



How to Connect Milesight Gateway to the ChirpStack v4 platform



Version Change Log			
Version	Revision Date	Revision Details	Revised By
V1.0	20240614	Initial	lockon



Platform Introduction

The ChirpStack open-source LoRaWAN Network Server stack provides open-source components for LoRaWAN networks. Together they form a ready-to-use solution including a user-friendly web-interface for device management and APIs for integration. The modular architecture makes it possible to integrate within existing infrastructures. All components are licensed under the MIT license and can be used for commercial purposes. It supports Class A, Class B, and Class C modes, as well as adaptive data-rate, live-frame logging, channel configuration, multi-tenant, APIs and integration, etc.

This article will guide you how to integrate Milesight LoRaWAN gateways to ChirpStack server. Click [here](#) for more information about how to install ChirpStack.

Preconditions

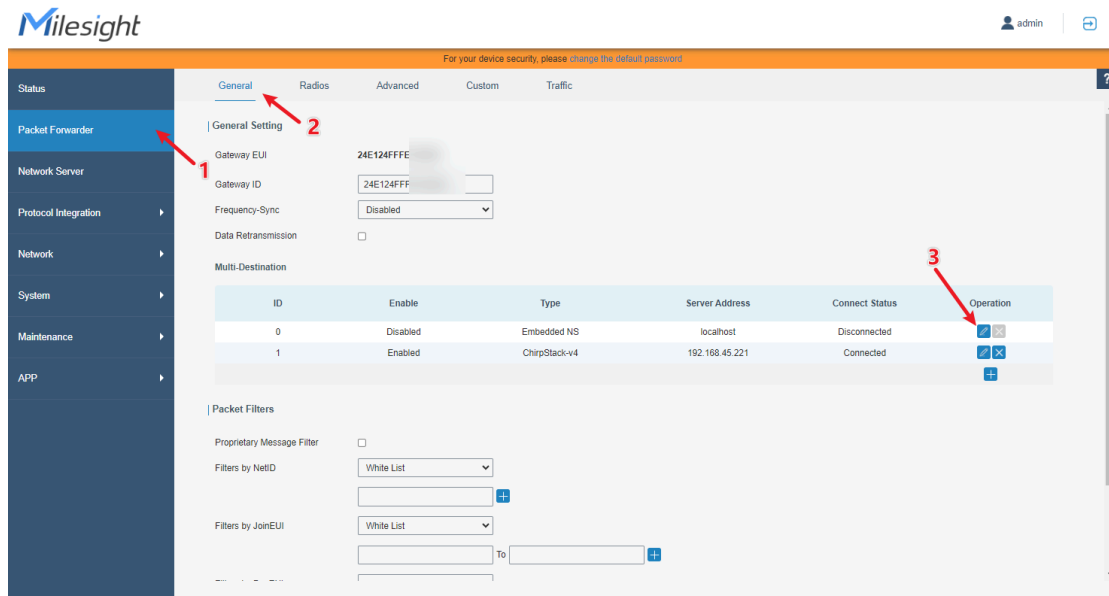
1. Have a gateway device with built-in packet forwarding capability. Here, I'm demonstrating using the UG65.
2. Deploy a chirpstack v4 system. Here, I am using Docker deployment, and the address is 192.168.45.221.
3. Ensure network connectivity between the gateway device and the chirpstack v4 system.



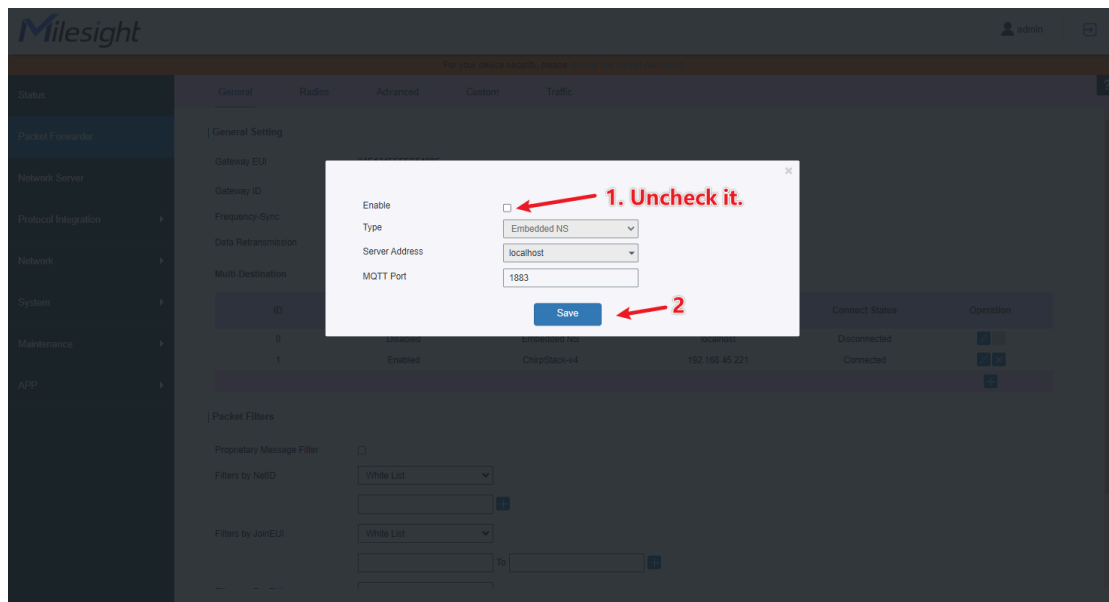
1. Gateway Configuration

1.1. Add Network Server

Login to the gateway and navigate to **Packetforward** -> **General**.

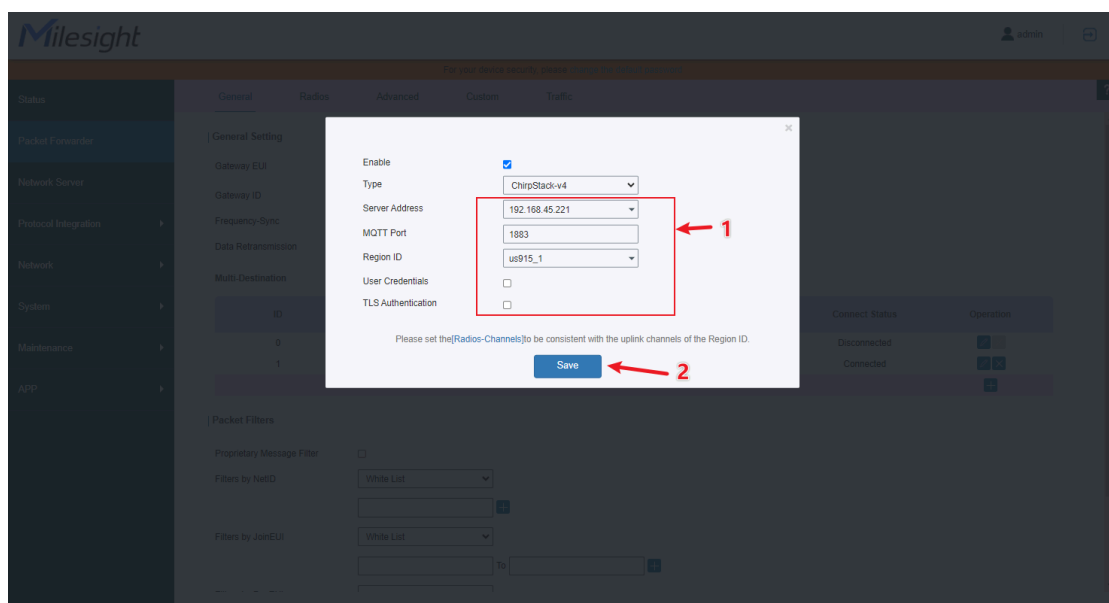
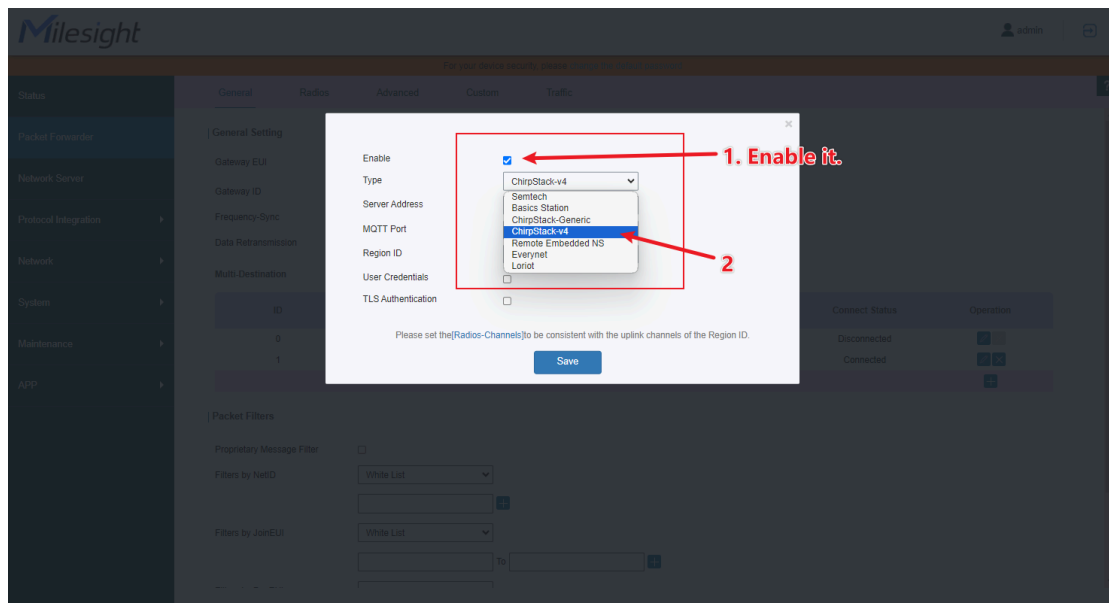


Disable the built-in Embedded NS under Multi-Destination.



Add a new one. In the popup window, select **ChirpStack-v4** from the dropdown menu, and fill in the address as shown in the picture. Remember the Gateway EUI code; it will be used later.

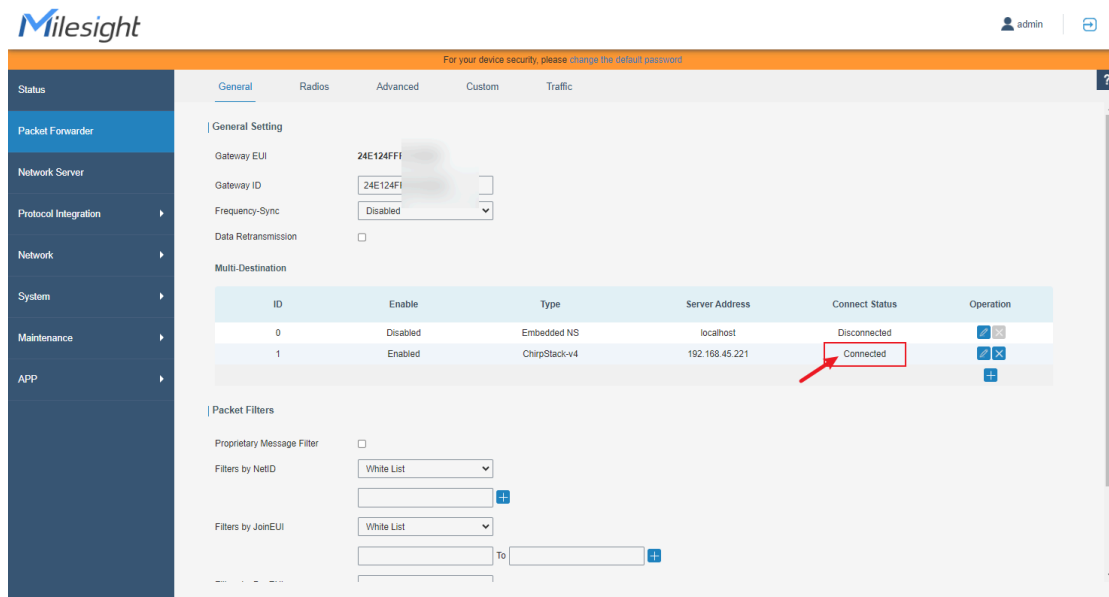




1.2. Check Status

Wait for a moment. When the page displays "**Connected**," it indicates that the gateway and ChirpStack-v4 networks are interconnected. Proceed to the next steps. If there's no "Connected" prompt here, troubleshoot the network between the gateway and ChirpStack-v4.





2. Overview of the Process

Next, let's discuss how to integrate a gateway and add LoRaWAN devices. The main operational steps can be summarized as follows:

1. Integrate the gateway. Once the gateway is integrated, data streams from the gateway can be observed in ChirpStack-v4.
2. Create a device profile and input the relevant device decode code within the device profile.
3. Begin adding LoRaWAN devices. During the addition process, it's essential to select the appropriate device profile.
4. Check whether LoRaWAN data is being reported and if it can be decoded correctly.
5. If everything is functioning properly, it indicates successful integration of the gateway with ChirpStack-v4 and successful addition of the LoRaWAN device.

3. Adding a Gateway

1. Log in to the management address of ChirpStack-v4, which is typically accessed via <http://192.168.45.221:8080/>.



ChirpStack login

* Username / email:

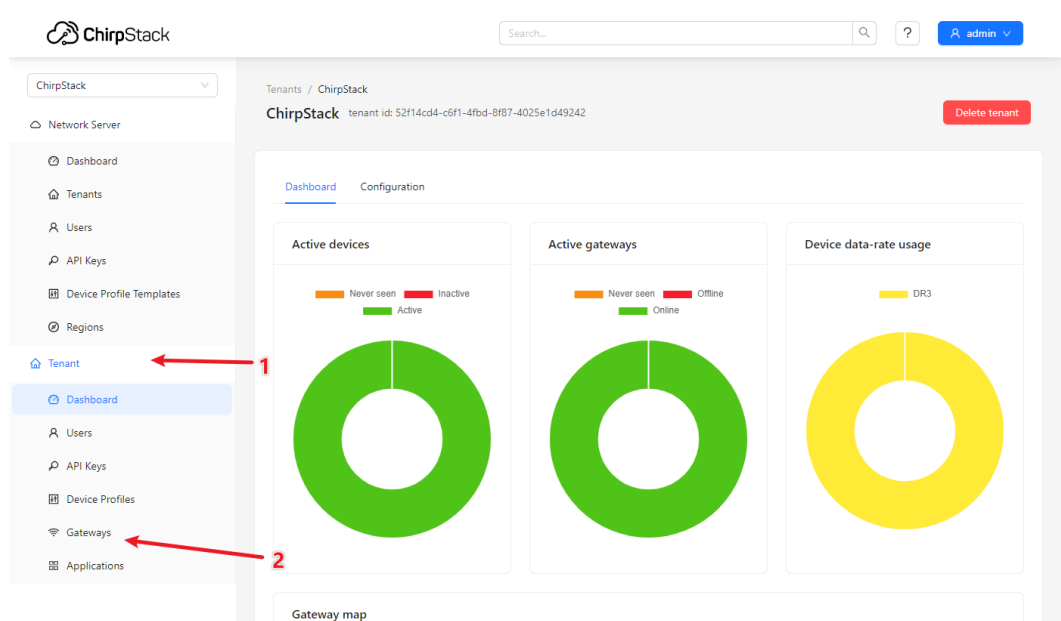
admin

* Password:

admin

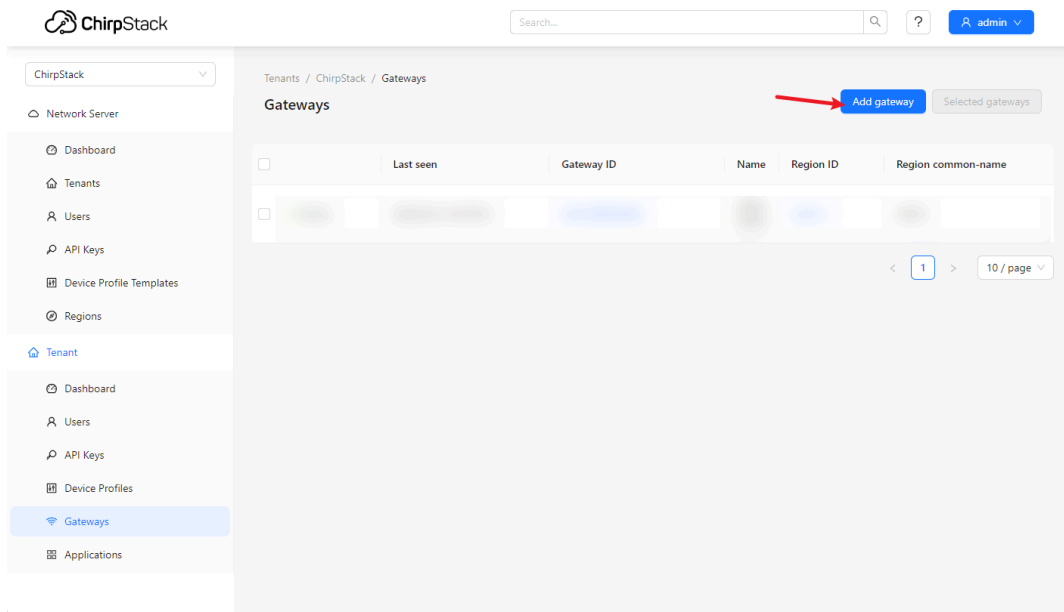
Submit

2. Navigate to Tenants -> Gateways.

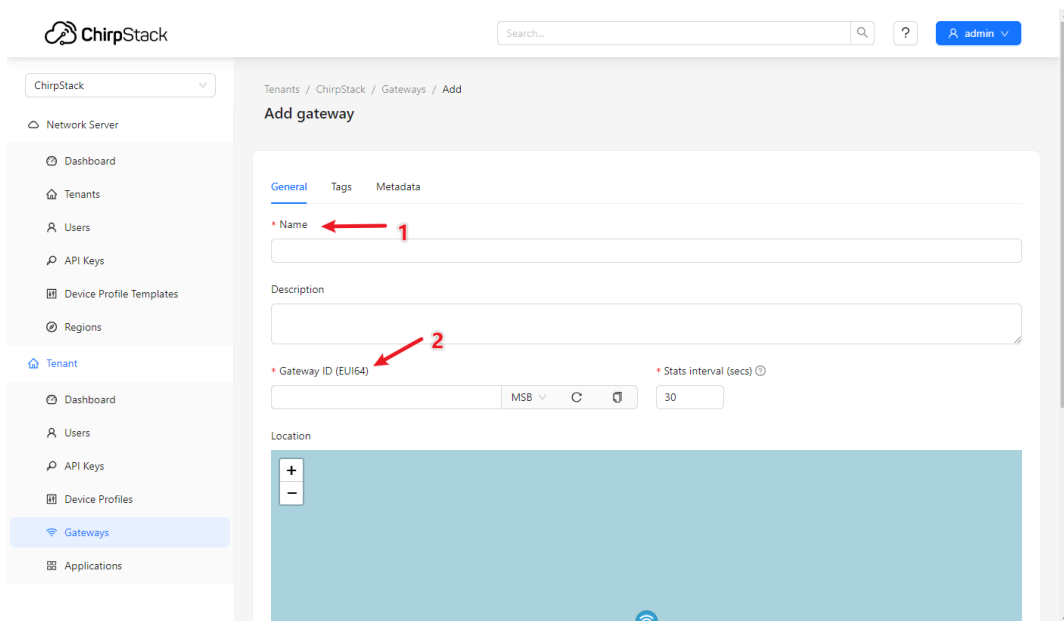


3. On the page, click on "Add gateway."





4. Fill in the relevant information on the popup page, mainly including the Name and Gateway ID (EUI64). Other information can be filled in as needed.



ChirpStack

Search...

admin

Tenants / ChirpStack / Gateways / UG65-US915 gateway id: 24e124ffe5408e

Delete gateway

Dashboard Configuration TLS certificate LoRaWAN frames

General Tags Metadata

* Name
UG65-US915

Description
US915

* Gateway ID (EUI64)
24e124f

* Stats interval (secs)
30

Location

+
-

- Once completed, click the "Submit" button at the bottom of the page to submit the data.

ChirpStack

Search...

admin

Tenants / ChirpStack / Gateways / UG65-US915 gateway id: 24e124ffe5408e

Delete gateway

Dashboard Configuration TLS certificate LoRaWAN frames

General Tags Metadata

* Name
UG65-US915

Description
US915

* Gateway ID (EUI64)
24e124f

* Stats interval (secs)
30

Location

+
-

Submit

Leaflet | © OpenStreetMap contributors

Set to current location

- Wait for approximately 1-2 minutes and observe the status of the device. If it shows "Online," it indicates successful addition.

ChirpStack

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ChirpStack

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Tenant

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- Gateways**
- Applications

Tenants / ChirpStack / Gateways

Add gateway Selected gateways

	Last seen	Gateway ID	Name	Region ID	Region common-name
<input type="checkbox"/>	Online	24e124	UG65-US915	us915_1	US915

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- Click on the Gateway ID column to access the gateway ID. On the redirected page, find "LoRaWAN frames" to see if there's any data scrolling display, typically including JoinRequest, UnconfirmedDataUp, etc.

ChirpStack

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admin

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Tenants / ChirpStack / Gateways

Add gateway Selected gateways

	Last seen	Gateway ID	Name	Region ID	Region common-name
<input type="checkbox"/>	Online	24e124ffef5408e	UG65-US915	us915_1	US915

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ChirpStack

Tenants / ChirpStack / Gateways / UG65-US915

UG65-US915 gateway id: 24e124f1

Dashboard Configuration TLS certificate **LoRaWAN frames** Download

Timestamp	Status	DevEUI	DevAddr
2024-06-14 17:00:24	JoinRequest	24e124f7d279645	
2024-06-14 17:00:23	UnconfirmedDataUp		0037166d
2024-06-14 17:00:17	JoinRequest	24e124126c486560	
2024-06-14 17:00:16	ConfirmedDataUp		06f7ca88
2024-06-14 17:00:15	JoinRequest	24e124126c322396	
2024-06-14 17:00:14	UnconfirmedDataUp		06cdc1bc
2024-06-14 17:00:13	UnconfirmedDataUp		0037166d
2024-06-14 17:00:12	JoinRequest	24e124136c278976	

8. If data is present, it indicates successful integration of the gateway and establishment of the data link.

4. Adding Device Profile

Navigate to the Tenants -> Device Profiles page, click "Add device profile."

ChirpStack

Tenants / ChirpStack / Device profiles

Device profiles Add device profile

Name	Region	MAC version	Revision	Supports OTAA	Supports Class-B	Supports Class-C
WTSS06-915M	US915	LoRaWAN 1.0.3	A	yes	no	no

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On the popup page, fill in the relevant information.

The main fields include the Name, Region, MAC version, ADR algorithm under the General tab, and Payload codec and Codec functions under the codec tab.

The screenshot shows the 'Add device profile' form in the ChirpStack web interface, specifically the 'General' tab. The form is titled 'Add device profile' and has a 'Select device profile template' button. The tabs are: General, Join (OTAA / ABP), Class-B, Class-C, Codec, Relay, Tags, and Measurements. The 'General' tab is active. The form contains the following fields:

- Name:** A text input field.
- Description:** A text area.
- Region:** A dropdown menu with 'EU868' selected.
- Region configuration:** A dropdown menu.
- MAC version:** A dropdown menu with 'LoRaWAN 1.0.3' selected.
- Regional parameters revision:** A dropdown menu with 'A' selected.
- ADR algorithm:** A dropdown menu with 'Default ADR algorithm (LoRa only)' selected.
- Flush queue on activate:** A toggle switch.
- Expected uplink interval (secs):** A text input field with '3600'.
- Allow roaming:** A toggle switch.
- Device-status request frequency (req/day):** A text input field.

Red arrows point to the following fields:

1. General tab
2. Name
3. Region
4. MAC version
5. Regional parameters revision
6. ADR algorithm

The screenshot shows the 'Add device profile' form in the ChirpStack web interface, specifically the 'Codec' tab. The form is titled 'Add device profile' and has a 'Select device profile template' button. The tabs are: General, Join (OTAA / ABP), Class-B, Class-C, Codec, Relay, Tags, and Measurements. The 'Codec' tab is active. The form contains the following fields:

- Payload codec:** A dropdown menu with 'JavaScript functions' selected.
- JavaScript functions:** A text area containing the following code:

```
// Input is an object with the following fields:
// - bytes = Byte array containing the uplink payload, e.g. [255, 230, 255, 0]
// - fPort = Uplink fPort.
// - variables = Object containing the configured device variables.
//
// Output must be an object with the following fields:
// - data = Object representing the decoded payload.
function decodeUplink(input) {
  return {
    data: {
      temp: 22.5
    }
  };
}

// Encode downlink function.
//
// Input is an object with the following fields:
// - data = Object representing the payload that must be encoded.
// - variables = Object containing the configured device variables.
//
// Output must be an object with the following fields:
// - bytes = Byte array containing the downlink payload.
```

Red arrows point to the following fields:

1. Codec tab
2. Payload codec

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Tenants / ChirpStack / Device profiles / WTSS506-915M

WTSS506-915M device profile id: d4a6824b-e36c-4164-8884-339ec357baef

Delete device profile

General

Join (OTAA / ABP)

Class-B

Class-C

Codec

Relay

Tags

Measurements

Select device-profile template

Name

WTSS506-915M

Description

Milesight IoT Weather Station is an ultimate all-in-one LoRaWAN® weather monitoring system for various and continuous atmospheric conditions including temperature, humidity, wind speed, wind direction, barometric pressure and rainfall. It is solar-powered and has chargeable batteries backup lasting up to seven days. It boasts high resolution and accuracy with rugged and aesthetic housing.

Region

US915

Region configuration

MAC version

LoRaWAN 1.0.3

Regional parameters revision

A

ADR algorithm

Default ADR algorithm (LoRa only)

Flush queue on activate

Expected uplink interval (secs)

3600

Allow roaming

Device-status request frequency (req/day)

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Tenants / ChirpStack / Device profiles / WTSS506-915M

WTSS506-915M device profile id: d4a6824b-e36c-4164-8884-339ec357baef

Delete device profile

General

Join (OTAA / ABP)

Class-B

Class-C

Codec

Relay

Tags

Measurements

Select device-profile template

Payload codec

JavaScript functions

Codec functions

```
1 /**
2  * Payload Decoder
3  *
4  * Copyright 2024 Milesight IoT
5  *
6  * @product WT3305 / WT5305 / WT5306
7  */
8 // Chirpstack v4
9 function decodeLink(input) {
10     var decoded = milesightDeviceDecode(input.bytes);
11     return { data: decoded };
12 }
13
14 function milesightDeviceDecode(bytes) {
15     var decoded = {};
16
17     for (var i = 0; i < bytes.length; ) {
18         var channel_id = bytes[i++];
19         var channel_type = bytes[i++];
20         // BATTERY
21         if (channel_id === 0x01 && channel_type === 0x70) {
22             decoded.battery = bytes[i];
23             i += 1;
24         }
25     }
26     // TEMPERATURE
```

Milesight-IoT / SensorDecoders

Code

Issues 3

Pull requests 1

Actions

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Security

Insights

Files

main

Go to file

AM_Series

AT_Series

CT_Series

DS_Series

EM_Series

GS_Series

TS_Series

UC_Series

VS_Series

WS_Series

WTS_Series

WTS305AWTSS06_Decoder.js

WTS305.png

WTS505.png

WTS506.png

WTS_Decoder.js

WT_Series

Z_AWS_IoT_Core

.gitignore

LICENSE.md

LoRaObject.md

SensorDecoders / WTS_series / WTS_Decoder.js

milesight-sway chore: Updated project structure

tsd56c - 2 months ago

History

Code

Blame

167 lines (155 loc) - 5.42 KB

Code 95% faster with GitHub Copilot

Raw

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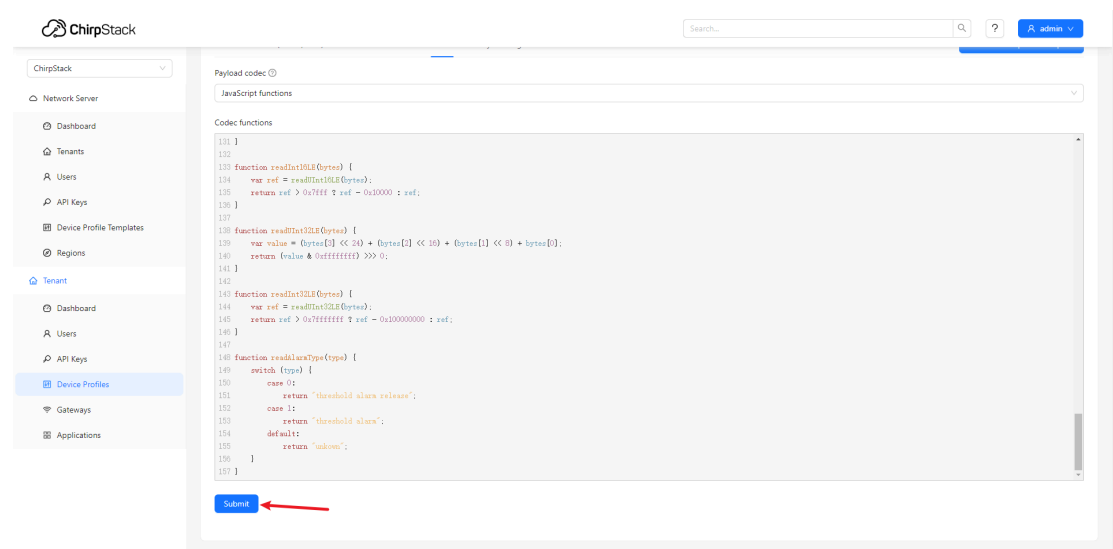
More

```
1 /**
2  * Payload Decoder
3  *
4  * Copyright 2024 Milesight IoT
5  *
6  * @product WT3305 / WT5305 / WT5306
7  */
8 // Chirpstack v4
9 function decodeLink(input) {
10     var decoded = milesightDeviceDecode(input.bytes);
11     return { data: decoded };
12 }
13
14 // Chirpstack v3
15 function Decode(Port, bytes) {
16     return milesightDeviceDecode(bytes);
17 }
18
19 // The Things Network
20 function Decoder(bytes, port) {
21     return milesightDeviceDecode(bytes);
22 }
23
24 function milesightDeviceDecode(bytes) {
25     var decoded = {};
26
27     for (var i = 0; i < bytes.length; ) {
28         var channel_id = bytes[i++];
29         var channel_type = bytes[i++];
30         // BATTERY
31         if (channel_id === 0x01 && channel_type === 0x70) {
32             decoded.battery = bytes[i];
33             i += 1;
34         }
35     }
36     // TEMPERATURE
```

Delete this two functions.

If using products from Milesight, you can access decode code at [GitHub - Milesight-IoT/SensorDecoders](#).

Fill in the Codec functions with the appropriate decode code. However, please note that you need to delete the Decode function and Decoder function from this decode code; keep the rest unchanged.

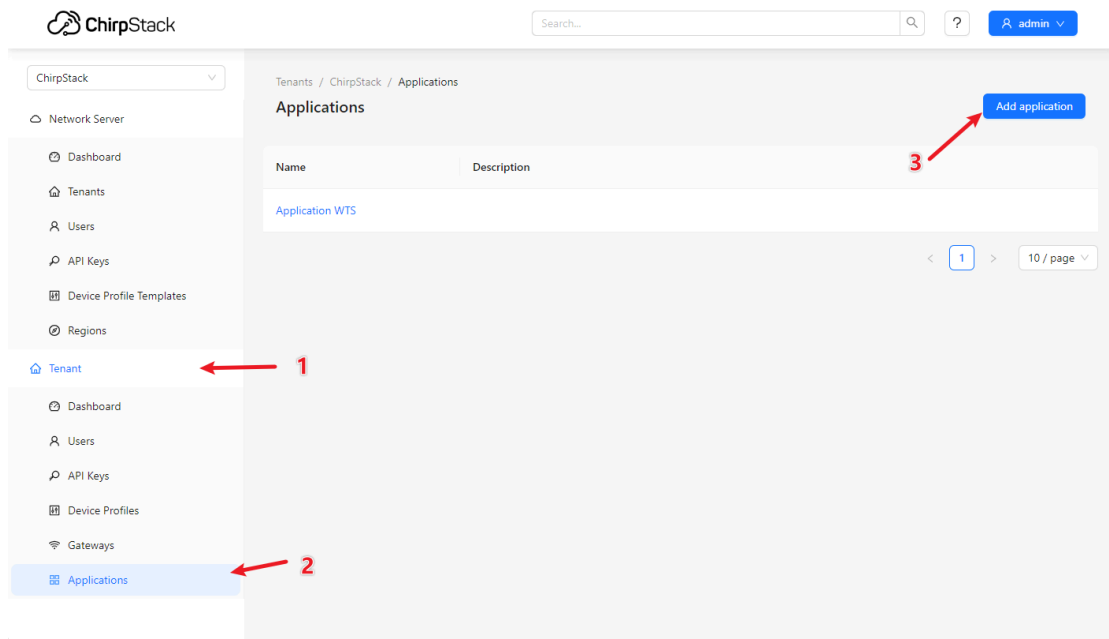


Once completed, click the "Submit" button at the bottom of the page to submit the data.

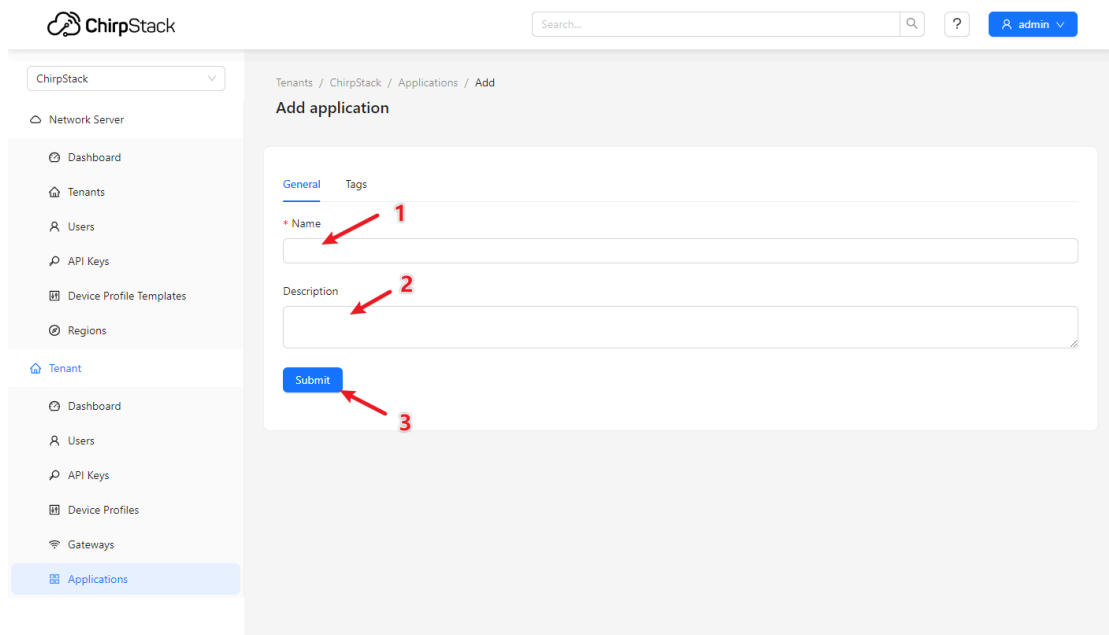
5. Adding LoRaWAN Device

Navigate to Tenants -> Applications, create an application by clicking "Add application."





Fill in the Name and other relevant information on the popup page, then click the "Submit" button at the bottom to submit the data.



On the Applications page, click on the name of the application you just added. On the popup page, go to the Device tab, find the "Add device" button, and click it.



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Description

Application WTS

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Application WTS application id: 94c1b4b0-ccd1-4ec6-b5e9-93f40e461f90

Delete application

Devices

Multicast groups

Relays

Application configuration

Integrations

1

2

Add device

Selected devices

Last seen

DevEUI

Name

Device profile

Battery

2024-06-14 17:09:48

24e12445-

WTS506-915M

WTS506-915M

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The image shows the 'Add device' form in the ChirpStack web interface. The form is titled 'Add device' and is located under the path 'Tenants / ChirpStack / Applications / Application WTS / Add device'. The form has three tabs: 'Device', 'Tags', and 'Variables'. The 'Device' tab is active. The form contains the following fields and controls:

- Name:** A text input field with a red asterisk indicating it is required. A red box and arrow labeled '1' point to this field.
- Description:** A text input field with a red box and arrow labeled '2' pointing to it.
- Device EUI (EUI64):** A text input field with a red asterisk indicating it is required. A red box and arrow labeled '3' point to this field.
- Join EUI (EUI64):** A text input field with a red box and arrow labeled '4' pointing to it.
- Device profile:** A dropdown menu with a red asterisk indicating it is required. A red box and arrow labeled '5' point to this field. The dropdown shows 'WTS506-915M' as the selected option.
- Submit:** A blue button at the bottom of the form.

Red annotations 1 through 5 are used to highlight the fields that need to be filled in: Name (1), Description (2), Device EUI (EUI64) (3), Join EUI (EUI64) (4), and Device profile (5).

Fill in the Name, Device EUI (EUI64), and Device profile information obtained from your LoRaWAN device on the popup page.

The image shows the 'Configuration' page for a device in the ChirpStack web interface. The page is titled 'Configuration' and is located under the path 'Tenants / ChirpStack / Applications / Application WTS / Devices / WTS506-915M'. The page has several tabs: 'Dashboard', 'Configuration', 'OTAA keys', 'Activation', 'Queue', 'Events', and 'LoRaWAN frames'. The 'Configuration' tab is active. The page contains the following fields and controls:

- Name:** A text input field with a red asterisk indicating it is required. The value 'WTS506-915M' is entered. A red box highlights this field.
- Description:** A text input field.
- Device EUI (EUI64):** A text input field with a red asterisk indicating it is required. The value '24e12445c' is entered. A red box highlights this field.
- Join EUI (EUI64):** A text input field with a red box highlighting it. The value '24e124c0002d001' is entered.
- Device profile:** A dropdown menu with a red asterisk indicating it is required. The value 'WTS506-915M' is selected. A red box highlights this field.
- Device is disabled:** A toggle switch.
- Disable frame-counter validation:** A toggle switch.
- Submit:** A blue button at the bottom of the form.
- Delete device:** A red button at the top right of the page.

Red boxes highlight the Name, Device EUI (EUI64), and Device profile fields, which are the same fields mentioned in the previous image.

ChirpStack

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Tenants / ChirpStack / Applications / Application WTS / Devices / WT5506-915M

WT5506-915M device eui:24e124454c481342

Delete device

Dashboard Configuration **OTAA keys** Activation Queue Events LoRaWAN frames

Flush OTAA device nonces

* Application key ⓘ
5572414c4f9 MSB C

Submit

Click the "Submit" button at the bottom to submit the data. Another page will pop up to fill in the Application Key.

After completing the addition, the effect should appear as follows:

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Tenants / ChirpStack / Applications / Application WTS

Application WTS application id:94c1b4b0-c0d1-4ec5-b5e9-9340e461f90

Delete application

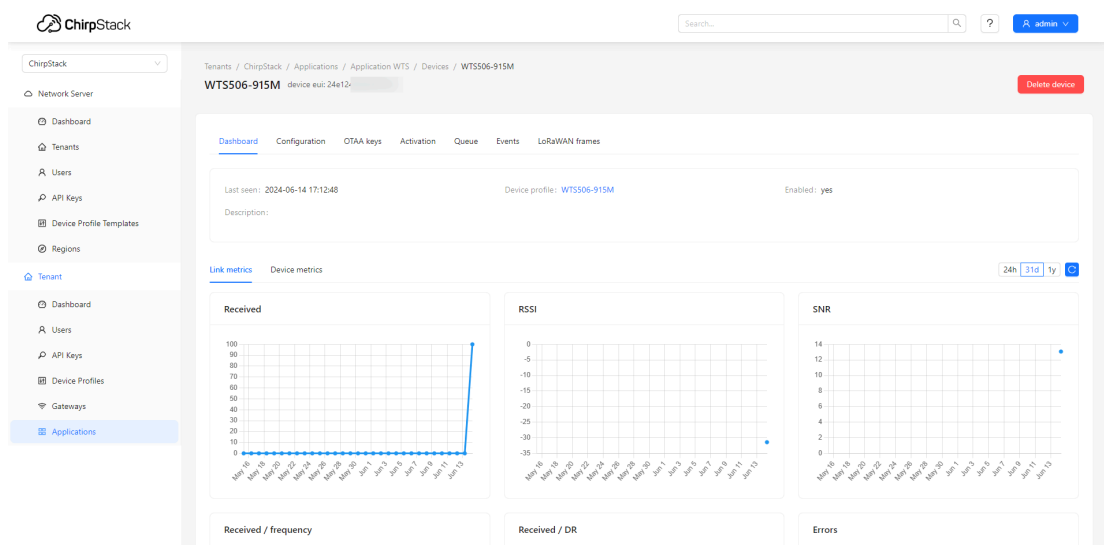
Devices Multicast groups Relays Application configuration Integrations

Add device Selected devices

<input type="checkbox"/>	Last seen	DevEUI	Name	Device profile	Battery
<input type="checkbox"/>	2024-06-14 17:12:48	24e12445	WT5506-915M	WT5506-915M	

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ChirpStack

Tenants / ChirpStack / Applications / Application WTS / Devices / WTSS06-915M

WTSS06-915M device eui:24e12445-...

Dashboard Configuration OTAA keys Activation Queue Events LoRaWAN frames

Download

2024-06-14 17:13:48	UnconfirmedDataUp	DevAddr: 01e1863e	DevEUI: 24e1244
2024-06-14 17:12:48	UnconfirmedDataUp	DevAddr: 01e1863e	DevEUI: 24e1244
2024-06-14 17:11:48	UnconfirmedDataUp	DevAddr: 01e1863e	DevEUI: 24e1244
2024-06-14 17:10:48	UnconfirmedDataUp	DevAddr: 01e1863e	DevEUI: 24e1244
2024-06-14 17:09:48	UnconfirmedDataUp	DevAddr: 01e1863e	DevEUI: 24e1244
2024-06-14 17:08:48	UnconfirmedDataUp	DevAddr: 01e1863e	DevEUI: 24e1244
2024-06-14 17:07:48	UnconfirmedDataUp	DevAddr: 01e1863e	DevEUI: 24e1244
2024-06-14 17:06:48	UnconfirmedDataUp	DevAddr: 01e1863e	DevEUI: 24e1244
2024-06-14 17:05:48	UnconfirmedDataUp	DevAddr: 01e1863e	DevEUI: 24e1244
2024-06-14 17:04:49	UnconfirmedDataDown	DevAddr: 01e1863e	DevEUI: 24e1244 Gateway ID: 24e124ffff

Note: During the process of adding a LoRaWAN device, ensure to select the correct Device Profile; otherwise, the device data may not be correctly parsed.

Here, navigate to the LoRaWAN frames page to see data scrolling and refreshing. Then, open the Events page and randomly check a few packets to verify if they are correctly parsed.



ChirpStack

Tenants / ChirpStack / Applications / Application WTS / Devices / WTS506-915M

WTS506-915M device eui: 24e12

Dashboard Configuration OTAA keys Activation Queue Events LoRaWAN frames

Time	DR	Size	Data
2024-06-14 17:14:48	3	3	Data: 0175640367070104080510504e0802073f5268792010000ec0200000063
2024-06-14 17:13:48	3	3	Data: 0175640367070104080510504e0802073f5268792010000ec0200000064
2024-06-14 17:12:48	3	3	Data: 0175640367070104080510504e0802073f5268792010000ec0200000063
2024-06-14 17:11:48	3	3	Data: 0175640367070104080510504e0802073f5268792010000ec0200000062
2024-06-14 17:10:48	3	3	Data: 0175640367070104080510504e0802073f5268792010000ec0200000061
2024-06-14 17:09:48	3	3	Data: 0175640367060104080510504e0802073f5268792010000ec0200000060
2024-06-14 17:08:48	3	3	Data: 0175640367060104080510504e0802073f5268792010000ec020000005f
2024-06-14 17:07:48	3	3	Data: 0175640367060104080510504e0802073f5268792010000ec020000005e
2024-06-14 17:06:48	3	3	Data: 0175640367060104080510504e0802073f5268792010000ec020000005d
2024-06-14 17:05:48	3	3	Data: 0175640367060104080510504e0802073f5268792010000ec020000005c

deduplicationId: "84cdfa9-268b-4a12-a544-bf0c94c1a14"
time: "2024-06-14T09:14:48.724+00:00"
deviceInfo: {
 0: 10 keys
 tenantId: "5214c0d4-c6f1-4fb4-8f07-4025e16d93d2"
 tenantName: "ChirpStack"
 applicationId: "94c1b4b0-ccd1-4ec6-b5e9-9340e461190"
 applicationName: "Application WTS"
 deviceProfileId: "d4a6824b-e36c-4164-8884-339ed8357ba"
 deviceProfileName: "WTS506-915M"
 deviceName: "WTS506-915M"
 devEui: "24e124e1"
 deviceClassEnabled: "CLASS_A"
 tags: {
 0: 0 keys
 deviceId: "01d1863d"
 adr: true
 dr: 3
 rCn: 102
 fPort: 85
 confirmed: false
 data: "XVVKAZHARokQWESgeGUm85BAAjAgAAAGU=" 1
 uplink: {
 0: 13 keys
 battery: 100
 temperature: 26.3
 rainfall_counter: 101
 humidity: 72.5
 pressure: 997.3
 wind_direction: 45.6
 rainfall_total: 0.02
 wind_speed: 0.1
 2
 }
 }
 rttm: {
 0: 13 keys
 gatewayId: "24e12"
 uplinkId: 43848
 gntime: "2024-06-14T09:14:48.724337+00:00"
 nsTime: "2024-06-14T09:14:48.73153955+00:00"
 timeSinceGpsEpoch: "1402391706.724s"
 rssi: -20
 snr: 14
 channel: 4
 rfChain: 1
 location: {
 0: 0 keys
 context: "EEZyA=="
 metadata: {
 0: 2 keys

So far, the gateway has been successfully integrated with ChirpStack-v4 and can effectively read and parse data from LoRaWAN devices.

-END-

