



XGW1 LoRaWAN Gateway

MANUAL

REVISIONS

Revision	Revisor	Date	Changes
0	Dominik Lastovčić	11/2021	First version
1	Dominik Lastovčić	01/2022	Changed base platform for registration
2	Tihomir P. / Dominik L.	09/2022	Added web GUI and some manual configs
3	Dominik L.	09/2022	Updated instructions for the console configuration

Table of contents

1. Getting started	3
2. XGW1 DASHBOARD	6
2.1 Login.....	6
2.1 General.....	7
2.2 LoRaWAN packet forwarder configuration	8
2.3 Network connection configuration.....	10
3. SCRIPT BASED CONFIGURATION.....	13
3.1 Usage	13
3.2 Configuration options	14
3.3 Static IP configuration	18
4. Network server gateway registration	19
4.1 Lorient network gateway registration	19

Table of figures

Figure 1 XGW1 assembly	3
Figure 2 XGW1 connection terminals.....	4
Figure 3 XGW1 LED signalization	5
Figure 4 Login screen	6
Figure 5 General settings	7
Figure 6 LoRaWAN configuration.....	8
Figure 7 Network configuration.....	10
Figure 8 Register a new gateway	19
Figure 9 Choose Base platform.....	20
Figure 10 X-logic XGW1 gateway's MAC address	21
Figure 11 Register X-logic XGW1t gateway.....	22
Figure 12 Gateway disconnected.....	23
Figure 13 Gateway connected.....	24

1. Getting started

XGW1 should be mounted on desired location using delivered mechanical hardware.

Complete assembly should be as shown in the image below:



Figure 1 XGW1 assembly

LoRa antenna shall be attached to the mechanical stand as shown in image. Antenna is delivered separated due to packaging requirements.

Connect Lora (white long fiberglass) antenna to provided extension cable with N-Type connectors. GPS antenna (the smallest one) shall be mounted to the right and Mobile network antenna (2G, 3G, 4G) in between GPS and LoRa antenna.

To power the gateway, POE 48V power (passive) or 12V DC power supply is needed.



Figure 2 XGW1 connection terminals

To use POE, plug in RJ-45 connector into Ethernet socket on XGW1 and the other one to the POE injector's LAN socket. POE injector is provided in delivery package. **Use POE injector in a dry place!**

To use 12V DC, pressure compensation plug marked in image must be removed and replaced with provided pressure compensation cable gland.

Added cable gland is then used to get 12V DC cable inside. 12V lines should be connected to X200 terminal block. When 12V is present, power supply of XGW1 is switched to 12V input.

If XGW1 device is opened, multiple operation signaling LEDs are visible during normal operation. LEDs viewing is not necessary in normal operation, but useful for troubleshooting.



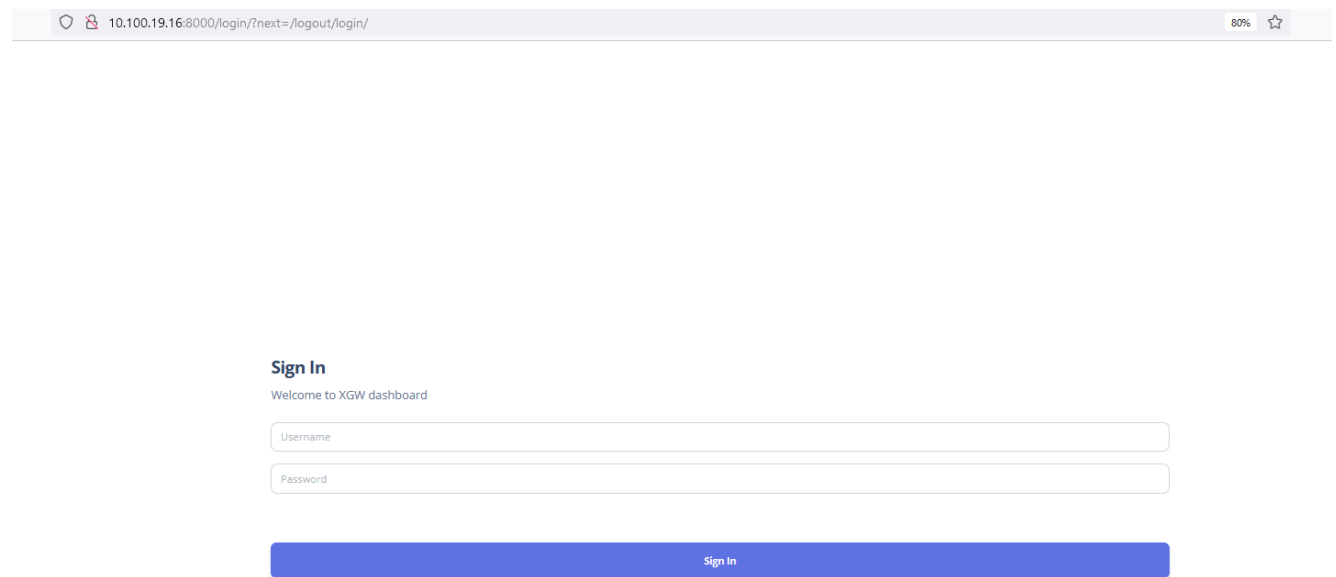
Figure 3 XGW1 LED signalization

2. XGW1 DASHBOARD

Web dashboard is used for configuration when IP address of XGW1 is available to the user. Access it from web browser by typing in IP address of the XGW1 device.

Ensure you can access IP address of the device. As default device is delivered with DHCP active and using applications as *nmap* or *Advanced IP Scanner* you can find out the IP address of your XGW1.

2.1 Login



10.100.19.16:8000/login/?next=/logout/login/ 80% ☆

Sign In
Welcome to XGW dashboard

Username

Password

Sign In

Figure 4 Login screen

Use credentials provided by X-LOGIC to login on the login screen.

2.2 General

This page gives information about device's MAC address, Network Server and current state of connection to the Network (Internet).

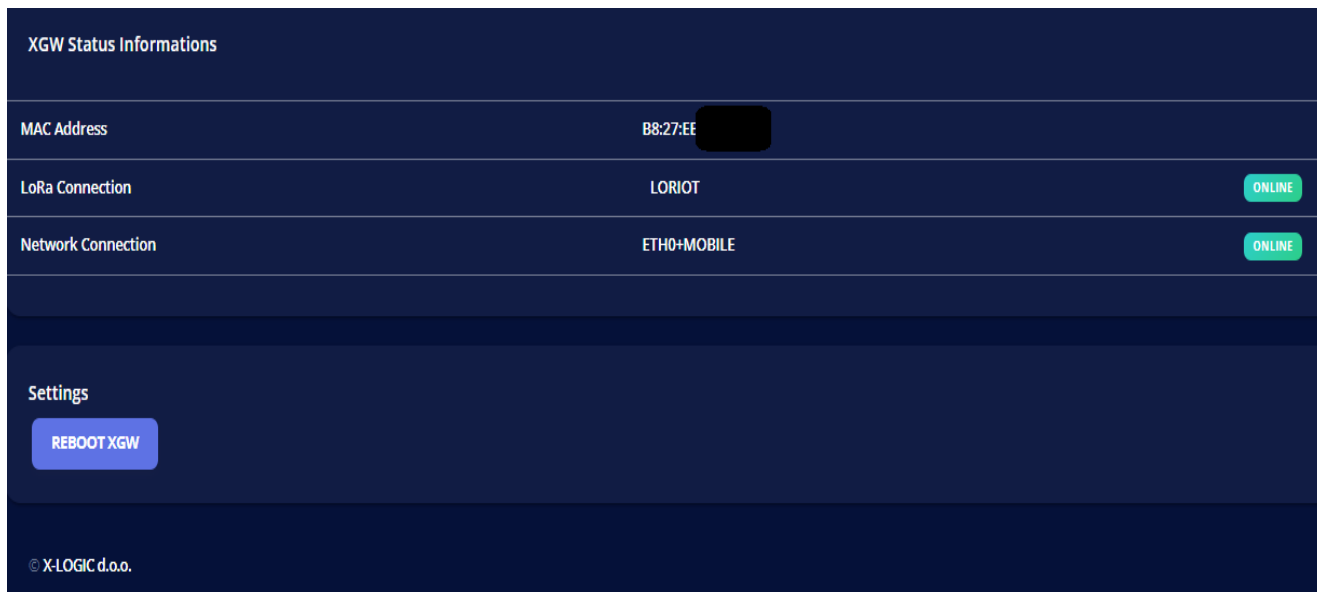


Figure 5 General settings

On the bottom of the page, press button *REBOOT XGW1* when necessary to reboot the device.

2.3 LoRaWAN packet forwarder configuration

The screenshot displays a configuration interface for LoRaWAN packet forwarding. At the top, there is a 'Select LoRaWAN connection:' section with two radio buttons: 'Loriot' (selected) and 'Custom Lora Server'. To the right of these are three buttons: 'Confirm', 'Reset Loriot', and 'Reset Custom LoRa Network Server'.

Below this are two columns of settings:

- Current Loriot Settings:**
 - Loriot Server IP Address: eu1.loriot.io
- Current Custom LoRa Server Settings:**
 - Custom LoRa Server IP Address: eu1.cloud.thethings.network
 - Custom LoRa Server Port UP: 1700
 - Custom LoRa Server Port Down: 1700
 - Device EUI: B827EBFFFFBA4228

At the bottom, there are two configuration panels:

- CONFIGURE LORIOT SETTINGS:** A dropdown menu for 'Loriot server IP address' is set to 'EU1', with an 'Apply Changes' button below it.
- CONFIGURE CUSTOM LORA SERVER SETTINGS:** Three input fields for 'Custom Server IP Address' (chirpstack.iot.net), 'Custom Server Port UP' (1700), and 'Custom Server Port DOWN' (1800), with an 'Apply Changes' button below them.

Figure 6 LoRaWAN configuration

Available options for network servers are:

- Loriot
- Chirpstack

Use menu *Select LoRaWAN connection* on top of the page to choose between supported network servers.

Use settings group on the right to configure Chirpstack properties:

- Chirpstack Server IP Address
- Chirpstack Server Port UP
- Chirpstack Server Port DOWN

Use settings group on the right to configure Lorient properties:

- Lorient server IP address

By default, supported Lorient servers are:

- eu1.lorient.eu
- eu4.lorient.eu

These two servers require different packet forwarder binaries. Binary is automatically switched when the respective server is chosen.

2.4 Network connection configuration

The gateway can use Ethernet or a Mobile network interface to connect to the network and use one or another as backup connection according to user preferences.

To use the mobile network interface SIM card should be provided. SIM card should have a cleared PIN number. If not, the PIN number must be provided in the gateway's configuration file.

The screenshot displays a network configuration interface with a dark blue background. At the top, there is a 'Select Network:' section with four radio buttons: 'Ethernet', 'Ethernet then Mobile' (which is selected), 'Mobile network', and 'Mobile then Ethernet'. A 'Change Network Connection' button is located to the right of these options.

Below this, there are two main panels. The left panel is titled 'Current Ethernet Settings' and contains a table with the following data:

Static IP Address:	127.0.0.1
DNS Address:	8.8.8.8
Gateway IP Address:	127.0.0.1
Netmask Address:	255.255.255.0
Preferred Ethernet Connection:	DHCP

Below the table is a 'CONFIGURE ETHERNET SETTINGS' section with a 'Preferred Ethernet Connection' dropdown menu set to 'DHCP' and an 'Apply Changes' button.

The right panel is titled 'Current Mobile Settings' and contains a table with the following data:

APN:	
Username:	
Password:	
SIM PIN:	1234
SIM PUK:	12345678
Preferred Mobile Connection:	AUTOMATIC

Below the table is a 'CONFIGURE MOBILE SETTINGS' section with input fields for APN, Username, Password, SIM PIN (containing '1234'), and SIM PUK (containing '12345678'). There is also a 'Preferred Mobile Connection' dropdown menu set to 'AUTOMATIC' and an 'Apply Changes' button.

Figure 7 Network configuration

Choose between Ethernet and Mobile network connection.

Use *Select network* menu on top of the page. Available options are:

- Ethernet
- Ethernet then mobile (if Ethernet has no Internet access)
- Mobile
- Mobile then Ethernet

Mobile network settings:

- APN – if necessary, can be left empty for defaults
- Username – if necessary, can be left empty for defaults
- Password – if necessary, can be left empty for defaults
- Preferred mobile connection – choose between 2G, 3G, 4G and AUTOMATIC. If available, chosen type of mobile connection will be used. If AUTOMATIC is chosen, modem will automatically change communication technologies depending on availability.

Preferred Ethernet Connection:

- DHCP – automatically assigns IP addresses and other communication parameters
- Static IP – assigns custom communication parameters

Static IP settings (only if static IP is chosen in *Preferred Ethernet Connection* drop down):

- Static IP address – static IP address used for the gateway, for example: 192.168.255.130
- DNS address – desired DNS server address, for example: 8.8.8.8
- Gateway IP Address – gateway or router IP address, for example: 192.168.255.1
- Netmask Address – subnet mask for the network for example: 255.255.255.0

3. SCRIPT BASED CONFIGURATION

3.1 Usage

After a successful boot, the gateway connects to the network server (Loriot, TTN...)

To manually configure the gateway, keyboard and monitor should be attached or you should be connected via SSH.

To log in use the credentials provided by X-LOGIC

The gateway can use Ethernet or a mobile network interface to connect to the network and use one or another as backup connection according to user preferences.

To use the mobile network interface SIM card should be provided. SIM card should have a cleared PIN number. If not, the PIN number must be provided in the gateway's configuration file.

3.2 Configuration options

There is an application used for configuring some of the gateway's parameters used for connecting the gateway to the network. The application can be found at:

```
/home/xgw1/xgw1-files/xgw1-software-main/config-xgw1.py
```

When located in the directory, application can be started by typing:

```
./config-xgw1.py
```

After starting the application, the user can choose between one of the options:

1. Show XGW1 configuration file
2. Edit XGW1 configuration file

The first option shows current settings for the gateway.

After choosing the second option, follow the instructions.

-
1. CHOOSE PACKET FORWARDER (LORIoT/CUSTOM) – choose packet forwarder
 2. SET LORIoT SERVER (eu1.loriot.io) – set desired Lorient server (eu1.loriot.io, eu4pro.loriot.io)
 3. SET CUSTOM SERVER (eu1.cloud.thethings.network) – choose custom server
 4. SET CUSTOM SERVER PORT UP (1700) – choose port up for the custom server
 5. SET CUSTOM SERVER PORT DOWN (1700) – choose port down for the custom server
 6. CHOOSE MOBILE NETWORK INTERFACE (ETH0/ETH0+MOBILE/MOBILE+ETH0/MOBILE)
– choose network interface priority
 7. CHOOSE MOBILE NETWORK TECHNOLOGY (2G/3G/4G/AUTOMATIC) – choose mobile communication network technology
 8. SET SIM USERNAME (JOHN) – set username for the SIM card (optional)
 9. SET SIM PASSWORD (JOHN_123) – set password for the SIM card (optional)
 10. SET SIM PIN (1234) – set the 4 numbered PIN for the SIM card (optional)
 11. SET SIM PUK (12345678) – set the 8 numbered PUK for the SIM card (optional)
 12. SET SIM APN (m2m.tele2.com) – set the APN for the SIM card, some network providers do not require APN (can be optional)

13. SET ETHERNET IP TYPE (DHCP/STATIC) – choose between static and dynamic IP address

14. SET ETHERNET IP (192.168.255.120) – set STATIC IP address

15. SET ETHERNET NETMASK (255.255.255.0) – set STATIC subnet mask

16. SET ETHERNET DNS (8.8.8.8) – set STATIC DNS server

17. SET ETHERNET GATEWAY (192.168.255.1) – set STATIC gateway IP

For the parameter to remain unchanged, press ENTER and the application will skip to the next question.

These changes should be done with caution. In case of wrong network configuration, the gateway will not work as expected or can become unreachable via network. Then, the only way for the gateway to recover is by attaching a keyboard and monitor to it and troubleshoot it.

To check network interface priorities, use the command:

ip route show

or

route

These commands will print out network interfaces with their priorities in order. Priorities are determined by the network metric. Interfaces with higher metrics have lower priorities. If two interfaces have the same metric, the one with the higher subnet mask number gets the priority.

3.3 Static IP configuration

To set static IP address manually, connect to the gateway via SSH connection or Terminal and type following commands to the console:

```
sudo nano /etc/dhcpd.conf
```

Append to the end of the file or edit these configurations if they already exist:

```
interface eth0
static ip_address=192.168.0.4/24
static routers=192.168.0.1
static domain_name_servers=192.168.0.1
```

Where:

- interface eth0 – desired interface to configure
- static ip_address – desired IP address and subnet mask to assign
- static routers – desired gateways or routers to assign
- static domain_name_servers – desired DNS servers to assign

Save and exit the file with *CTRL+X*, choose *YES* and press *ENTER* to exit.

Reboot the gateway with:

```
sudo reboot
```

These changes should be done with caution. In case of a wrong configuration or a typo, the gateway will not connect to the desired network when it reboots!

4. Network server gateway registration

For the gateway to send data to the desired network server, it should first be registered.

4.1 Lorient network gateway registration

Log in to your Lorient user account and press **Register a new gateway**.

The screenshot displays the LORIoT web interface. On the left is a dark sidebar with navigation links: Dashboard, Applications, Networks, Join Servers, Documentation, Account, Support, Alerts, and Admin. The main content area shows a user profile for 'PUBLIC PROFESSIONAL ACCOUNT' with a welcome message. Below this is a 'News' section with two entries: one from Feb 14, 2022, and another from Jun 15, 2021. At the bottom of the main content area, there is a section titled 'Gateways of Sample network' which contains a green button labeled '+ Register a new gateway'. A red arrow points to this button.

Figure 8 Register a new gateway

Choose X-logic XGW1.



Figure 9 Choose Base platform

Choose the following settings:

1. Radio Front-end choose: X-logic
2. Bus: SPI
3. eth0 MAC address: <gateway's MAC address> Find it on the label (inside device) or get info from X-LOGIC based on the serial number on the front label.

Figure 10 X-logic XGW1 gateway's MAC address

Press Register X-logic XGW1 gateway.

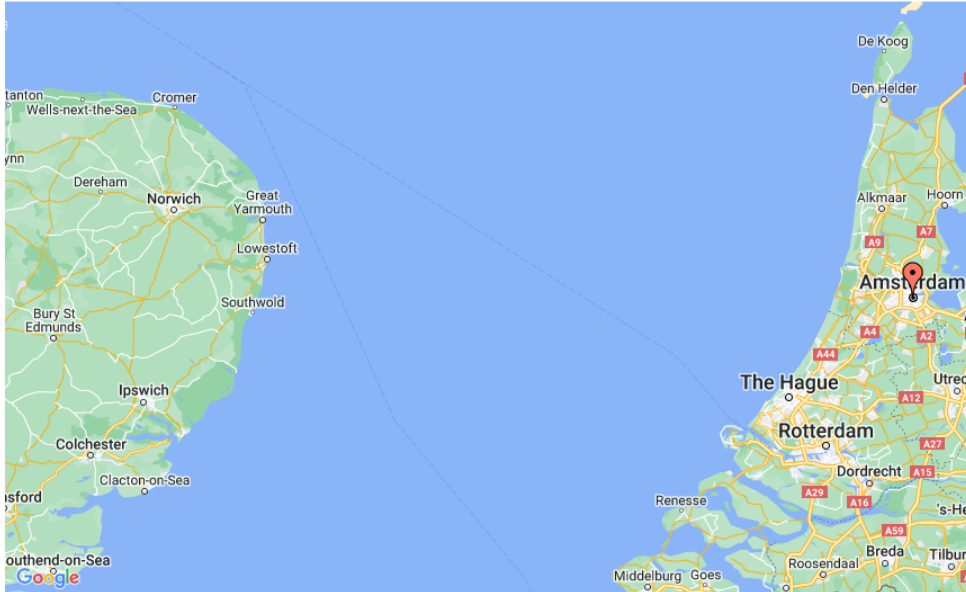
Gateway Location

To provide all users with a reasonable view of the coverage of the network, please provide the address at which the gateway will be placed.

When displayed to other users, the location will be offset by a random value to protect your privacy.

Choose between these 2 options for setting the position of the gateway.

Map Manual Address



Register X-logic XGW1 gateway

Figure 11 Register X-logic XGW1 gateway

After the registration, the gateway will appear on the dashboard as disconnected.

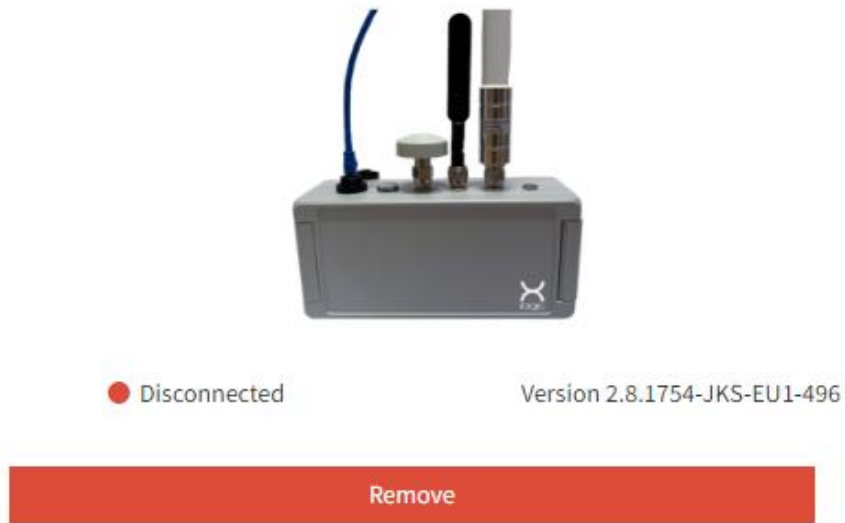


Figure 12 Gateway disconnected

If everything was properly set up, the gateway will soon connect to the Lorient Network server. Refresh the page until the gateway appears as connected.

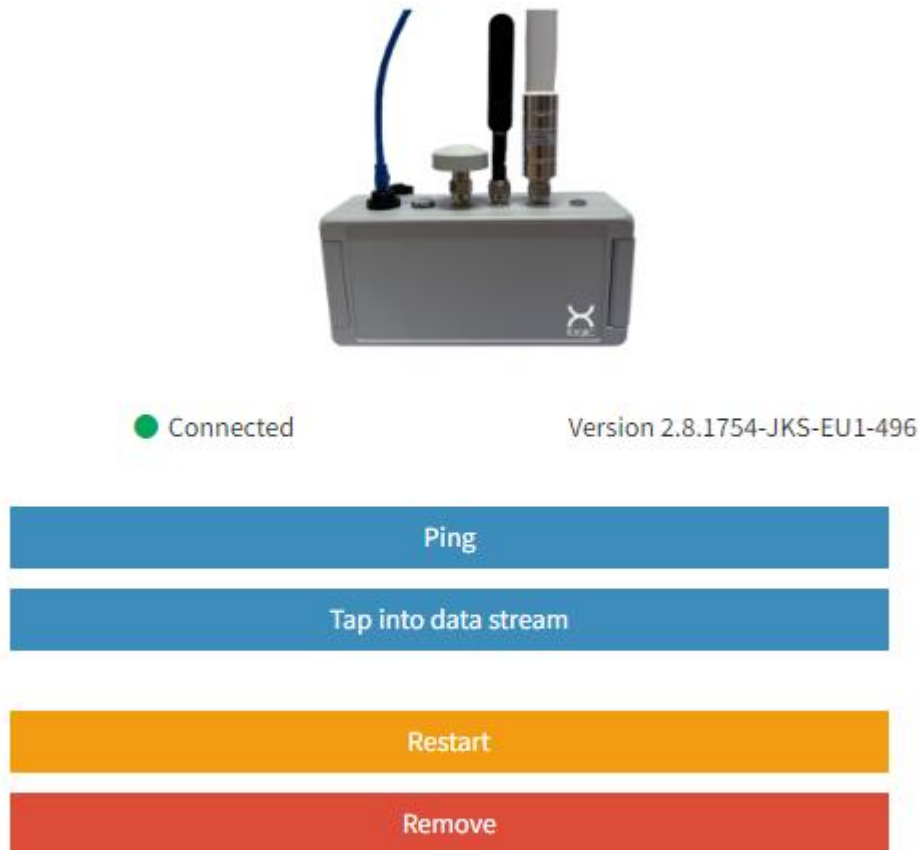


Figure 13 Gateway connected