



EDA TEC ED-GWL501 Indoor Light Gateway User Manual

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Disclaimers

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Product Overview

ED-GWL501 is an indoor light gateway designed based on Raspberry Pi Zero 2 W. This product uses the LoRa gateway module of the new generation SX1302 and SX1303 baseband chips, which has the characteristics of long transmission distance, large node capacity and high receiving sensitivity. In addition, this gateway has strong performance, light structure and simple deployment, which can greatly simplify and shorten your development threshold and design time.

Target Application

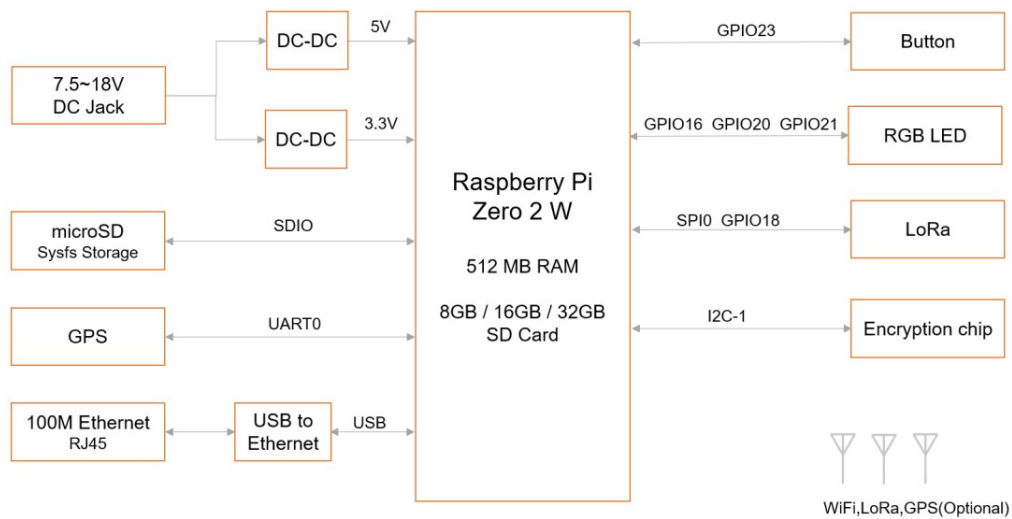
- LoRa intelligent gateway
- Industrial control
- Smart manufacturing
- Intelligent city
- Intelligent transportation

Specifications and Parameters

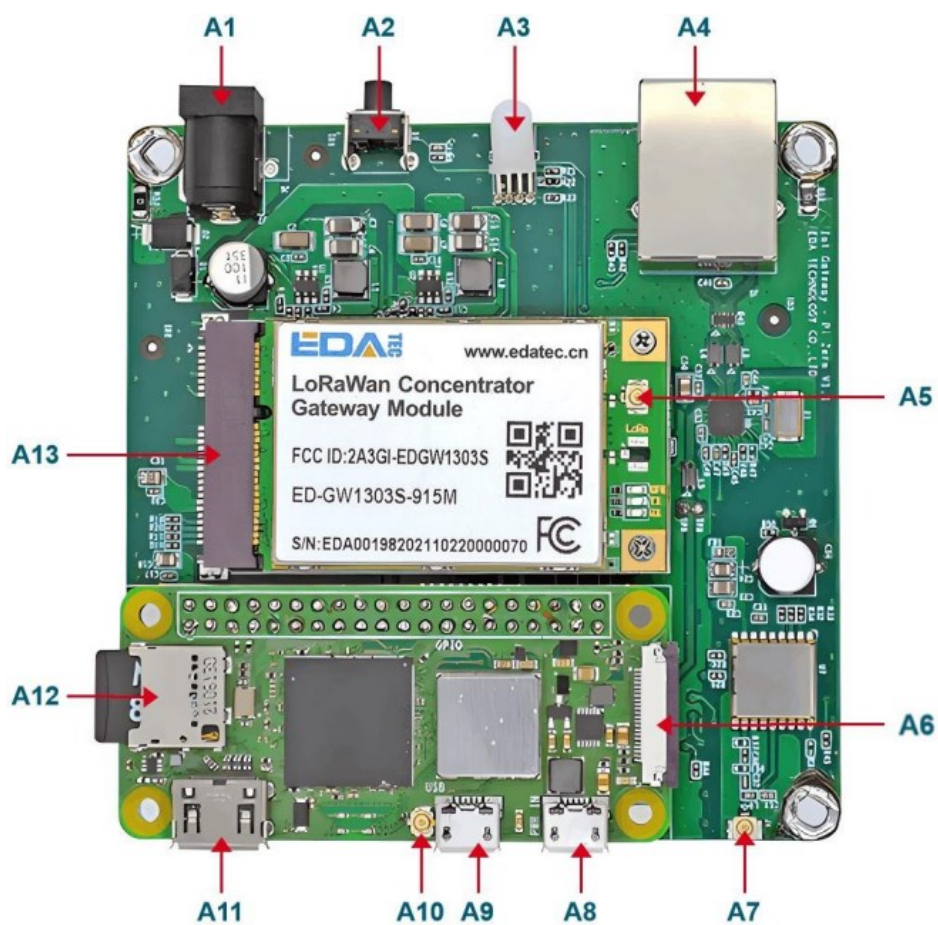
Function	Parameters
CPU	Broadcom BCM2710A1 4 core, ARM Cortex-A53, 1GHz, 64bit CPU
Memory	512MB SDRAM
SD card	micro SD Card
Ethernet	1x 10/100M Ethernet
WiFi / Bluetooth	2.4GHz 802.11 b/g/n WiFi Bluetooth 4.2 Support BLE
LoRa	SX1303+SX1250
	868 ~ 870 MHz (EU868, IN865, RU864)
	902 ~ 928 MHz (US915, AU915, KR920, AS923-1/2/3)
Security	Embedded ATECC608A security chip
GPS	Support multi-satellite system
	– GPS L1 C/A 1575.42 \pm 1.023 MHz
	– BeiDou B1I 1561.098 \pm 2.046 MHz
	– GLONASS L1 1597.78~1605.66 MHz
Button	1x User Button
LED Indicator	1x RGB LED
Power input	7.5V ~ 18V

Function	Parameters
Antenna accessory	WiFi/BT external antenna, which has passed wireless authentication together with Raspberry Pi Zero 2 W.
	1x 2.5dBi LoRa Antenna [option]
	1x GPS Antenna [option]
Working environment temperature	option-25 ~ 50°C
OS	Compatible with official Raspberry Pi OS, provides BSP software support package, and supports online installation and update of APT.
Software resources	Provide example guidance for LoRaWAN networks such as ChipStack.
Dimensions	105(L) x 90(W) x 25(H) mm
Certification	CE / FCC
OTA	Support online updating BSP

System Diagram



Functional Layout

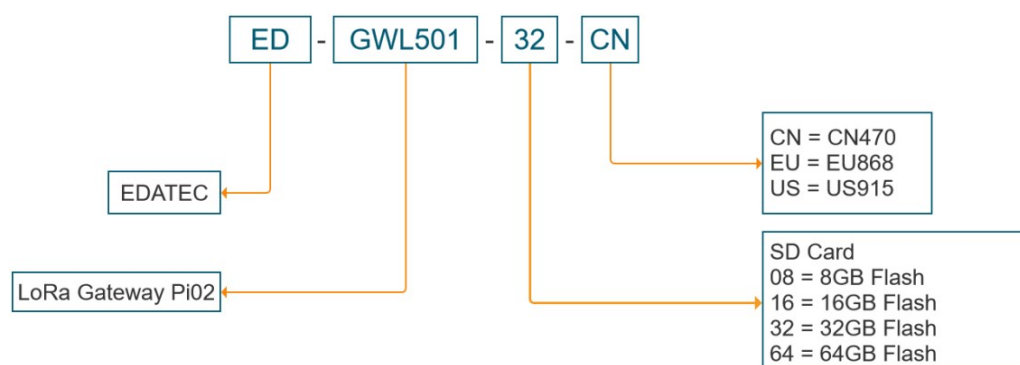


Item	Function Description	Item	Function Description
A1	12V DC power socket	A9	USB OTG port
A2	Key	A10	IPX connector of WiFi/BT antenna
A3	RGB LED	A11	Mini HDMI port
A4	Ethernet RJ45 port	A12	Micro SD slot
A5	LoRa antenna IPX connector	A13	LoRa mini-PCle port
A6	CSI port		
A7	IPX connector of GPS antenna		
A8	Micro USB Power supply port		

Packing List

- 1x ED-GWL501 host
- [option] WiFi/BT antenna
- [option 4G version] 1x 4G/LTE antenna

Order Code



Quick Star

Equipment List

- 1x ED-GWL501 host
- 1x WiFi / BT external antenna
- 1x LoRa external antenna
- 1x GPS antenna
- 1x net cable
- 1x 12V@2A power supply

Hardware Connection

1. Install the WiFi external antenna.

2. Install LoRa external antenna.
3. Install the GPS external antenna and place it outdoors.
4. Insert the network cable into the Ethernet port, and the network cable is connected with network devices such as routers and switches that can access the Internet.
5. Plug in the DC power input port (+12V DC) of ED-GWL501 and supply power to the power adapter.

First Start

ED-GWL501 has no power switch. Plug in the power cord and the system will start.

Raspberry Pi OS (Lite)

If you use the system image provided by us, after the system starts, you will automatically log in with the user name pi, and the default password is raspberry.

```
[ OK ] Started User Login Management.
[ OK ] Finished Permit User Sessions.
[ OK ] Started Getty on tty1.
[ OK ] Reached target Login Prompts.
[ OK ] Started OpenBSD Secure Shell server.
[ OK ] Started Modem Manager.
[ OK ] Started Hostname Service.
Starting Network Manager Script Dispatcher Service...
[ OK ] Started Network Manager Script Dispatcher Service.
[ OK ] Listening on Load/Save RF Kill Switch Status /dev/rfkill Watch.
Starting Load/Save RF Kill Switch Status...
[ OK ] Started LSB: Switch to on@ (unless shift key is pressed).
[ OK ] Started Load/Save RF Kill Switch Status.
Starting Save/Restore Sound Card State...
[ OK ] Finished Save/Restore Sound Card State.
[ OK ] Reached target Sound Card.

Debian GNU/Linux 11 raspberrypi tty1
raspberrypi login: pi (automatic login)

Linux raspberrypi 5.15.32-08+ #1538 SMP PREEMPT Thu Mar 31 19:40:39 BST 2022 aarch64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

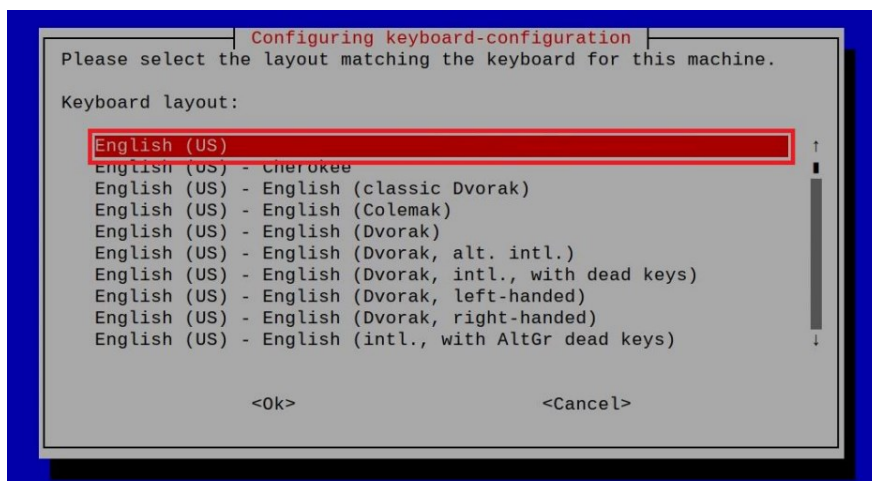
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Jan 31 03:52:21 GMT 2023 from 192.168.168.211 on pts/0

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set a new password.

pi@raspberrypi:~$
```

If you use the official system image, and the image is not configured before burning, the configuration window will appear when you start it for the first time. You need to configure the keyboard layout, set the user name and the corresponding password.

- Set the configuration keyboard layout



- Create new user name



Then set the password corresponding to the user according to the prompt, and enter the password again for confirmation. At this point, you can log in with the user name and password you just set.

Use SSH

All the images we provide have turned on the SSH function. If you use the official image, you need to turn on the SSH function.

Use raspi-config enable SSH

sudo raspi-config

1. Choose 3 Interface Options
2. Choose I2 SSH
3. Would you like the SSH server to be enabled? Select Yes
4. Choose Finish

Add Empty File To Enable SSH

Put an empty file named ssh in the boot partition, and the SSH function will be automatically enabled after the device is powered on.

Get The Device IP

- If the display screen is connected, you can use the ifconfig command to find the current device IP.
- If there is no display screen, you can view the assigned IP through the router.
- If there is no display screen, you can download the nmap tool to scan the IP under the current network. Nmap supports Linux, macOS, Windows and other platforms. If you want to use nmap to scan the network segments from 192.168.3.0 to 255, you can use the following command

After waiting for a period of time, the result will be output.

Starting Nmap 7.92 (<https://nmap.org>) at 2022-12-30 21:19

Nmap scan report for 192.168.3.1 (192.168.3.1)

Host is up (0.0010s latency).

MAC Address: XX:XX:XX:XX:XX:XX (Phicomm (Shanghai))

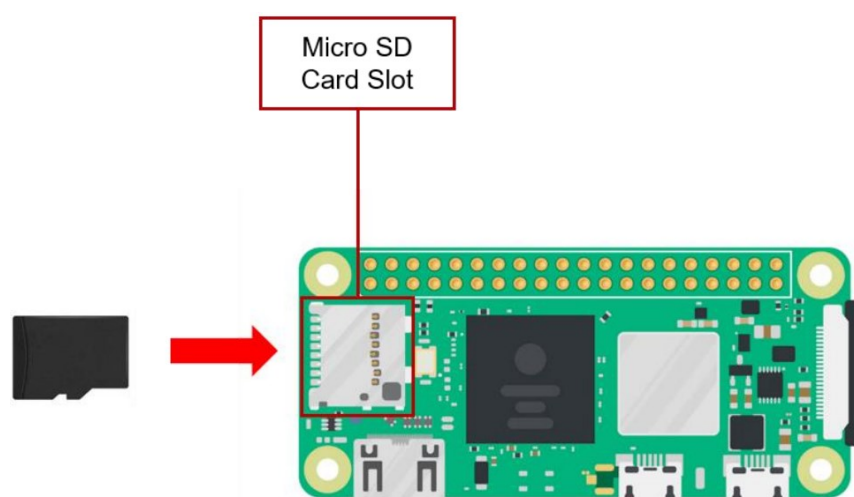
Nmap scan report for DESKTOP-FGEOUUK.lan (192.168.3.33)
Host is up (0.0029s latency).
MAC Address: XX:XX:XX:XX:XX:XX (Dell)
Nmap scan report for 192.168.3.66 (192.168.3.66)
Host is up.
Nmap done: 256 IP addresses (3 hosts up) scanned in 11.36 seconds

Wiring Guide

Internal I/O

micro-SD Card

ED-GWL501 is internally integrated with Raspberry Pi Zero 2 W, which has a micro SD card slot. Please insert the micro SD card of the burned system face up into the micro SD card slot.



Software Operation Guide

Button

ED-GWL501 has one user-defined button, the screen printing on the shell is Setup, which is connected to the GPIO23 pin of the CPU. By default, it is high, and when the key is pressed, the pin is low.

We use the `raspi-gpio` command to test, and query the GPIO23 pin when the key is not pressed.

```
raspi-gpio get 23
```

```
GPIO 23: level=1 fsel=0 func=INPUT
```

LED Indication

ED-GWL501 has an RGB three-color LED indicator. Corresponding to the GPIO pin of CPU is as follows

RGB LED PIN	GPIO
Blue	GPIO16
Green	GPIO20
Red	GPIO21

When the GPIO output is low, the corresponding LED is valid. We use the `raspi-gpio` command to operate, and the configuration parameter is `op`, which means output setting, `dl` setting pin is low level, and `dh` setting pin is high level.

- LED is blue
- LED is green
- LED is red
- LED is yellow

Ethernet Configuration

ED-GWL501 has an adaptive 10/100Mbps Ethernet interface, with the screen-printed logo: Ethernet, which is extended by the built-in USB interface. The interface address of the network card is /sys/class/net/usb0. The official system of Raspberry Pi uses dhcpcd as the network management tool by default. Setting static IP can be set by modifying/etc/dhcpcd.conf. For example, set usb0, and users can set wlan0 and other network interfaces according to their different needs

WiFi

ED-GWL501 support 2.4 GHz IEEE 802.11 b/g/n WiFi The official system of Raspberry Pi uses dhcpcd as the network management tool by default

1. Choose 1 System Options
2. Choose S1 Wireless LAN
3. Select your country in the Select the country in which the pi is to be used window, and then select OK. This prompt only appears when setting up WIFI for the first time.
4. Please enter SSID input WIFI SSID.
5. Please enter passphrase. Leave it empty if none input password, then restart

Bluetooth

ED-GWL501 supports Bluetooth 4.2 and Bluetooth Low Power Consumption (BLE), and the Bluetooth function is turned on by default. Bluetoothctl can be used to scan, pair and connect Bluetooth devices. Please refer to the ArchLinuxWiki-Bluetooth guide to configure and use Bluetooth.

Usage

- Scan
- Find
- Trust device
- Connect device
- Disconnect device

GPS

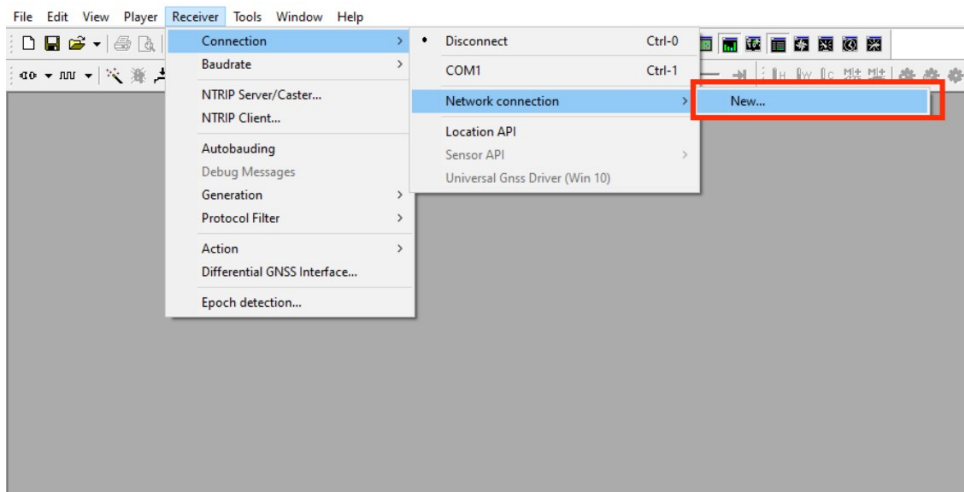
The ED-GWL501 gateway integrates L76K GPS module, which is connected with UART0 serial port of CPU. The module reports GNSS information through NMEA 0183 general protocol output statemen

- \$BDGSV Visible Beidou satellite information
- \$GNRMC Recommended GNSS data
- \$GNVTG Relative ground heading and speed information
- \$GNZDA Time and date, UTC format
- \$GPTXT Text transmission
- \$GNGGA Multi-satellite joint positioning data
- \$GNGLL Geographical location, latitude and longitude

- \$GNGSA GNSS accuracy factor and effective satellite
- \$GPGSV Visible GNSS satellite

Checks Ser2net Port Forwarding Service

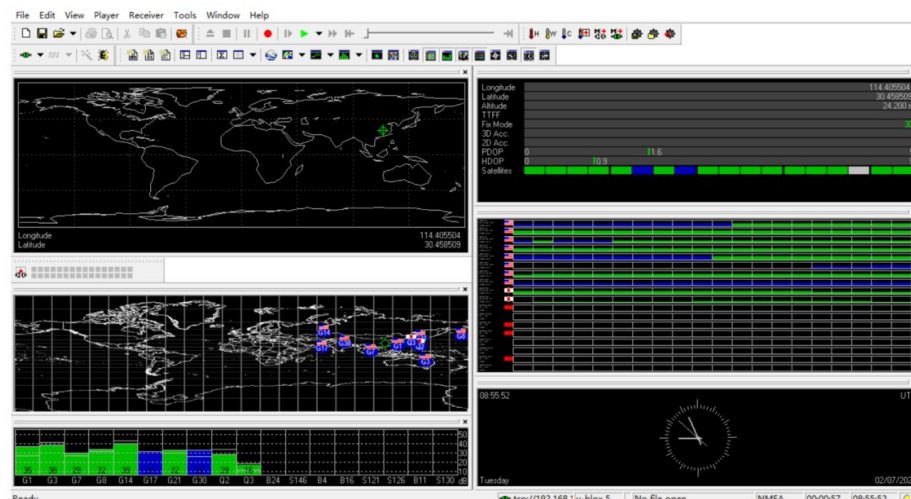
Open u-center Choose Receiver->Port->Network connection->New...



Enter your device IP and port number 2000.



You will see the GPS positioning information immediately after the configuration is completed.



If the Fix Mode is displayed as No Fix, it means that the positioning failed, which is usually caused by the antenna being indoors. Please put the module or antenna outdoors for testing.

Longitude	
Latitude	
Altitude	
TTF	
Fix Mode	No Fix
3D Acc.	
2D Acc.	
PDOP	0 4.3 10
HDOP	0 2.0 10
Satellites	

NOTE:For the first time, it takes about 30 seconds to locate successfully when there is no large building outside. If the weather conditions are bad, it may take longer or it may not be possible to locate it.

LoRaWAN

ED-GWL501 supports LoRaWAN open source service platform ChipStack, please refer to the following steps for installation and configuration.

Install LoRa Service And ChirpStack Client

We install it by APT.

- Add edatec APT warehouse
- Install ChirpStack
- Modify config.txt

Configuring LoRa Service

chirpstack-gateway-bridge Configuration

You can use nano to edit the configuration file chirpstack-gateway-bridge.toml

```
# This configuration provides a Semtech UDP packet-forwarder backend and
# integrates with a MQTT broker. Many options and defaults have been omitted
# for simplicity.
```

```
#
```

```
# See https://www.chirpstack.io/gateway-bridge/install/config/ for a full
# configuration example and documentation.
```

```
# Gateway backend configuration.
```

```
[backend]
```

```
# Backend type.
```

```
type="semtech_udp"
```

```
# Semtech UDP packet-forwarder backend.
```

```
[backend.semtech_udp]
```

```
# ip:port to bind the UDP listener to
```

```
#
```

```
# Example: 0.0.0.0:1700 to listen on port 1700 for all network interfaces.
```

```
# This is the listener to which the packet-forwarder forwards its data
```

```
# so make sure the 'serv_port_up' and 'serv_port_down' from your
```

```
# packet-forwarder matches this port.
```

```
udp_bind = "0.0.0.0:1700"
```

```
# Integration configuration.
```

```
[integration]
```

```
# Payload marshaler.
```

```
#
# This defines how the MQTT payloads are encoded. Valid options are:
# * protobuf: Protobuf encoding
# * json: JSON encoding (easier for debugging, but less compact than 'protobuf')
marshaller="protobuf"
# MQTT integration configuration.
[integration.mqtt]
# Event topic template.
event_topic_template="eu868/gateway/{{ .GatewayID }}/event/{{ .EventType }}"
# Command topic template.
command_topic_template="eu868/gateway/{{ .GatewayID }}/command/#"
# MQTT authentication.
[integration.mqtt.auth]
# Type defines the MQTT authentication type to use.
#
# Set this to the name of one of the sections below.
type="generic"
# Generic MQTT authentication.
[integration.mqtt.auth.generic]
# MQTT server (e.g. scheme://host:port where scheme is tcp, ssl or ws)
server="tcp://127.0.0.1:1883"
# Connect with the given username (optional)
username=""
# Connect with the given password (optional)
password=""
```

Reboot

```
$ sudo reboot
```

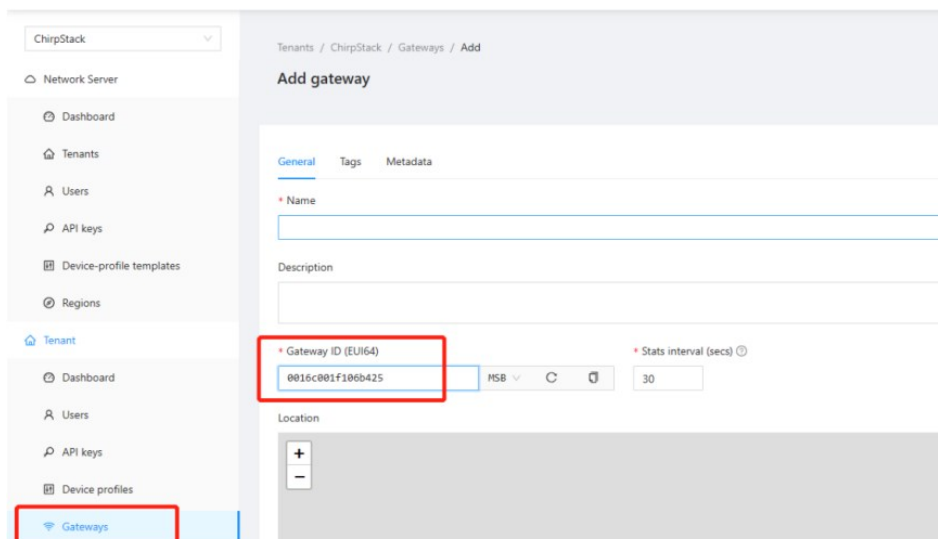
Install ChirpStack Server

To configure a cloud server, docker needs to be installed on the server before configuration.

Install docker: <https://docs.docker.com/get-docker/>

Add LoRa Gateway

Open chirpstack management interface in PC browser, click Gateway -> Add gateway, fill in the Gateway ID corresponding to the device, set the Name, and then click Submit. If the network connection is correct, wait a moment to see that the added gateway becomes Online.



The screenshot shows the ChirpStack web interface. On the left, a sidebar menu has 'Gateways' highlighted with a red box. The main content area is titled 'Add gateway' and contains a form with three tabs: 'General', 'Tags', and 'Metadata'. The 'General' tab is active. It includes fields for 'Name', 'Description', and 'Gateway ID (EUI64)'. The 'Gateway ID (EUI64)' field is highlighted with a red box and contains the value '0016c001f306b425'. To the right of this field is a 'Stats interval (secs)' field set to '30'. Below these fields is a 'Location' section with a map and a red box around the 'Gateway ID (EUI64)' field.

Add Device Profile

Click device profile-> add device profile to further improve the device information.

The screenshot shows the 'Add device profile' form in the ChirpStack interface. The left sidebar contains a navigation menu with options like Network Server, Dashboard, Tenants, Users, API keys, Device-profile templates, and Regions. The main content area has a header 'Add device profile' and a search bar. Below the header, there are tabs for 'General', 'Join (OTAA / ABP)', 'Class-B', 'Class-C', 'Codec', 'Tags', and 'Measurements'. The 'General' tab is active, showing fields for 'Name', 'Description', 'Region' (set to EU868), 'Region configuration', 'MAC version' (set to LoRaWAN 1.0.3), 'Regional parameters revision' (set to A), and 'ADR algorithm' (set to Default ADR algorithm (LoRa only)). There are also checkboxes for 'Flush queue on activate', 'Expected uplink interval (secs)', and 'Device-status request frequency (req/day)'.

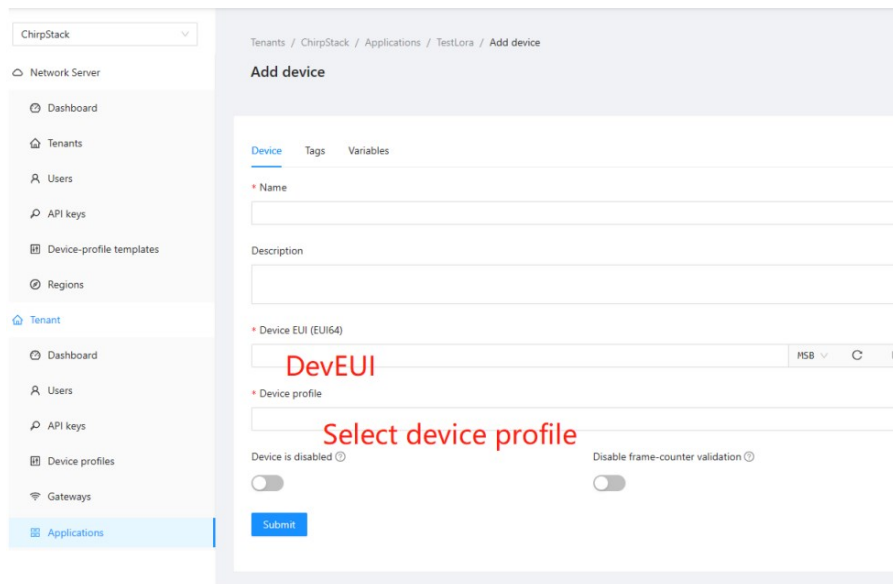
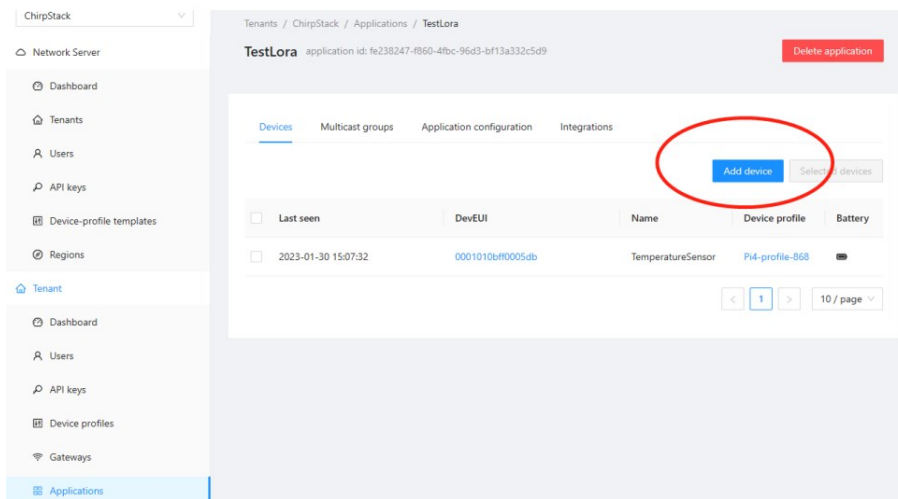
Add Application

Click Applications -> Add application

The screenshot shows the 'Add application' form in the ChirpStack interface. The left sidebar contains a navigation menu with options like Network Server, Dashboard, Tenants, Users, API keys, Device-profile templates, and Regions. The main content area has a header 'Add application' and a search bar. Below the header, there are tabs for 'General', 'Join (OTAA / ABP)', 'Class-B', 'Class-C', 'Codec', 'Tags', and 'Measurements'. The 'General' tab is active, showing fields for 'Name', 'Description', and a 'Submit' button.

Add Device

You should know the DevEUI and AppKey of LoRa terminal products, which are provided by LoRa terminal equipment manufacturers.



Operating System Installation

Image Download

We have provided the factory image. If the system is restored to factory settings, please click the following link to download the factory image.

Raspberry Pi OS Lite, 32-bit

- Release date: 2023-02-09
- System: 32-bit
- Kernel version: 5.15
- **Debian version:** 11 (bullseye)
- **Downloads:** <https://1drv.ms/u/s!Au060HUAteYBf3YgII0T6ex1BVce=1Kn9KN>

System flash

The system burning of ED-GWL501 means burning SD card.

- Download and install Raspberry Pi Imager or balenaEtcher mirror writing tool.
- Insert the micro SD card into the card reader, and then insert the card reader into the USB port of the computer.
- Open the mirror burning tool and select the mirror you want to burn. The path is the path of the identified mass

storage device.

- Click Burn, wait for burn and verification to be completed, and pop up the card reader device.
- Open the top cover of ED-GWL501 equipment and insert the micro SD card with burned image into the card slot.
- Just re-power the equipment.

FAQ

Default Username and Password

The default user name of our factory image is pi, and the default password is raspberry

About Us

About EDATEC

EDATEC, located in Shanghai, is one of Raspberry Pi's global design partners. Our vision is to provide hardware solutions for Internet of Things, industrial control, automation, green energy and artificial intelligence based on Raspberry Pi technology platform. We provide standard hardware solutions, customized design and manufacturing services to speed up the development and time to market of electronic products.

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Documents / Resources

 <p>ED-GWL501</p> <p>EDA TEC</p>	<p>EDA TEC ED-GWL501 Indoor Light Gateway [pdf] User Manual</p> <p>ED-GWL501, ED-GWL501 Indoor Light Gateway, Indoor Light Gateway, Light Gateway, Gateway</p>
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References

-  [OpenPGP Keyserver](#)
-  [Microsoft OneDrive - Access files anywhere. Create docs with free Office Online.](#)
-  apt.edatec.cn/pubkey.gpg
-  [Index of /raspbian/](#)
-  [Index of /packages/4.x/deb/](#)
-  [GitHub - chirpstack/chirpstack-docker: Setup ChirpStack using Docker Compose](#)
-  [Nmap: the Network Mapper - Free Security Scanner](#)
-  [Bluetooth - ArchWiki](#)
-  [balenaEtcher - Flash OS images to SD cards & USB drives](#)

-  [Configuration - ChirpStack open-source LoRaWAN® Network Server](#)
-  - -CAN -
-  [Download Visual C++ Redistributable Packages for Visual Studio 2013 from Official Microsoft Download Center](#)
-  [Raspberry Pi OS – Raspberry Pi](#)
-  [u-center | u-blox](#)

Manuals+.