

FLFET

Fleet Gen 2 Portal User Manual



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Role	Name	Position
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1 INTRODUCTION

1.1 Hardware

The following is a complete list of the hardware required to set up the Fleet Portal.



1. 12V DC Wall Adapter
2. Ethernet Cable
3. WiFi/LTE/GPS antenna
4. Fleet Gen 2 Portal
5. Fleet Gen 1 Satellite Modem
6. OrbcComm Satellite modem
7. LoRa Antenna

NOTE: Depending on the version of your Portal, you may not require a satellite modem for operation.

1.2 Tech Specs

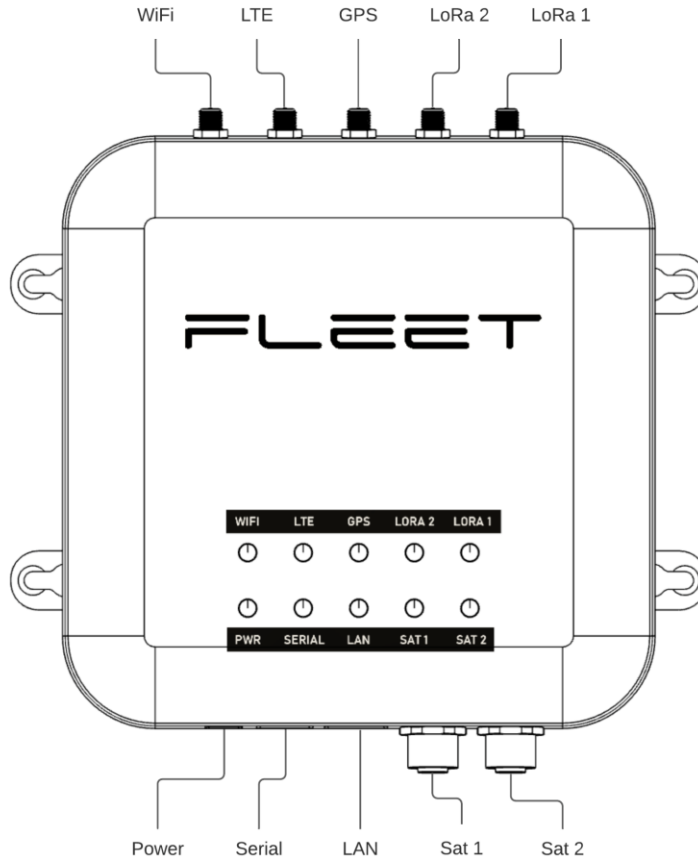
Operating Temperature	-20 – 70°C
Input Voltage	12V DC
Average Power Consumption	5.5 W
Maximum Power Consumption	14.5 W
CPU	2x Arm Cortex™-A7
Disk	4 GB (DDR3)
RAM	512 MB

1.3 Variants

MODEL NUMBER	FLEET PART NUMBER	LORA SINGLE GATEWAY	LTE	NB-IOT
FSPOR0201-2	FA-POR-002-1-2	Yes	Yes	No
FSPOR0201-3	FA-POR-002-1-3	Yes	No	Yes

2 INSTALLATION

2.1 Wiring up Your Portal



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NAME	DESCRIPTION	CONNECTOR	DETAILS
PWR	Power Input	5.5mm x 2.1mm DC Barrel Jack	12V
SERIAL	Serial	RJ11	RS232
LAN	Ethernet	RJ45	
SAT1	Satellite Modem 1	8-pin M12 Circular connector	Fleet Modem
SAT2	Satellite Modem 2	8-pin M12 Circular connector	Orbcomm Modem
WIFI	WiFi	SMA	
LTE	LTE/NB-IoT	SMA	
GPS	GPS	SMA	
LORA2	LoRa 2	SMA	
LORA1	LoRa 1	SMA	(optional)

2.1.1 12V DC Power Jack

The Portal is shipped with a 12V DC Wall Mount Adaptor for bench testing. To use this simply insert one end of the power cable into the portal and the other into a socket.

Important: The DC Jack to the Portal is centre positive, meaning that positive voltage is supplied to the core of the jack.

We recommend customers to use Certified Wall Mount Adaptors according to the proposed countries (Canada, AS/NZS and America) for deployments where the wall-plug power is available.

If you need support to use alternative power source equipment for any other reason and are unsure on how to check the polarity, contact Fleet for assistance.

2.1.2 Serial Port

The portal supports one serial port which uses an RJ11 connector and uses the RS232 interface. This can be utilised to access the Serial Console or for connecting to and RS-232 MPPT charge controller See Victron Energy's VE.Direct interface and applicable devices:

<https://www.victronenergy.com/solar-charge-controllers>.

2.1.3 Ethernet Port

The Portal supports one RJ45 ethernet port. This can be used to connect directly to the portal via a static IP at 192.168.5.1 or via DHCP when connected to a router. Internet provided via Ethernet can also be used as a backhaul method when available.

Note : *Crossover ethernet cables will not work with this ethernet port.*

2.1.4 Satellite Port 1

The Portal comes with 2 Satellite Ports, both of which use an 8-pin M12 Circular connector. Satellite Port 1 should be used with the Fleet Modem included. This can be achieved by connecting the Fleet Modem to Satellite Port 1 using the included cable by inserting the cable end into the 8-pin M12 Circular connector and then hand-tightening it.

2.1.5 Satellite Port 2

The second Satellite Port supported by the Portal uses an 8-pin M12 Circular connector. Satellite Port 2 should be connected to the included Orbcomm Modem. In order to connect them, insert the cable coming off of the Orbcomm modem into the 8-pin M12 Circular connector and hand-tighten it.

2.1.6 WiFi Antenna Port

The included WiFi Antenna Port uses an SMA female connector which should be connected to the WIFI/LTE/GPS Antenna. This can be done by using the cable with a green end marked “WIFI” coming out of the Antenna into the WiFi Port. The male SMA connector on the end of the cable should be inserted and then hand-tightened.

2.1.7 LTE Antenna Port

The Portal includes one LTE Antenna Port which uses an SMA female connector. In order to utilise this connection, the LTE Antenna Port should be connected to the WIFI/LTE/GPS Antenna which is done by connecting the cable with the purple end marked “LTE” into the LTE Port. In order to achieve this, the male SMA Connector on the end of the cable should be inserted into the LTE Port and hand-tightened.

2.1.8 GPS Antenna Port

The included GPS Antenna Port utilises an SMA female connector. For proper utilisation, this port should be connected to the WIFI/LTE/GPS Antenna. This is done by connecting the cable coming out of the WIFI/LTE/GPS Antenna with a blue end marked “GPS”. To do this, connect the male SMA connector at the end of this cable into the GPS Antenna Port’s SMA female connector and hand-tighten.

2.1.9 Lora Antenna Port 1 & 2

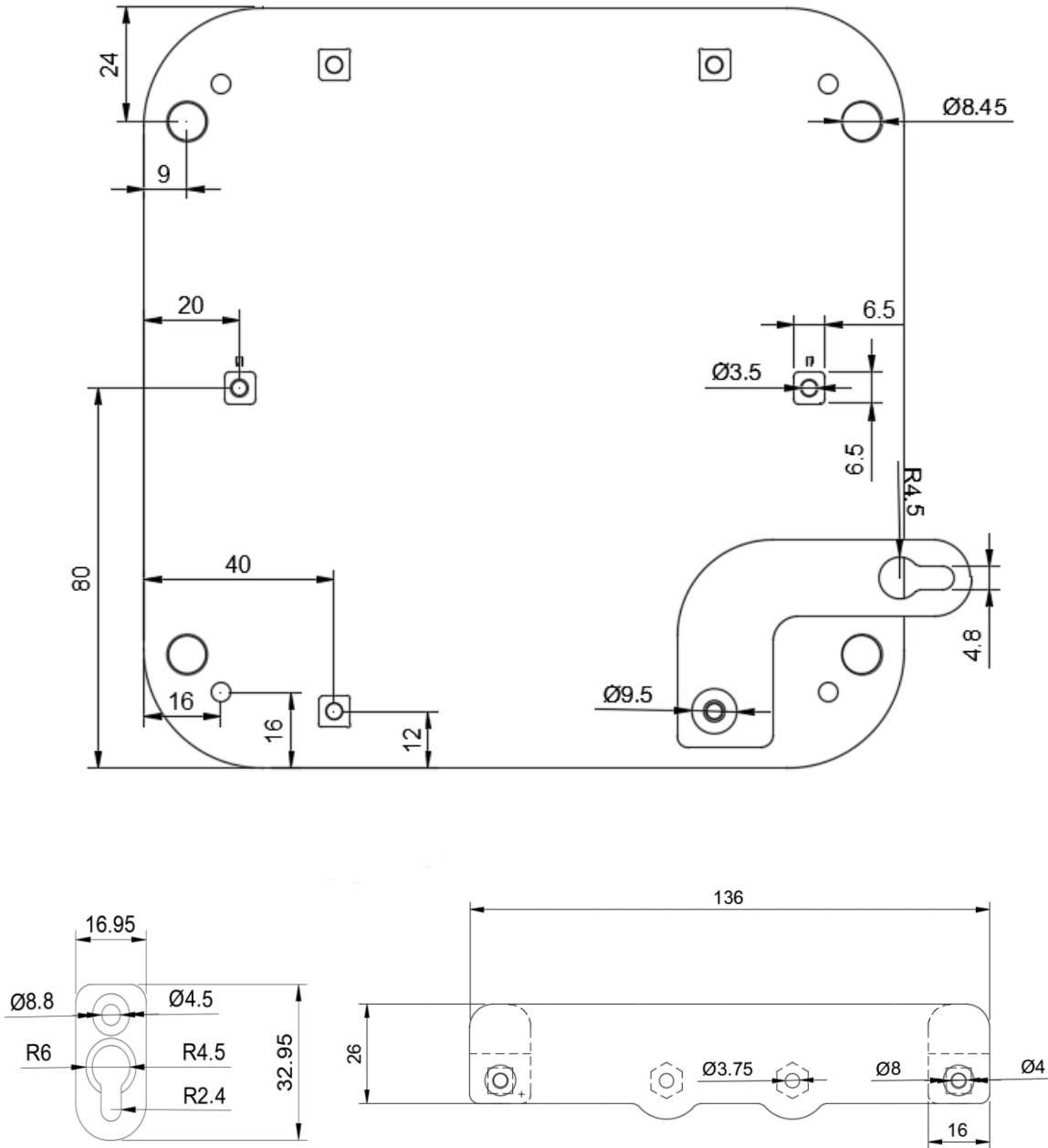
The Portal is provided with a LoRa antenna and cable with an SMA male connector. This connection is essential for the operation of the Portal. Simply insert the male connector from the antenna into the port and hand-tighten the connector.

N-Type connectors come with a twist-lock sleeve when connected to a mating part. To ensure the longevity of the cables, ensure to only twist the sleeve in order to lock the connector, rather than twisting the entire cable around.

Note: *The LoRa transceiver can be damaged if operated without a connected antenna. Ensure that the antenna is attached correctly to the Portal before powering it on.*

2.2 Mechanical Mounting and Assembly

2.2.1 Portal Mounts Diagram



2.2.2 Mounting your Portal

Your portal can be mounted in a number of different ways based on the specifications ordered:

- Standard wall mount feet can be utilised which use #8 Pan Head Screw.
- The M4 screw points on the back can be utilised to mount the Portal directly onto a surface or custom bracket.
- L-brackets can be included in order to offset the specific place the Portal is mounted.
- A bracket which can be installed and attached to a standard Din Rail is also available.

If the portal is being placed outside, it will need to be contained in a suitable cabinet, the requirements for this cabinet are:

- Circuit breaker

-
- Uninterruptible Power Supply (Pre-certified)
 - Battery
 - IP67 rating

And if solar panels are being utilised, then an MPPT is recommended which can be attached to the Serial Port using an RJ11 male connector.

Note: *The Fleet Modem also utilises M4 screws and so the same kind of mounting methods mentioned above for the Portal can also be used with the Fleet Modem.*

Note:

- The Portal must be mounted in a vertical position with the LoRa Antenna connector facing the sky.*
- Ensure at least 10 m of clearance from any tall structures within the Portal range (buildings, scaffolds, etc.).*
- Metal objects should **not** rest on the Portal as this will interfere with communications to the satellite.*

2.2.3 Mounting your Antenna

U-Bolts are recommended for the included LORA Antenna which should be attached on the collar at the base of the Antenna so as to not interfere with the signal. The Antenna needs a fair amount of clearance, so it should not be installed against a wall, and its proximity to electromagnetic signals should be kept in mind as these can interfere with or even damage the Antenna. Multiple Antennas should be kept at least 33cm from each other to avoid potential interference.

It is also important to note that while a variety of cable lengths may be utilised, a longer cable for use with the Antenna may make the Antenna less effective.

2.2.4 Tips for Placement

There are a couple reasons why you may want to mount your Portal above ground or other out-of-reach areas.

2.2.4.1 Hazard Reduction

In order to ensure effective operation of the Portal, position the Portal out of the way from the paths of people and machinery. In addition, wild fauna have the potential to damage equipment if the Portal resides too close to the ground. Birds also provide a hazard to exposed cables, so utilising mesh sleeves as protection is generally advised.

**This equipment is not suitable for use in locations
where children are likely to be present.**

2.2.4.2 Improved Reception

There are 5 antenna ports included on the Portal:

- 2 x LoRa
- WiFi
- GPS
- LTE

Where possible, it is recommended to use a low profile multiband antenna for WiFi, GPS and LTE. These are omnidirectional and should be mounted as high as possible. The LoRa antenna/s are typically selected based on the application.

3 CONFIGURATION

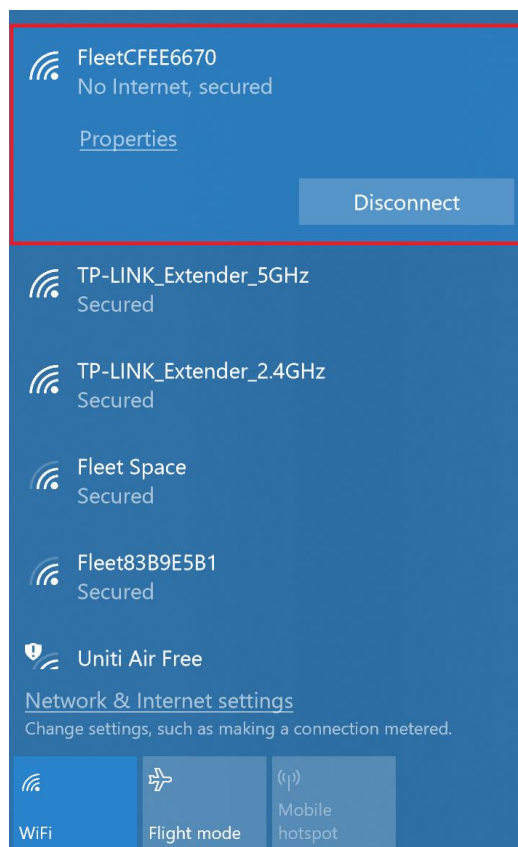
3.1 Local Network Configuration

3.1.1 Method 1: Wi-Fi

The Portal provides a Wi-Fi hotspot that can be joined via any Wi-Fi enabled laptop or desktop computer. To join this network:

1. Ensure that Wi-Fi is enabled on your laptop or desktop.
2. Check the available Wi-Fi connections for your device. Select the connection labelled "FleetXXXXXXXX", where "X" may be an alphanumeric value in the range "A-F" and "0-9". The Wi-Fi SSID for your Portal is included on the underside of the Portal.

Note: *If the Portal is being powered for the first time, please allow a few minutes for it to initialise before the Wi-Fi network becomes available.*



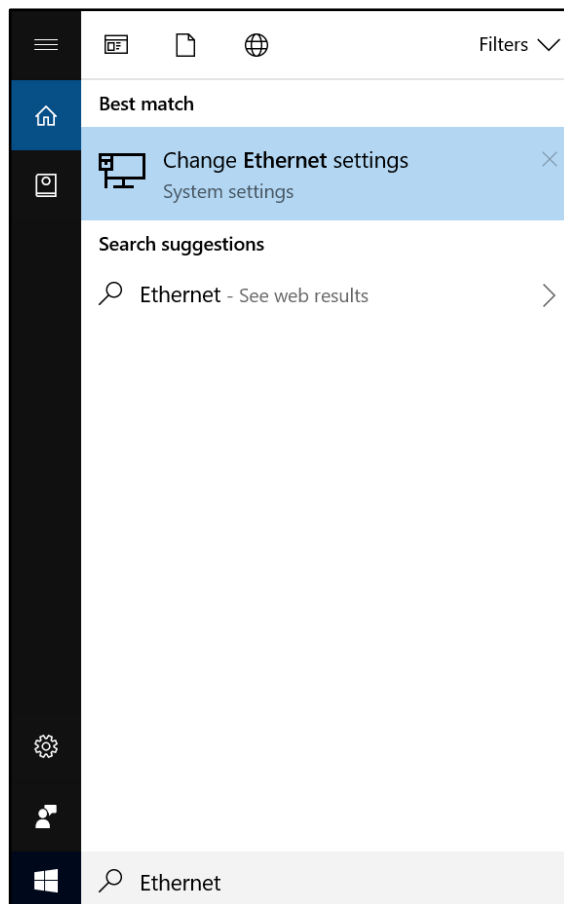
3. Enter the Wi-Fi password *Aabbccdd* and click "Connect".

The Portal is now connected. The Portal can be accessed with the following IP address: **192.168.4.1**

3.1.2 Method 2: Wired Ethernet – Direct Connection

The Portal can also be accessed using the Ethernet port. This is a less portable method of connecting to the Portal, however, Wi-Fi can still be used on your device while you operate the Portal.

1. Connect one end of the provided Ethernet cable to the Portal RJ45 port, and the other to the RJ45 port on your device.
2. Type *Ethernet* into the search box at the bottom of the screen and click the result “*Change Ethernet Settings*”.



3. In the window that opens, click “*Change adapter options*”.
4. In the next window, right click your Ethernet connection and select “*Properties*”.
5. In the next window, double-click on *Internet Protocol Version 4 (TCP/IPv4)*.
6. Enter the information shown in the image below into the respective fields.

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7. Press OK and close all previously opened windows.

The Portal is now connected. The IP address to access the Portal over Ethernet is: **192.168.5.1**

3.1.3 Method 3: Wired Ethernet – Local Network

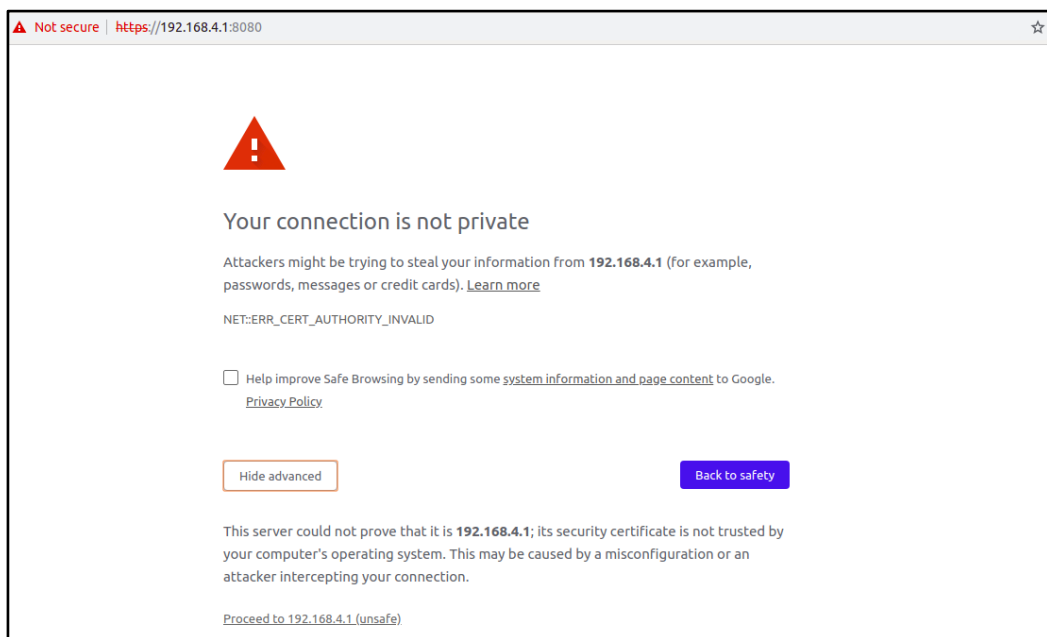
The Portal can also be assigned an IP address by connection to a router. This is useful if you require remote access to the Portal that cannot be serviced via Wi-Fi or direct Ethernet connection.

1. Connect one end of the provided Ethernet cable to the Portal RJ45 port and the other to a RJ45 port on your device.

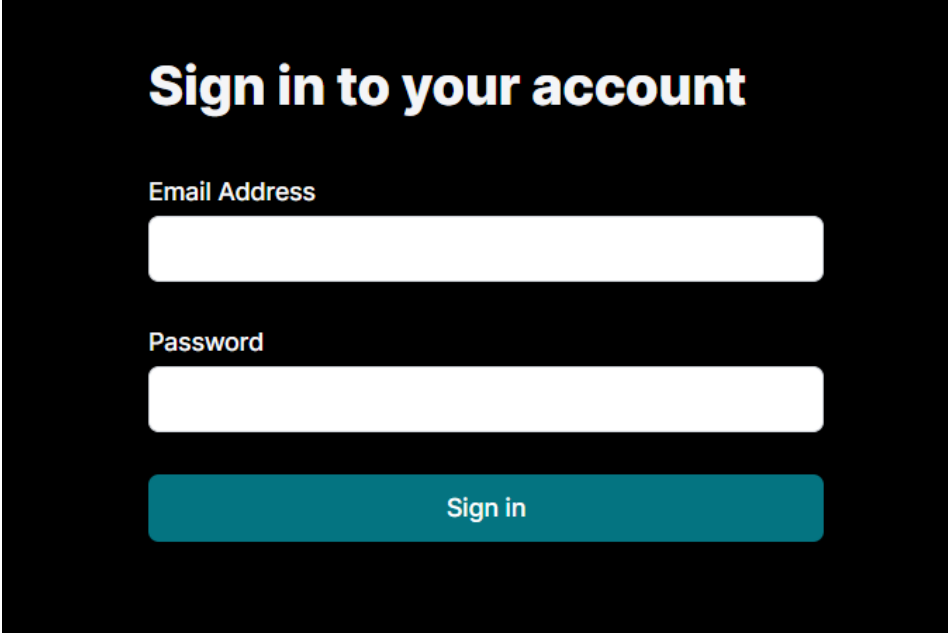
The Portal is now connected, but it will be assigned a dynamic IP address by your router. Consult your router operating manual to determine this address.

3.2 Accessing the Portal Interface

1. Open an Internet browser. It is recommended to use Google Chrome. In the URL address bar, enter *https://<IP Address>:8989*, where *<IP Address>* is the full IP address that was determined in **Section 3.1**.
2. A security warning will appear in the browser window. At the bottom of the page, click “Advanced” and then click “Proceed to *<IP Address>* (unsafe)” at the bottom of the page.



3. A login screen will appear. Enter the following credentials and press “Login”:
Username: *admin*
Password: *admin*

A screenshot of a sign-in form on a black background. The title "Sign in to your account" is in white bold text at the top. Below it are two white input fields: "Email Address" and "Password". At the bottom is a teal button with the text "Sign in" in white.

3.3 Portal Configuration

3.3.1 Device Groups

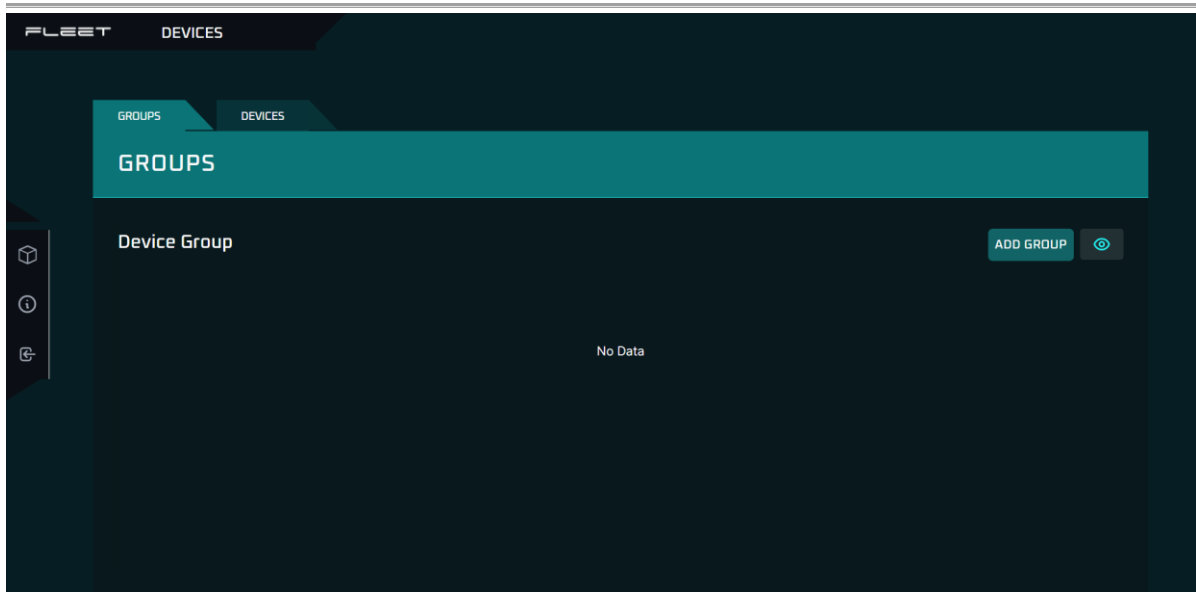
Device Groups are objects that separate the use cases of your LoRa network. For instance, one device group may be soil monitoring and another might be water reservoir monitoring. Device groups provide a way for the user to group common sensors together to make managing them easier.

Each device group contains scripts which are called codecs. One is called a decoder codec, which is used to decode sensor information that arrives at the Portal. The other is called an encoder codec, which encodes the information to be sent via the satellite backhaul.

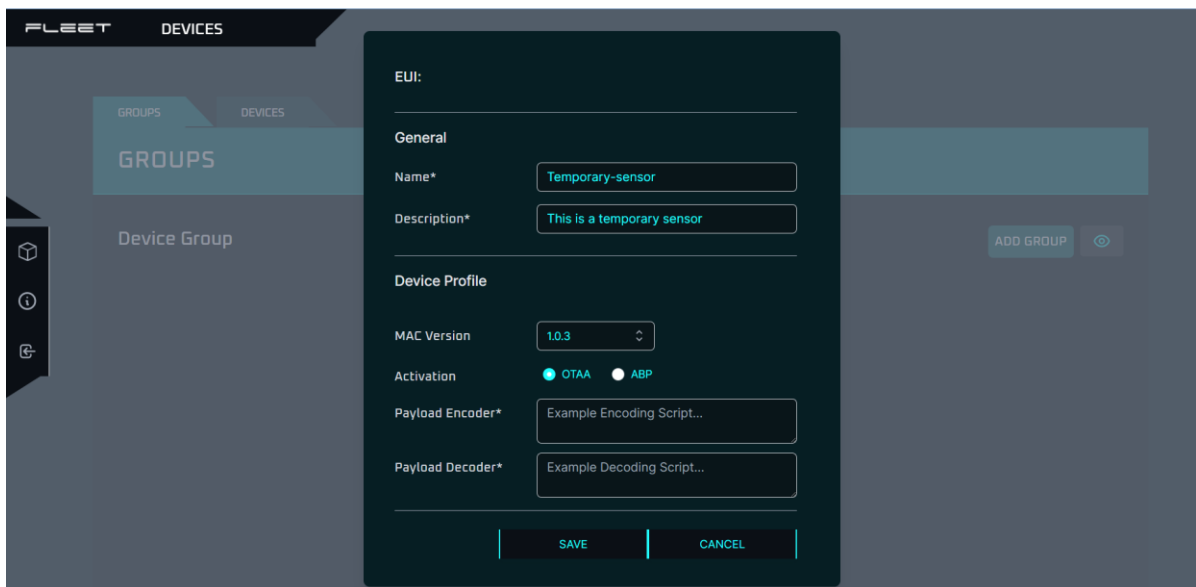
Note: *Each device group only supports **one** decoder and **one** encoder codec because device groups are intended for use with only one type of sensor.*

3.3.2 Adding a Device Group

1. From the home page, click on the “*Devices*” link on the left to list all currently configured Device Groups. Click the “*Add Group*” button to add a new Device Group.



2. Enter a name and description for the Device Group. Choose the MAC version required, and whether the Device Group will use OTAA or ABP.



3. For the decoder and encoder codec, enter the appropriate Payload Encoder and Payload Decoder.
4. Click "Save" at the bottom of the page.

3.3.2.1 Creating Custom Codecs

As mentioned above, one may change the codecs within an application for custom use. It is **not** recommended to change encoding codecs without consulting Fleet first, as unsuitable changes made here could make it impossible to retrieve your data after satellite backhaul.

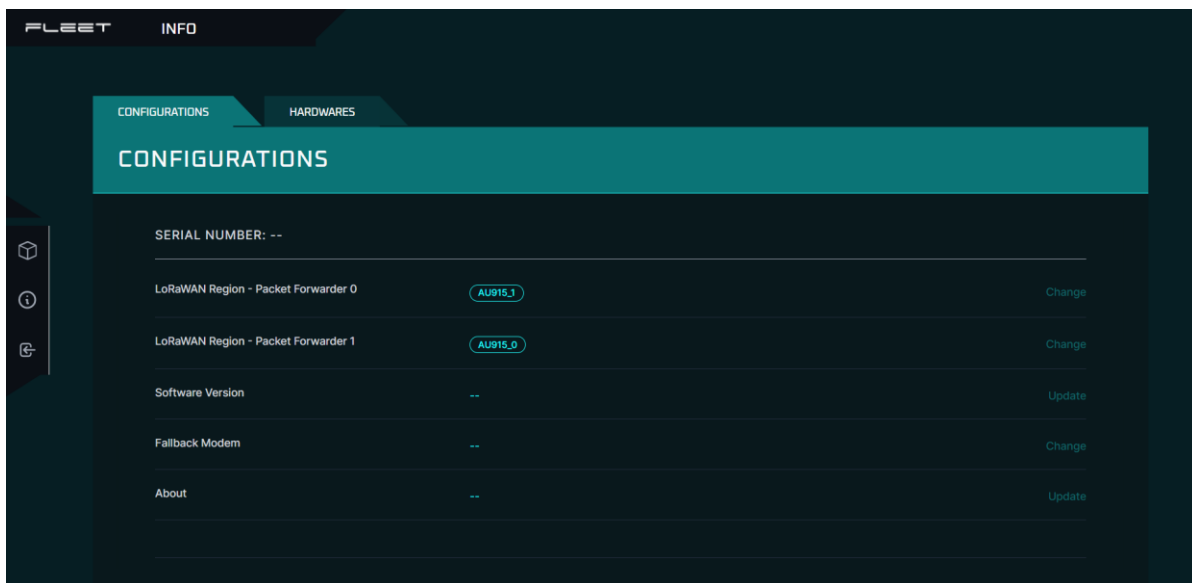
The Portal supports a variety of devices. More devices are constantly being added, and each of these require a different codec.

If you need to use a device which is not presently supported, contact Fleet and we can provide support in creating your own codec.

Note: *Fleet does not bear responsibility for custom codecs created by the customer.*

3.3.3 Region Selection / Frequency Bands

The user has the ability to switch their Portal's frequency region to a different band if desired. Click on the "Info" link in the left menu. From here the LoRaWAN region for the wanted packet forwarder can be changed by pressing "Change", selecting the wanted region, and pressing "Save".



The relevant frequency band should be selected based on the region of operation. For example, if the Portal is operated in the US, one of the US bands should be selected.

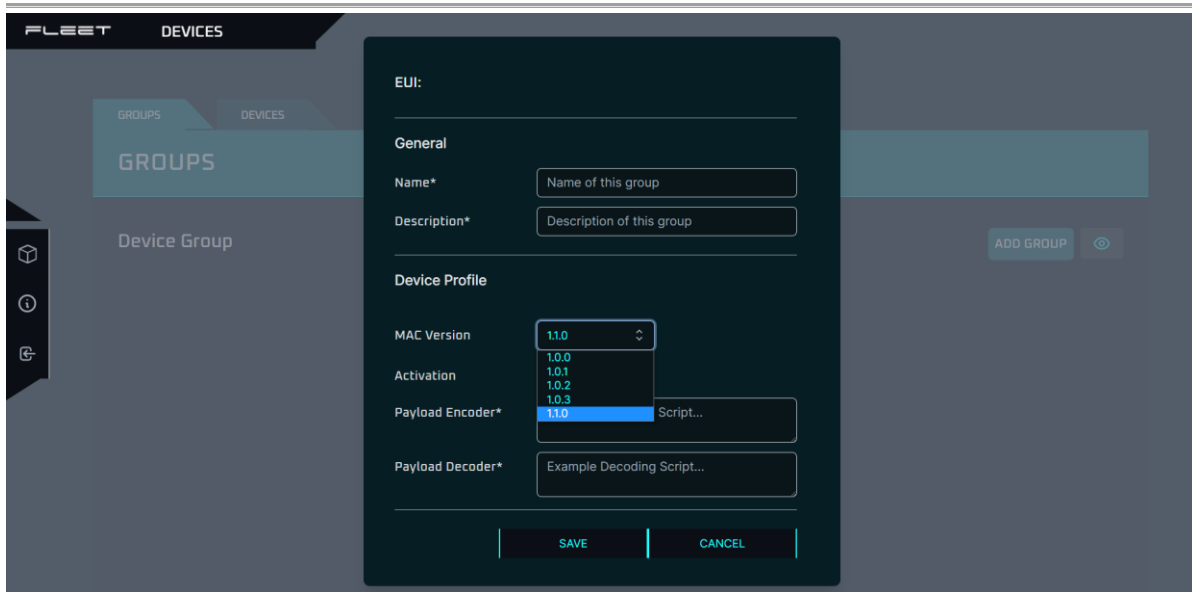
To ensure that the Portal can communicate with other LoRa devices, all devices on the network must operate on the same frequency band.

At the time of writing, the Portal firmware is fully compatible with US, AU, AS and EU regions.

3.3.4 LoRaWAN Version

Different LoRaWAN devices operate with different LoRaWAN versions. Currently, the Portal supports LoRaWAN versions 1.0.0, 1.0.1, 1.0.2, 1.0.3 and 1.1.0 . Fleet will provide support of future LoRaWAN versions with software updates in the future.

If you are using devices with earlier LoRaWAN versions, ensure you assign them to a dedicated application and pick the correct LoRaWAN version in the device group. If supplied by Fleet, the dispatch sheet will show which LoRaWAN version the device are using. Independently sourced devices will have this information contained within its data sheet.



3.3.5 LoRaWAN Device Classes

LoRaWAN comes in three different device classes: A, B & C.

The Portal supports all three classes of device. The device group created on the portal must match the classes supported by the device being used. Failure to do so will result in the device not being able to receive downlinks from the Portal.

4 OPERATION

Once familiarity with the basic configuration of the Portal is complete, it's time to start building your LoRa network.

4.1 Adding LoRa Devices

Devices need to be registered with your Portal for it to start receiving data. It's recommended that you add the LoRa devices and verify their operation before installation to save the need for remote debugging.

Adding LoRa devices requires three pieces of information:

1. **LoRaWAN version**

Mentioned in **Section 3.3.4**: when adding devices, this LoRaWAN version will be associated with a device group. Currently, the Portal supports versions 1.0.0, 1.0.1, 1.0.2, 1.0.3 and 1.1.0.

2. **Device Electronic Unique Identifier (DevEUI)**

A unique identifier required for each LoRa device. This is usually displayed on the exterior of the device enclosure or inside the packaging.

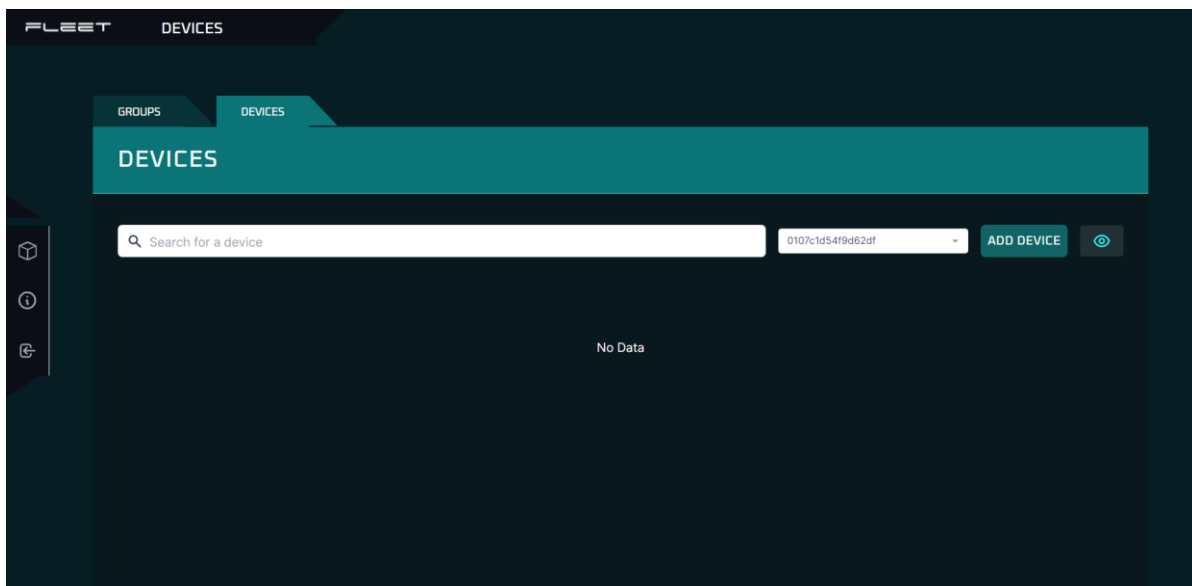
3. **Activation keys**

The required keys differ depending on the LoRa MAC version and activation method your device uses:

	OTAA	ABP
LORAMAC 1.0.X	<ul style="list-style-type: none"> • Application Key 	<ul style="list-style-type: none"> • Device Address • Network Session Key • Application Session Key
LORAMAC 1.1.0	<ul style="list-style-type: none"> • Network Key • Application Key 	<ul style="list-style-type: none"> • Device Address • Network Session Encryption Key • Serving Network Session Integrity Key • Forwarding Network Session Integrity Key • Application Session Key

If the nodes were provided by Fleet, these details will be included in the packaging. If purchased independently, you will need to consult the user manual and data sheets of those nodes and sensors. To add a LoRa Device to an application:

1. From the Groups page, click on the “>>” of the Device Group you would like to add the device to.
2. Click the “Add Device” button on the right-hand-side.



3. Enter a name and description for your device. Ensure to keep a record of the exact use of each device against its name, as this is what appears on the received data at the cloud. Alternatively, create a device name descriptive enough for this purpose.
4. Enter the DevEUI in the appropriate box.

CREATING FOR SELECTED GROUP 016BFCCD10140CC5

LoRaWAN MAC Version: 1.0.3 Activation Type: OTAA

General

Name* Temporary-sensor-1

DevEUI* Device EUI ([a-fA-F0-9]{16})

Description* This is the 1st temporary sensor

Location* Latitude: 0 Longitude: 0

5. Enter activation keys:

a. OTAA devices:

Enter activation keys in the appropriate boxes.

Keys

Application Key* Key ([a-fA-F0-9]{32})

Generate AppKey* Key ([a-fA-F0-9]{32})

SAVE CANCEL

Note: the exact fields shown here will depend on the LoRaMAC version of your device group

b. ABP devices:

Enter the device address and activation keys in the appropriate boxes.

Device Address

Device Address* Device Address ([a-fA-F0-9]{8})

Keys

Application Session Key* Key ([a-fA-F0-9]{32})

Network Session EncKey* Key ([a-fA-F0-9]{32})

Frame Counters

Uplink Counter 0

Downlink Counter 0

SAVE CANCEL

Note: the exact fields shown here will depend on the LoRaMAC version of your device group

6. Click "Save".

It is **highly** recommended that you check that your device is communicating successfully before deployment.

4.2 Distributing your LoRaWAN Network

LoRa is a protocol that relies on the transmission of radio waves over long distances carrying small amounts of data. Like any radio communication, LoRa is inhibited by physical obstructions, sheer distance, and inclement weather to a certain extent.

LoRa is known to be able to successfully communicate up to 10 km when line-of-sight is not disrupted. This should be kept in mind when distributing your sensors in the field and all care should be taken to ensure that obstructions between your device and the Portal are limited.

Also, radio waves are effectively reflected by metal surfaces. Thus, do not place your devices in sealed metal containers. If necessary, consider running an external antenna from inside the structure to the outside to boost signal range.

4.3 Accessing your Data

Your data will be sent automatically over the backhaul network and will be available at <https://nebula.fleet.space>.

5 TROUBLESHOOTING

For assistance troubleshooting the portal please contact Fleet at support@fleet.space.

FCC Notices

This device complies with Part 15 of the FCC Rules and with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device."

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CAUTION:

Any changes or modifications not expressly approved by the grantee could void the user's authority to operate this equipment. This equipment complies with the FCC and ISED Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and all persons during normal operation.

Cet équipement est conforme aux limites d'exposition aux rayonnements de la FCC et d'ISED Canada établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et toutes les personnes pendant le fonctionnement normal.

CAN ICES-003 (A) / NMB-003 (A)

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.