simply need to input the basic information of their devices, choose from default profiles, and effortlessly receive LoRaWAN data.

Advantech LoRaWAN Service also supports Docker and can run on various platforms, including X86 and ARM.

1.2 Feature

Comprehensive LoRaWAN Support:

This network server provides comprehensive support for LoRaWAN technology, including device management, device configuration, data collection, and application integration.

Highly Configurable:

Users can customize it to a high degree to meet their specific requirements, including custom device configurations, data processing rules, and application integration.

Security:

Advantech places a strong emphasis on data security. The server offers data encryption and authentication features to ensure the confidentiality and integrity of device data.

Big Data Support:

This server has the capability to handle large volumes of data, making it suitable for the demands of large-scale IoT deployments.

Multi-Device Support:

Advantech's LoRaWAN Network Server supports various types and models of LoRaWAN devices, making it suitable for a wide range of IoT applications.

Real-time Monitoring:

Users can monitor the status and data of LoRaWAN devices in real-time, helping to address issues promptly.

Scalability:

Advantech's LoRaWAN Network Server is highly scalable, allowing for the addition of more devices and gateways as needed.

User Support:

Advantech offers user support and technical documentation to help users better understand and utilize the server.

These advantages make Advantech's LoRaWAN Network Server a robust solution for LoRaWAN management and data processing, suitable for a wide range of IoT applications, whether in industrial, agricultural, urban, or other fields.

Chapter 2

Web Interface

2.1 Login

When the device is first installed, the default IP is 192.168.1.1. You will need to make sure your network environment supports the device setup before connecting it to the network.
If your Advantech LoRaWAN Service is installed using a Docker image, the IP address of the Advantech LoRaWAN Service is the host itself.

1. Launch your web browser on a computer.
2. In the browser's address bar type in the device's default IP address (192.168.1.1 or host)). The login screen displays.
3. Enter the default user name and password (admin/admin) to log into the management interface. You can change the default password after you have successfully logged in.
4. Click Sign in to enter the management interface.

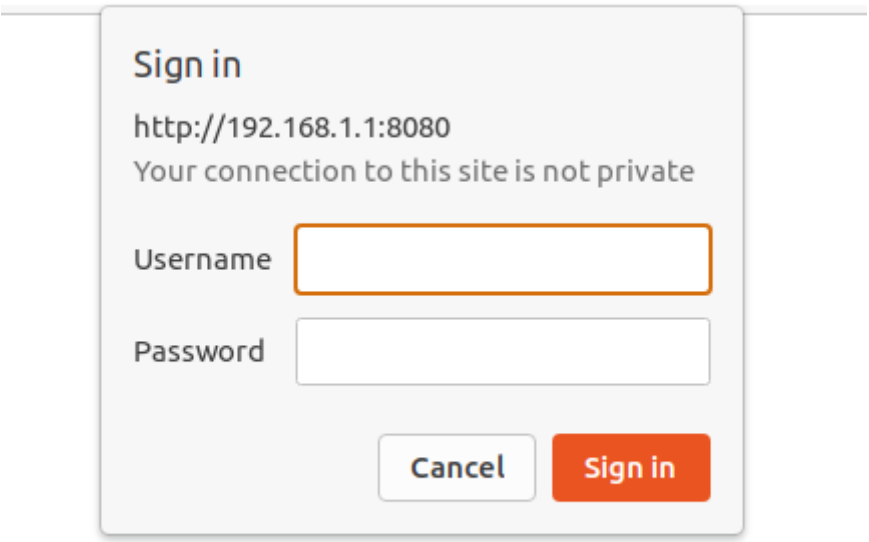


Figure 2.1 Login Screen

2.2 Overview

In the Overview page, you will find various pieces of information, including the service event timeline, servers, gateways, devices, and events. For more detailed information, please refer to the following.
To access this page, click **Overview**.

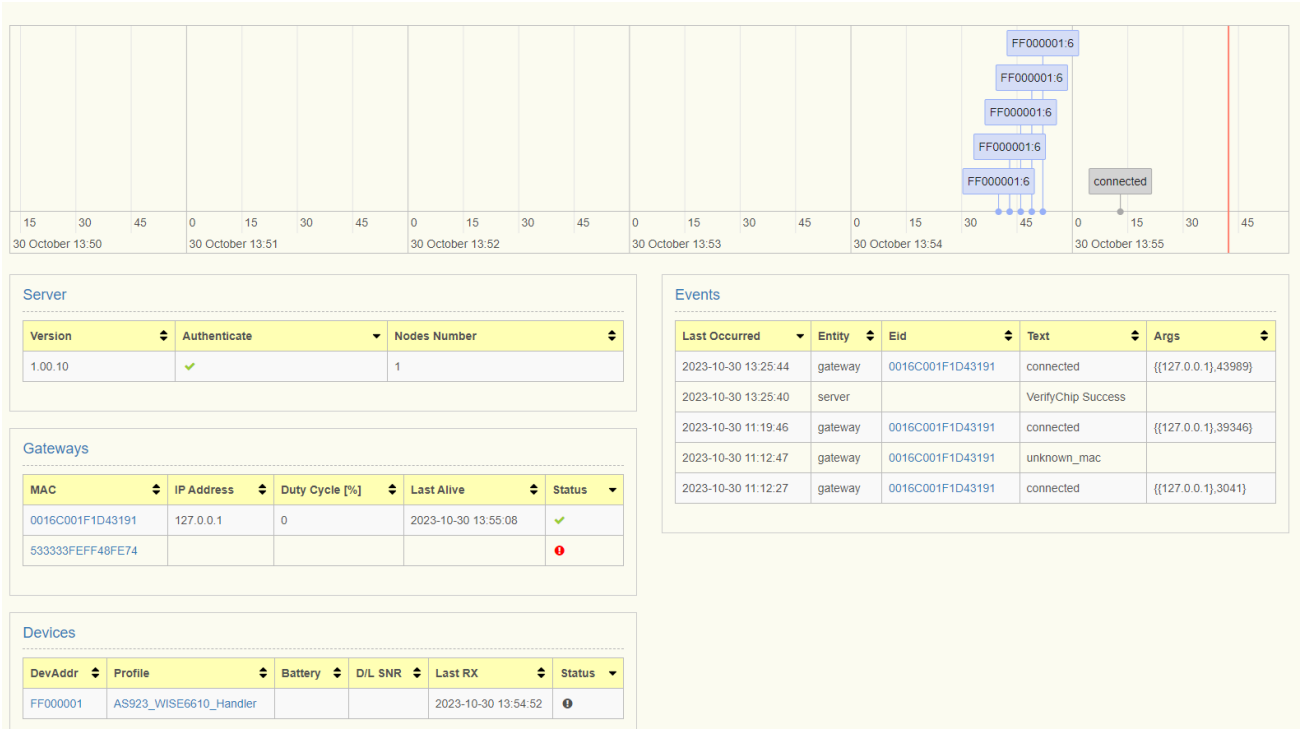
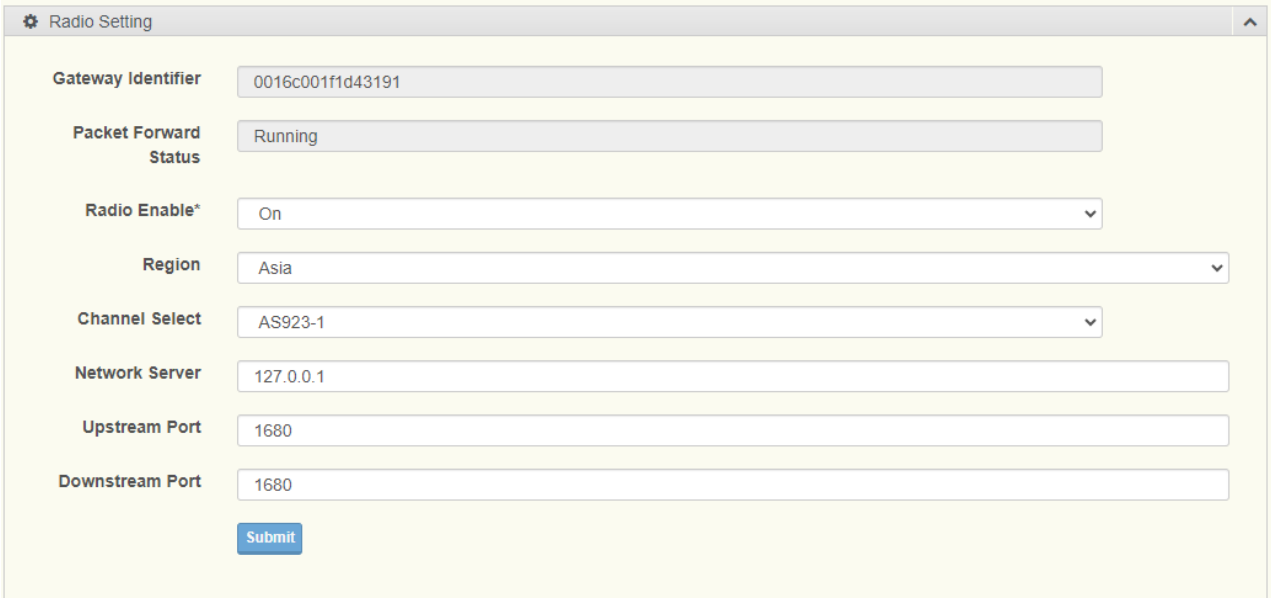


Figure 2.2 Overview

2.2 LoRaWAN RF

2.2.1 Radio Settings

To access this page, click **LoRaWAN RF > Radio Settings**.



	Channel Frequency(MHz)									
Name	Ch 0	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7	Ch STD	Ch FSK
US902-0	902.3	902.5	902.7	902.9	903.1	903.3	903.5	903.7	903MHz Bandwidth:500Khz	Disable
US902-1	903.9	904.1	904.3	904.5	904.7	904.9	905.1	905.3	904.6MHz Bandwidth:500Khz	Disable
US902-2	905.5	905.7	905.9	906.1	906.3	906.5	906.7	906.9	906.2MHz Bandwidth:500Khz	Disable
US902-3	907.1	907.3	907.5	907.7	907.9	908.1	908.3	908.5	907.8MHz Bandwidth:500Khz	Disable
US902-4	908.7	908.9	909.1	909.3	909.5	909.7	909.9	910.1	909.4MHz Bandwidth:500Khz	Disable
US902-5	910.3	910.5	910.7	910.9	911.1	911.3	911.5	911.7	911MHz Bandwidth:500Khz	Disable
US902-6	911.9	912.1	912.3	912.5	912.7	912.9	913.1	913.3	912.6MHz Bandwidth:500Khz	Disable
US902-7	913.5	913.7	913.9	914.1	914.3	914.5	914.7	914.9	914.2MHz Bandwidth:500Khz	Disable

Figure 2.2 LoRaWAN RF > Radio Settings

The following table describes the items in the previous figure.

Item	Description
Gateway Identifier	Read only , LoRaWAN Module chip ID
Packet Forward Status	Packet Forward Status. Running or Stop
Radio Enable	Click the drop-down menu to On or OFF the Packer Forward function.
Region	Click the drop-down menu to assign the region or customize for channel Select. Customize NorthAmerica(WISE-6610-NB or docker support) Australia(WISE-6610-NB or docker support) Asia(WISE-6610-NB or docker support) Europe(WISE-6610-EB or docker support) China-Antenna-20Mhz-Type-A(WISE-6610-CB or docker support) China-Antenna-20Mhz-Type-B(WISE-6610-CB or docker support) China-Antenna-26Mhz-Type-A(WISE-6610-CB or docker support) China-Antenna-26Mhz-Type-B(WISE-6610-CB or docker support)
Channel Select	Click the drop-down menu to assign the channels to packert forward. For more detailed information, please refer to the page ?.
Network Server	Enter network server IP address or URL, default IP address is 127.0.0.1.
Upstream Port	Enter network server upstream port
Downstream Port	Enter network server Downstream port
Reference Channel Table	Display channel table with region.

2.2.2 Radio Settings(Customize)

To access this page, click **LoRaWAN RF > Radio Settings**. And Region select to Customize.

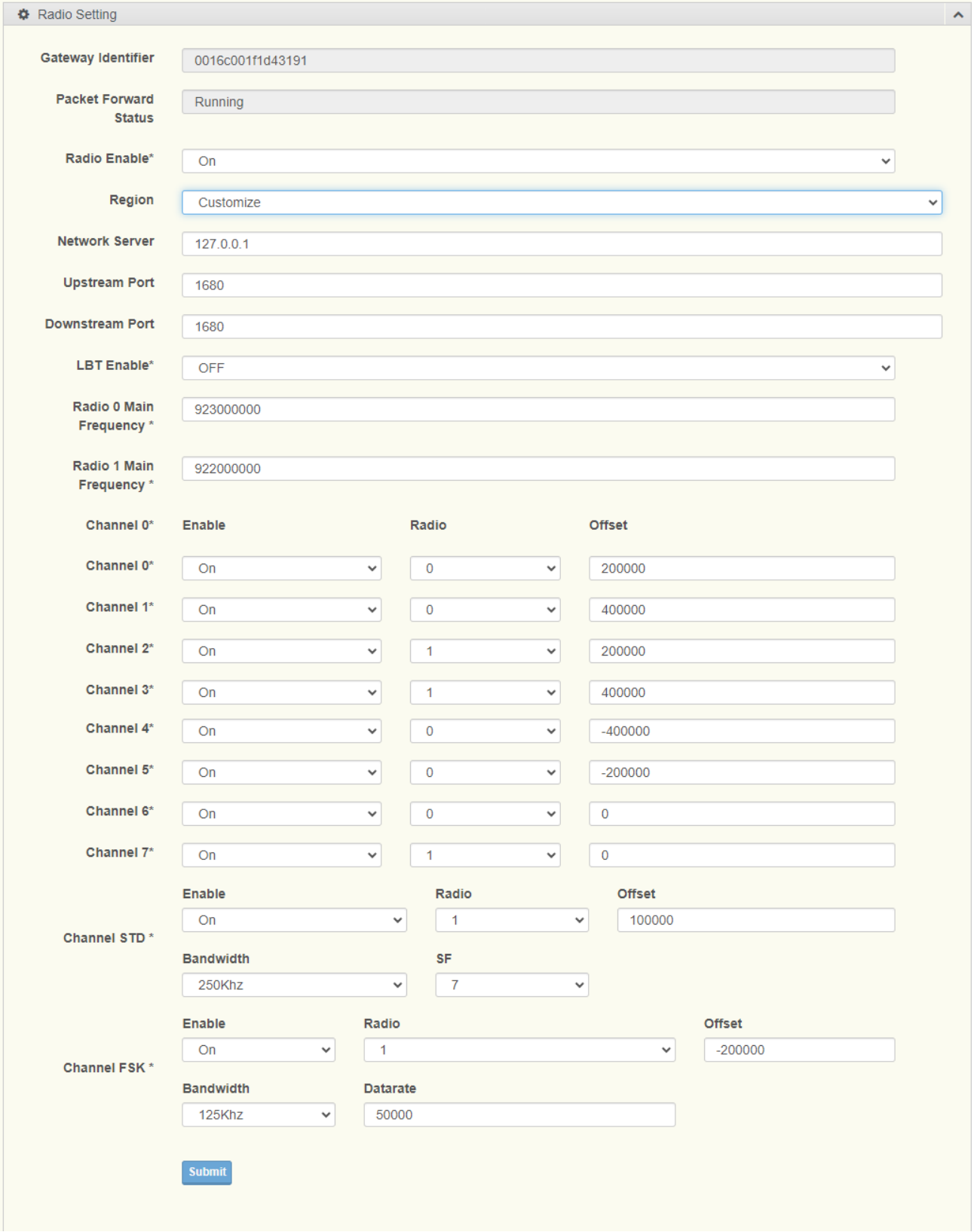
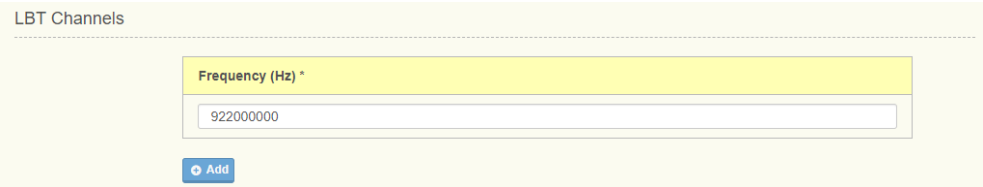


Figure 2.3 LoRaWAN RF > Radio Settings(customize)

The following table describes the items in the previous figure.

Item	Description
Gateway Identifier	Read only , LoRaWAN Module chip ID
Packet Forward Status	Packet Forward Status. Running or Stop

Radio Enable	Click the drop-down menu to On or OFF the Packer Forward function.
Network Server	Enter network server IP address or URL, default IP address is 127.0.0.1.
Upstream Port	Enter network server upstream port
Downstream Port	Enter network server Downstream port
LBT Enable	Click the drop-down menu to On or OFF the LBT function for Packet Forward.
Radio 0 Main Frequency	Enter main frequency for radio 0
Radio 1 Main Frequency	Enter main frequency for radio 1
Channel [0-7]	
Enable	Click the drop-down menu to On or OFF Channel [0-7].
Radio	Click the drop-down menu to select radio 0 or radio 1 with this channel.
Offset	Enter the offset frequency. This offset frequency will be applied to either radio 0 or radio 1, as selected in Channel [0-7] Radio.
Channel STD	
Enable	Click the drop-down menu to On or OFF Channel STD.
Radio	Click the drop-down menu to select radio 0 or radio 1 with the channel STD.
Offset	Enter the offset frequency. This offset frequency will be applied to either radio 0 or radio 1, as selected in Channel STD.
Bandwidth	Click the drop-down menu to select 250Khz or 500Khz for the channel STD.
SF	Spreading factors, click the drop-down menu to select SF for the channel STD.
Channel FSK	
Enable	Click the drop-down menu to On or OFF Channel FSK.
Radio	Click the drop-down menu to select radio 0 or radio 1 with the channel FSK.
Offset	Enter the offset frequency. This offset frequency will be applied to either radio 0 or radio 1, as selected in Channel FSK.
Bandwidth	Click the drop-down menu to select 125Khz, 250Khz or 500Khz for the channel FSK.
Datarate	Enter data-rate for channel FSK
LBT Channel	If the LBT function is enabled, the LBT channel table will be displayed below. 
Add	Add LBT channel in LBT table.

2.2.2 Spectrum Analyzer

The Spectrum Analyzer page allows user to scan the frequency spectrum of the surrounding environment.

2.2.2.1 Real Time Mode

Real Time mode allows for immediate scanning of the surrounding signals. If more channels are scanned, the time for each scanning cycle becomes longer.

To access this page, click **LoRaWAN RF > Spectrum Analyzer**, Mode is Real Time.

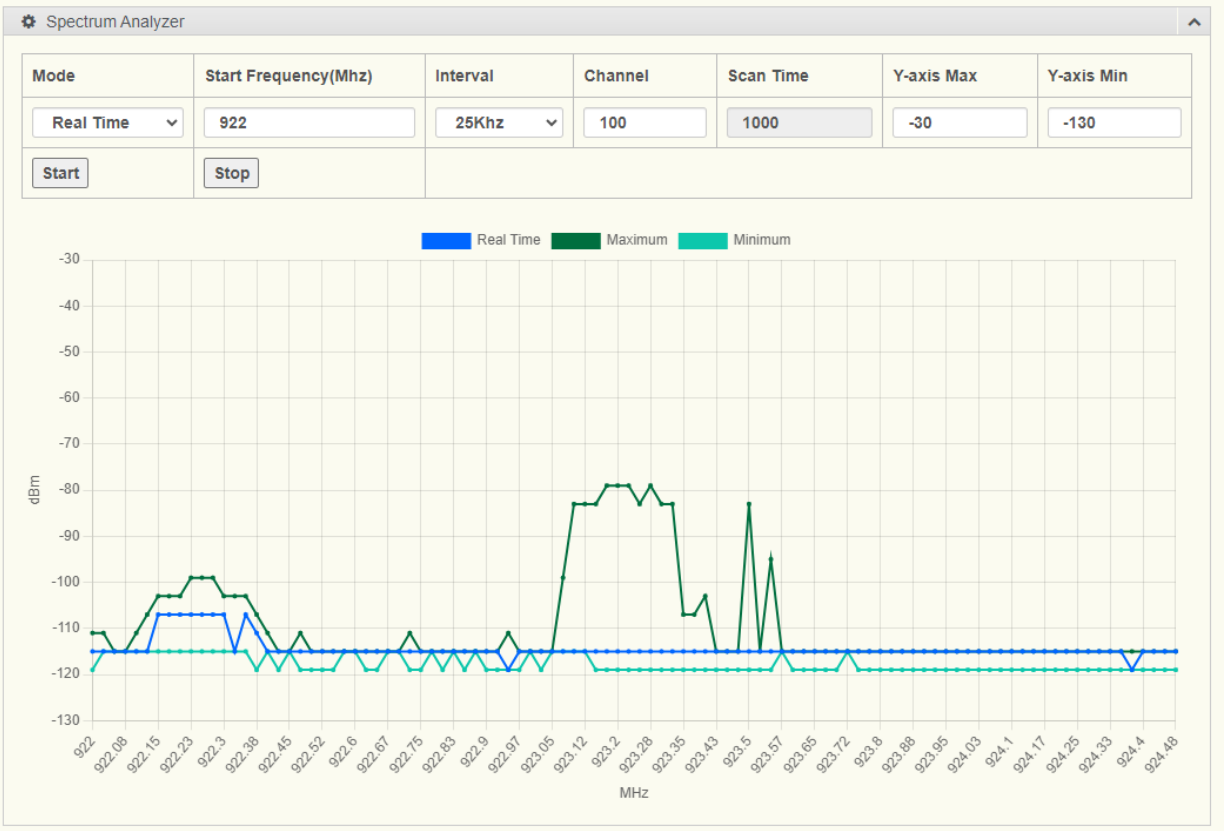


Figure 2.4 LoRaWAN RF > Spectrum Analyzer (Real Time)

The following table describes the items in the previous figure.

Item	Description
Mode	Click the drop-down menu to select Spectrum Analyzer mode.
Start Frequency (Mhz)	Enter start frequency for Spectrum Analyzer.
Interval	Click the drop-down menu to select the interval for the Spectrum Analyzer. This interval represents the spacing for each channel. In Analysis mode , default is 200Khz
Channel	Enter a number to assign total channel for Spectrum Analyzer.
Scan time	For Analysis mode. Enter a number to assign scan time for one channel.
Y-axis Max	Set Y-axis maximum on chart.

Y-axis Min	Set Y-axis minimum on chart.
Start	Click **Start** button to start Spectrum Analyzer
Stop	Click **Stop** button to stop Spectrum Analyzer
Chart Line	
Real Time	Current spectrum data, also click **Real Time** to display or hide Real time line on the chart.
Maximum	Maximum spectrum data, also click **Maximum** to display or hide maximum line on the chart.
Minimum	Minimum spectrum data, also click **Minimum** to display or hide minimum line on the chart.

2.2.2.1 Analysis Mode

Analysis Mode involves scanning the same channel multiple times to analyze whether it is clean. To access this page, click **LoRaWAN RF > Spectrum Analyzer**, Mode is Analysis.

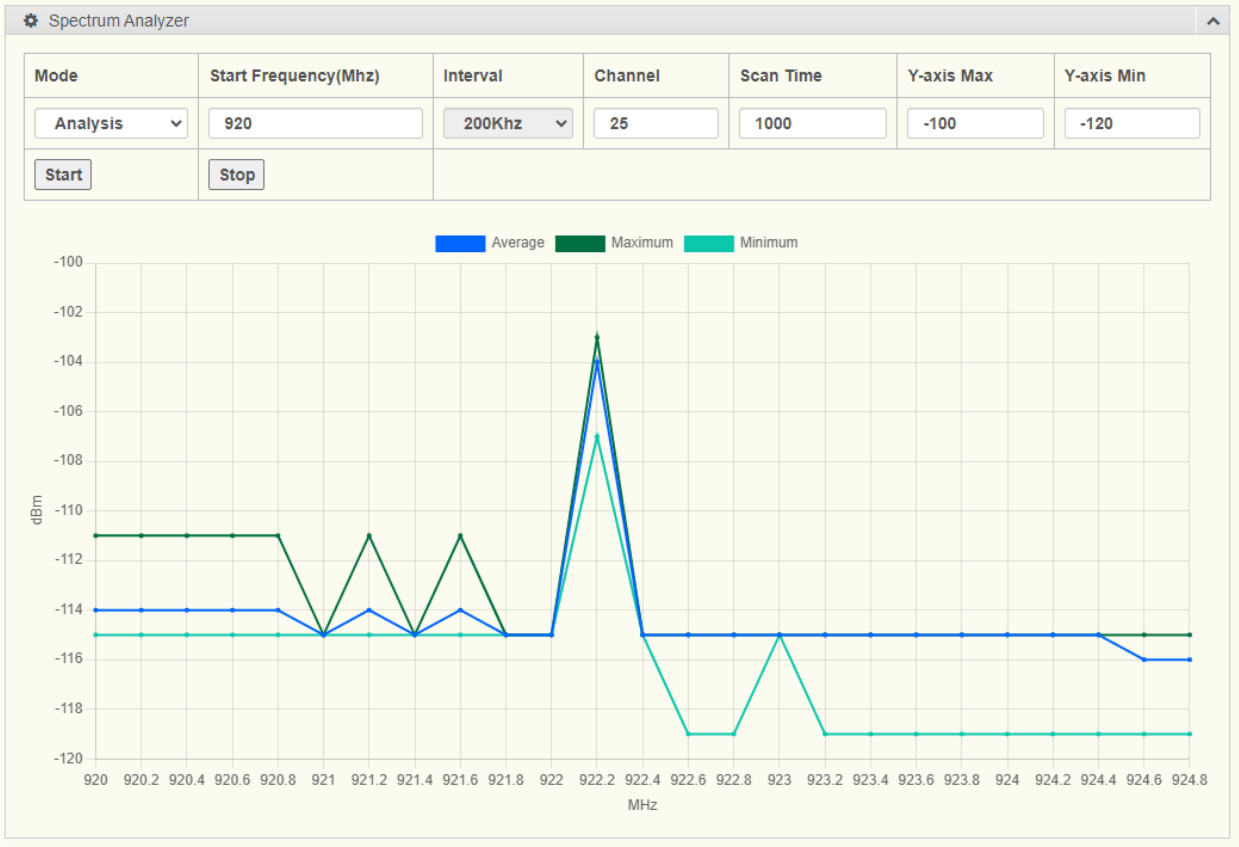


Figure 2.5 LoRaWAN RF > Spectrum Analyzer (Analysis)

The following table describes the items in the previous figure.

Item	Description
Chart Line	
Average	Average spectrum data, also click **Average** to display or hide Average line on the chart.
Maximum	Maximum spectrum data, also click **Maximum** to display or hide maximum line on the chart.

Minimum	Minimum spectrum data, also click **Minimum** to display or hide minimum line on the chart.

2.3 Infrastructure

2.3.1 Device Profiles

2.3.1.1 Device Profile List

To access this page, click **Infrastructure > Device Profiles**

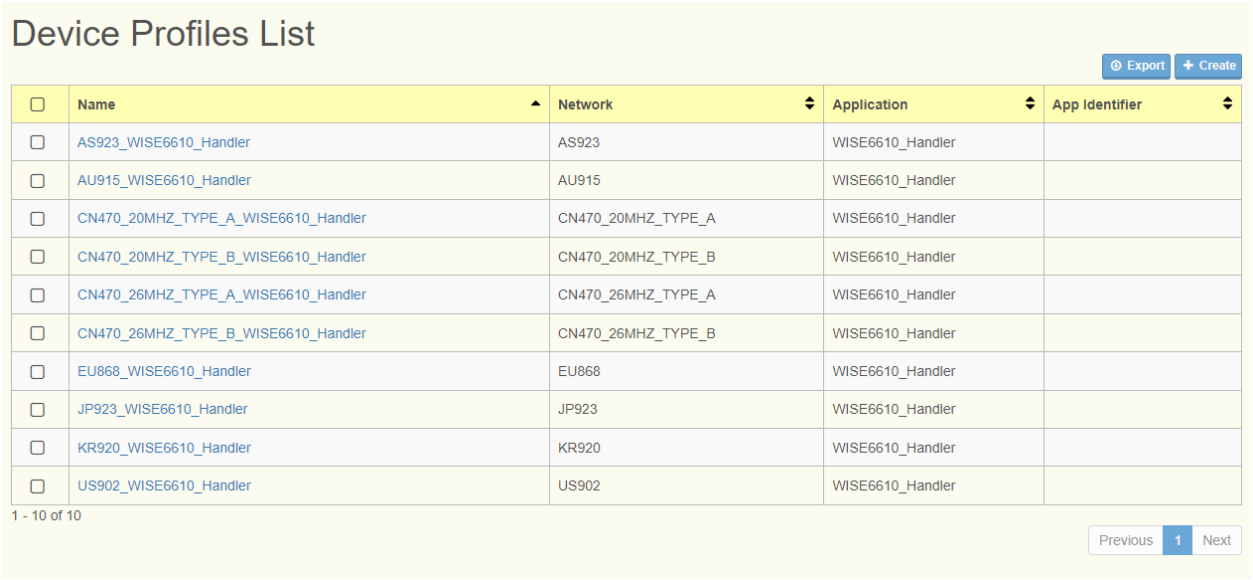


Figure 2.6 Infrastructure > Device Profiles

The following table describes the items in the previous figure.

Item	Description
Name	Device profile name
Network	Indicate which Region Profile this Device Profile is using.
Application	Indicate which Handle Profile this Device Profile is using.
App Identifier	A string defined by user, for this device profile.
Selected	Delete selected device profiles.
Export	Export all device profiles to csv file
Create	Open create device profile page

2.3.1.2 Create Device Profile

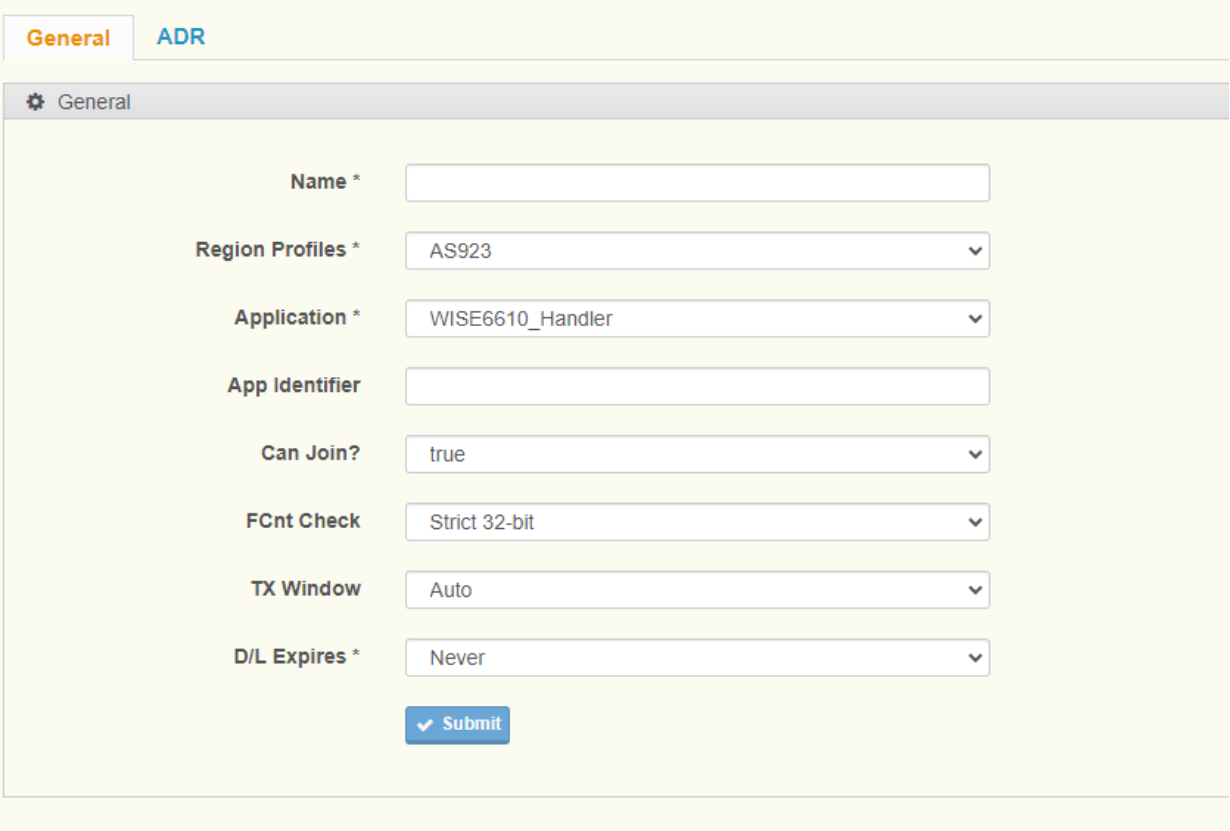


Figure 2.7 Create Device Profile, General

The following table describes the items in the previous figure.

Item	Description
Name	Enter a string to define this Device Profile name.
Region Profiles	Click the drop-down menu to select Region Profile for this Device Profile. In the drop-down menu, the value references the Region Profile List.
Application	Click the drop-down menu to select Handler Profile for this Device Profile. In the drop-down menu, the value references the Handler Profiles List.
App Identifier	Enter a string to define this Device Profile App Identifier.
Can Join?	Allow OTAA join or denied
FCnt Chcek	FCnt Check to be used for this device, default is static 32-bit
TX Window	Used for downlinks to this device, Auto ,RX1 or RX2
D/L Expires	"never" means that: All class A downlinks for a device will be queued and eventually delivered. All confirmed downlinks will be retransmitted until acknowledged, even when a new downlink is sent. When Superseded means that: Only the most recent class A downlink will be scheduled for delivery. "superseded" downlinks will be dropped. Unacknowledged downlinks will be dropped when a new downlink (either

class A or C) is sent.

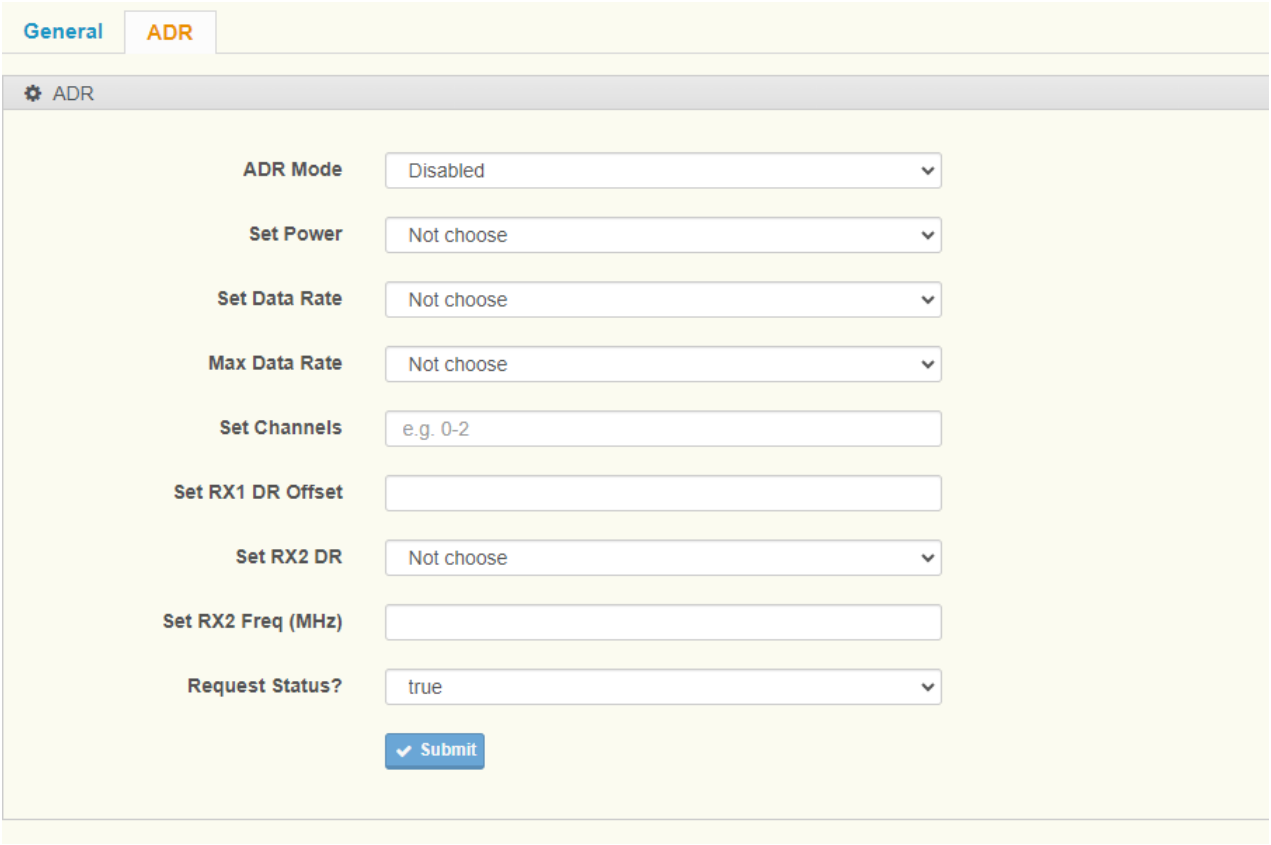


Figure 2.8 Create Device Profile, ADR

The following table describes the items in the previous figure.

Item	Description
ADR Mode	Determines the ADR mechanism for this device: Disabled, Auto-Adjust, or Maintain.
Set Power	Defines the power (in dBm)
Set Data Rate	Defines the data rate
Max Data Rate	Defines the maximal data rate supported by the devices
Set Channels	Defines the set of channels. The channels are given as a comma-separated list of interfaces, e.g. 0-2 for EU, 0-71 for the whole US band, or 0-7,64 for the first US sub-band.
Set RX1 DR Offset	Defines the offset between the uplink and the RX1 slot downlink data rates
Set RX2 DR	Defines the data rate for the second reception slot (RX2).
Set RX2 Freq (Mhz)	Defines the default frequency in the RX2 receive window.
Request Status?	Which can be used to disable the status requests for simple devices that do not support it (by default true).

2.3.2 Region Profile

2.3.2.1 Region Profile List

To access this page, click **Infrastructure > Region Profiles**

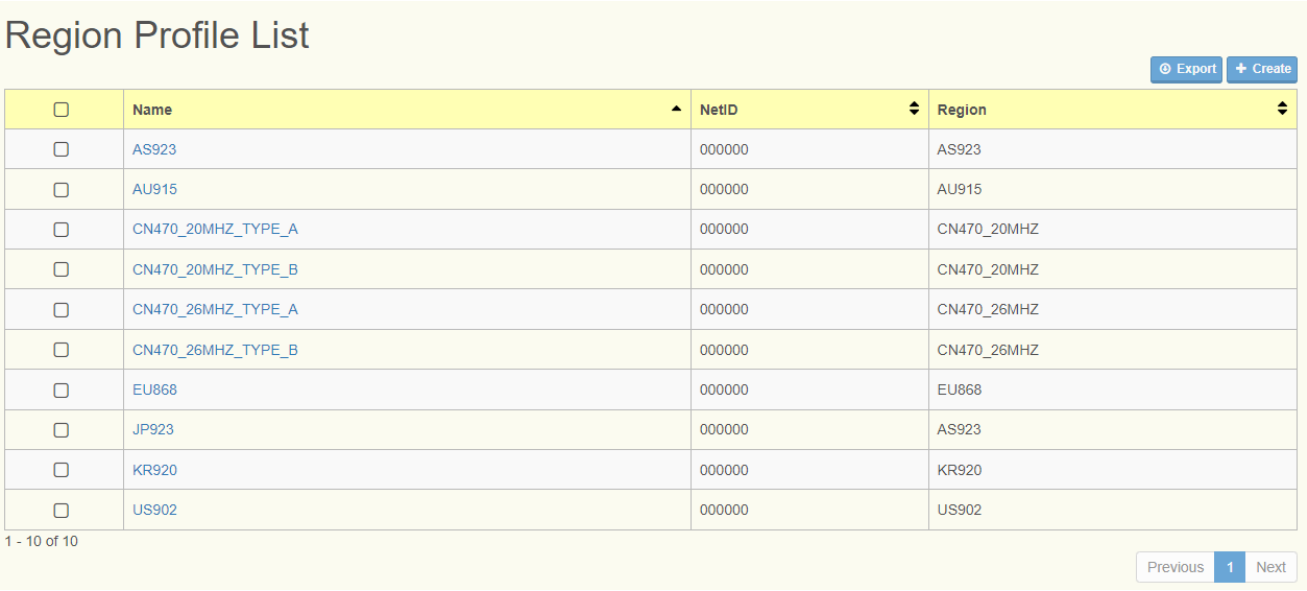


Figure 2.9 Infrastructure > Region Profiles

The following table describes the items in the previous figure.

Item	Description
Name	Region profile name
NetID	NetID of the network. Private networks should use 000000 or 000001.
Region	Indicate which region this Region Profile is using.
Selected	Delete selected region profiles.
Export	Export all region profiles to csv file
Create	Open create region profile page

2.3.2.2 Create Region Profile

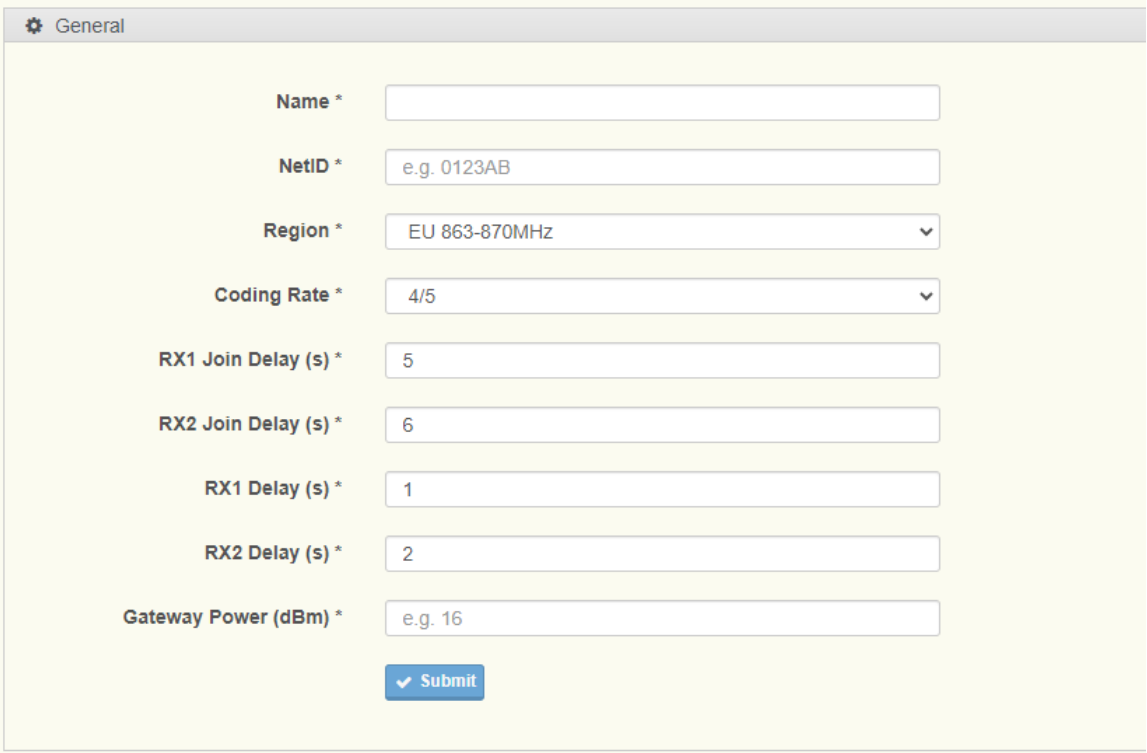


Figure 2.10 Create Region Profile, General

The following table describes the items in the previous figure.

Item	Description
Name	Enter a string to define this Region Profile name.
NetID	NetID of the network. Private networks should use 000000 or 000001.
Region	Region that determines the LoRaWAN regional characteristics. EU 863-870MHz, US 902-928MHz, Australia 915-928MHz, China 470-510MHz Plan for 20 MHz antenna, China 470-510MHz Plan for 26 MHz antenna, Asia 923MHz, South Korea 920-923MHz, India 865-867MHz, Russia 864-870MHz
Coding Rate	Coding Rate is always "4/5" on LoRaWAN.
RX1 Join Delay (s)	Defines the JOIN_ACCEPT_DELAY1 , in normal situation, it would be 5.
RX2 Join Delay (s)	Defines the JOIN_ACCEPT_DELAY2 , in normal situation, it would be 6.
RX1 Delay (s)	Defines the RECEIVE_DELAY1 , in normal situation, it would be 1.
RX2 Delay (s)	Defines the RECEIVE_DELAY2 , in normal situation, it would be 2.
Gateway Power (dBm)	Defines a default transmission power for downlinks.

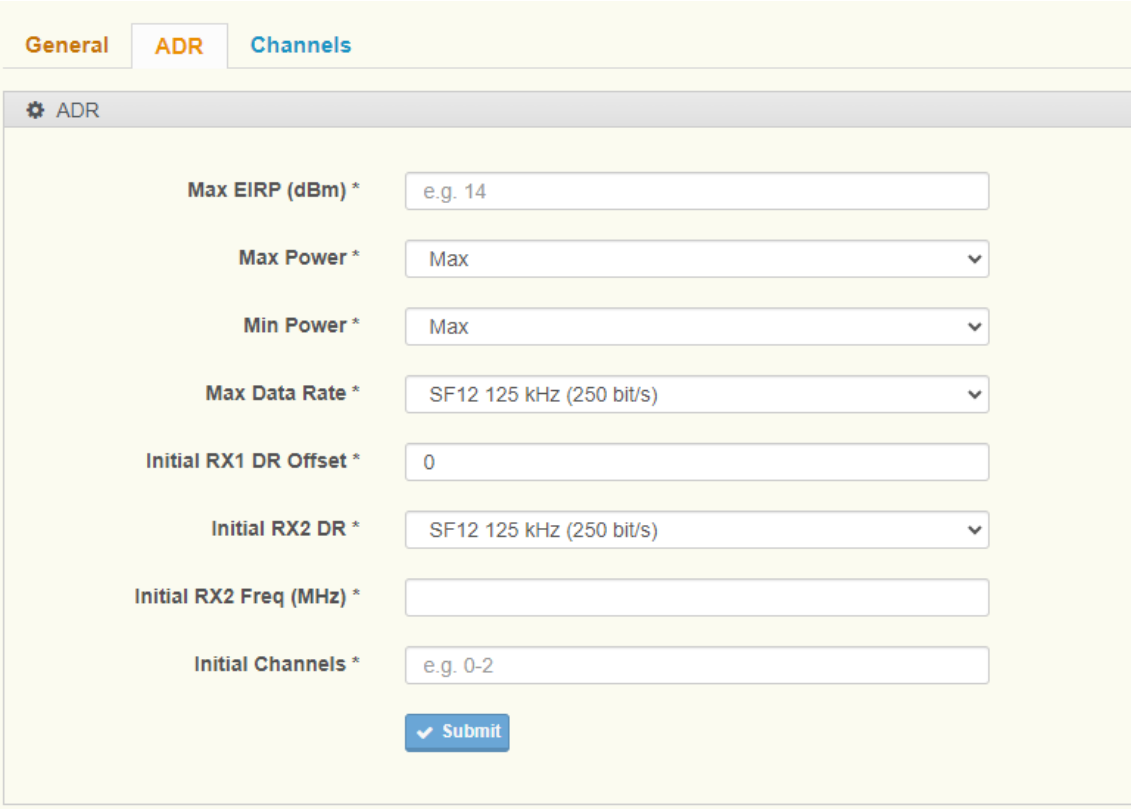


Figure 2.11 Create Region Profile, ADR

The following table describes the items in the previous figure.

Item	Description
Max EIRP (dBm)	Used in your region. For each region it is defined in the "Data Rate and End-device Output Power encoding" section.
Max Power	Defines the first item in the "TX Power Table"
Min Power	Defines the last item in the "TX Power Table"
Max Data Rate	Defines the highest DR (lowest SF) supported by channels in this network. Additional Channels may specify a different value.
Initial RX1 DR Offset	Defines the offset between the uplink data rate and the downlink data rate used to communicate with the end-device on the first reception slot (RX1).
Initial RX2 DR	Defines the data rate for the second reception slot (RX2). See the "Receive windows" section.
Initial RX2 Freq (MHz)	Defines the default frequency in the RX2 receive window.
Initial Channels	Enabled in your devices. This stall include a comma-separated list of intervals, e.g. 0-2 for EU or 0-71 for US.

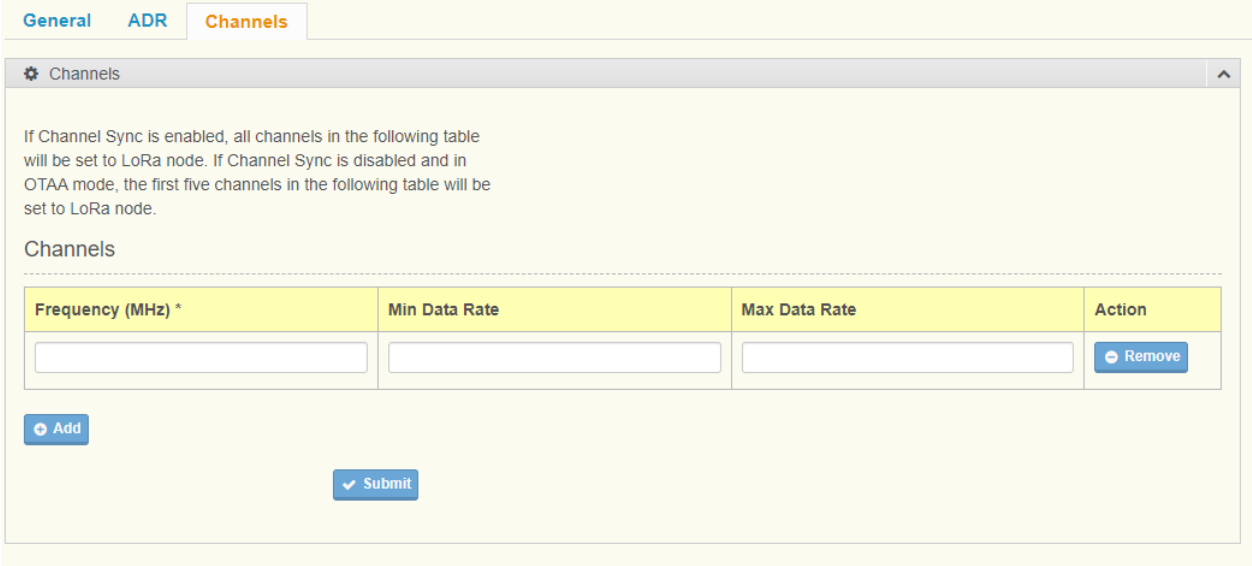


Figure 2.12 Create Region Profile, Channels

This channels table is used for OTAA join or node channel sync function.

The following table describes the items in the previous figure.

Item	Description
Frequency (MHz)	Defines the channel frequency in the channel table
Min Data Rate	Defines the minimum data rate for this channel.
Max Data Rate	Defines the maximum data rate for this channel.
Remove	Click **Remove** to remove this channel
Add	Click **Add** to add a channel in this channel table

2.3.3 Multicast Channels

2.3.3.1 Multicast Channels List

To access this page, click **Infrastructure > Multicast Channels**

Figure 2.13 Infrastructure > Multicast Channels

The following table describes the items in the previous figure.

Item	Description
DevAddr	DevAddr of the Multicast Channel
Profile	Indicate which Device Profile this Multicast Channel is using.
FCnt Down	Downlink frame count of the Multicast Channel

Selected	Delete selected Multicast Channel.
Export	Export all Multicast Channel to csv file
Create	Open create Multicast Channel page

2.3.3.2 Create Multicast Channels

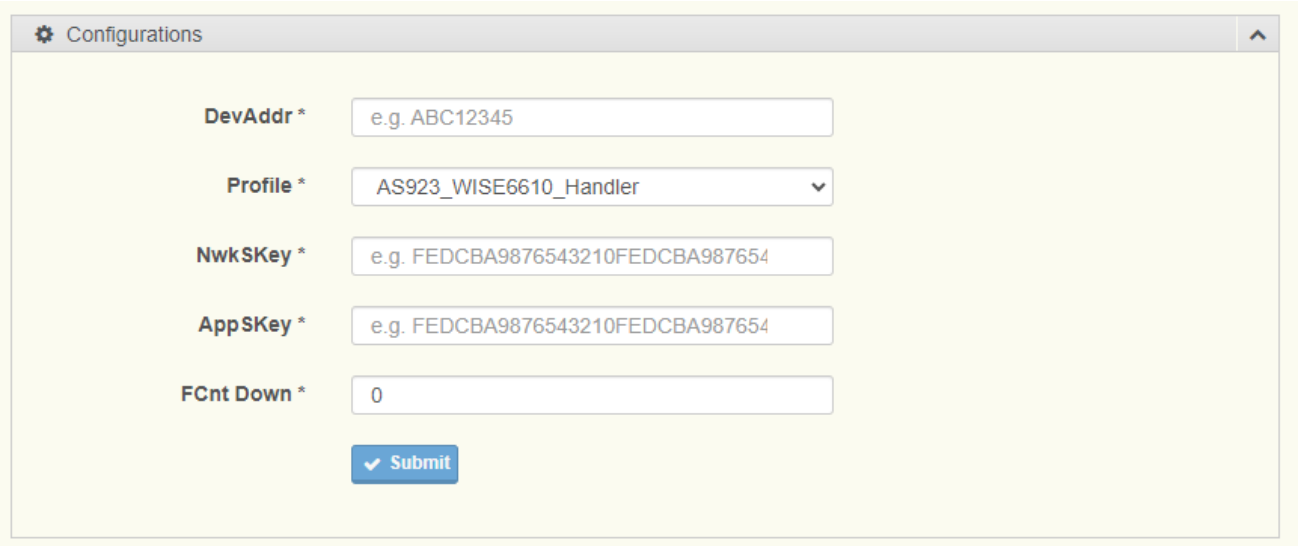


Figure 2.14 Create Multicast Channels

The following table describes the items in the previous figure.

Item	Description
DevAddr	DevAddr of the Multicast Channel
Profile	Indicate which Device Profile this Multicast Channel is using.
FCnt Down	Downlink frame count of the Multicast Channel
NwkSkey	Network session key
AppSkey	Application session key

2.3.4 Events

To access this page, click **Infrastructure > Events**

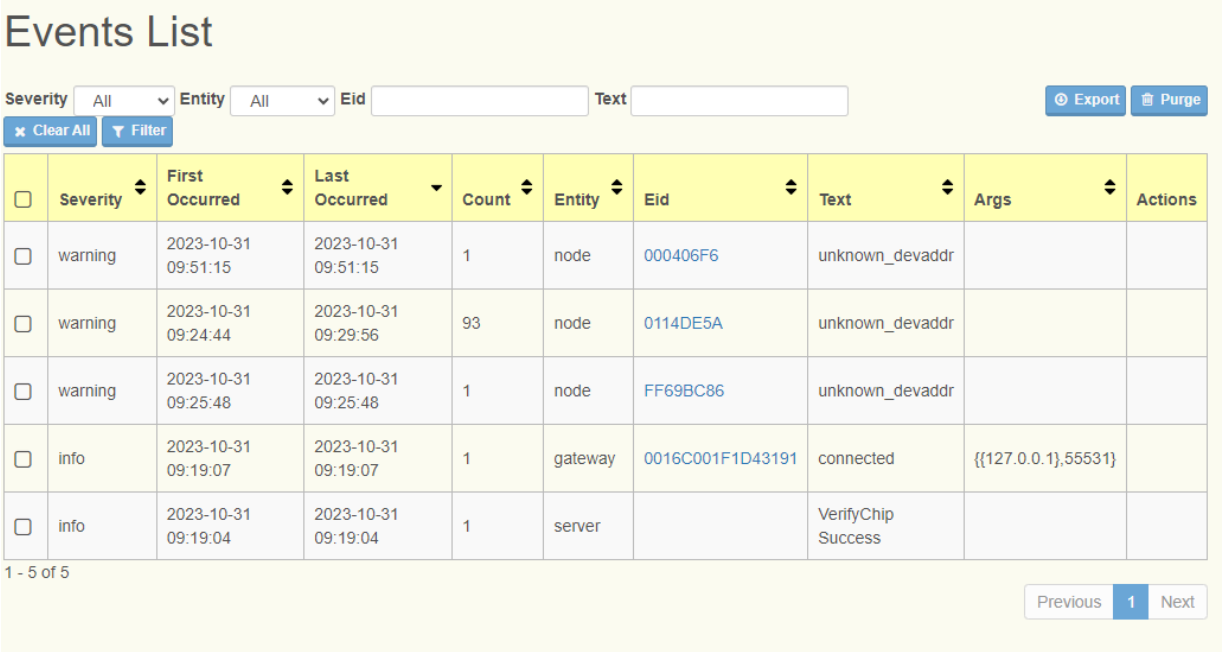


Figure 2.15 Infrastructure > Events

The following table describes the items in the previous figure.

Item	Description
Severity	Severity of this event.
First Occurred	First occurred time of this event.
Last Occurred	Last occurred time of this event.
Count	Count of this event.
Entity	Entity of this event, node, gateway or server.
Eid	Eid of this event , if available, it should be the Node's DevAddr or EUI
Text	Description of this event.
Args	Argument of this event.
Export	Export all events to csv file
Purge	Clean all events.

2.4 Gateways

2.4.1 Gateways List

To access this page, click **Gateways.**

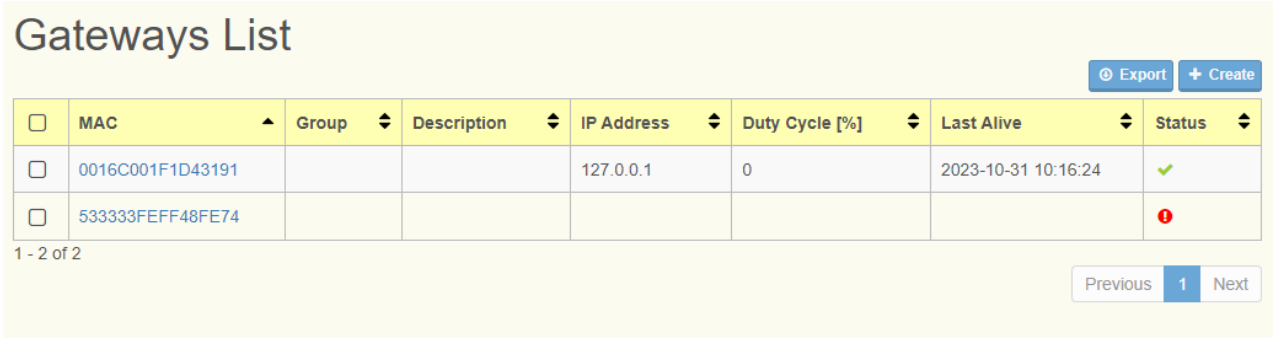


Figure 2.16 Gateways

The following table describes the items in the previous figure.

Item	Description
MAC	MAC address of this gateway.
Group	Group name of this gateway.
Description	Description of this gateway.
IP Address	IP Address of this gateway.
Duty Cycle[%]	TX duty cycle percentage in 1 hour.
Last Alive	Last gateway receive LoRaWAN packet time.
Status	Gateway's status.
Selected	Delete selected region profiles.
Export	Export all region profiles to csv file
Create	Open create region profile page

2.4.2 Create Gateway

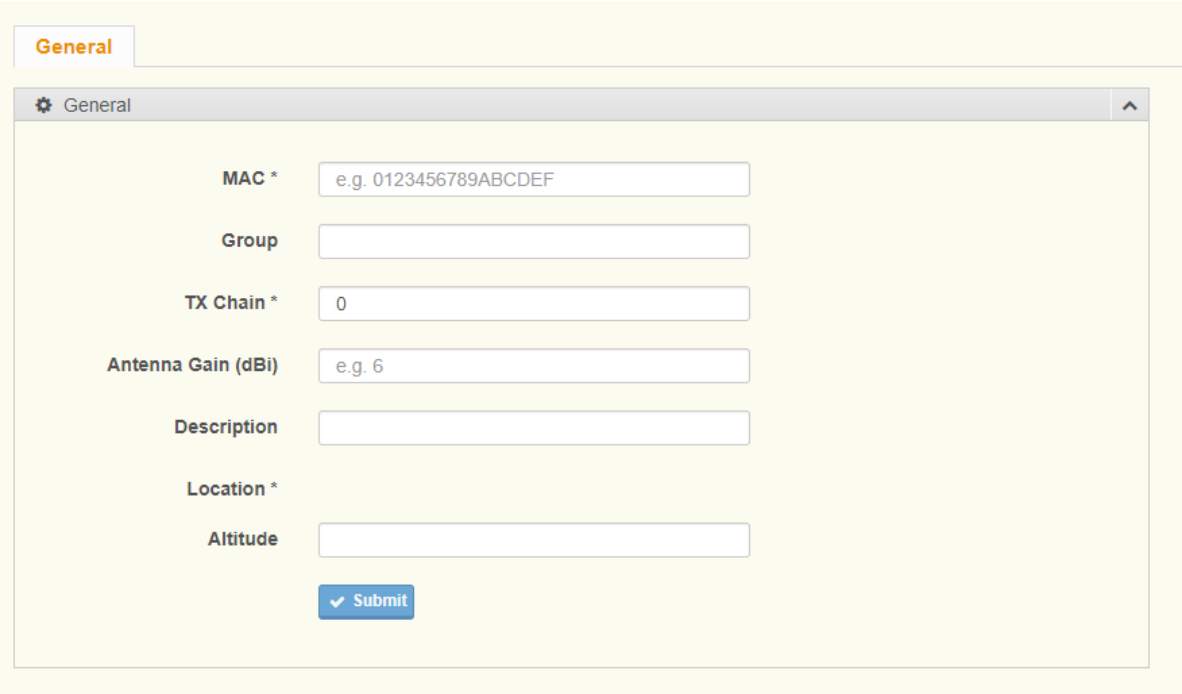


Figure 2.17 Create Gateway

The following table describes the items in the previous figure.

Item	Description
MAC	Define MAC address of this gateway.
Group	Define group name of this gateway.
TX Chain	Define Tx RF radio
Antenna Gain (dBi)	Antenna gain
Description	Define description of this gateway.
Altitude	Define gateway's altitude

2.4.3 Gateway Status

2.4.3.1 Gateway General

For further information regarding the create of the Gateway function see page 22.

2.4.3.2 Gateway Status

Figure 2.18 Gateway Status

The following table describes the items in the previous figure.

Item	Description
Alert	Alert massage of this gateway
IP Address	IP Address of this gateway.
Last Alive	Last gateway receive LoRaWAN packet time.
Last Report	Last gateway report time.
Temperature	Current temperature of this gateway.

Chart	
Transmissions	Record the gateway's transmission time over the past hour.
Receive	Record the gateway's receive bytes with 8 channel over the past hour.
Temperature	Record the gateway's temperature over the past hour.

2.4.3.3 Gateway Traffic

This recorded gateway's traffic over the past 10 minutes.

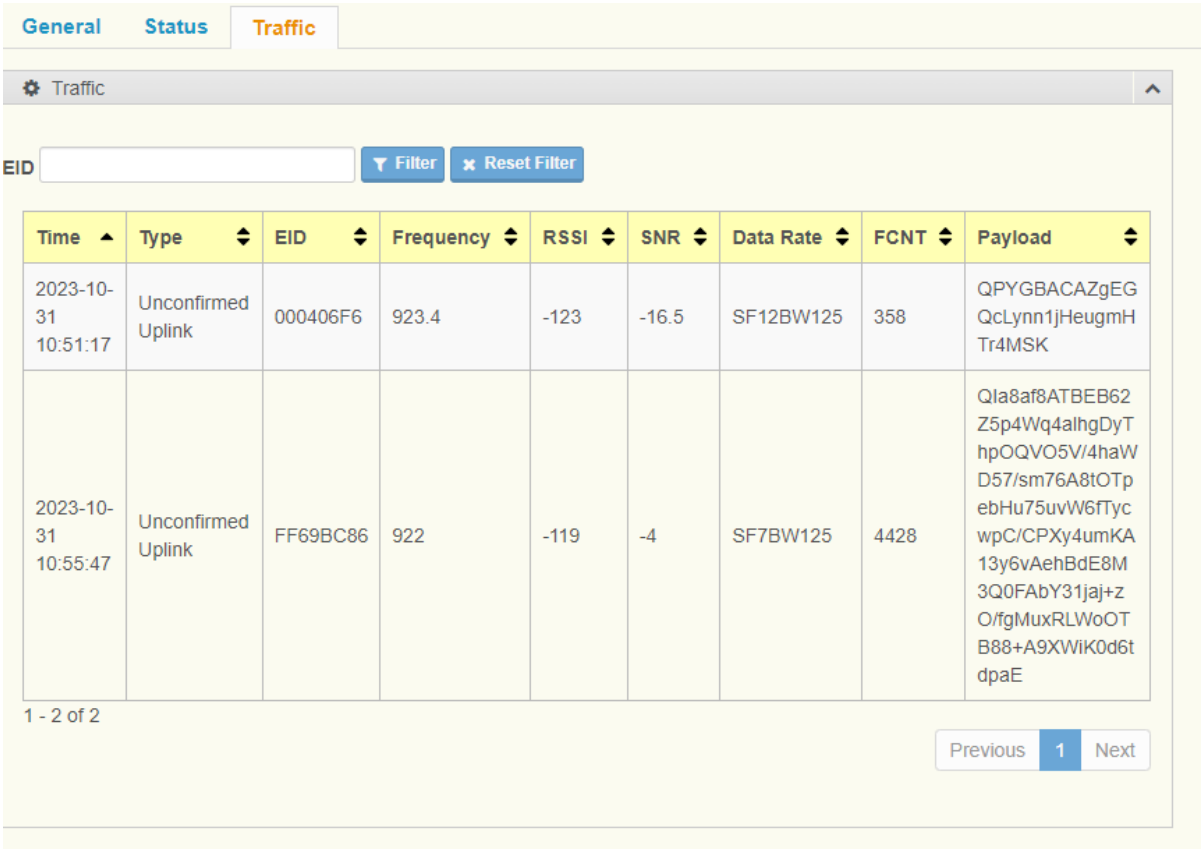


Figure 2.19 Gateway Traffic

The following table describes the items in the previous figure.

Item	Description
Time	Receive time of this LoRaWAN packet.
Type	Type of this LoRaWAN packet.
EID	Eid of this event , it should be the Node's DevAddr or EUI
Frequency	Frequency of this LoRaWAN packet.
RSSI	RSSI of this LoRaWAN packet.
SNR	SNR of this LoRaWAN packet.
Data Rate	Data Rate of this LoRaWAN packet.
FCNT	FCNT of this LoRaWAN packet.
Payload	RAW data of this LoRaWAN packet, it is **undecrypted**.

2.5 Devices

2.5.1 Create Device

To access this page, click **Devices > Create Device.**

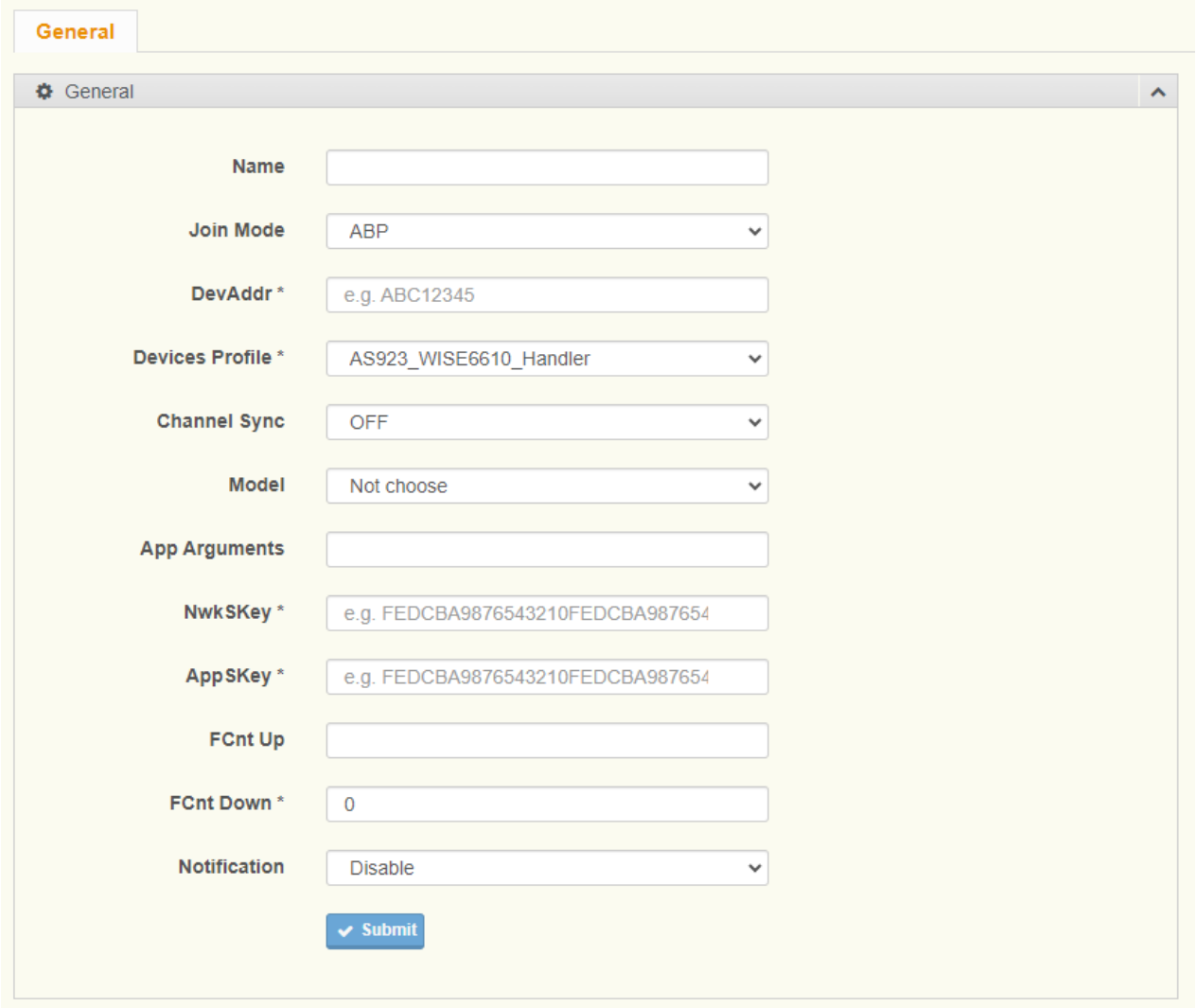


Figure 2.20 Devices > Create Device

The following table describes the items in the previous figure.

Item	Description
Name	Enter the Name of the LoRaWAN Device. When the field is empty, it will be generated automatically.
Join Mode	Click the drop-down menu to select the Join Mode of the LoRaWAN Device , OTAA or ABP
Devaddr	DevAddr of the LoRaWAN device, when join mode is OTAA and field is empty , it will be generated automatically.
DevEUI	OTAA Only: DevEUI of the LoRaWAN device.

Devices Profile	Indicate which Device Profile this device is using.
Channel Sync	The node's channel synchronizes with the network server, referencing the channel from the **Device > Device Profile > Region Profile > Channels**.
Model	If the LoRaWAN device is an Advantech LoRaWAN Node, you can quickly use the drop-down menu to set the **App Arguments**, which will affect the Application Server.
App Arguments	Define LoRaWAN device App Arguments. It's used for parsing the node in the backend.
NwkSkey	ABP Only: Network session key.
AppSkey	ABP Only: Application session key.
AppEUI	OTAA Only Application identifier.
AppKey	OTAA Only Application key.
FCnt Up	Uplink frame count.
FCnt Down	Downlink frame count.
Notification	Click the drop-down menu to enable or disable notification function, more information please reference page 86.
Timeout	When the network server doesn't receive a packet from this device within the timeout period, the network server will use SMTP to notify the user.

2.5.2 Devices List

To access this page, click **Devices > Devices List.**

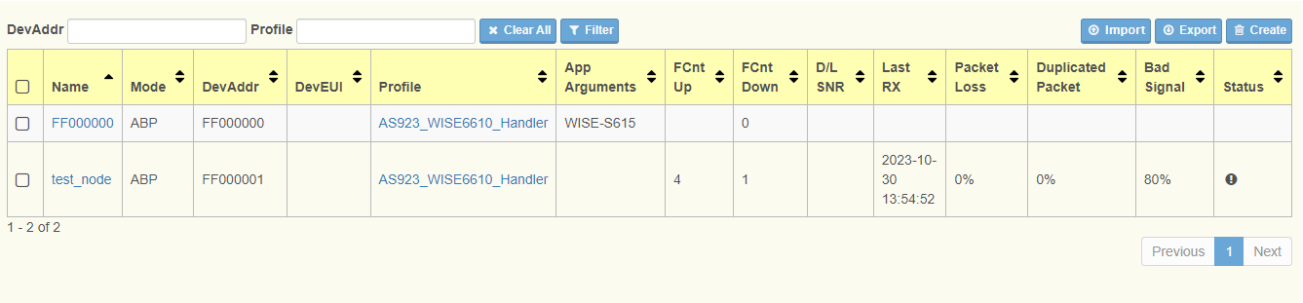


Figure 2.21 Devices > Devices List

The following table describes the items in the previous figure.

Item	Description
Name	Name of the LoRaWAN Device.
Mode	Join mode of the LoRaWAN Device.
Devaddr	Devaddr of the LoRaWAN Device.
DevEUI	End-device identifier of the LoRaWAN Device.

Profile	Indicate which Device Profile this device is using.
App Arguments	App Arguments of the LoRaWAN Device.
FCnt Up	Current uplink frame count.
FCnt Down	Current downlink frame count.
D/L SNR	The D/L SNR is the demodulation signal-to-noise ratio in dB rounded to the nearest integer value for the last successfully received DevStatusReq command
Last RX	Time of the last received packet from this device
Packet loss	Packet loss rate.
Duplicated Packet	Duplicated packet rate. If this value is too high, it's possible that the node did not receive the ACK from the gateway.
Bad Signal	The rate of signals less than -110dbm
Status	Status of this device.
Selected	Delete selected devices.
Export	Export all devices to csv file
Create	Open create device page
Import	Import devices csv file to create devices.

2.5.3 Devices Status

2.5.3.2 General

For more detailed arguments, please refer to page 25.

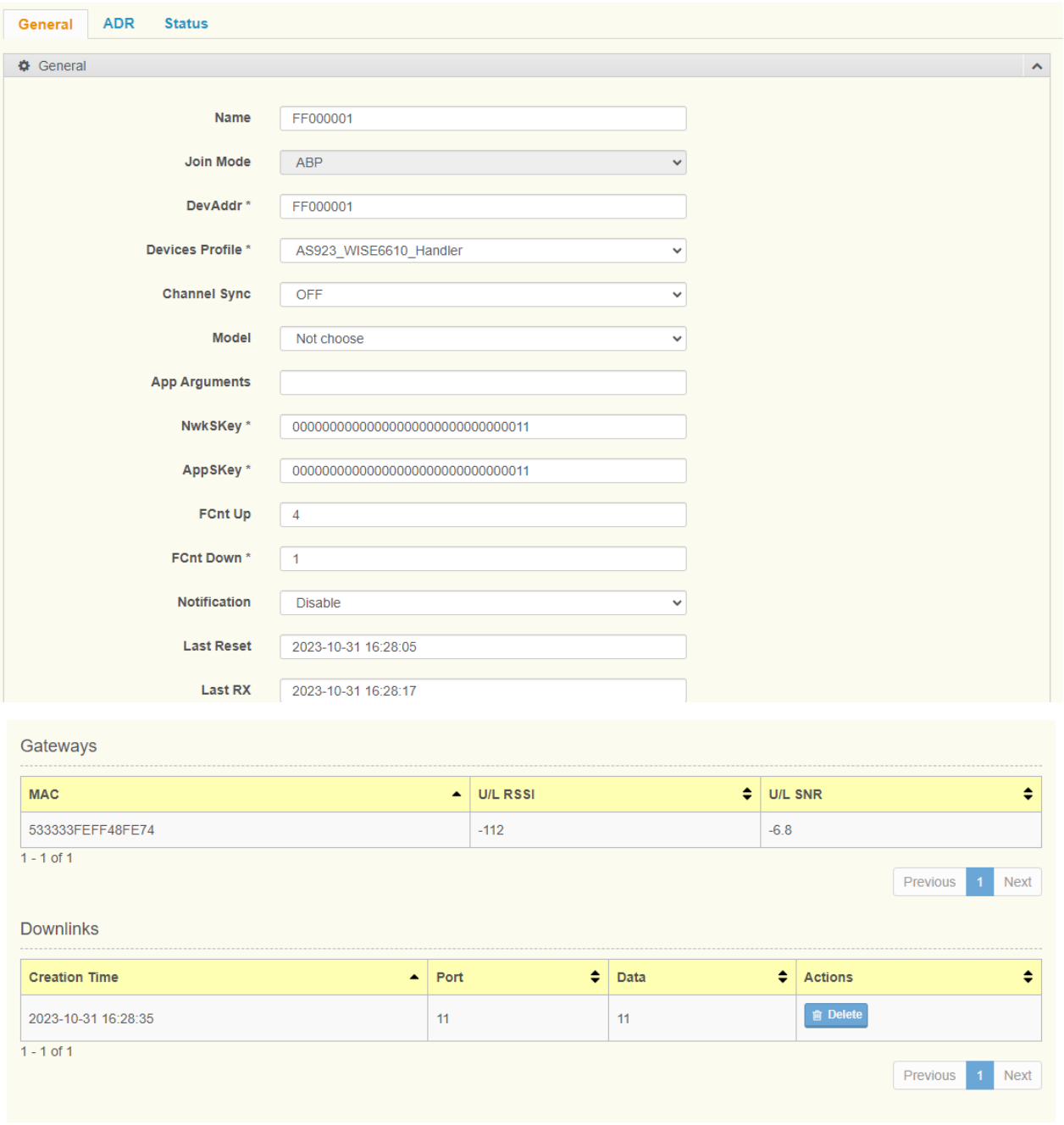


Figure 2.22 Device Status > General

The following table describes the items in the previous figure.

Item	Description
Gateways Table	The packets from which gateways this device came from.
MAC	Gateway MAC address
U/L RSSI	RSSI of last packet received from this gateway.
U/L SNR	SNR of last packet received from this gateway.
Downlinks	Current transmitter frame for this device.
Creation	Time of create transmitter frame.
Port	Port of this transmitter frame.
Data	Data of this transmitter frame.
Delete	Click **Delete** to delete this transmitter frame.

2.5.3.2 ADR

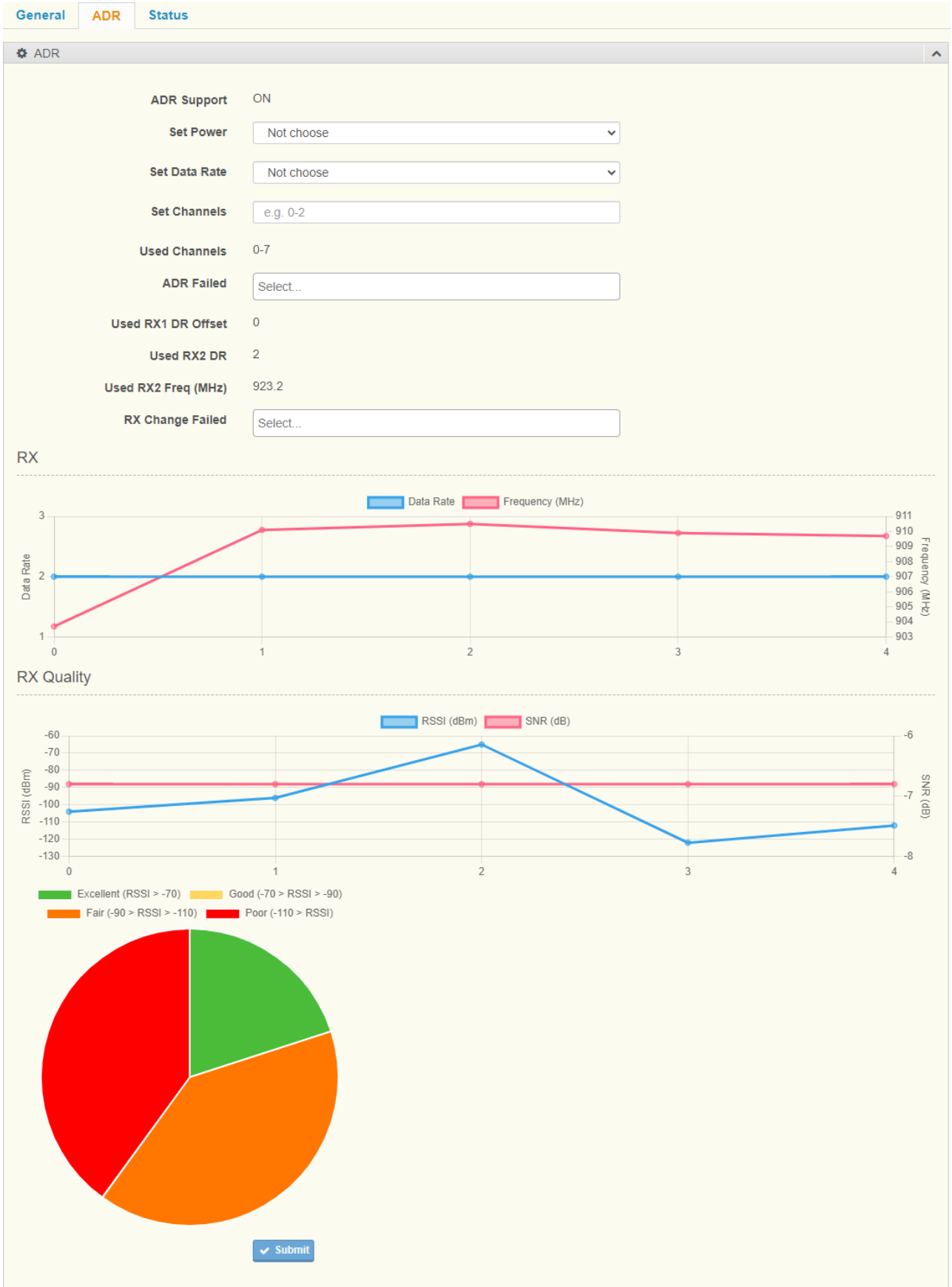


Figure 2.23 Device Status > ADR

The following table describes the items in the previous figure.

Item	Description
ADR Support	Indicate whether this device supports ADR.
Set Power	Defines the power (in dBm) for ADR function.
Set Data Rate	Defines the data rate for ADR function.
Set Channels	Defines the set of channels for ADR function. The channels are given as a comma-separated list of interfaces, e.g. 0-2 for EU, 0-71 for the whole US band, or 0-7,64 for the first US sub-band.
Used Channels	Current channel define.
ADR Failed	If ADR command fails, an error message will be displayed in this field.
Used RX1 DR Offset	Current RX1 DR Offset of this device.
Used RX2 DR	Current RX2 DR of this device.
Used RX2 Freq (MHz)	Current RX2 frequency of this device.
RX Change Failed	If RX Change command fails, an error message will be displayed in this field.
Chart	
RX	Record the device's uplink frame data rate and frequency.
RX Quality	Record the device's uplink frame RSSI and SNR.
Signal pie chart	The ratio of various signals.

2.5.3.3 Status

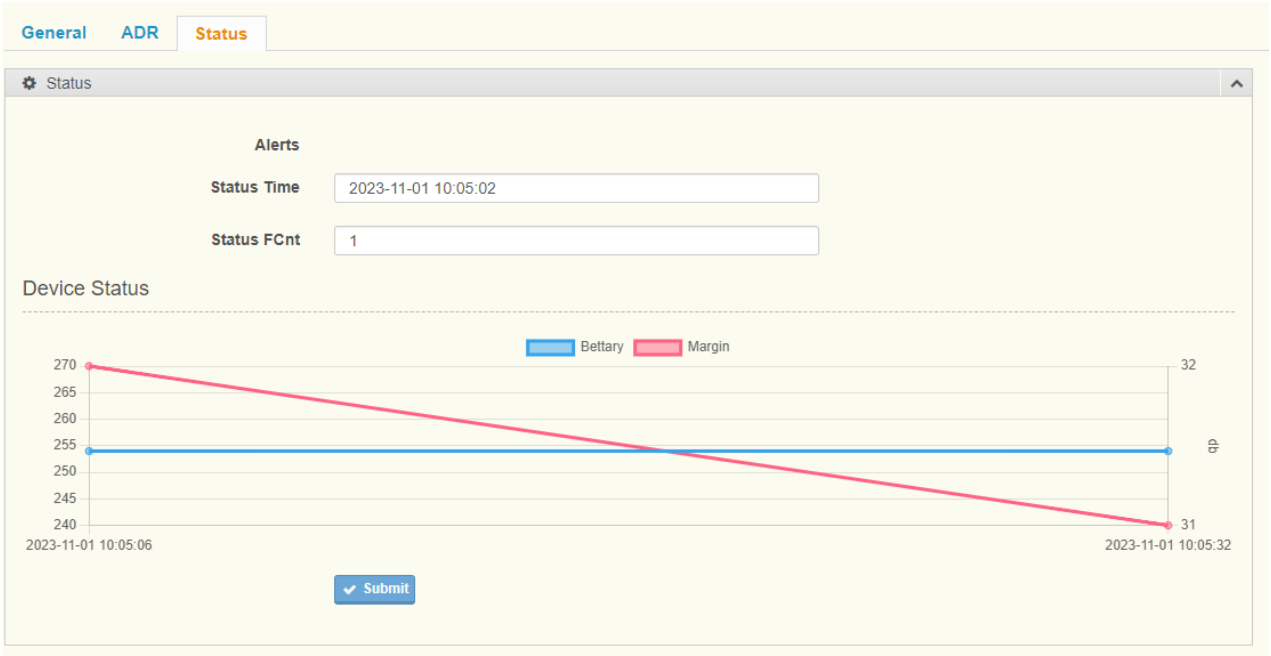


Figure 2.24 Device Status > Status

The following table describes the items in the previous figure.

Item	Description
Alerts	If the device has any alerts, a message will be displayed in this field.
Status Time	Time of the last DevStatusReq command sent from the network server.
Status FCnt	Fcnt of the last DevStatusReq command sent from the network server.
Chart	
Device Status	Record the device's battery and margin which from DevStatusAns.

2.5.4 Ignored

2.5.4.1 Ignored List

To access this page, click **Devices > Ignored.**

Figure 2.25 Devices> Ignored

The following table describes the items in the previous figure.

Item	Description
Devaddr	Devaddr of Ignored.
Mask	Mask of Ignored.
Selected	Delete selected ignored.
Export	Export all ignored to csv file
Create	Open create ignored page

2.5.4.2 Create Ignored List

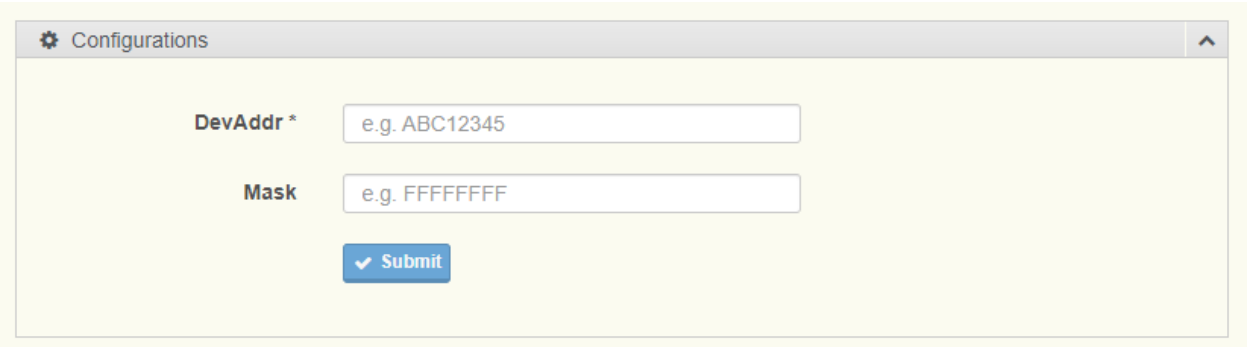


Figure 2.26 Create Ignored

The following table describes the items in the previous figure.

Item	Description

Devaddr	Devaddr of Ignored.
Mask	Mask of Ignored.

2.5.4.3 Ignored Rule

Uplink node devaddr & Mask = Ignored devaddr
Example:
Ignored devaddr is FF00AA00
Ignored Mask is FFFFFF00

If uplink devaddr is FF00AA01
FF00AA01 & FFFFFF00 = FF00AA00 equal ignored devaddr FF00AA00
This uplink frame will ignored by Network Server.

If uplink devaddr is FF00AB01
FF00AB01 & FFFFFF00 = FF00AB00 not equal ignored devaddr FF00AA00
Network Server will accept this uplink frame.

2.5.5 Received Frames

To access this page, click **Devices > Received Frames.**

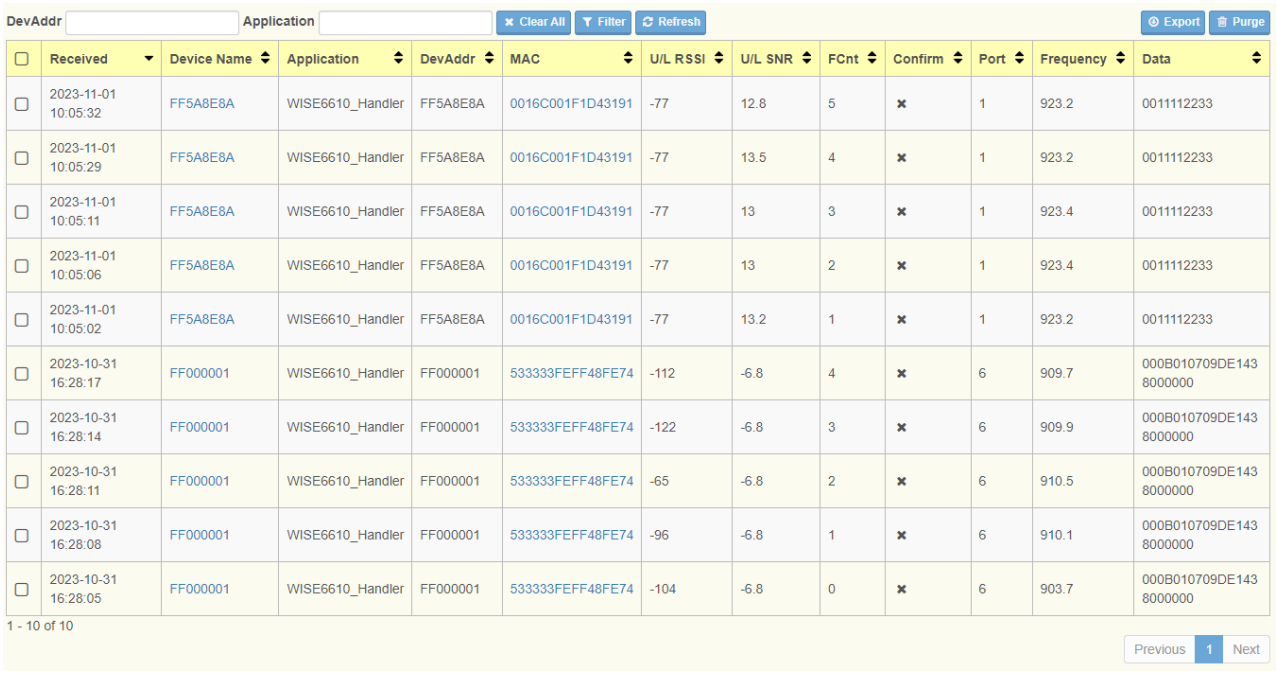


Figure 2.27 Devices> Received Frames

The following table describes the items in the previous figure.

Item	Description
Received	Time of Network Server received this packet.
Device Name	Name of this uplink frame device's name.
Application	Indicate which Handle Profile this Device is using.

Devaddr	Devaddr of this uplink frame device's devaddr.
MAC	Indicate from which gateway this uplink frame received.
U/L RSSI	Signal strength of this uplink frame.
U/L SNR	SNR of this uplink frame.
FCnt	Uplink frame count
Confirm	Indicate this uplink frame is confirmed data or not.
Port	Port of this uplink frame LoRaWAN port.
Frequency	Frequency of this uplink frame.
Data	Data of this uplink frame, it is decrypted.
Selected	Delete selected received frames.
Export	Export all received frames to csv file
Purge	Clean all received frames

2.5.6 Transmission Frames

2.5.6.1 Transmission Frames List

In this list, downlink frames are queued on the Network Server. When the Network Server receives a node's uplink frame, it will send a downlink frame to the node.

To access this page, click **Devices > Transmission Frames.**

Figure 2.28 Devices> Transmission Frames

The following table describes the items in the previous figure.

Item	Description
Device Name	The downlink frame will be sent to which device.
Devaddr	Devaddr of this downlink frame.
Creation Time	Time of the downlink frame was created.
Txdata Port	Port of this downlink frame LoRaWAN port.
Txdata Data	Data of this downlink frame.
Confirmed	Indicate this downlink frame is confirmed data or not.

2.5.6.2 Create Transmission Frame

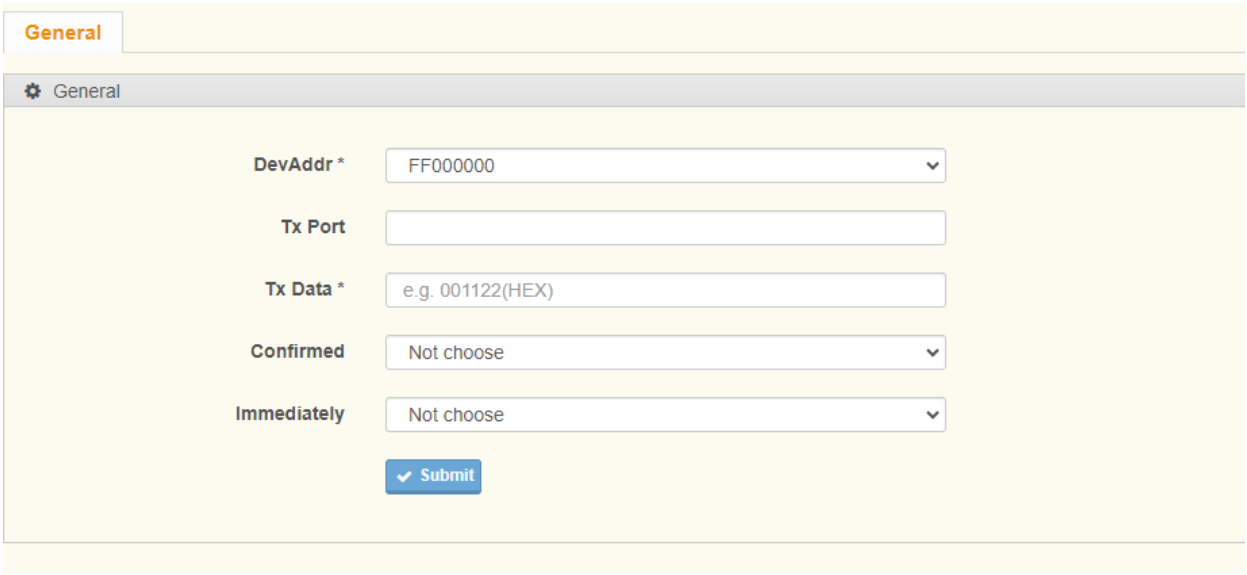


Figure 2.29 Create Transmission Frame.

The following table describes the items in the previous figure.

Item	Description
Devaddr	Devaddr of this downlink frame. It automatically captures all node's devaddr to populate this drop-down menu.
Txdata Port	Port of this downlink frame LoRaWAN port.
Txdata Data	Data of this downlink frame.
Confirmed	Indicate this downlink frame is confirmed data or not.
Immediately	If 'Immediately' is set to true, the Network Server will send this downlink to the node, and this downlink frame will not be listed on the Transmission Frame List. This feature supports LoRaWAN Class C nodes.

2.5.7 FUOTA Task

LoRaWAN FUOTA (Firmware Updates Over The Air) is a technology for remotely updating firmware on LoRaWAN devices using wireless connections. It enables remote management and firmware updates for IoT devices without the need for physical contact or manual intervention. Here are the key features and working principles of LoRaWAN FUOTA:

Key Features:

Remote Firmware Updates: LoRaWAN FUOTA allows remote firmware updates for devices deployed in different geographical locations through the LoRaWAN network. This reduces the cost and complexity of maintaining and updating devices.

Over-The-Air Updates: FUOTA uses the LoRaWAN network's uplink link for firmware transmission, eliminating the need for physical connections or manual intervention. It's an efficient and convenient way to keep devices up to date.

Gradual Updates: Devices can be updated gradually as needed to avoid network congestion and simultaneous updates of a large number of devices.

In summary, LoRaWAN FUOTA is a crucial technology for achieving wireless remote firmware updates, making it highly valuable for managing and maintaining IoT devices. It allows devices to stay up to date over time and be upgraded as needed without physical intervention.

2.5.7.1 FUOTA Task List

To access this page, click **Devices > FUOTA Task.**

Figure 2.30 Devices> FUOTA Task

The following table describes the items in the previous figure.

Item	Description
Name	Name of this FUOTA Task
Profile	Indicate which Device Profile this FUOTA Task is using.
Status	Status of this FUOTA Task
Selected	Delete selected FUOTA Task.
Export	Export all FUOTA Task to csv file
Create	Open create FUOTA Task page

2.5.7.2 Create FUOTA Task

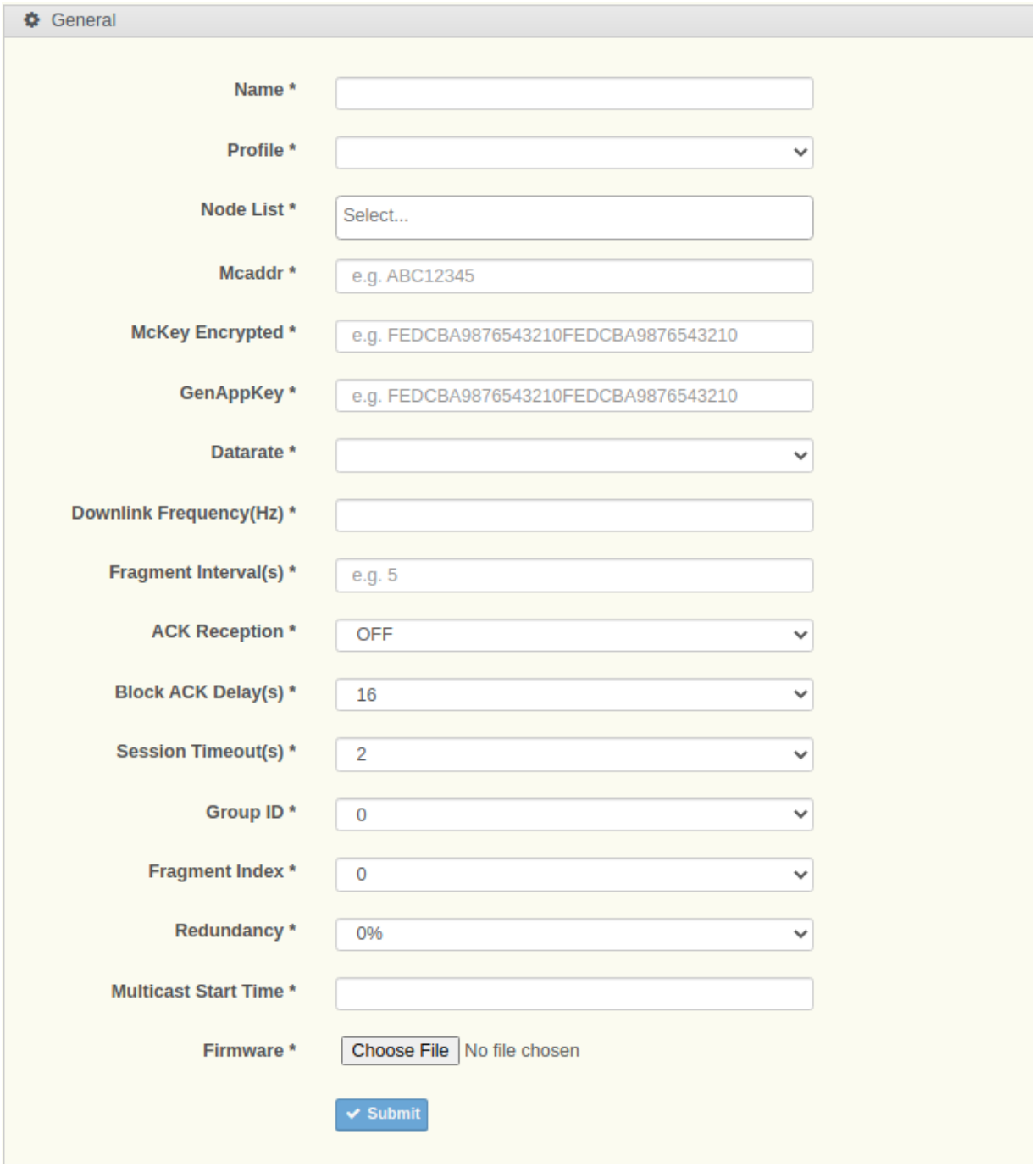


Figure 2.31 Create FUOTA Task

The following table describes the items in the previous figure.

Item	Description
Name	Define name for this FUOTA Task
Profile	Indicate which Device Profile this FUOTA Task is using.
Node List	Add node to FUOTA list , it is support multiple node in same FUOTA Task.
Mcaddr	Network address of the multicast group, common to all end-devices of the group.
McKey Encrypted	Encrypted multicast group key

GenAppKey	Provisioned in the end-device
Datarate	Indicate which Datarate this FUOTA Task is using.
Downlink Frequency(Hz)	Multicast channel.
Fragment Interval	Multicast frame interval
ACK Reception	If AckReception is set to ON, the end-device SHALL transmit the FragDataBlockReceivedReq command once the data block is fully received. If AckReception is set to OFF, the end-device SHALL do nothing and directly proceed to processing the data block.
Block ACK Delay	Random delay that end-devices have to wait between the reception of a downlink command and the transmission of their answer.
Session Timeout	Maximum length in seconds of the multicast session (maximum time the end-device stays in Class C before reverting to Class A to save battery)
Group ID	Multicast group ID of the multicast context. An end-device MAY support being part of several multicast groups.
Fragment Index	[0 to 3] identifies one of the four simultaneously possible fragmentation sessions.
Redundancy	The transmitter of the fragmented binary file can select to add arbitrary redundancy to the transmission content through this FEC. For example, 10% redundancy added by the fragmentation transmitter allows the receiver performing the defragmentation to lose roughly 10% of the incoming frames and still be able to reconstruct the binary file.
Multicast Start Time	Start FUOTA task time.
Firmware	Click **choose file** to upload device firmware for this FUOTA task.

2.5.7.3 FUOTA Task Status - General

For more detailed arguments, please refer to page 36.

2.5.7.3 FUOTA Task Status – Node List

This page will list all device within this FUOTA Task their status

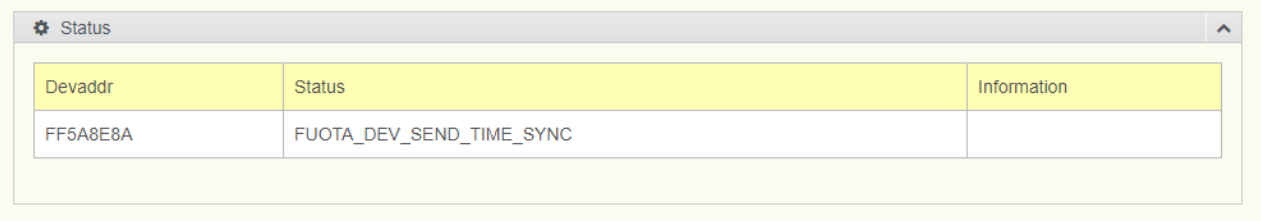


Figure 2.32 FUOTA Task > Node List

The following table describes the items in the previous figure.

Item	Description
Devaddr	Devaddr of node.
Status	Status of this node in the FUOTA Task.
Information	Message of this node in the FUOTA Task.

2.6 Backend

2.6.1 Custom Database

Custom Database allows users to create a customized database where parsable parameters, such as temperature or humidity, can be stored after processing in the 'Parse Uplink' within the Handler. Custom Database supports multiple devices, can store data for up to 4 days, and allows data to be displayed as curves on charts. It also offers the ability to export data to CSV and provides data filtering functions.

2.6.1.1 Custom Database List

To access this page, click **Backends > Custom Database.**

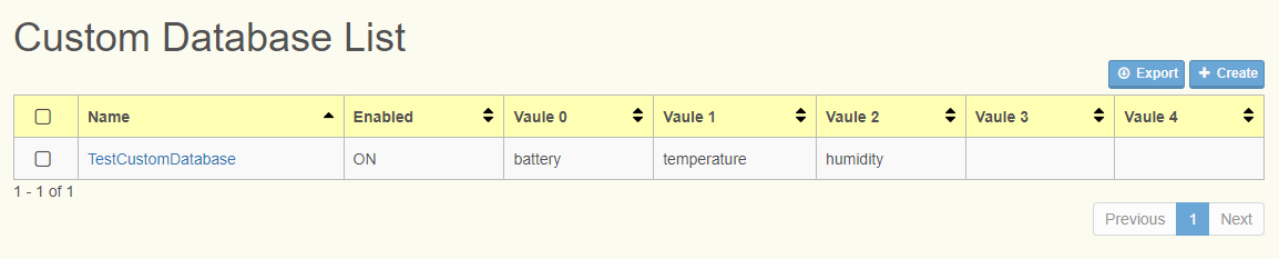


Figure 2.33 Backends > Custom Database

The following table describes the items in the previous figure.

Item	Description
Name	Name of this custom database.
Enabled	ON or OFF of this custom database rule.
Value [0-4]	Value name [0-4] of this custom database rule.
Selected	Delete selected custom database.
Export	Export all custom database to csv file
Create	Open create custom database page

2.6.1.2 Create FUOTA Task

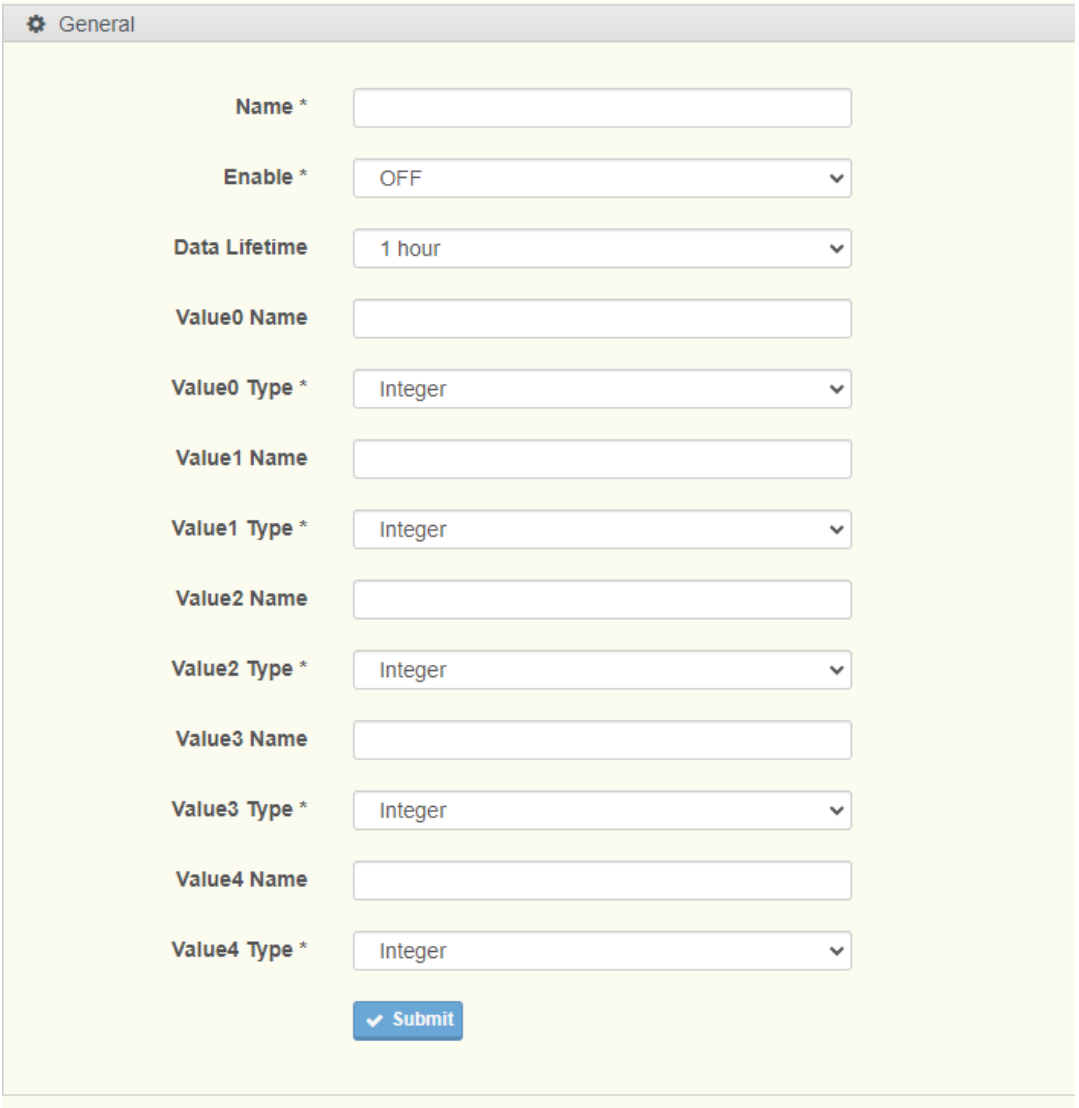


Figure 2.34 Create Custom Database

The following table describes the items in the previous figure.

Item	Description
Name	Define name for this custom database.
Enable	Click the drop-down menu to set ON or OFF for this custom database.
Data Lifetime	Click the drop-down menu to set Data Lifetime for this custom database.
Value[0-4] Name	Define value [0-4] name for this custom database. **This name must match the output of the handler's 'Parse Uplink'.**
Value[0-4] Type	Define value [0-4] data type for this custom database. Integer , Unsigned Integer or Floating Point.

2.6.2 Handlers

2.6.2.1 Handlers List

To access this page, click **Backends > Handler.**

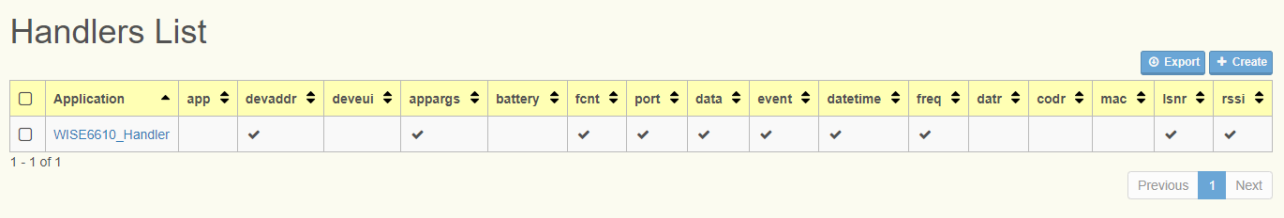


Figure 2.35 Backends > Handler

The following table describes the items in the previous figure.

Item	Description
Application	Name of this Handler.
app	Indicate whether 'app' is contained in the Handler output.
devaddr	Indicate whether 'devaddr' is contained in the Handler output.
deveui	Indicate whether 'deveui' is contained in the Handler output.
appargs	Indicate whether 'appargs' is contained in the Handler output.
battery	Indicate whether 'battery' is contained in the Handler output.
fcnt	Indicate whether 'fcnt' is contained in the Handler output.
port	Indicate whether 'port' is contained in the Handler output.
data	Indicate whether 'data' is contained in the Handler output.
event	Indicate whether event topic published by Network Server.
datetime	Indicate whether 'datetime' is contained in the Handler output.
freq	Indicate whether 'freq' is contained in the Handler output.
datr	Indicate whether 'datr(datarate)' is contained in the Handler output.
codr	Indicate whether 'codr' is contained in the Handler output.
mac	Indicate whether 'mac' is contained in the Handler output.
lsnr	Indicate whether 'lsnr' is contained in the Handler output.
rssi	Indicate whether 'rssi' is contained in the Handler output.
Selected	Delete selected handlers.
Export	Export all handlers to csv file
Create	Open create handler page

2.6.2.2 Create Handlers

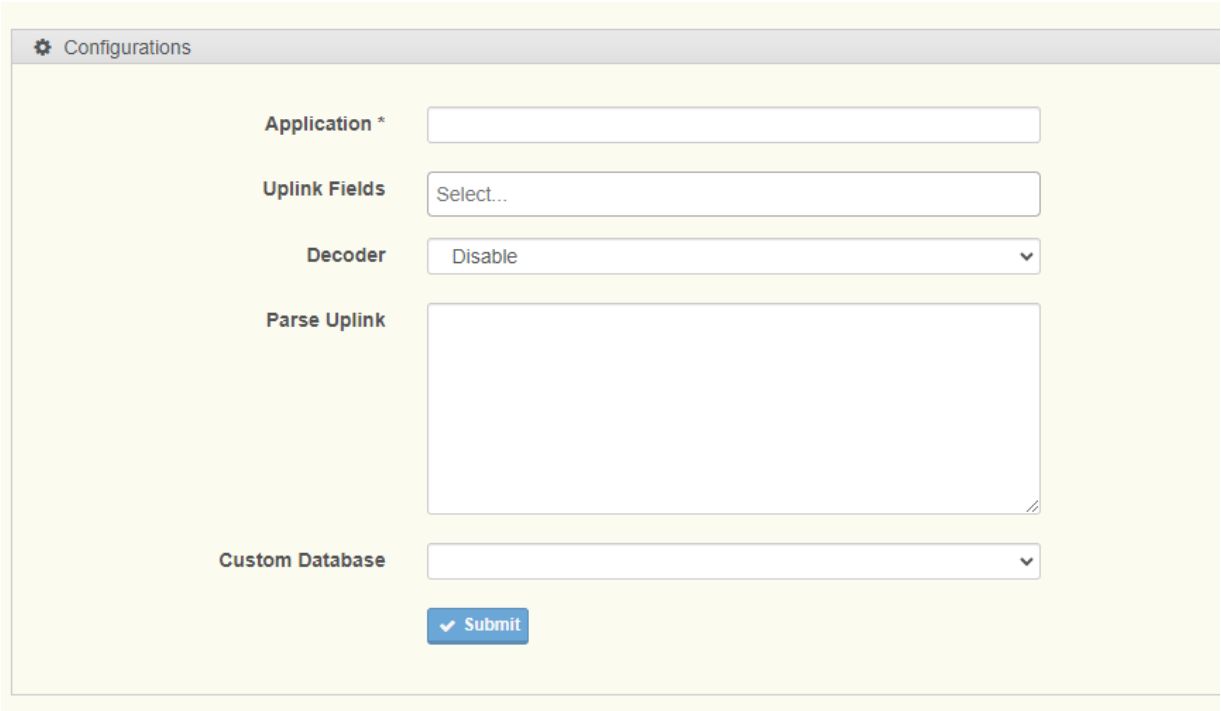


Figure 2.36 Create Handler

The following table describes the items in the previous figure.

Item	Description
Application	Define name for this Handler.
Uplink Fields	Add fields to Handler output.
Decoder	Click the drop-down menu to set code type for Pares Uplink. Disable, Python, Javascript or Advantech Payload Engine.
Pares Uplink	Parsing code, support Python, Javascript and Advantech Payload Engine.
Custom Database	Indicate which custom database this Handler is using; it can also be empty.

2.6.2.3 Handlers Status

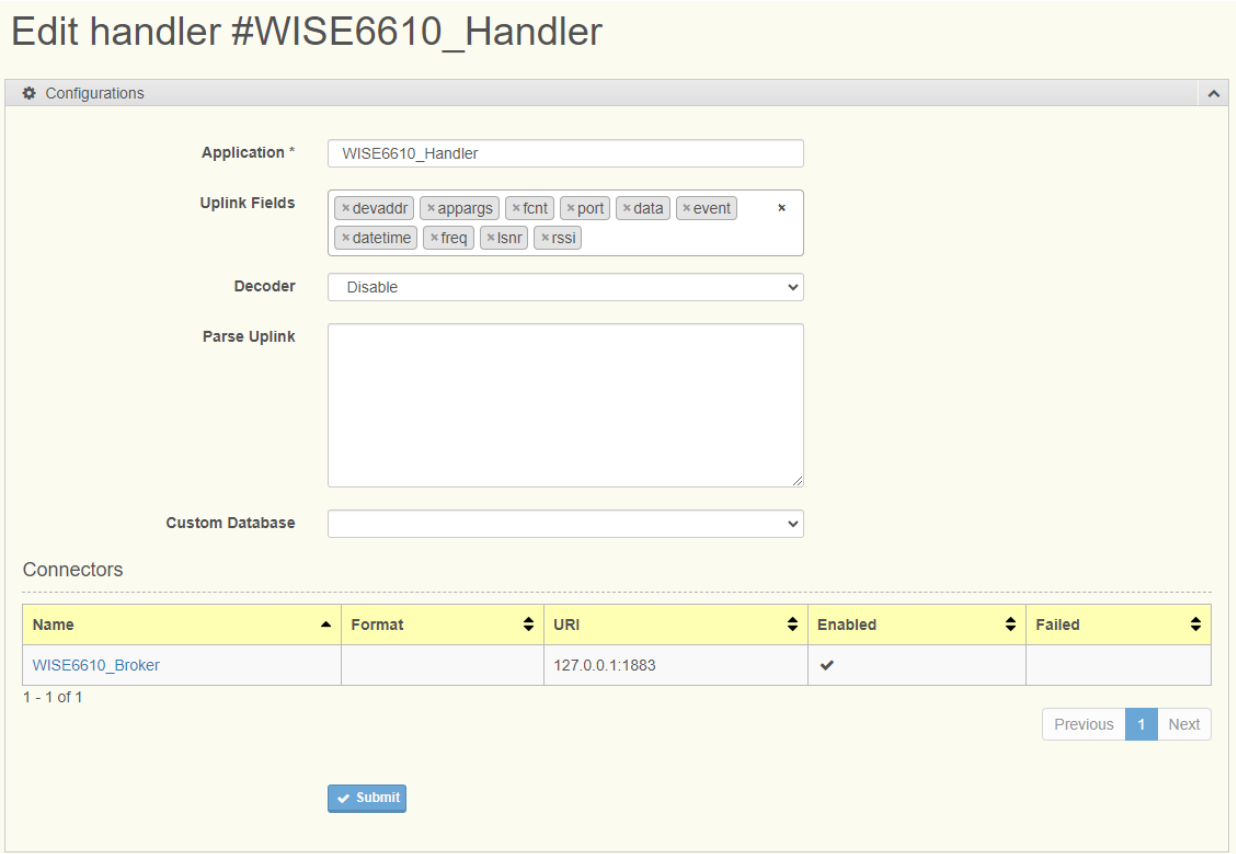


Figure 2.37 Handler Status

The following table describes the items in the previous figure.

For more detailed arguments, please refer to page 41.

Item	Description
Table	
Connector	List which connector is using this Handler.

2.6.2.4 Handlers Output

By default, the example of Handler output is as follows:

Topic: uplink/FF000001

Payload:


```
{
    "data": "000B010709DE1438000000",
    "datetime": "2023-11-01T09:12:20Z",
    "devaddr": "FF000001",
    "fcnt": 0,
    "port": 6,
    "lsnr": -6.8,
```

```
        "freq": 909.7,
        "rssi": -33
}
```


2.6.3 Connector

2.6.3.1 Connector List

To access this page, click **Backends > Connector.**

Figure 2.38 Backends > Connector

The following table describes the items in the previous figure.

Item	Description
Name	Name of this Connector.
Application	Indicate which Handler this Connector is using.
URL	URL or IP address and port of this Connector.
Publish Uplinks	Topic format for MQTT publish.
Received Topic	Topic format for MQTT subscribe.
Enabled	Status of this Connector.
Failed	If MQTT connection fails, an error message will be displayed in this field.
Selected	Delete selected Connector.
Export	Export all Connector to csv file
Create	Open create Connector page

2.6.3.2 Create Connector - General

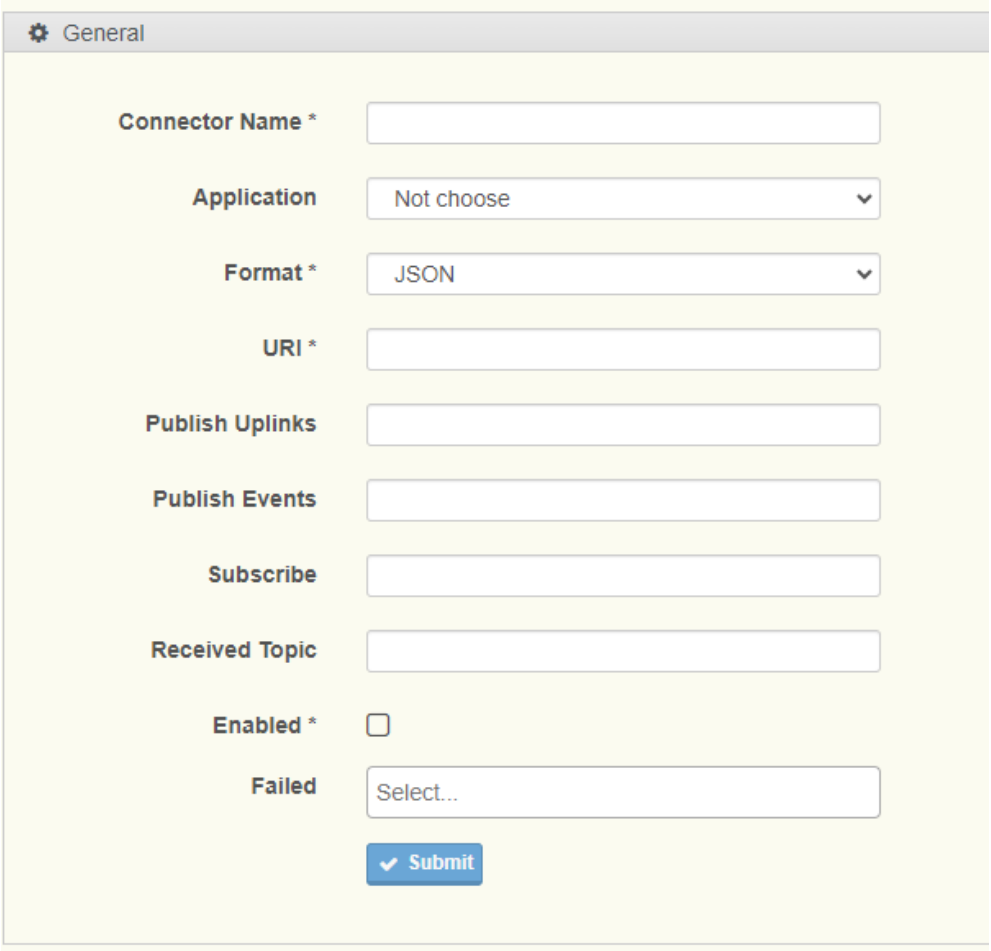


Figure 2.39 Create Connector > General

The following table describes the items in the previous figure.

Item	Description
Connector Name	Name of this Connector.
Application	Indicate which Handler this Connector is using.
Format	Only support JSON now.
URL	MQTT broker URL and port.
Publish Uplinks	Topic format for MQTT publish. {devaddr} represent node's devaddr
Publish Events	Events Topic format for MQTT publish.
Received Topic	Topic format for MQTT subscribe. {devaddr} represent node's devaddr
Subscribe	Subscribe Topic format for this Connector
Enabled	Enabled this Connector
Failed	If MQTT connection fails, an error message will be displayed in this field.

2.6.3.3 Create Connector - Authentication

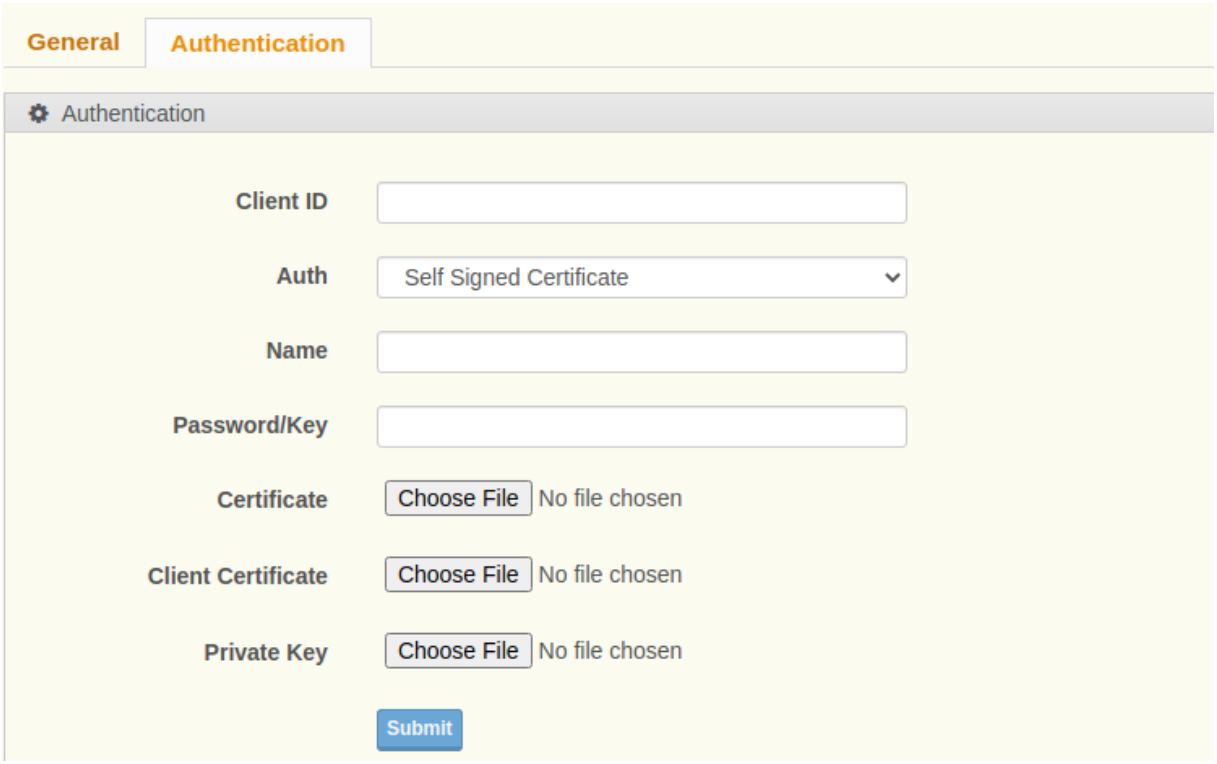


Figure 2.40 Create Connector > Authentication

The following table describes the items in the previous figure.

Item	Description
Client ID	Enter the ID for Connector, if necessary.
Auth	Click the drop-down menu to set authentication type for Connector.
Name	Enter the username for Connector, if necessary.
Password/Key	Enter the username for Connector, if necessary.
Certificate	Click Choose File to upload certificate file.
Client Certificate	Click Choose File to upload client certificate file.
Private Key	Click Choose File to upload private key file.

2.6.4 Handler Decoder

The Handler Decoder currently supports JavaScript, Python, and the Advantech Payload Engine. Below, we will provide a brief description of how to use them, along with examples.

2.6.4.1 JavaScript

Users can set the Decoder to JavaScript and paste JavaScript code into 'Parse Uplink.' It supports JavaScript ES2020.

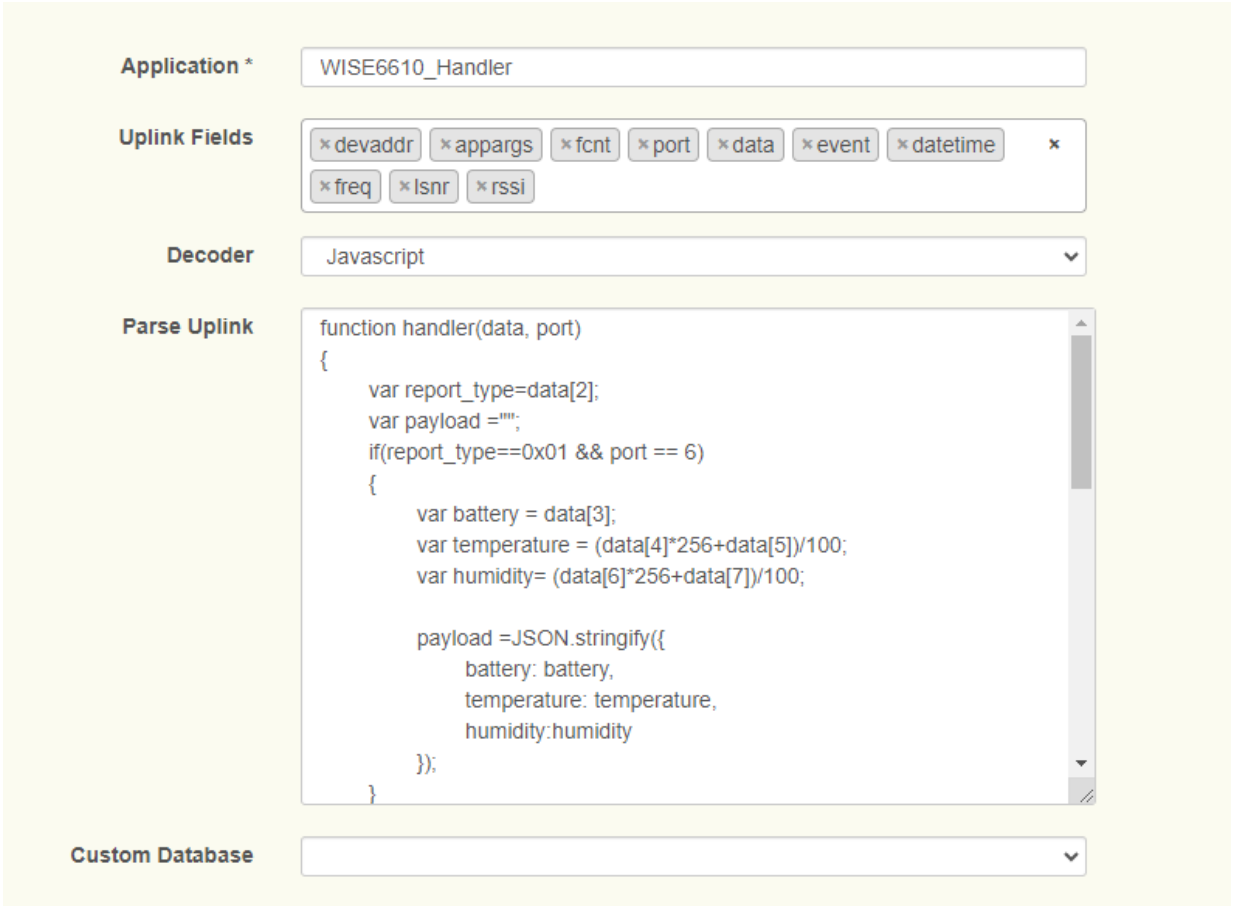


Figure 2.41 Handler using JavaScript

If there is a LoRaWAN device with the following format:

Version	DeviceType	Report Type	Battery	Temperature	Humidity	Reserved
1Byte	0x0B	0x01	(1Byte, unit:0.1V)	(Signed2Bytes,unit:0.01°C)	(2Bytes,unit:0.01%)	(3Bytes)

JavaScript Example as below:

The user only modified the handler function, and return JSON format string.

In the Handler function, the network server will input two arguments: 'data' and 'port'.

The data is in the form of a hexadecimal array, and the port represents the LoRaWAN application port. Users can use the port to differentiate between different types of uplinks for some devices.

```
//=============Custom Function====================
function handler(data, port)
{
	var report_type=data[2];
	var payload ="";
	if(report_type==0x01 && port == 6)
	{
		var battery = data[3];
		var temperature = (data[4]*256+data[5])/100;
		var humidity= (data[6]*256+data[7])/100;
```

```
                payload =JSON.stringify({
                        battery: battery,
                        temperature: temperature,
                        humidity:humidity
                });
        }
        return payload;
}

//=========================================================

var data;
var port;
var result = [];

if(typeof scriptArgs[1] != 'undefined')
{
        data = scriptArgs[1].toString();
        while (data.length >= 2) {
                result.push(parseInt(data.substring(0, 2), 16));
                data = data.substring(2, data.length);
        }
}

if(typeof scriptArgs[1] != 'undefined')
{
        port = parseInt(scriptArgs[2]);
}

console.log(handler(result, port));
//=====================================
```

If device uplink data is **000B010709DE1438000000**

We can result from Handler output on MQTT Broker


```
{
    "data": "000B010709DE1438000000",
    "datetime": "2023-11-02T01:17:44Z",
    "devaddr": "FF000001",
    "fcnt": 0,
```

```
    "port": 6,
    "lsnr": -6.8,
    "freq": 907.5,
    "rssi": -91,
    "payload": {
        "battery": 7,
        "temperature": 25.26,
        "humidity": 51.76
    }
}
```


2.6.4.1 Python

Users can set the Decoder to Python and paste Python code into 'Parse Uplink'. It is support full Python3 function, but the performance is lower than JavaScript.

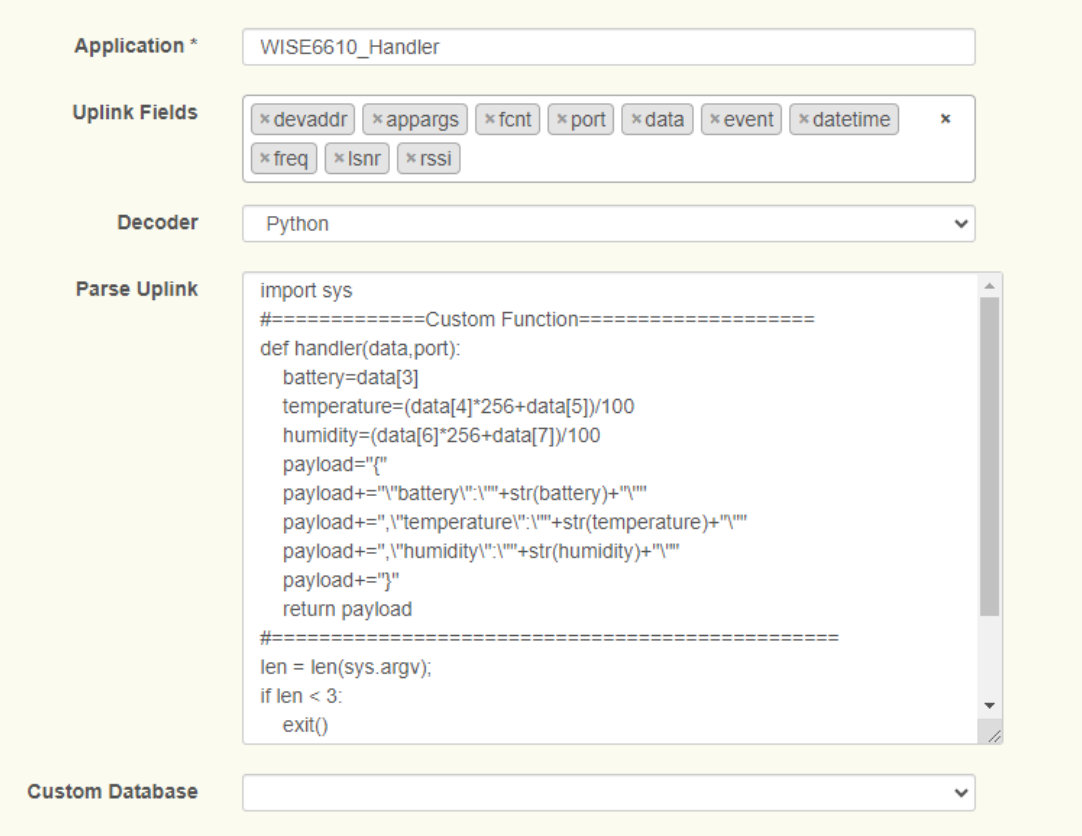


Figure 2.42 Handler using Python

If there is a LoRaWAN device with the following format:

Version	DeviceType	Report Type	Battery	Temperature	Humidity	Reserved
1Byte	0x0B	0x01	(1Byte, unit:0.1V)	(Signed2Bytes,unit:0.01°C)	(2Bytes,unit:0.01%)	(3Bytes)

Python Example as below:

The user only modified the handler function, and return JSON format string.

In the Handler function, the network server will input two arguments: 'data' and 'port'.

The data is in the form of a hexadecimal array, and the port represents the LoRaWAN application port. Users can use the port to differentiate between different types of uplinks for some devices.

```
import sys
#=============Custom Function====================
def handler(data,port):
    battery=data[3]
    temperature=(data[4]*256+data[5])/100
    humidity=(data[6]*256+data[7])/100
    payload="{"
    payload+="\"battery\":\""+str(battery)+"\""
    payload+=",\"temperature\":\""+str(temperature)+"\""
    payload+=",\"humidity\":\""+str(humidity)+"\""
    payload+="}"
    return payload
#================================================
len = len(sys.argv);
if len < 3:
    exit()
data=sys.argv[1]
port=sys.argv[2]
array=bytearray.fromhex(data)
print(handler(array,port))
```

If device uplink data is **000B010709DE1438000000**

We can result from Handler output on MQTT Broker

```
{
    "data": "000B010709DE1438000000",
    "datetime": "2023-11-02T01:17:44Z",
    "devaddr": "FF000001",
    "fcnt": 0,
    "port": 6,
    "lsnr": -6.8,
    "freq": 907.5,
    "rssi": -91,
    "payload": {
        "battery": 7,
```

```
        "temperature": 25.26,
        "humidity": 51.76
    }
}
```

2.6.4.1 Advantech Payload Engine

The Advantech Payload Engine, developed by Advantech, uses JSON format to describe and parse LoRaWAN device payloads.
The performance is greater than JavaScript and Python.

Format Content

Basic

name	**type**	**require**	
commheader	Boolean	No	If payload has common header.
loop	Boolean	No	If payload is multiple payload.
packet	packet[array]	Yes	

Packet

name	type	require	
fport	Number(1-255)	Yes	Must equal with uplink fport.
conditional	conditional	No	Conditional operator.
value	value[array]	Yes	

Conditional

name	type	require	
offset	Number(1-255)	Yes	Offset of payload.
value	Number(1-255)	Yes	Conditional operator.
and	Number(1-255)	No	Extra condition.
or	Number(1-255)	No	Extra condition.

Value

name	**type**	**require**	

name	string	Yes	
format	string	Yes	Format of this value.
name	string	Yes	Output name of this value on MQTT.
length	Number(1-255)	No	If format is string or ignore , this option can define length.
endian	String (big/little)	No	Default is big endian
arithmetic	Arithmetic[array]	No	If value need calculation , add this option.
bit	bit[array]	No	Getting bit value in this data.

Format Table

name	Size(byte)	
uint8	1	
uint16	2	
uint32	4	
uint64	8	
int8	1	
int16	2	
int32	4	
int64	8	
double32	4	
double64	8	
str	1-n	Default length is 1 , if no length option in this value.
boolean	1	
ignore	1-n	Default length is 1 , if no length option in this value.

Arithmetic

name	type	require	
action	string	Yes	See action table
value	Number/float	Yes	

Action Table

Name	
additon	Addition with value
substraction	substraction with value

multiply	multiply with value
division	division with value

bit

name	type	require	
name	string	Yes	
offset	Number(0-7)	Yes	Offset of this value byte.

Example

Basic Example

```
{
    "packet": [
        {
            "fport": 1,
            "value": [
                {
                    "format": "uint16",
                    "name": "temperature"
                },
                {
                    "format": "uint16",
                    "name": "humidity"
                },
                {
                    "format": "uint8",
                    "name": "pm2.5"
                }
            ]
        },
        {
            "fport": 2,
            "value": [
                {
                    "format": "int32",
                    "name": "Voltage"
                },
```

```
            {
                "format": "str",
                "name": "status",
                "length": 4
            }
        ]
    }
  ]
}
```

If a LoRaWAN device has two types of uplink frames from different ports, 1 and 2.

Port 1:

Payload: 09C419910A

This data using first value format to parsing .

1st format is uint16 : 0x09C4 -> 2500

2nd format is uint16: 0x1991 ->6545

3rd format is uint8 :0x0A -> 10

Handler Output:

```
{
    "data": "09C419910A",
    "datetime": "2023-11-02T03:24:24Z",
    "devaddr": "FF5A8E8A",
    "fcnt": 12,
    "port": 1,
    "lsnr": 13,
    "freq": 923.4,
    "rssi": -82,
    "payload": {
        "temperature": 2500,
        "humidity": 6545,
        "pm2.5": 10
    }
}
```

Port 2:

Paylod: FFFFFFF5474F4F44

This data using 2ND value format to parsing .

1st format is int32 : 0xFFFFFFF5 -> -11

2nd format is str and length is 4: 0x474F4F44 -> “Good”

Handler Output:


```
{
    "data": "FFFFFFF5474F4F44",
    "datetime": "2023-11-02T03:29:35Z",
    "devaddr": "FF5A8E8A",
    "fcnt": 13,
    "port": 2,
    "lsnr": 12.2,
    "freq": 923.2,
    "rssi": -84,
    "payload": {
        "Voltage": -11,
        "status": "GOOD"
    }
}
```


Example with conditional option

If the payload contains multiple data types, and all data uses the same FPORT, in this case, we can add conditional options in the payload engine.


```
{
    "packet": [
        {
            "fport": 1,
            "conditional": {
                "offset": 0,
                "value": 1
            },
            "value": [
                {
                    "format": "uint8",
                    "name": "type"
                },
                {
                    "format": "uint16",
                    "name": "temperature"
                },
                {
                    "format": "uint16",
```

```
                "name": "humidity"
            },
            {
                "format": "uint8",
                "name": "pm2.5"
            }
        ]
    },
    {
        "fport": 1,
        "conditional": {
            "offset": 0,
            "value": 2
        },
        "value": [
            {
                "format": "uint8",
                "name": "type"
            },
            {
                "format": "int32",
                "name": "Voltage"
            },
            {
                "format": "str",
                "name": "status",
                "length": 4
            }
        ]
    }
  ]
}
```

Case 1:

LoRaWAN Payload :

Fport :1

Paylod: 0109C4199910A

Handler Output:

```
{
```

```
    "data": "0109C419910A",
    "datetime": "2023-11-02T05:11:31Z",
    "devaddr": "FF5A8E8A",
    "fcnt": 14,
    "port": 1,
    "lsnr": 12.5,
    "freq": 923.4,
    "rssi": -81,
    "payload": {
        "type": 1,
        "temperature": 2500,
        "humidity": 6545,
        "pm2.5": 10
    }
}
```


Case 2:

LoRaWAN Payload :
Fport :1
Paylod: 02FFFFFF5474F4F44

Handler Output:


```
{
    "data": "02FFFFFF5474F4F44",
    "datetime": "2023-11-02T05:15:08Z",
    "devaddr": "FF5A8E8A",
    "fcnt": 15,
    "port": 1,
    "lsnr": 13.2,
    "freq": 923.4,
    "rssi": -82,
    "payload": {
        "type": 2,
        "Voltage": -11,
        "status": "GOOD"
    }
}
```

Example with bit option

If a value represents a bit within a byte, in this case, we can add a bit option in the payload engine.

```
{
    "packet": [
        {
            "fport": 1,
            "value": [
                {
                    "format": "uint8",
                    "name": "bit",
                    "bit": [
                        {
                            "name": "TempLowAlarm",
                            "offset": 1
                        },
                        {
                            "name": "TempHighAlarm",
                            "offset": 0
                        }
                    ]
                },
                {
                    "format": "uint16",
                    "name": "temperature"
                },
                {
                    "format": "uint16",
                    "name": "humidity"
                },
                {
                    "format": "uint8",
                    "name": "pm2.5"
                }
            ]
        }
    ]
}
```

LoRaWAN Payload :

Fport :1

Paylod: 0109C419910A

Handler Output:


```
{
    "data": "0109C419910A",
    "datetime": "2023-11-02T05:21:08Z",
    "devaddr": "FF5A8E8A",
    "fcnt": 16,
    "port": 1,
    "lsnr": 13,
    "freq": 923.2,
    "rssi": -83,
    "payload": {
        "TempLowAlarm": 0,
        "TempHighAlarm": 1,
        "temperature": 2500,
        "humidity": 6545,
        "pm2.5": 10
    }
}
```


Example with arithmetic

If a value needs to be converted to a real value, we can perform arithmetic in the payload engine.

```
{
    "packet": [
        {
            "fport": 1,
            "value": [
                {
                    "format": "uint8",
                    "name": "bit",
                    "bit": [
                        {
                            "name": "TempLowAlarm",
                            "offset": 1
                        },
                        {
```

```
                    "name": "TempHighAlarm",
                    "offset": 0
                }
            ]
        },
        {
            "format": "uint16",
            "name": "temperature",
            "arithmetic": [
                {
                    "action": "multiply",
                    "value": 0.01
                }
            ]
        },
        {
            "format": "uint16",
            "name": "humidity",
            "arithmetic": [
                {
                    "action": "division",
                    "value": 100
                }
            ]
        },
        {
            "format": "uint8",
            "name": "pm2.5",
            "arithmetic": [
                {
                    "action": "additon",
                    "value": 100
                },
                {
                    "action": "substraction",
                    "value": 50
                }
            ]
        }
    ]
}
```

```
    ]
}
```

LoRaWAN Payload :
Fport :1
Paylod: 0109C419910A

Handler Output:


```
{
    "data": "0109C419910A",
    "datetime": "2023-11-02T05:29:53Z",
    "devaddr": "FF5A8E8A",
    "fcnt": 17,
    "port": 1,
    "lsnr": 13.2,
    "freq": 923.2,
    "rssi": -82,
    "payload": {
        "TempLowAlarm": 0,
        "TempHighAlarm": 1,
        "temperature": 25,
        "humidity": 65.45,
        "pm2.5": 60
    }
}
```


2.6.4 Example with Custom Database

If there is a LoRaWAN device with the following format, and we are using JavaScript for decoding, as shown on page 45.

Version	DeviceType	Report Type	Battery	Temperature	Humidity	Reserved
1Byte	0x0B	0x01	(1Byte, unit:0.1V)	(Signed2Bytes,unit:0.01°C)	(2Bytes,unit:0.01%)	(3Bytes)

In Step 1, we need to create a custom database for this type of LoRaWAN device.
These names must correspond to the output of the handler's 'Parse Uplink,' and this is important.

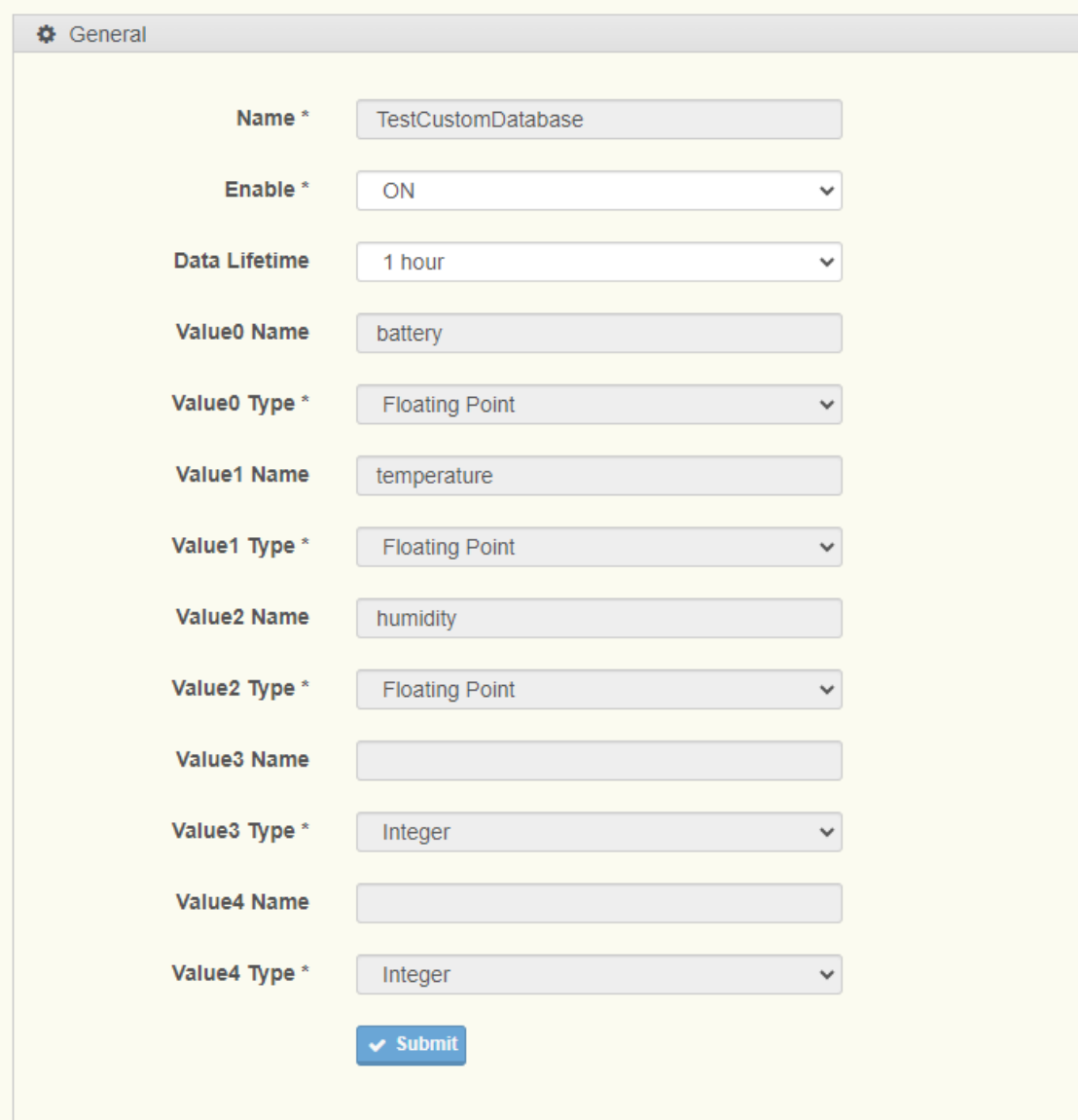


Figure 2.43 Create Custom Database

In Step 2, we paste JavaScript code into the Handler's 'Parse Uplink' and set this custom database for this Handler.

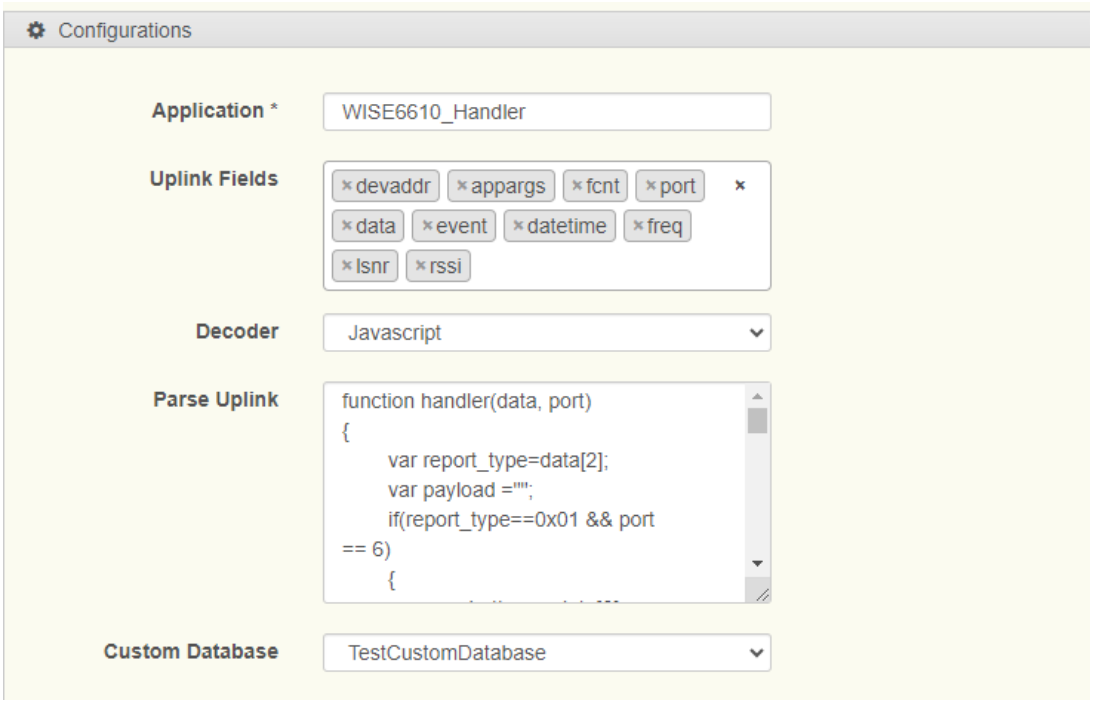
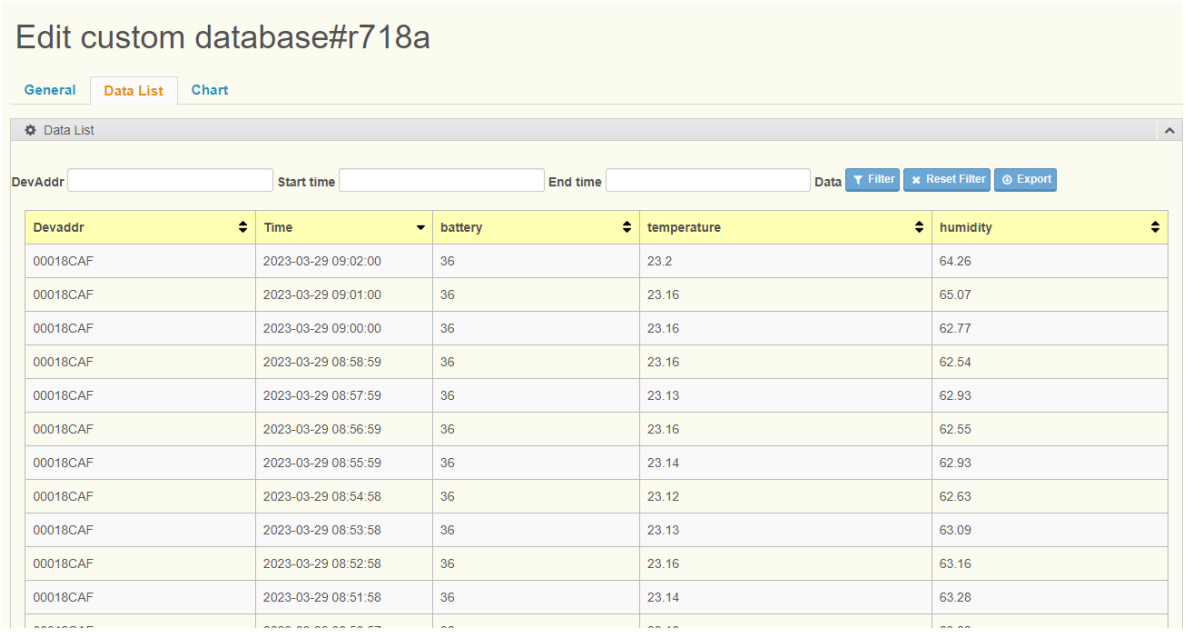


Figure 2.44 Set Custom Database to Handler

In Step 3, enable the LoRaWAN device and wait for the uplink. After a few minutes, you can check the device data on the Data List page



Devaddr	Time	battery	temperature	humidity
00018CAF	2023-03-29 09:02:00	36	23.2	64.26
00018CAF	2023-03-29 09:01:00	36	23.16	65.07
00018CAF	2023-03-29 09:00:00	36	23.16	62.77
00018CAF	2023-03-29 08:58:59	36	23.16	62.54
00018CAF	2023-03-29 08:57:59	36	23.13	62.93
00018CAF	2023-03-29 08:56:59	36	23.16	62.55
00018CAF	2023-03-29 08:55:59	36	23.14	62.93
00018CAF	2023-03-29 08:54:58	36	23.12	62.63
00018CAF	2023-03-29 08:53:58	36	23.13	63.09
00018CAF	2023-03-29 08:52:58	36	23.16	63.16
00018CAF	2023-03-29 08:51:58	36	23.14	63.28

Figure 2.45 Set Custom Database Data List

Users can also use the 'Export' button to download a CSV file.

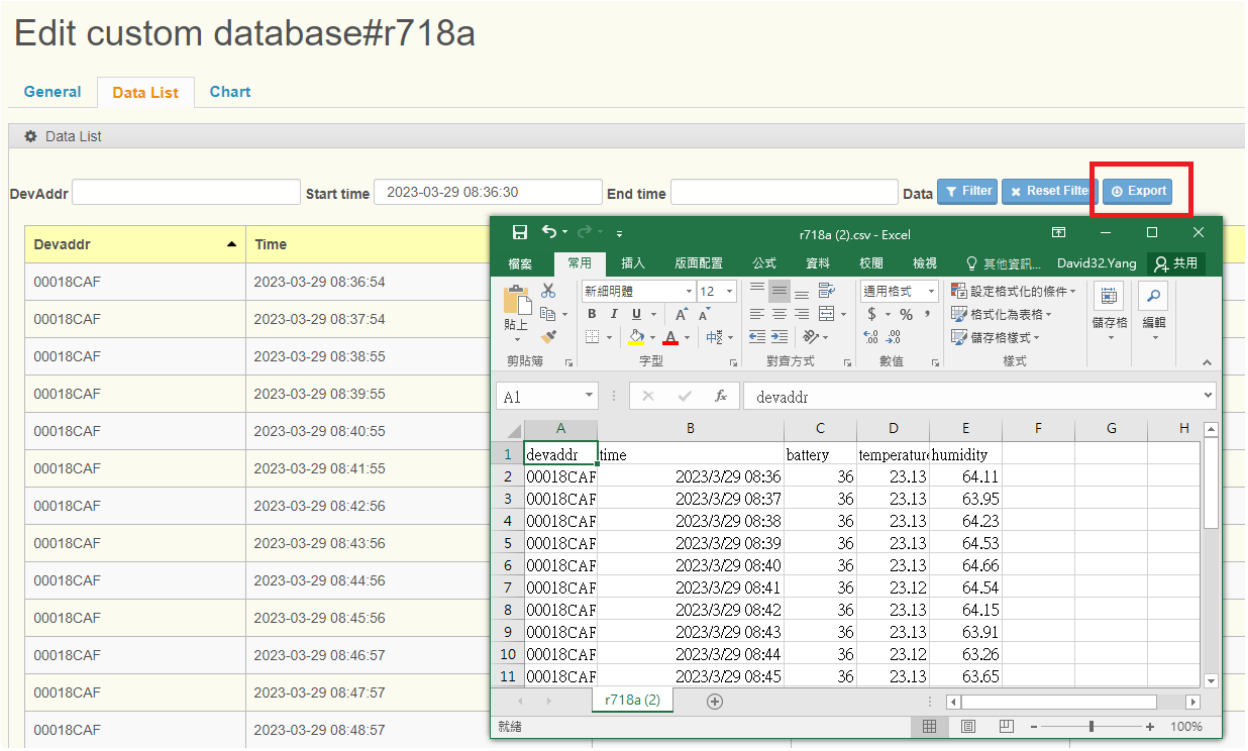


Figure 2.46 Export CSV file.

On the chart page, users can draw curves on the chart using either the full dataset or a subset of the data.

Figure 2.47 Custom Database Chart 1.

Figure 2.48 Custom Database Chart 2.

2.7 Application Server

The Application Server is used to manage Advantech WISE serial Nodes and B+B serial Nodes, In Application Server, users can manage all Advantech devices , get devices current data, and create downlink commands ,and it also supports using Modbus to request node data.

2.7.1 Advantech Nodes Status

2.7.1.1 Advantech Nodes Status List

To access this page, click **Application Server > Advantech Nodes Status.**

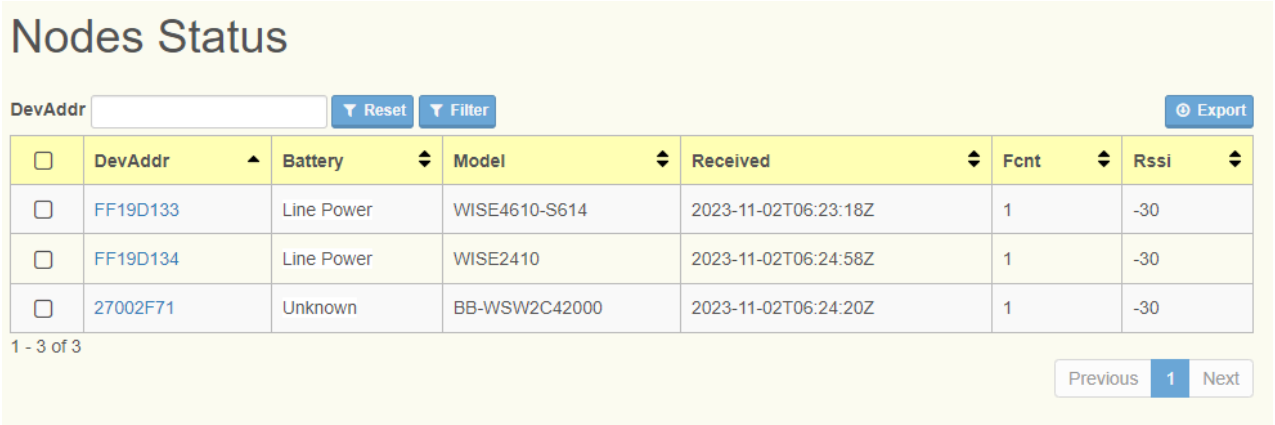


Figure 2.46 Application Server > Advantech Nodes Status

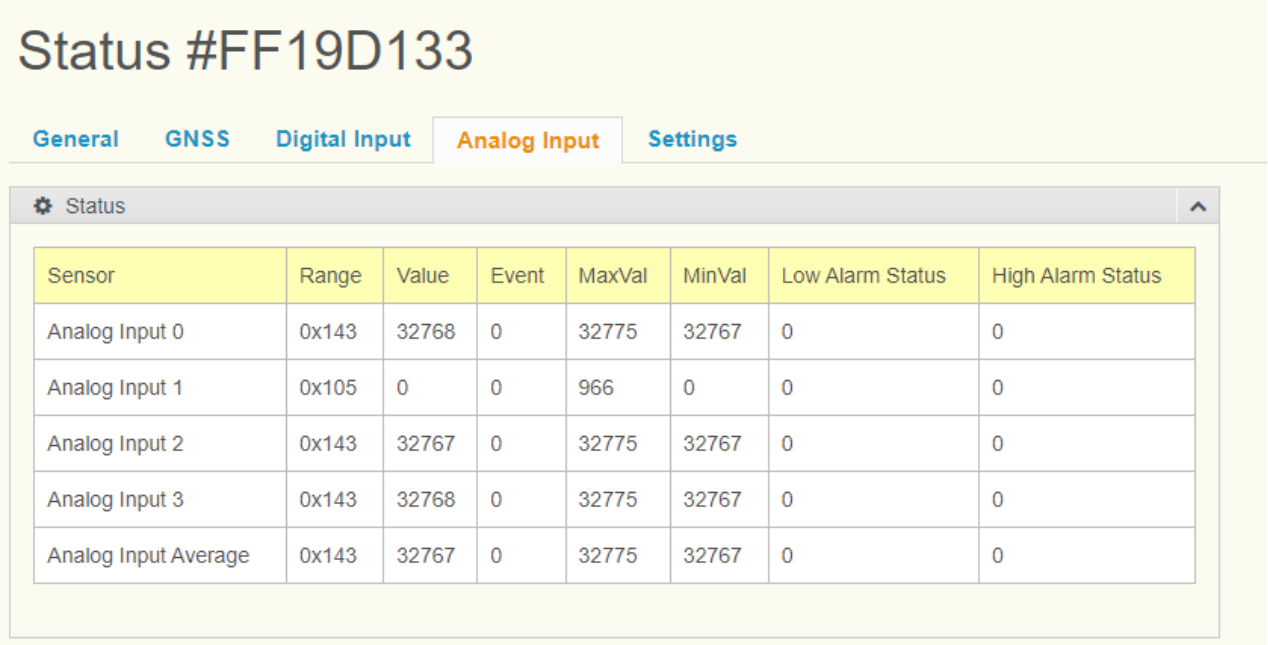
The following table describes the items in the previous figure.

Item	Description
Devaddr	Devaddr of this device.
Battery	Indicate power type or display percentage of battery or battery voltage.
Model	Model name of this device.
Received	Time of Application Server received this packet.
Fcnt	Uplink frame count.
RSSI	Signal strength of last uplink frame.

2.7.1.2 Advantech Nodes Status Detail

Different models of nodes may have different data pages.

For more information, please refer to the WISE serial nodes and B+B serial nodes documentation.



Sensor	Range	Value	Event	MaxVal	MinVal	Low Alarm Status	High Alarm Status
Analog Input 0	0x143	32768	0	32775	32767	0	0
Analog Input 1	0x105	0	0	966	0	0	0
Analog Input 2	0x143	32767	0	32775	32767	0	0
Analog Input 3	0x143	32768	0	32775	32767	0	0
Analog Input Average	0x143	32767	0	32775	32767	0	0

Figure 2.49 Advantech Nodes Detail 1.

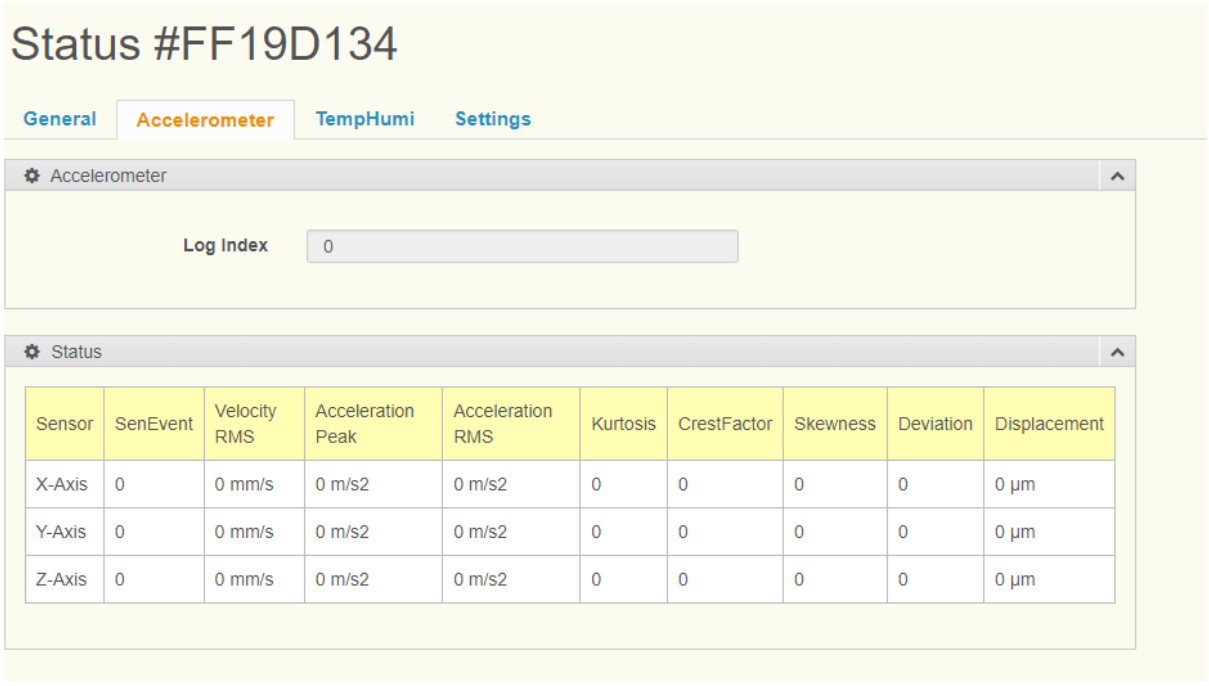


Figure 2.50 Advantech Nodes Detail 2.

2.7.1.3 Advantech Nodes Downlink

Users can use the 'Settings' to create downlink commands for Advantech Nodes. It supports both Class A and Class C nodes, as well as confirmed and unconfirmed data. However, please note that different node models may have different downlink functions.

For more information, please refer to the WISE serial nodes and B+B serial nodes documentation.

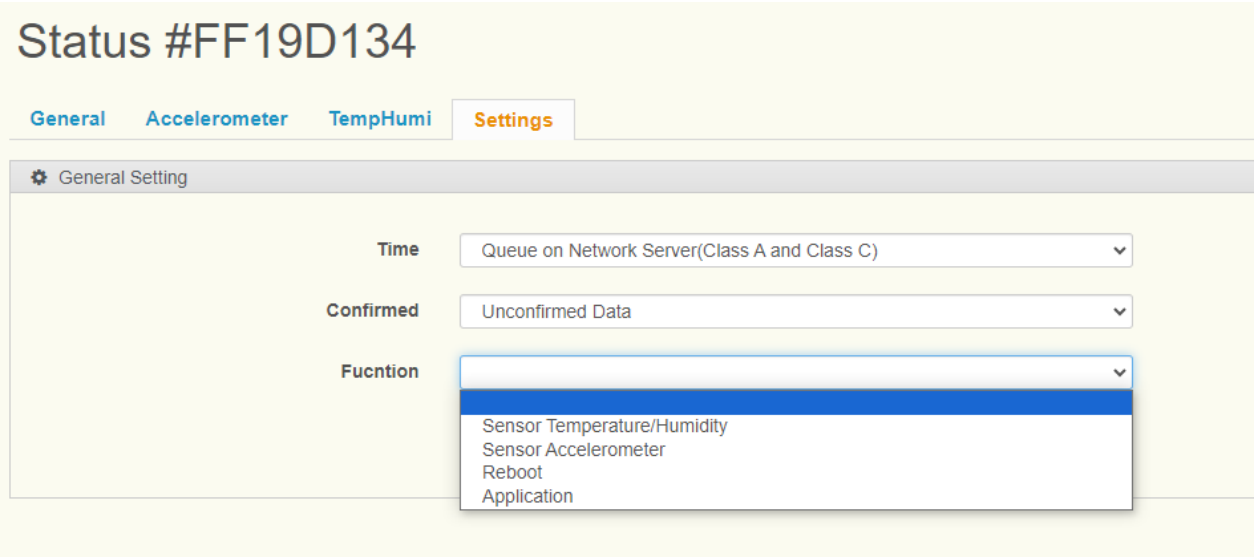


Figure 2.51 Nodes Settings Page.

The following table describes the items in the previous figure.

Item	Description
Time	Queue on Network Server or Immediately , If the field is set to 'Immediately,' this command will immediately be sent to the node, but it's only supported for Class C nodes.

Confirmed	Indicate whether this command is confirmed or not.
Function	Downlink command type.

Digital Input (WISE Serial)

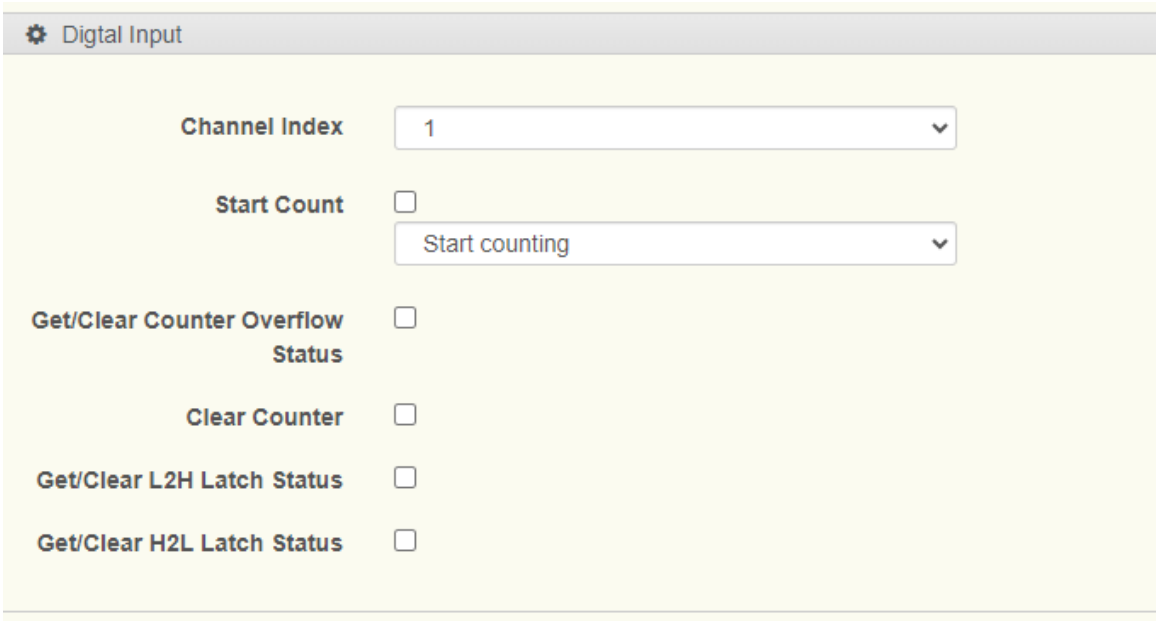


Figure 2.52 Digital Input – WISE Serial

The following table describes the items in the previous figure.

Item	Description
Channel Index	I/O channel 0 ~ 15
Start Count	Start counting or stop counting
Get/Clear Counter Overflow Status	Clear the overflow status
Clear Counter	Clear the counter value
Get/Clear L2H Latch Status	Clear the L2H latch status
Get/Clear H2L Latch Status	Clear the H2L latch status

Analog Input (WISE Serial)

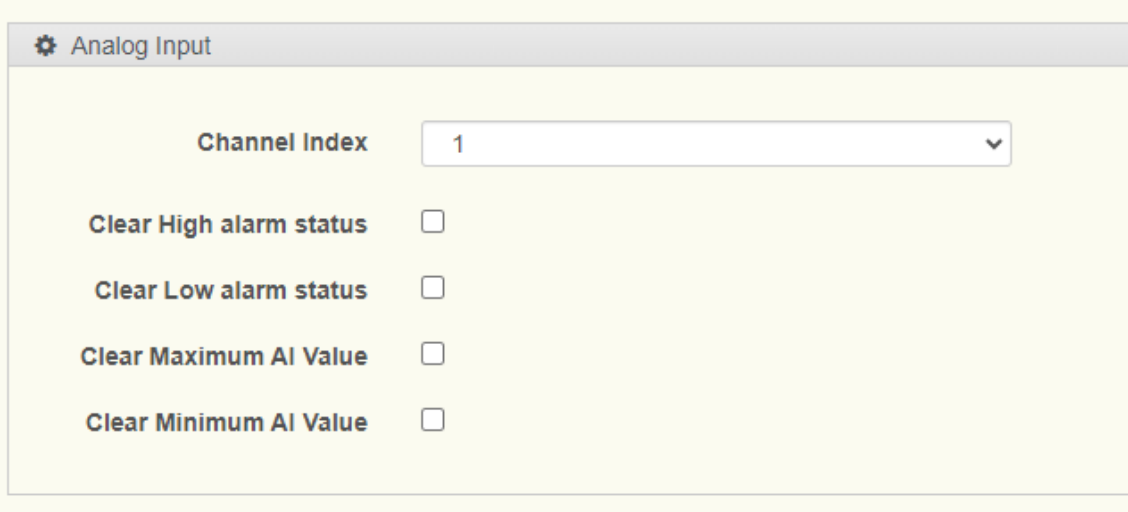


Figure 2.53 Analog Input – WISE Serial

The following table describes the items in the previous figure.

Item	Description
Channel Index	I/O channel 0 ~ 15
Clear High alarm status	Clear the high alarm status
Clear Low alarm status	Clear the low alarm status
Clear Maximum AI Value	Clear the maximum AI value
Clear Minimum AI Value	Clear the minimum AI value

Digital Output (WISE Serial)

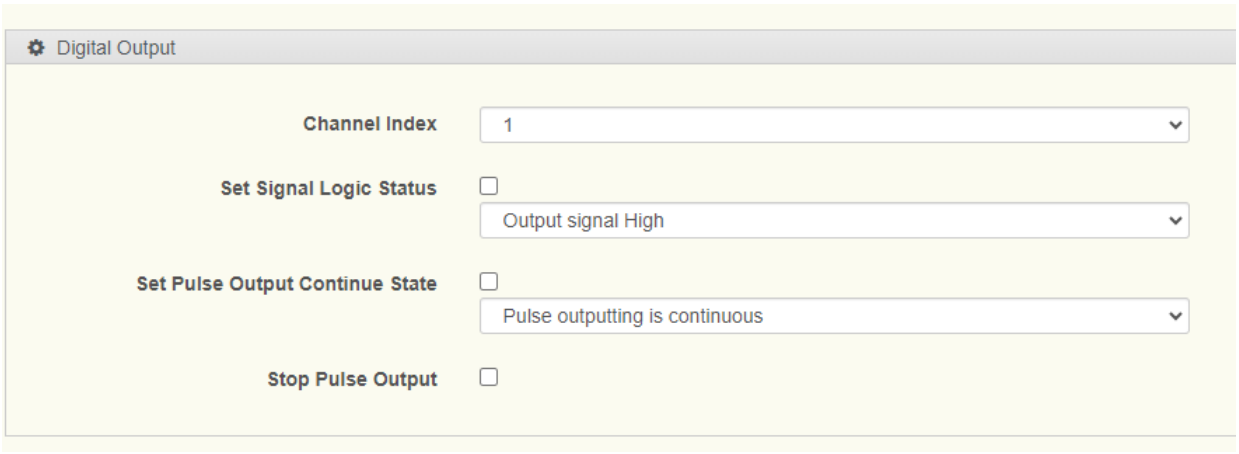


Figure 2.54 Digital Output – WISE Serial

The following table describes the items in the previous figure.

Item	Description
Channel Index	I/O channel 0 ~ 15
Set Signal Logic Status	Set output to signal High or signal Low.
Set Pulse Output Continue State	Enable or disable outputting to continuous mode.
Stop Pulse Output	Stop the pulse outputting.

Sensor Temperature/Humidity (WISE Serial)

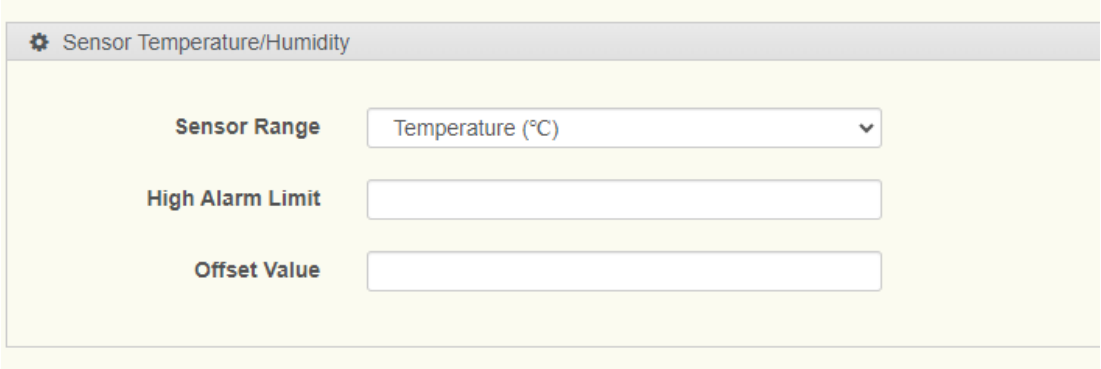


Figure 2.55 Sensor Temperature/Humidity – WISE Serial

The following table describes the items in the previous figure.

Item	Description
Sensor Range	Only support Temperature (℃) now.
High Alarm Limit	Set the high alarm limit value.
Offset Value	Set the offset value.

Sensor Accelerometer (WISE Serial)

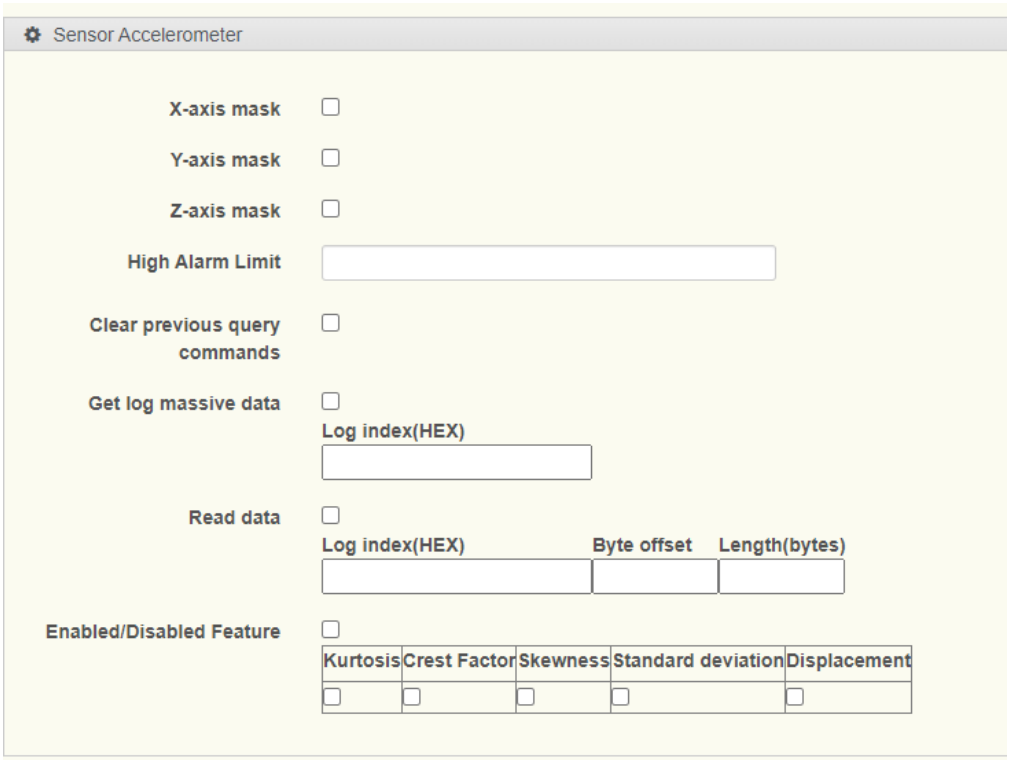


Figure 2.56 Sensor Accelerometer – WISE Serial

The following table describes the items in the previous figure.

Item	Description
X-axis mask	Check the X-axis checkbox to configure the X-axis.
Y-axis mask	Check the Y-axis checkbox to configure the Y-axis.
Z-axis mask	Check the Z-axis checkbox to configure the Z-axis.
High Alarm Limit	Set the high alarm limit value of velocity RMS (unit: 0.01 mm /s)
Clear previous query commands	Clear all log massive data query commands stored in device.
Get log massive data	Get the log massive data with a specific log index number.
Read data	Read the [**Length(bytes)]** bytes starting from the **[Byte offset]** th byte position of log data with a specific log index number.
Log index(HEX)	Enable or disable the feature data

Stack Light (WISE Serial)

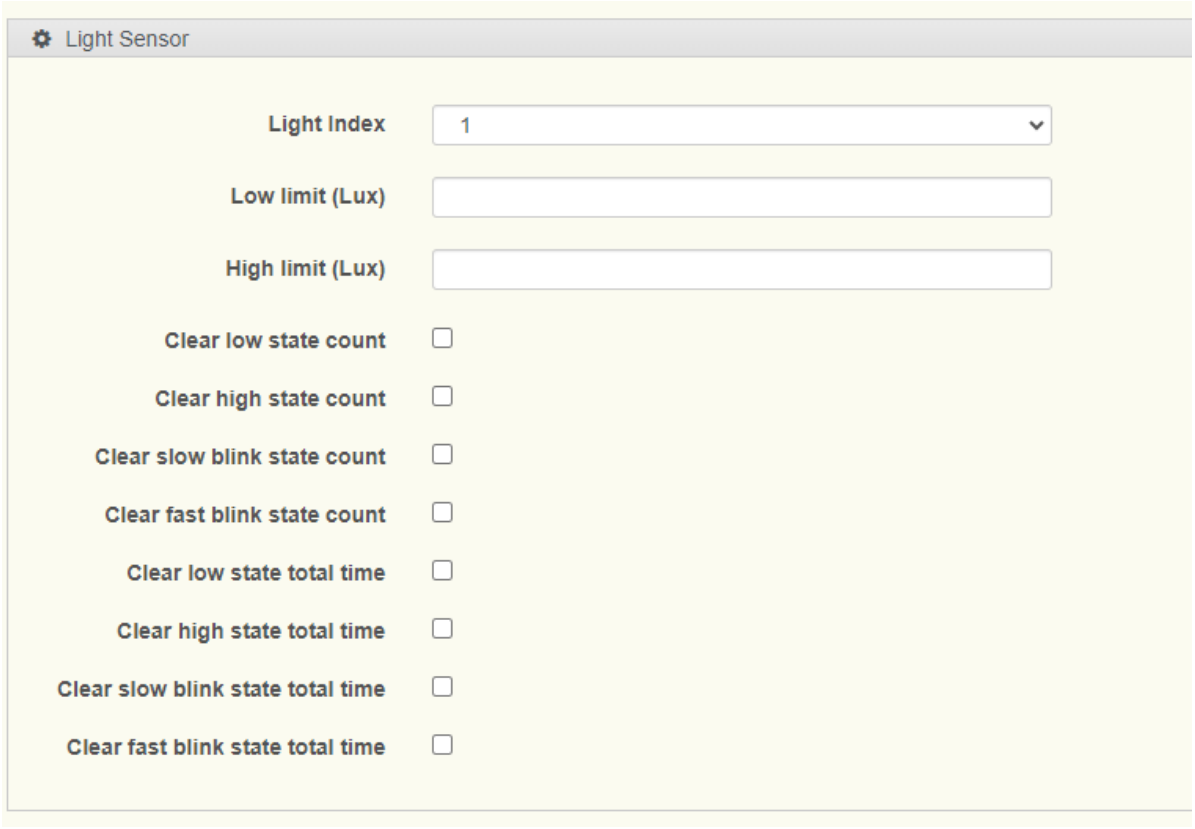


Figure 2.57 Stack Light – WISE Serial

The following table describes the items in the previous figure.

Item	Description
Light Index	I/O channel 0 ~ 15
Low limit (Lux)	Set Low limit (Lux).
High limit (Lux)	Set High limit (Lux).
Clear low state count	Clear low state count.
Clear high state count	Clear high state count.
Clear slow blink state count	Clear slow blink state count
Clear fast blink state count	Clear fast blink state count
Clear low state total time	Clear low state total time
Clear high state total time	Clear high state total time
Clear slow blink state total time	Clear slow blink state total time

Clear fast blink state total time	Clear fast blink state total time

Application (WISE Serial)

Figure 2.58 Application – WISE Serial

The following table describes the items in the previous figure.

Item	Description
Interval(Sec.)	Define node's uplink interval.

Reboot (WISE Serial)

Figure 2.59 Reboot – WISE Serial

The following table describes the items in the previous figure.

Item	Description
Reboot	Set reboot command to node.

RS-485 Coil Data (WISE Serial)

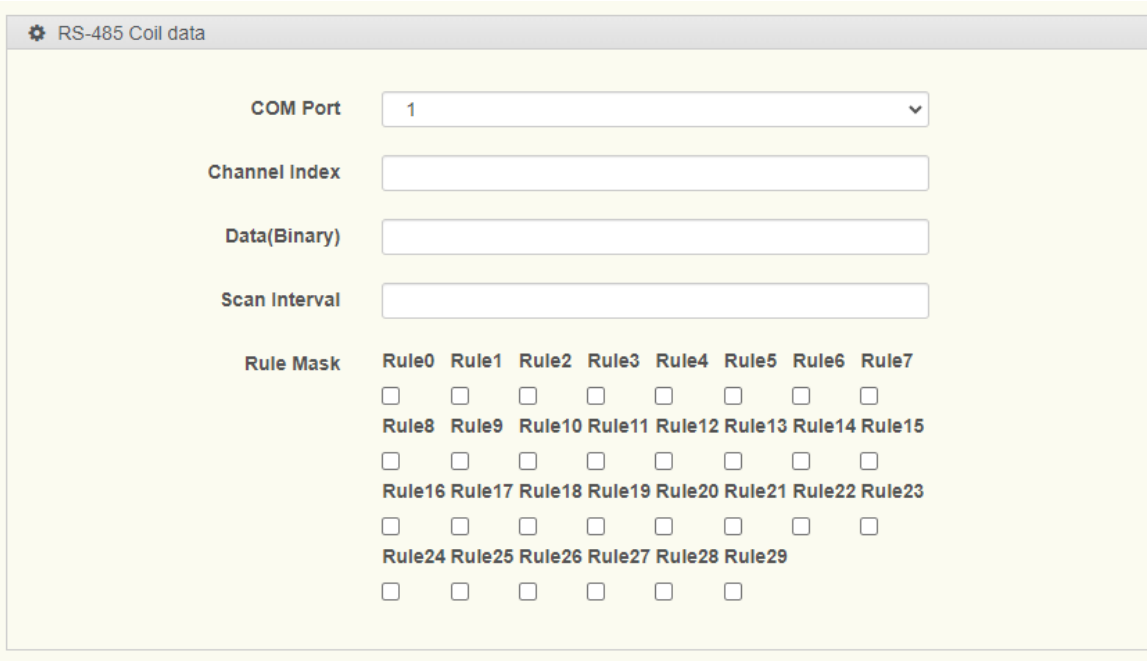


Figure 2.60 RS-485 Coil Data – WISE Serial

The following table describes the items in the previous figure.

Item	Description
COM Port	COM Port Index: 1-COM port 1 2-COM port 2
Channel Index	Coil channel index
Data(Binary)	Set coil value Write 0 or 1
Scan Interval	Configure the Scan Interval value (seconds) of certain **Rule Mask**.
Rule Mask	Select rule to configure **Scan Interval.**

RS-485 Register Data (WISE Serial)

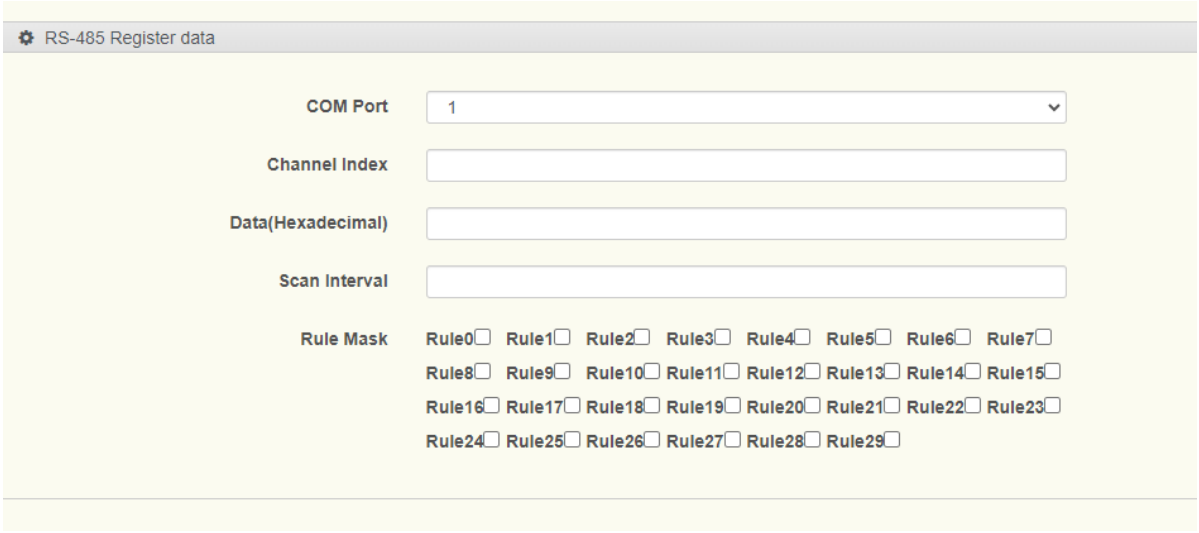


Figure 2.61 RS-485 Register Data – WISE Serial

The following table describes the items in the previous figure.

Item	Description
COM Port	COM Port Index: 1-COM port 1 2-COM port 2
Channel Index	Register Channel Index
Data(Hexadecimal)	Set register value (by channel index) Write 0000 ~ FFFF
Scan Interval	Configure the Scan Interval value (seconds) of certain **Rule Mask**.
Rule Mask	Select rule to configure **Scan Interval.**

I/O Interval (BB-WSW Serial)

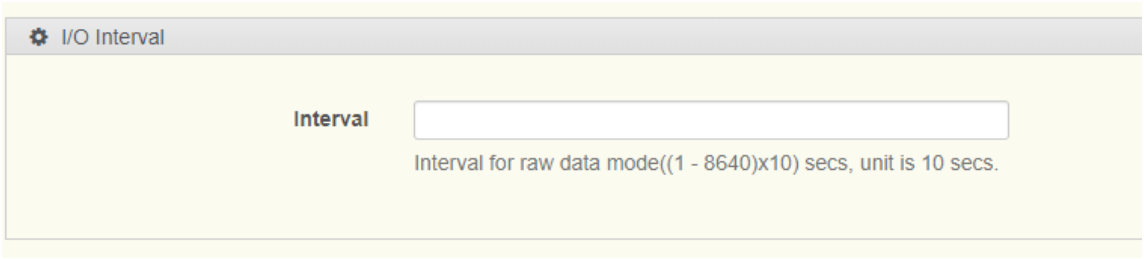


Figure 2.62 I/O Interval – BB-WSW Serial

The following table describes the items in the previous figure.

Item	Description
Interval	Configure the Scan Interval value , unit is 10 secs.

Digital Output (BB-WSW Serial)

Figure 2.63 Digital Output – BB-WSW Serial

The following table describes the items in the previous figure.

Item	Description
Active	Configure the Digital Output to active high or active low.

I/O Mode (BB-WSW Serial)

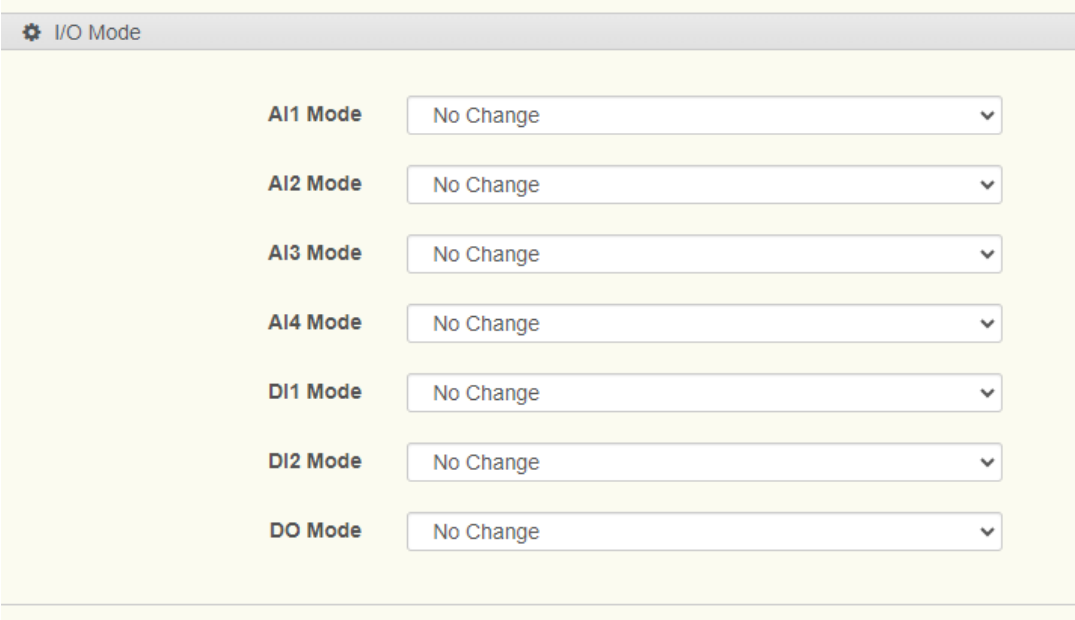


Figure 2.64 I/O Mode – BB-WSW Serial

The following table describes the items in the previous figure.

Item	Description
AI[1-4] Mode	Configure the Analog Input mode to voltage or current.
DI[1-2] Mode	Configure enable or disable for Digital Input.
DO Mode	Configure enable or disable for Digital Output.

Modbus Transaction (BB-WSW Serial)

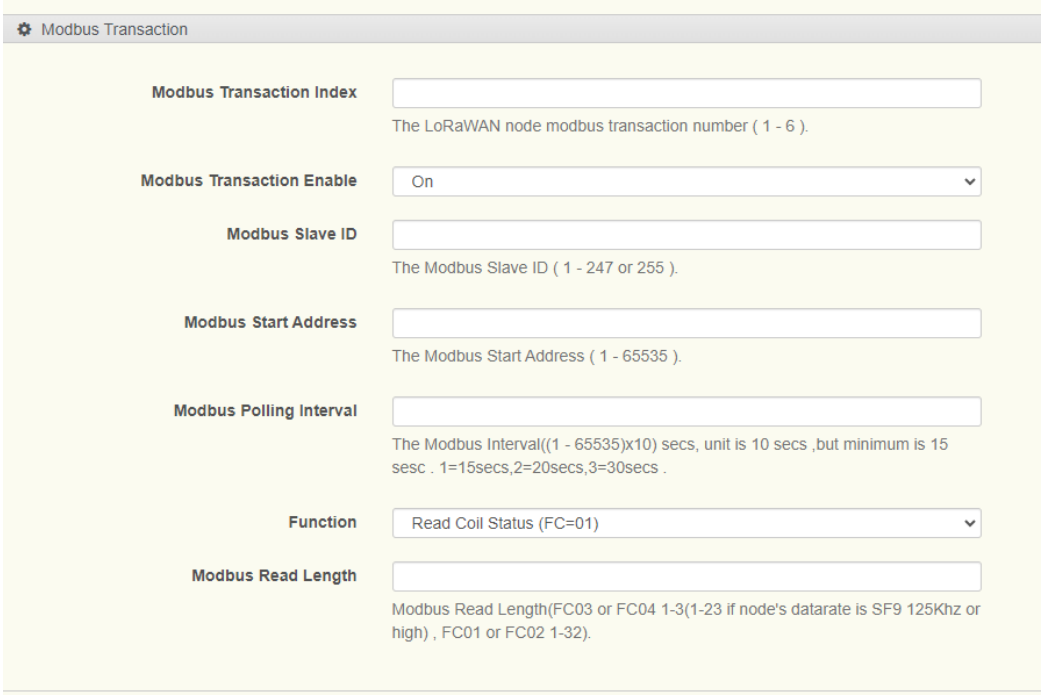


Figure 2.65 Modbus Transaction – BB-WSW Serial

The following table describes the items in the previous figure.

Item	Description
Modbus Transaction Index	Configure transaction rule for this index
Modbus Transaction Enable	Configure enable or disable for this transaction rule.
Modbus Slave ID	Configure Slave ID for this transaction rule.
Modbus Start Address	Configure start address for this transaction rule.
Modbus Polling Interval	Configure polling interval for this transaction rule.
Function	Configure Modbus function for this transaction rule.
Modbus Read Length	Configure read length for this transaction rule. Modbus Read Length(FC03 or FC04 1-3(1-23 if node's datarate is SF9 125Khz or high) , FC01 or FC02 1-32).

Modbus Write (BB-WSW Serial)

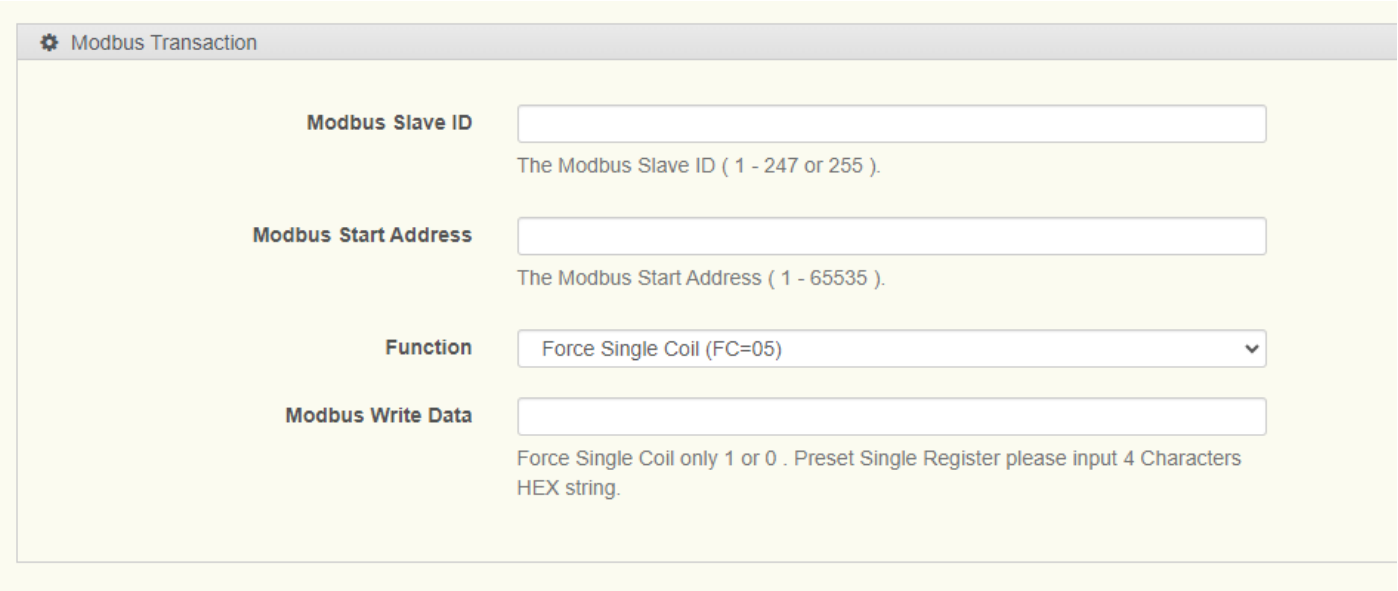


Figure 2.66 Modbus Write – BB-WSW Serial

The following table describes the items in the previous figure.

Item	Description
Modbus Slave ID	Configure Slave ID for this write command.
Modbus Start Address	Configure start address for this write command.
Function	Select write function for this write command.
Modbus Write Data	Set Modbus value

Modbus Forward (BB-WSW Serial)

This function can directly access Modbus devices connected to the BB-WSW Serial Modbus Node without the need for transaction rules, but it only supports Class C mode.

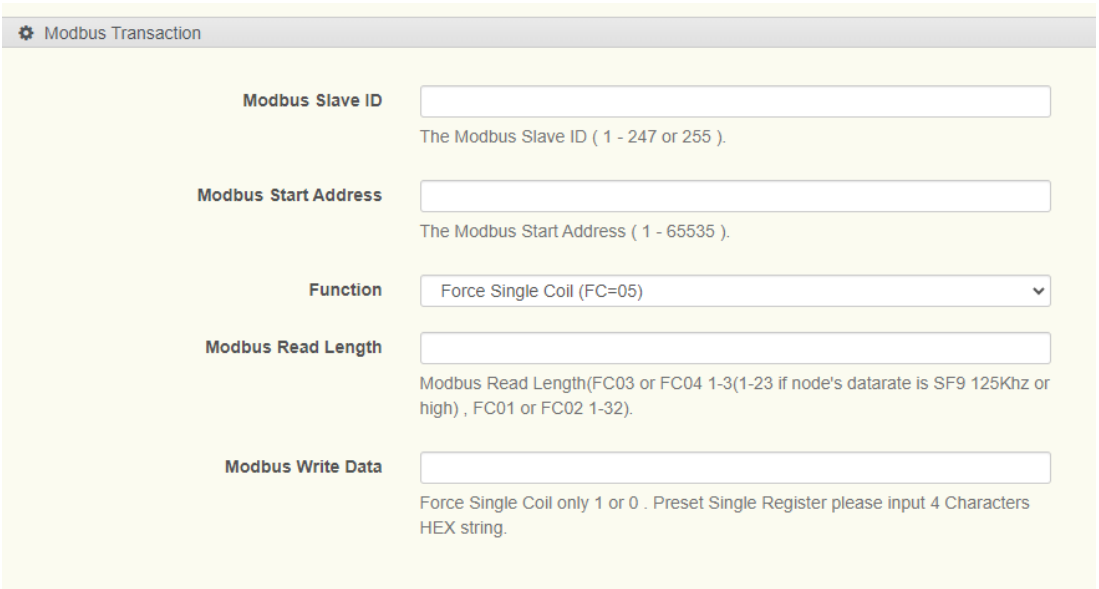


Figure 2.67 Modbus Forward – BB-WSW Serial

The following table describes the items in the previous figure.

Item	Description
Modbus Slave ID	Configure Slave ID for this forward command.
Modbus Start Address	Configure start address for this forward command.
Function	Select function for this forward command.
Modbus Read Length	Configure read length for this forward command.
Modbus Write Data	Set Modbus write value

System (BB-WSW Serial)

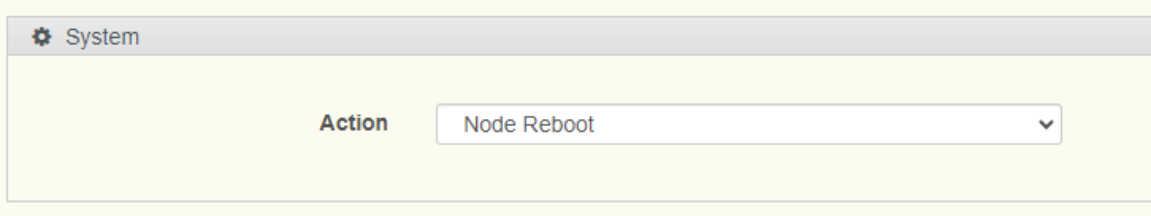


Figure 2.68 System – BB-WSW Serial

The following table describes the items in the previous figure.

Item	Description
Action	Send reboot command or factory reset command to node

2.7.2 Modbus Mapping Table

2.7.2.1 Modbus Mapping Table List

To access this page, click **Application Server > Modbus Mapping Table.**

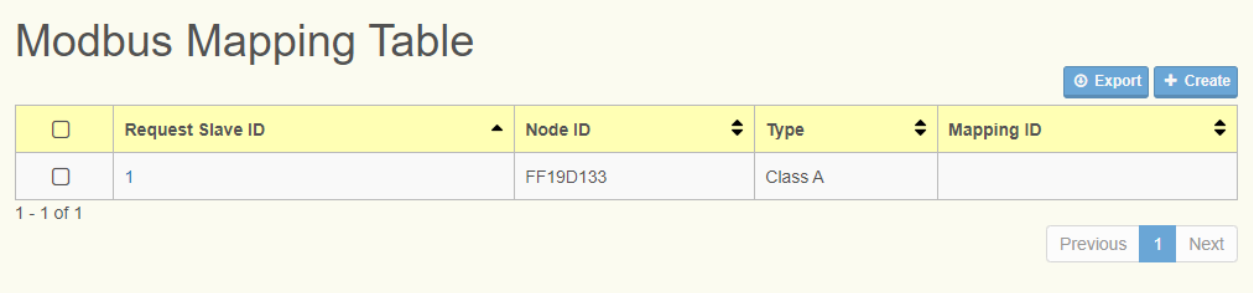


Figure 2.69 Application Server > Modbus Mapping Table.

The following table describes the items in the previous figure.

Item	Description
Request Slave ID	Modbus Slave ID of this device
Node ID	Node ID of this mapping rule

Type	Class C or Class A.
Mapping	Only support BB- WSW2C00015 Mapping slave ID on node's Modbus RTU
Selected	Delete selected mapping rule.
Export	Export all mapping rule to csv file
Create	Open create mapping rule page

Note! Create or change Modbus Mapping Table will take effect after re-save on Application Server.

2.7.2.2 Create Modbus Mapping Table

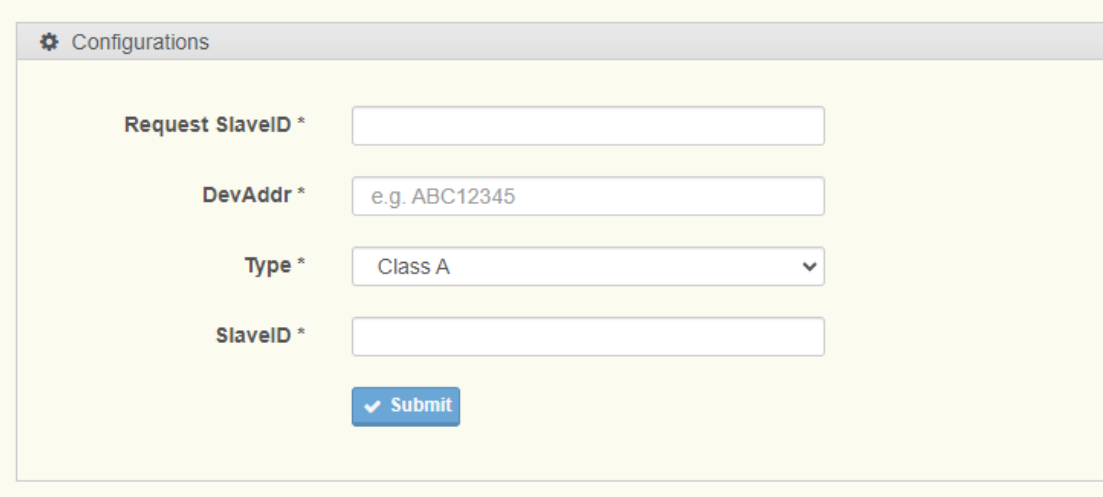


Figure 2.70 Create Modbus Mapping Table.

The following table describes the items in the previous figure.

Item	Description
Request Slave ID	Define Slave ID for this node on Modbus TCP Server.
Node ID	Enter the Node's devaddr that needs to be mapped on the Modbus TCP Server.
Type	Class C or Class A. If set to Class C , Modbus write can be immediately sent to the node.
SlaveID	Only support BB- WSW2C00015 If this value is set, when a user uses Modbus to request data, the Application Server will forward this Modbus TCP request convert to Modbus RTU request to the node. The node will then request this Modbus RTU data to the Modbus device ,which connected on BB-WSW2C00015, as a small LoRaWAN Modbus Gateway.

2.7.2.3 Modbus Mapping Address

Different models of nodes may have different mapping address.

For more information, please refer to the WISE Modbus Address documentation.

WISE-4610-S617 (for WISE-6610 LoRaWAN GW)										
AI	2	DI	2	DO	1		Serial Port	1		
Address 0X	Ch	Description	(struct Node_Info)	Attribute	Address 4X	Ch	Description	(struct Node_Info)	Attribute	
00001	0	DI Value	psNode->pDI->bDIStatus	Read	40017~40018	0	Counter/ Frequency Value	psNode->pDI->ulDICounter or ulDIFrequency	Read	(Addr): Upper word (Addr+1): Lower word
00002	1			Read	40019~40020	1			Read	
00033	0	Counter Start(1)/ Stop(0)	psNode->pDI->bCountStart	R/W	40211		Module Name1		Read	0x46 0x10
00034	1			R/W	40212		Module Name2		Read	0x53 0x36 ('S' '6')
					40213		Module Name3		Read	0x31 0x37 ('1' '7')
00041	0	Clear Counter(1)	psNode->pDI->bClrCnt	Write	40214		Reserved for Module Name		Read	0x00 0x00
00042	1			Write						
00049	0	Clear Overflow	psNode->pDI->bCountOverflow	R/W	40301	All	DI Value	Bit combination of all channels of	Read	
00050	1			R/W						
00057	0	DI L2H Latch Status	psNode->pDI->bL2HLatch	R/W						
00058	1			R/W						
00065	0	DI H2L Latch Status	psNode->pDI->bH2LLatch	R/W						
00066	1			R/W						

Figure 2.71 Modbus Mapping Address.

2.7.3 Application Server Settings

To access this page, click **Application Server > Application Server Settings.**

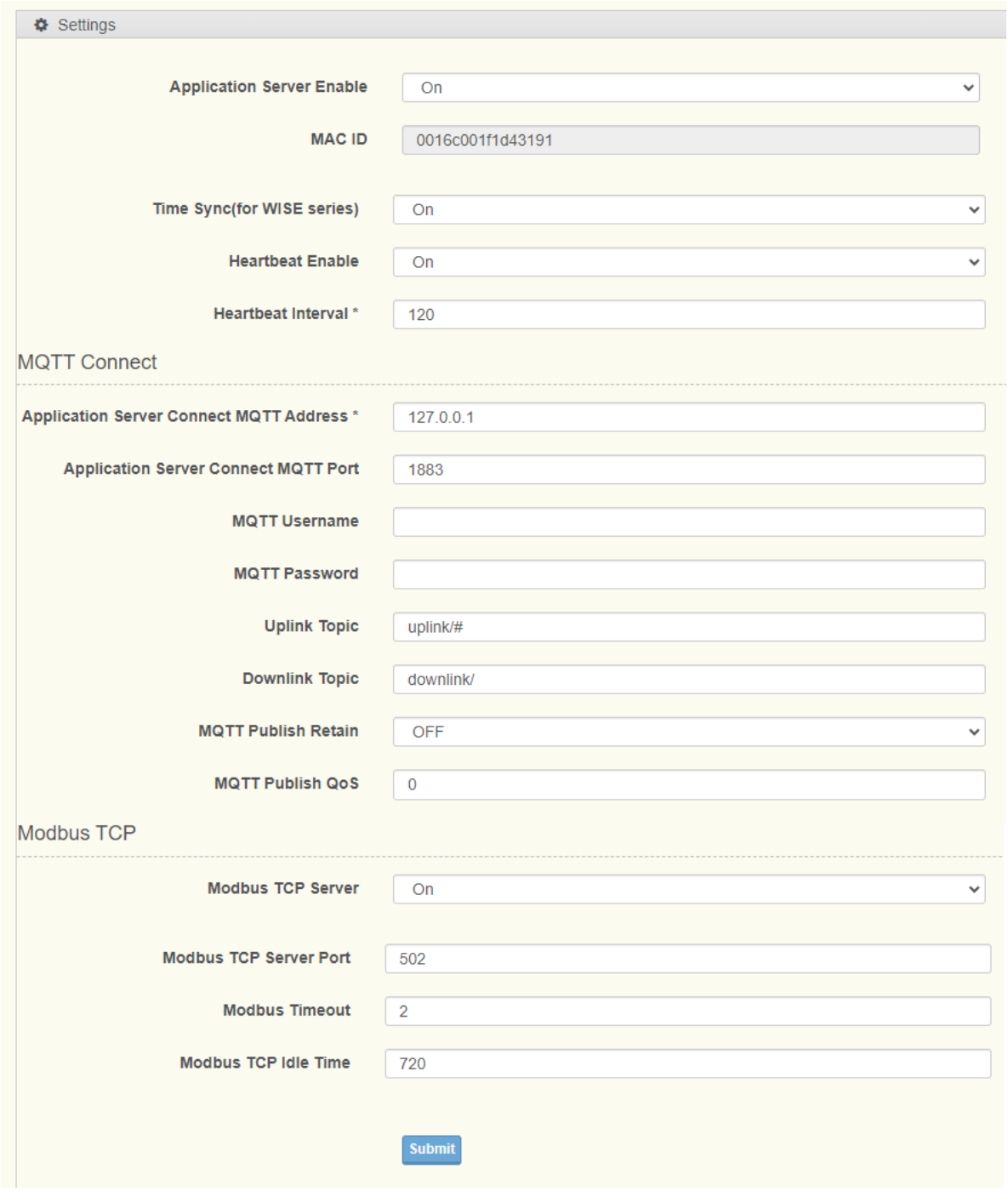


Figure 2.72 Application Server > Application Server Settings.

The following table describes the items in the previous figure.

Item	Description
Application Server Enable	Click the drop-down menu to enable or disable Application Server.
MAC ID	SX1302 chip ID, it is using on heartbeat topic.
Time Sync	Click the drop-down menu to enable or disable Time Sync function. It automatically sends a time sync command to the WISE serial node when the node's time deviates by more than 10 seconds from the Network Server system time.
Heartbeat Enable	Click the drop-down menu to enable or disable Heartbeat function.

Heartbeat Interval	Define Heartbeat interval
MQTT Connect	
Application Server Connect MQTT Address	Define URL or IP address for Application Server; default is 127.0.0.1.
Application Server Connect MQTT Port	Define MQTT port for Application Server; default is 1883.
MQTT Username	Enter the string to define a MQTT username for Application Server.
MQTT Password	Enter the string to define a MQTT password for Application Server.
Uplink Topic	Enter the string to define Application Server subscribe topic for uplink.
Downlink Topic	Enter the string to define Application Server subscribe topic for downlink. It is using to pars downlink command from MQTT broker.
MQTT Publish Retain	Click the drop-down menu to enable or disable MQTT Retain.
MQTT Publish QoS	Define MQTT QoS for Application Server
Modbus TCP	
Modbus TCP Server	Click the drop-down menu to enable or disable Modbus TCP Server.
Modbus TCP Server Port	Define port for Modbus TCP Server; default is 502.
Modbus Timeout	Define timeout for Modbus TCP Server; default is 2 secs.
Modbus TCP Idle Time	Define idle timeout for Modbus TCP Server; default is 720 secs.

2.8 System

2.8.1 Network Server Settings

To access this page, click **System > Network Server Settings.**

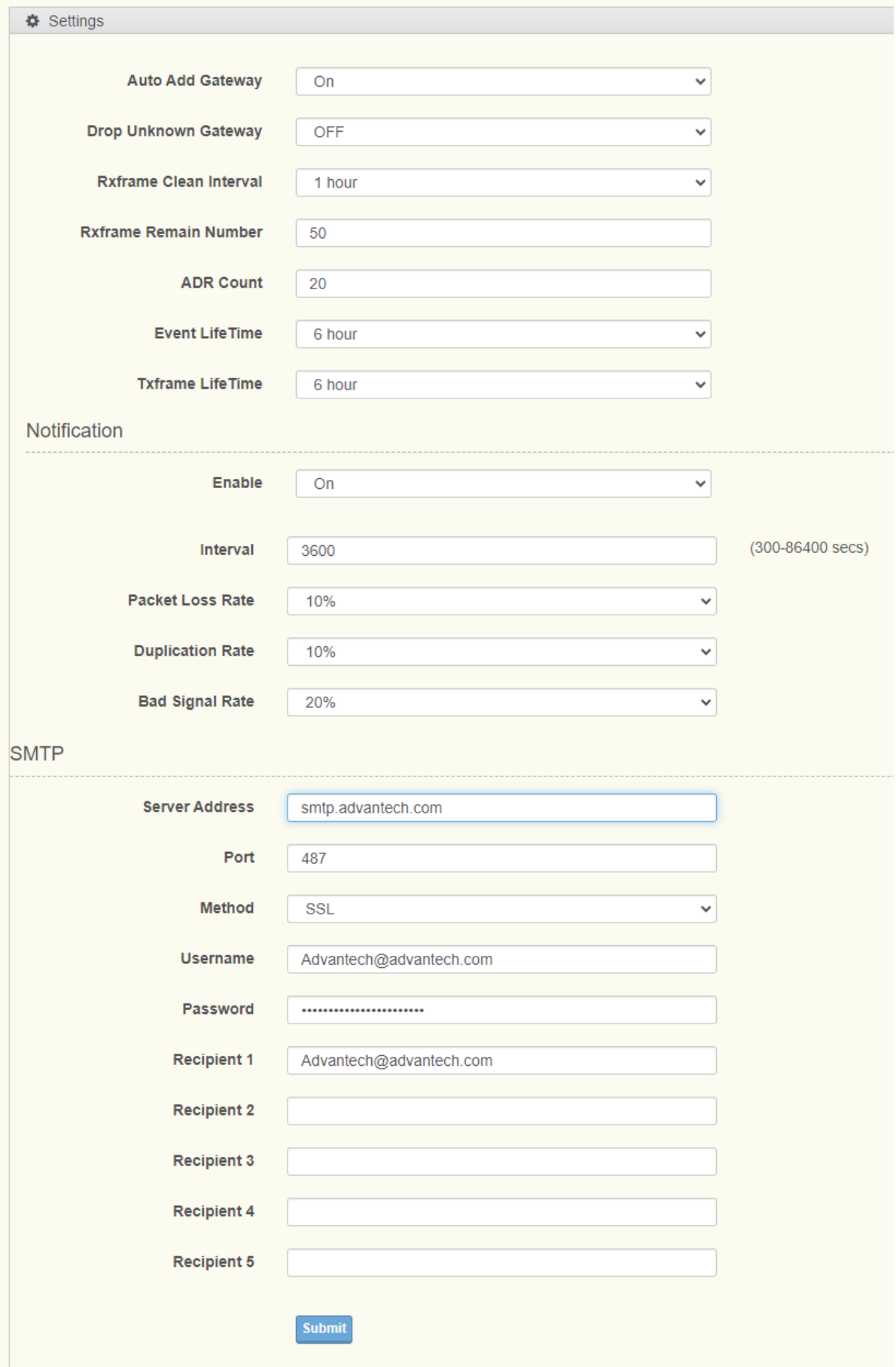


Figure 2.73 System > Network Server Settings

The following table describes the items in the previous figure.

Item	Description

Auto Add Gateway	Click the drop-down menu to enable or disable Auto Add Gateway function. If this value is 'On,' the Network Server will automatically add the gateway to the gateway list when the gateway sends a packet to the Network Server.
Drop Unknown Gateway	If this value is 'On,' the Network Server will drop packets from gateways that are not in the gateway list.
Rxframe Clean Interval	Click the drop-down menu to set Rxframe Clean Interval.
Rxframe Remain Number	Define Rxframe Remain Number for Network Server. This value represents the remaining Rxframe after cleaning Rxframe for each node.
ADR Count	Define ADR Count for Network Server. If the ADR mode of the Device Profile is set to Auto-Adjust, the Network Server will receive uplink frames until the uplink frame count reaches the ADR count and then calculate ADR.
Event LifeTime	Click the drop-down menu to set Event Lifetime.
Txframe LifeTime	Click the drop-down menu to set Txframe Lifetime.
Notification	
Enable	Click the drop-down menu to enable or disable Notification function.
Interval	Define interval for Notification function. This value represents how often the Network Server checks the node's status.
Packet Loss Rate	Click the drop-down menu to set packet loss rate or disable for Notification function.
Duplication Rate	Click the drop-down menu to set duplication rate or disable for Notification function.
Bad Signal Rate	Click the drop-down menu to set bad signal rate or disable for Notification function.
SMTP	
Server Address	Enter the IP address or URL of the SMTP server.
Port	Enter the port number of the SMTP server.
Method	Click the drop-down menu to set authentication method of the SMTP server.
Username	Enter the string to define a username for SMTP server.
Password	Enter the string to define a password for SMTP server.
Recipient [1-5]	Email of Recipient.

2.8.2 LoRaWAN Service Log

To access this page, click **System > LoRaWAN Service Log.**

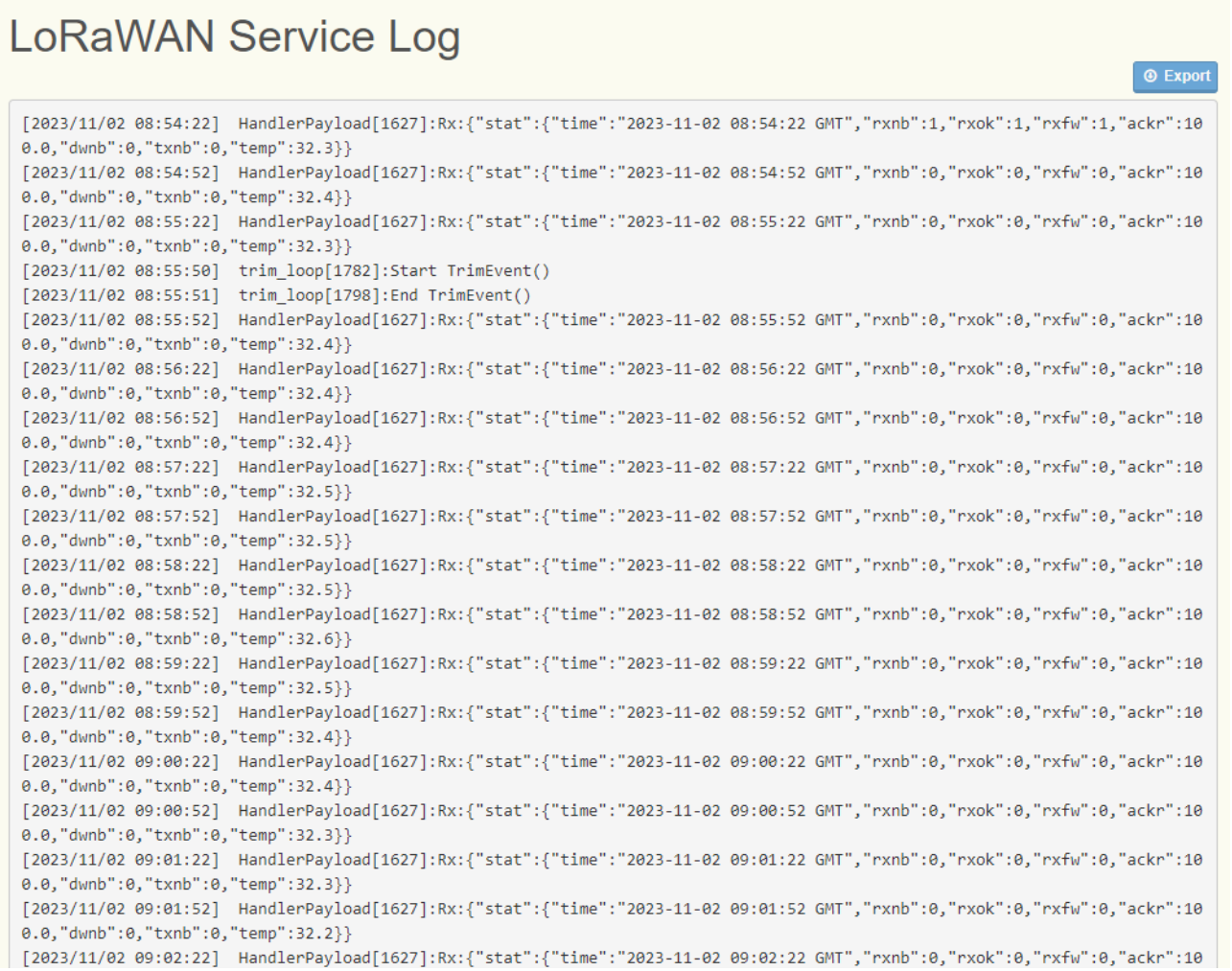


Figure 2.74 System > LoRaWAN Service Log.

The following table describes the items in the previous figure.

Item	Description
Export	Click **Export** to download the log file.

2.8.3 Database Management

To access this page, click **System > Database Management.**

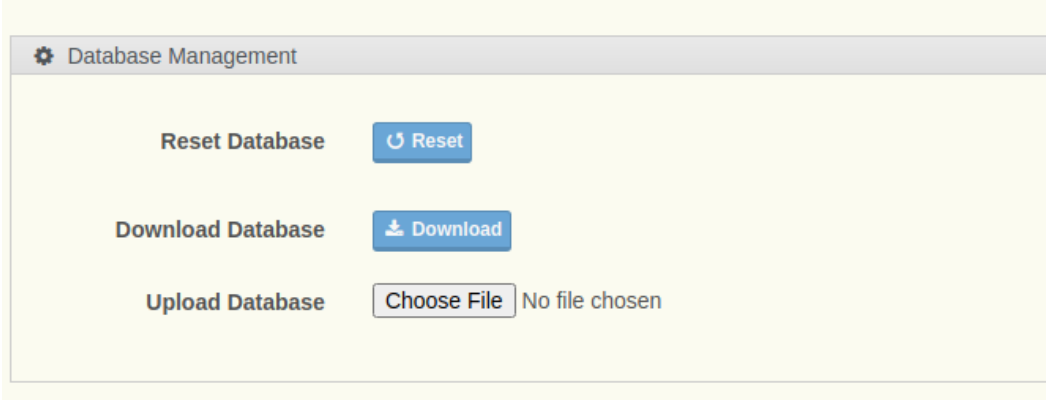


Figure 2.75 System > Database Management.

The following table describes the items in the previous figure.

Item	Description
Reset	Click **Reset** to reset LoRaWAN Service configuration.
Download	Click **Download** to download LoRaWAN Service configuration.
Upload Database	Click Choose File to upload LoRaWAN Service configuration.

2.8.4 Change Password

To access this page, click **System > Change Password.**

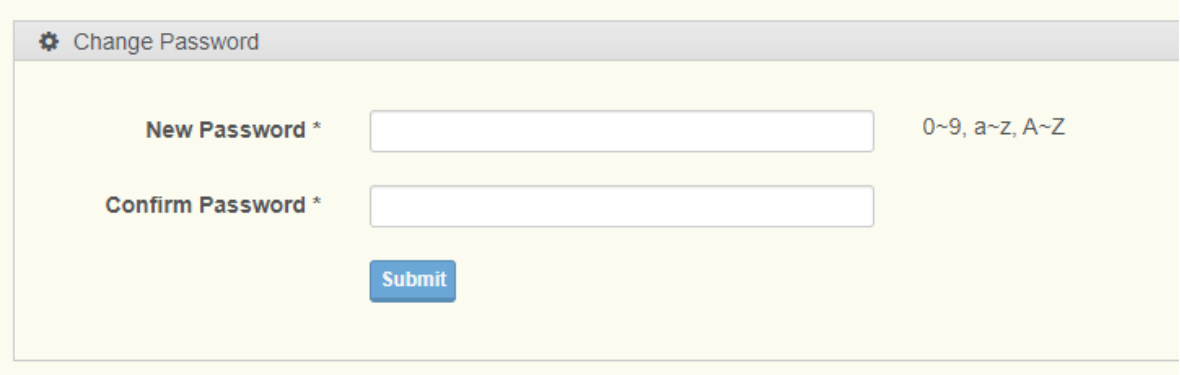


Figure 2.76 System > Database Management.

The following table describes the items in the previous figure.

Item	Description
New Password	Enter new password for LoRaWAN Service
Confirm Password	Enter new password again to confirm it’s correct.

2.8.5 Notification

The Notification function is used to monitor the health and connectivity of nodes. It checks various parameters such as packet loss rate, duplication rate, signal quality, and timeout monitoring. If the Network Server detects any issues with nodes, it will list the nodes with problems and send an email notification to the user.

Packet Loss Rate: A high packet loss rate may be due to poor signal quality. If it exceeds 30%, it could indicate that the node's channel and the gateway do not match.

Duplication Rate: If the duplication rate is excessively high, it may suggest that the node did not receive the gateway's ACK. This could indicate a lower reception sensitivity in the node or a mismatch in receiving frequencies. You can check if the selected Device Profile in the device configuration is correct.

Bad Signal Rate: If the Bad Signal Rate is excessively high, it indicates that the proportion of signals below -110dBm is too high, which may pose a risk of increased packet loss.

Timeout: You can configure the timeout on each device's page. When the Network Server goes beyond this timeout since the last packet reception, it will notify the user that the node has timeout.

I6

	A	B	C	D	E	F	G
1	Name	DevAddr	Last Rx	Packet Loss	Bad Signal Rate	Duplication Rate	Since last receive time(secs)
2	FF000001	FF000001	2023-10-03T03:01:54Z	0	25	0	80029
3	FF000000	FF000000	2023-10-04T01:14:10Z	25	0	25	93
4							
5							
6							
7							

Figure 2.77 Notification CSV file.