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# Pico Next Indoor Gateway User Guide



## L0006



## Revision History

Revision	Date	Description
.001	Aug. 19, 2021	Browan first release



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# 1 Product Overview

## 1.1 Product Features

The Pico Next Gateway is a LoRa gateway with GPS, using numerous ways of connection: ethernet, LTE, and Wi-Fi. Depending upon the SKU, some functions might not be available. Pico Next is specifically designed for wide-area IoT applications. Applications include, but are not limited to, home security, automatic meter reading, monitoring fault indicators, and monitoring streetlights. This gateway is very suitable for small businesses or private area uses like parking lots, exhibition centers, and campuses.

### 1.1.1 LED Functions

LED Functions	Constant	Flashing	Off
Power	Power On	Booting /OTA	OFF
Internet	Internet available	Check internet	RFU
Wireless	Wireless enabled	RFU	Wireless disabled
LoRa	LoRa Working	Initializing	LoRa not working

### 1.1.2 Reset Button

**Reboot:**

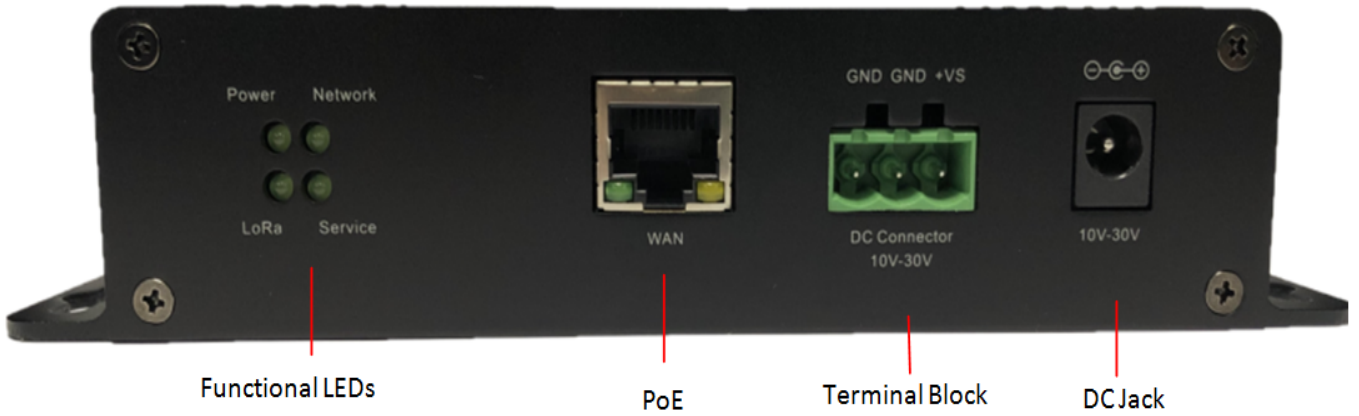
By pressing and holding the RESET Button, the Power LED will start flashing. The “reboot” procedure will be triggered when the RESET Button is released while the Power LED light is flashing.

**Restore to Default:**

By pressing and holding the RESET Button, the Power LED will start flashing. The “restore to default” procedure will be triggered when the RESET Button is released after the Power LED light becomes constant.

## 1.1.3 I/O Ports

Front Panel



Back Panel -





## 1.2 Accessories

Different SKUs would provide accessories pertaining to that country or SKU, such as the adapter plug model and GPS antenna. LTE and Wireless antennas are interchangeable; they have the same specifications.

Adapter



LoRa Antenna



LTE and Wi-Fi Antenna



GPS Antenna



## 2 Installation

### 2.1 Power up

Power up Pico Next through the following ways.

#### 2.1.1 DC Adapter

Connect the power adapter provided to the DC jack In. Pico Next will automatically turn on after powering up.

#### 2.1.2 Terminal Block

Connect a power supply to Pico Next with a 3-pin pluggable male terminal block.

#### 2.1.3 Ethernet

Connect an RJ45 Ethernet cable to Power-over-Ethernet In (WAN port). Connect the other end of the ethernet cable to a passive PoE that ensures a power of 12V / 1.5A DC. Provide power to the passive PoE.





### 3 GUI Access

#### 3.1 Open Admin GUI

The default mode of Pico Next Gateway is DHCP. Once Pico Next is turned on through plugging in the DC adapter, it will automatically link to available servers. Pico Next's IP address can be found on the DHCP server. Access Pico Next WebUI via the DHCP IP on Chrome. The default username is "admin" and the password can be found on the back label.

Figure 1.1-A Admin GUI

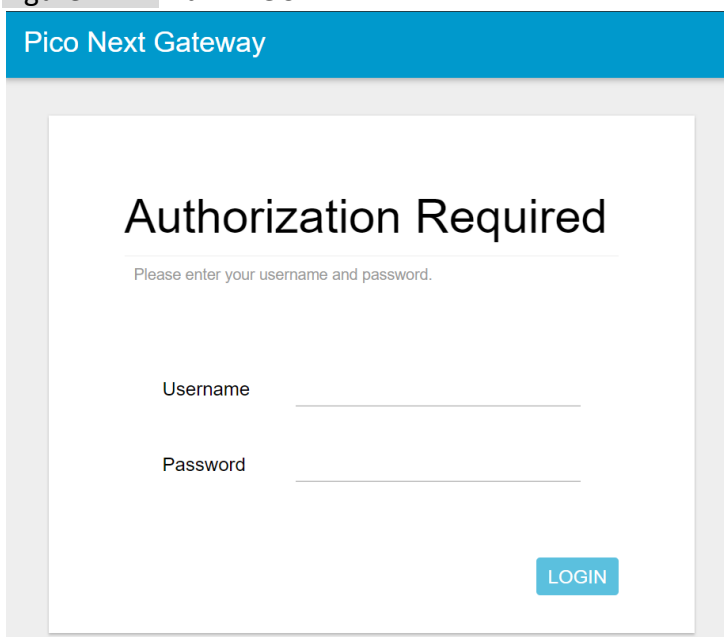
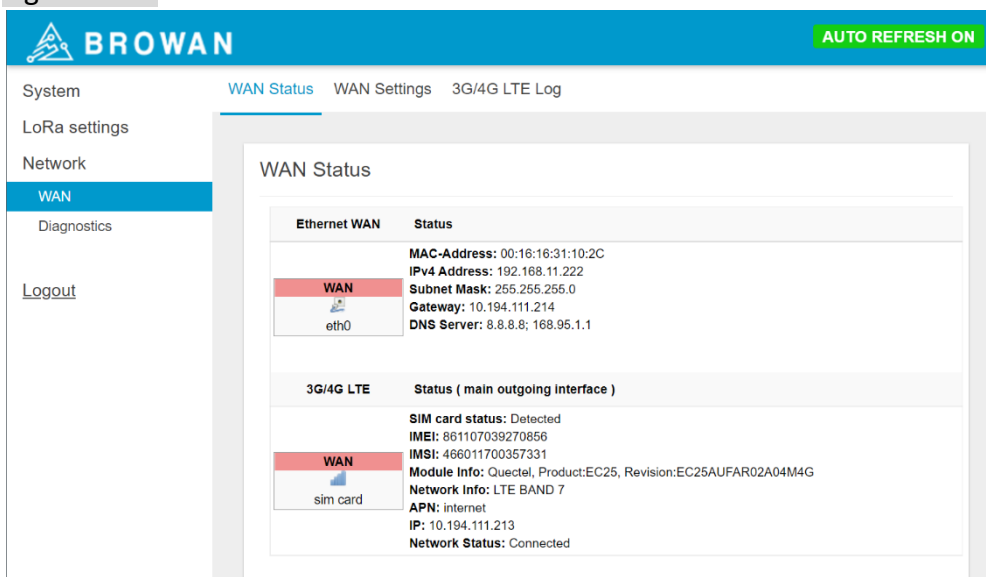


Figure 1.1-B Admin GUI





## 5 System

The System menu consists of the following categories: **Administration**, **Restore**, and **System Firmware**. An introduction of each category will be distinctly stated in individual paragraphs.


### 2.1 Administration


Pico Next login password can be configured on this page.

Figure 2.1-A Router Password

Router Password

Changes the administrator password for accessing the device

Password  

Confirmation  

### 2.2 Restore

Restore the **Password Credential**, **LoRa Setting** and **Network Setting** to the default configurations.

Figure 2.2-A Restore

Restore

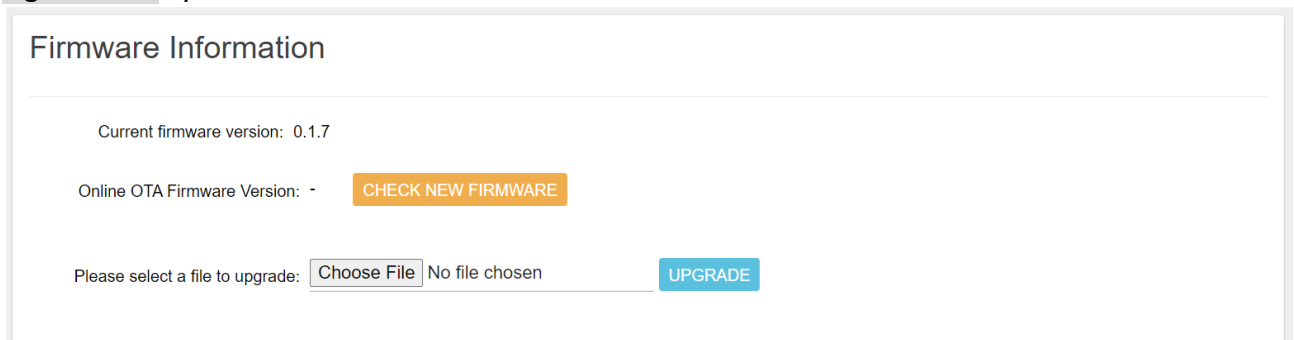
To reset the firmware to its initial state, click "Perform reset".

Reset to defaults:

## 2.3 System Firmware

Here the current firmware version can be found. Click the "Choose File" button to upload the newest system firmware. Click the "UPGRADE" button to upgrade the system firmware.

Figure 2.3-A System Firmware



The screenshot shows a web interface titled "Firmware Information". It displays the current firmware version as 0.1.7. Below this, the online OTA firmware version is shown as "-", with a "CHECK NEW FIRMWARE" button. At the bottom, there is a file selection area with a "Choose File" button, the text "No file chosen", and an "UPGRADE" button.

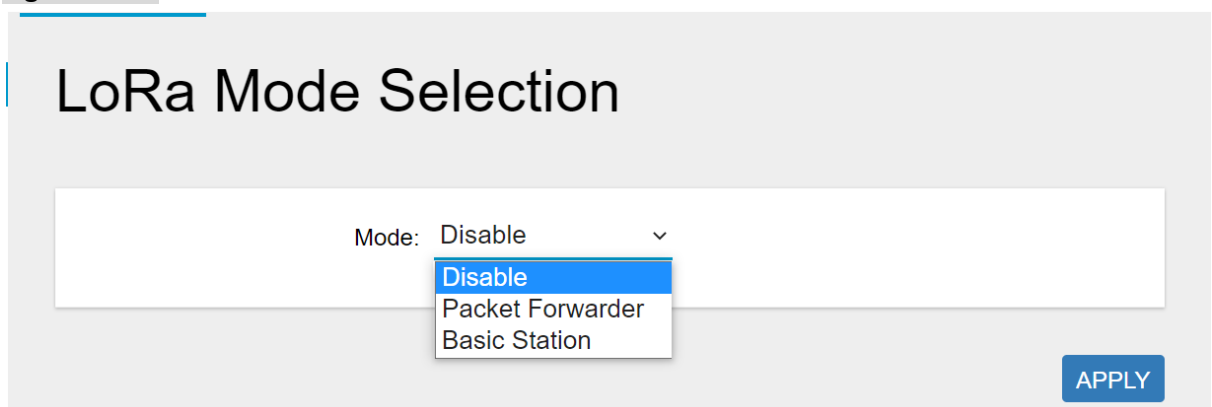
## 6 LoRa Settings

The LoRa menu consists of the following categories: **Mode Selection**, **Channel Scan**, and **Log**. An introduction of each category will be distinctly stated in individual paragraphs.

### 6.1 Mode Selection

By default, the LoRa Mode is disabled. Configure the "**Packet Forwarder**" or "**Basic Station**" by using the dropdown list.

Figure 3.1-A LoRa Mode Selection



The screenshot shows a web interface titled "LoRa Mode Selection". It features a dropdown menu labeled "Mode:" with the current selection "Disable". The dropdown is open, showing three options: "Disable", "Packet Forwarder", and "Basic Station". An "APPLY" button is located at the bottom right of the interface.



## 6.1.1 Packet Forwarder

Choose the "**Packet Forwarder**" option and click the "**APPLY**" button to Enable the Packet Forwarder mode. After applying the setting, the "Packet Forwarder" field can be found on the left menu.

Figure 3.1.1-A LoRa Mode Selection - Packet Forwarder

Applying settings...

### LoRa Mode Selection

Mode: Packet Forwarder ▾

APPLY

Figure 3.1.1-B LoRa Mode Selection - Packet Forwarder menu

**BROWAN**

System   Gateway Info   Gain   Radio and Channel Settings   LBT Settings

LoRa settings

- Mode Selection
- Packet Forwarder**
- Channel Scan
- Log

Network

[Logout](#)

### Gateway Info

Gateway ID: 1c497bfffefb5e56

Server Address: browan.eu1.cloud.thethings

Server Uplink Port: 1700 (1-65535)

Server Downlink Port: 1700 (1-65535)

### 3.1.1.1 Gateway Info

This page is to set up the LoRa configuration including **Gateway ID**, **Server Address**, **Server Uplink Port**, **Server Downlink Port**, **Keep-Alive Interval**, **Statistics Display Interval**, and **Push Timeout**.

Figure 3.1.1.1-A Gateway Info

### Gateway Info

Gateway ID:	1c497bfffefb5e56
Server Address:	<u>browan.eu1.cloud.thethings</u>
Server Uplink Port:	<u>1700</u> (1~65535)
Server Downlink Port:	<u>1700</u> (1~65535)
Keep Alive Interval:	<u>10</u> (seconds)
Statistics display Interval:	<u>30</u> (seconds)
Push Timeout:	<u>100</u> (milliseconds)

### 3.1.1.2 Antenna Gain

This page is to set up the **antenna gain** of Lora.

Figure 3.1.1.2-A Antenna Gain

Antenna Gain:	<u>0</u> (0 ~ 15)
---------------	-------------------

**APPLY**

### 3.1.1.3 Radio and Channel Settings

This page is to configure the radio 0 and radio 1 configurations of Lora, including **Central Frequency**, **Channel Status**, and **Center frequency offset**.

Figure 3.1.1.3-A Radio and Channel Settings

#### Radio Settings

Here you can modify Central frequency of Radio 0 or Radio 1 to change channel frequencies.

Radio 0 Central Frequency: <input type="text" value="867400000"/> (Hz) RSSI Offset: <input type="text" value="-167"/> (dBm)	Radio 1 Central Frequency: <input type="text" value="868200000"/> (Hz) RSSI Offset: <input type="text" value="-167"/> (dBm)
---	---

#### Channel Assignment

CH 0 Status: <input type="checkbox"/> Enable	Radio Interface: <input type="checkbox"/> 0	CenterFreqOffset: <input type="text" value="-300000"/>	(-400000~+400000)	
CH 1 Status: <input type="checkbox"/> Enable	Radio Interface: <input type="checkbox"/> 0	CenterFreqOffset: <input type="text" value="-100000"/>	(-400000~+400000)	
CH 2 Status: <input type="checkbox"/> Enable	Radio Interface: <input type="checkbox"/> 0	CenterFreqOffset: <input type="text" value="100000"/>	(-400000~+400000)	
CH 3 Status: <input type="checkbox"/> Enable	Radio Interface: <input type="checkbox"/> 0	CenterFreqOffset: <input type="text" value="300000"/>	(-400000~+400000)	
CH 4 Status: <input type="checkbox"/> Enable	Radio Interface: <input type="checkbox"/> 1	CenterFreqOffset: <input type="text" value="-300000"/>	(-400000~+400000)	
CH 5 Status: <input type="checkbox"/> Enable	Radio Interface: <input type="checkbox"/> 1	CenterFreqOffset: <input type="text" value="-100000"/>	(-400000~+400000)	
CH 6 Status: <input type="checkbox"/> Enable	Radio Interface: <input type="checkbox"/> 1	CenterFreqOffset: <input type="text" value="100000"/>	(-400000~+400000)	
CH 7 Status: <input type="checkbox"/> Enable	Radio Interface: <input type="checkbox"/> 1	CenterFreqOffset: <input type="text" value="300000"/>	(-400000~+400000)	
CH 8 Status: <input type="checkbox"/> Enable	Radio Interface: <input type="checkbox"/> 1	CenterFreqOffset: <input type="text" value="100000"/>	(-375000~+375000)	Channel Bandwidth: <input type="text" value="250K"/>



### 3.1.1.4 LBT Settings

For some regions (i.e. Japan), the Listen Before Talk (LBT) function is a must. This page is to set up the LBT configuration of Lora, including **LBT Status**, **RSSI Target**, **Channel settings**.

Figure 3.1.1.4-A LBT Settings

**LBT Settings**

LBT Status: Disable ▾

RSSI Target: -80 (dBm)

Channel settings:

Frequency:	<span>867100000</span>	(Hz)	Scan Time: <span>5000us</span> ▾
Frequency:	<span>867300000</span>	(Hz)	Scan Time: <span>5000us</span> ▾
Frequency:	<span>867500000</span>	(Hz)	Scan Time: <span>5000us</span> ▾
Frequency:	<span>867700000</span>	(Hz)	Scan Time: <span>5000us</span> ▾
Frequency:	<span>867900000</span>	(Hz)	Scan Time: <span>5000us</span> ▾
Frequency:	<span>868100000</span>	(Hz)	Scan Time: <span>5000us</span> ▾
Frequency:	<span>868300000</span>	(Hz)	Scan Time: <span>5000us</span> ▾
Frequency:	<span>868500000</span>	(Hz)	Scan Time: <span>5000us</span> ▾

APPLY

### 3.1.2 Basic Station

Choose the "**Basic Station**" option and click the "**APPLY**" button to Enable the Basic Station mode. After applying the setting, the "Basic Station" field can be found on the left menu.

Figure 3.1.2-A LoRa Mode Selection - Basic Station

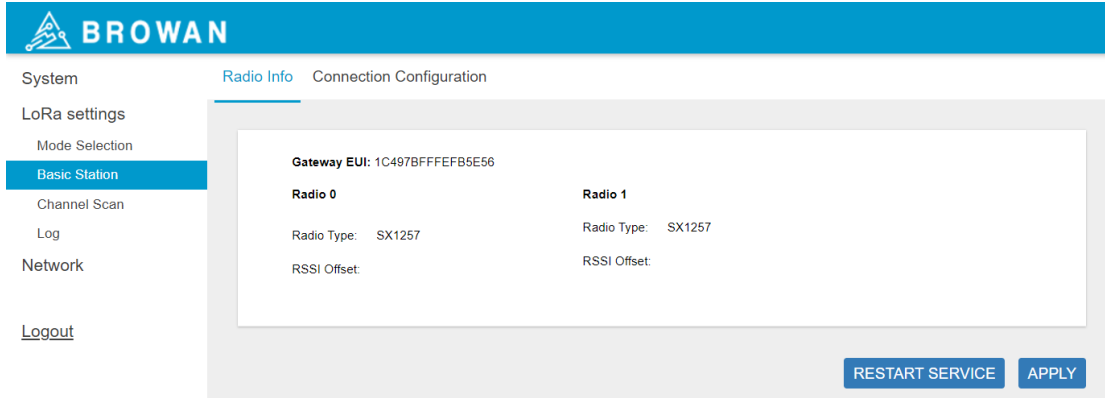
⌄ Applying settings...

**LoRa Mode Selection**

Mode: Basic Station ▾

APPLY

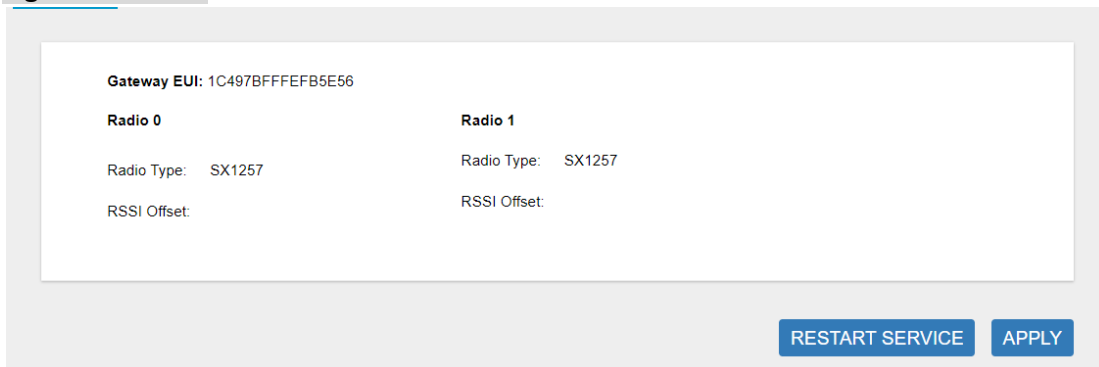
Figure 3.1.2-B LoRa Mode Selection - Basic Station menu



### 3.1.2.1 Radio Info

This page is to show the **Gateway EUI** information.

Figure 3.1.2.1-A Radio Info



### 3.1.2.2 Connection Configuration

This page is to set up the basic station configuration, including **Basic Station Mode, Protocol, Server Address, Server Port, and Credentials.**

- LNS Mode

Configure the LNS Mode settings and click the "APPLY" button.



Figure 3.1.2.2-A LNS Mode

Basic Station Mode: **LNS Mode** ▾

Protocol: **WebSocket Secure** ▾

Server Address: browan.eu1.cloud.thethings.

Server Port: 8887

Trust:  No file chosen

Trust Status: **Installed**

CRT:  No file chosen (Optional)

CRT Status: **Not Installed**

Key:  No file chosen (Optional)

Key Status: **Installed**

## - CUPS Mode

Configure the CUPS Mode settings and click the "APPLY" button.

Figure 3.1.2.2-B CUPS Mode

Basic Station Mode: **CUPS Mode** ▾

Protocol: **HTTPS** ▾

Type: **Boot** ▾

Server Address: browan.eu1.cloud.thethings.

Server Port: 443

Trust:  No file chosen

Trust Status: **Installed**

CRT:  No file chosen (Optional)

CRT Status: **Not Installed**

Key:  No file chosen (Optional)

Key Status: **Installed**



## 6.2 Channel Scan

Click the "SCAN" button to scan the RF signal. Then click the "EXPORT" button to export the scan result.

Figure 3.2-A Channel RSSI Scan

### Channel Scan

The device can scan all supported channels based on ISM band regulation.  
Note: The scanning process may take few minutes to complete, please wait until the end of process.

Scanning channel now...

Channel Index	Channel Frequency	Noise indication

SCAN
EXPORT

Figure 3.2-B Scan Result

### Channel Scan

The device can scan all supported channels based on ISM band regulation.  
Note: The scanning process may take few minutes to complete, please wait until the end of process.

Channel Index	Channel Frequency	Noise indication
Channel 1	863100000	-88.150
Channel 2	863300000	-90.470
Channel 3	863500000	-86.480
Channel 4	863700000	-84.810
Channel 5	863900000	-87.730
Channel 6	864100000	-86.210
Channel 7	864300000	-85.260
Channel 8	864500000	-87.720
Channel 9	864700000	-89.070
Channel 10	864900000	-88.380
Channel 11	865100000	-88.500
Channel 12	865300000	-88.720
Channel 13	865500000	-87.030
Channel 14	865700000	-88.420
Channel 15	865900000	-88.290
Channel 16	866100000	-90.470



## 6.3 Log

The LoRa logs will be shown on this page. Packet forwarder mode will show recent logs with a maximum limit of 5MB. Basic Station mode will show recent logs within 5,000,000 lines.

Figure 3.3-A Logs

### LoRa Logs

```

2021-07-08 08:29:31.591 [TCE:VERB] Connected to MUXS.
2021-07-08 08:29:31.775 [RAL:INFO] Lora gateway library version: Version: 5.0.1;
2021-07-08 08:29:31.830 [RAL:VERB] Connecting to device: /dev/spidev1.0
2021-07-08 08:29:31.830 [RAL:DEBU] SX130x txlut table (0 entries)
2021-07-08 08:29:31.830 [RAL:VERB] SX1301 rxrfchain 0: enable=1 freq=867.5MHz rssi_offset=-166.000000 type=2 tx_enabl
2021-07-08 08:29:31.831 [RAL:VERB] SX1301 rxrfchain 1: enable=1 freq=868.5MHz rssi_offset=-166.000000 type=2 tx_enabl
2021-07-08 08:29:31.831 [RAL:VERB] SX1301 ifchain 0: enable=1 rf_chain=1 freq=-400000 bandwidth=0 datarate=0 sync_wc
2021-07-08 08:29:31.831 [RAL:VERB] SX1301 ifchain 1: enable=1 rf_chain=1 freq=-200000 bandwidth=0 datarate=0 sync_wc
2021-07-08 08:29:31.832 [RAL:VERB] SX1301 ifchain 2: enable=1 rf_chain=1 freq=0 bandwidth=0 datarate=0 sync_word=0/6
2021-07-08 08:29:31.832 [RAL:VERB] SX1301 ifchain 3: enable=1 rf_chain=0 freq=-400000 bandwidth=0 datarate=0 sync_wc
2021-07-08 08:29:31.832 [RAL:VERB] SX1301 ifchain 4: enable=1 rf_chain=0 freq=-200000 bandwidth=0 datarate=0 sync_wc
2021-07-08 08:29:31.832 [RAL:VERB] SX1301 ifchain 5: enable=1 rf_chain=0 freq=0 bandwidth=0 datarate=0 sync_word=0/6
2021-07-08 08:29:31.833 [RAL:VERB] SX1301 ifchain 6: enable=1 rf_chain=0 freq=200000 bandwidth=0 datarate=0 sync_wor
2021-07-08 08:29:31.833 [RAL:VERB] SX1301 ifchain 7: enable=1 rf_chain=0 freq=400000 bandwidth=0 datarate=0 sync_wor
2021-07-08 08:29:31.833 [RAL:VERB] SX1301 ifchain 8: enable=1 rf_chain=1 freq=-200000 bandwidth=2 datarate=2 sync_wc
                
```

REFRESH

## 4 Network

The Network menu consists of the following categories: **WAN** and **Diagnostics**. Introduction and input procedures for each category are described in the following paragraphs.

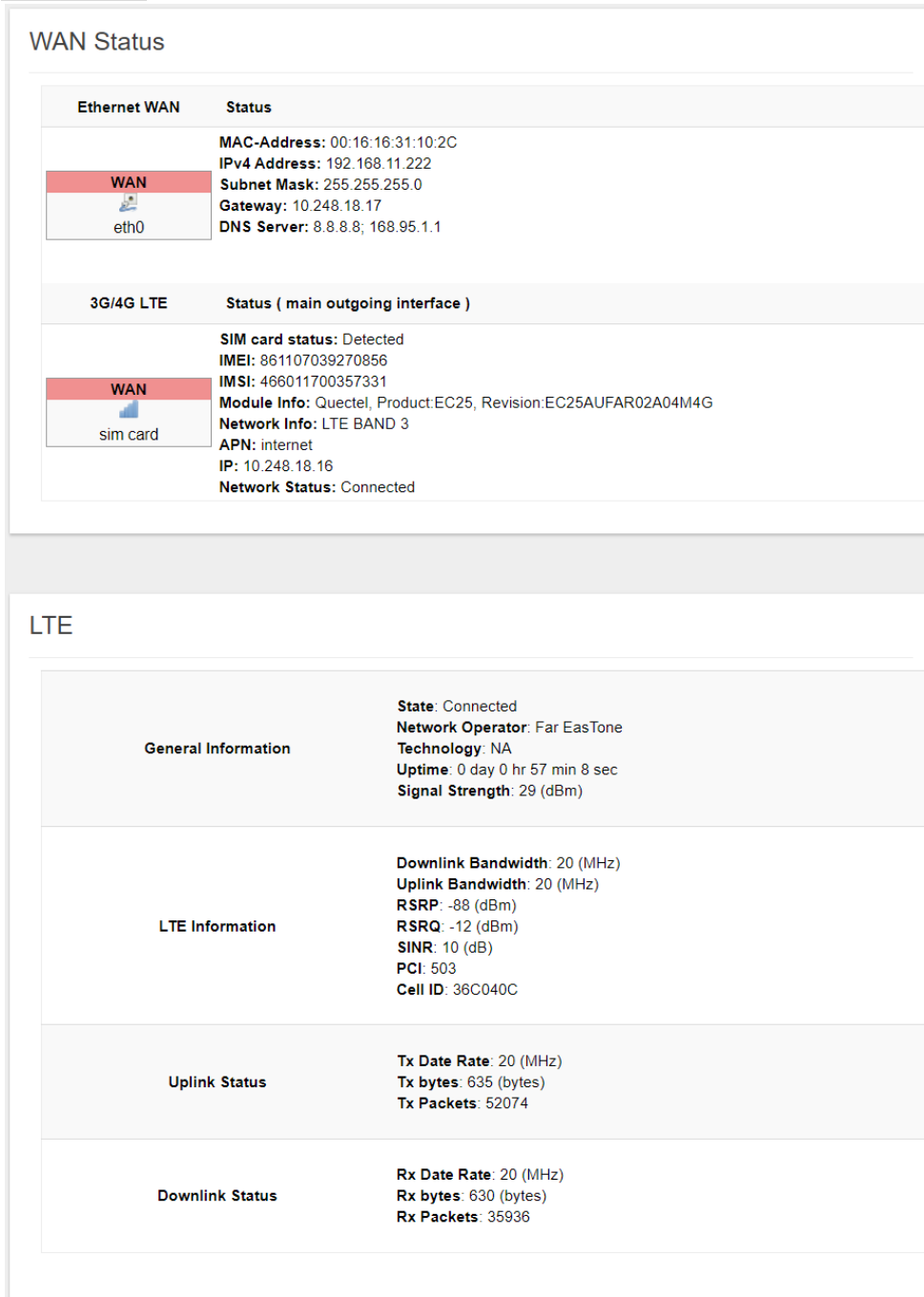
### 4.1 WAN

The purpose of this category is to view current WAN settings. This category is further divided into three sectors: **WAN Status**, **Wan Settings**, and **3G/4G LTE Log**. These individual options are lodged and labeled above the main content.

## 4.1.1 WAN Status

The current network status will be shown on this page.

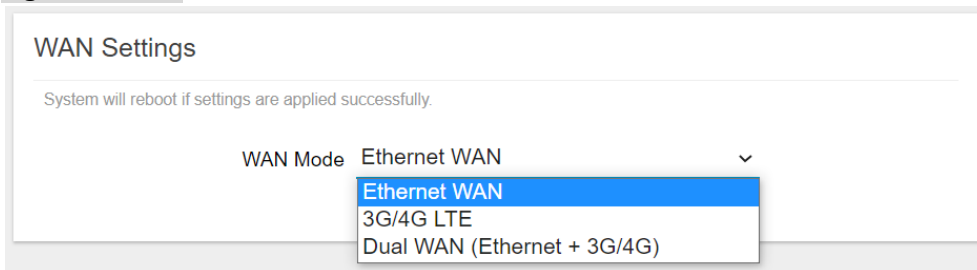
Figure 4.1.1 WAN Status



## 4.1.2 WAN Settings

Pico Next supports 3 WAN Modes: **Ethernet WAN**, **3G/4G LTE**, and **Dual-WAN (Ethernet+3G/4G)**.

Figure 4.1.2-A WAN Mode



WAN Settings

System will reboot if settings are applied successfully.

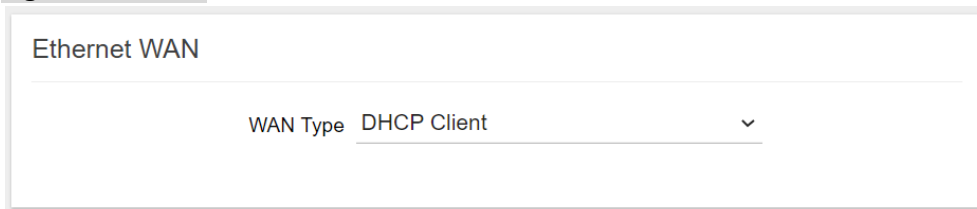
WAN Mode Ethernet WAN ▼

- Ethernet WAN
- 3G/4G LTE
- Dual WAN (Ethernet + 3G/4G)

### 4.1.2.4 Ethernet WAN

#### - DHCP Client

Figure 4.1.2.1-A DHCP Client

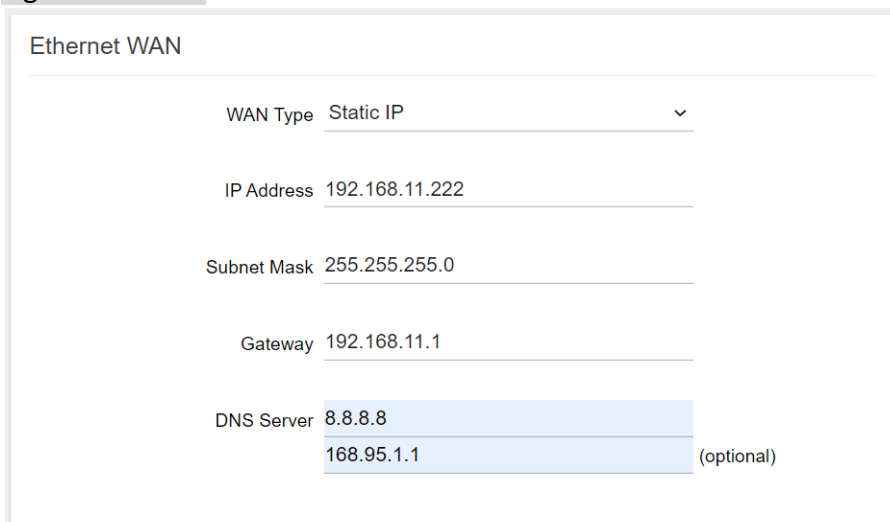


Ethernet WAN

WAN Type DHCP Client ▼

#### - Static IP

Figure 4.1.2.1-B Static IP



Ethernet WAN

WAN Type Static IP ▼

IP Address 192.168.11.222

Subnet Mask 255.255.255.0

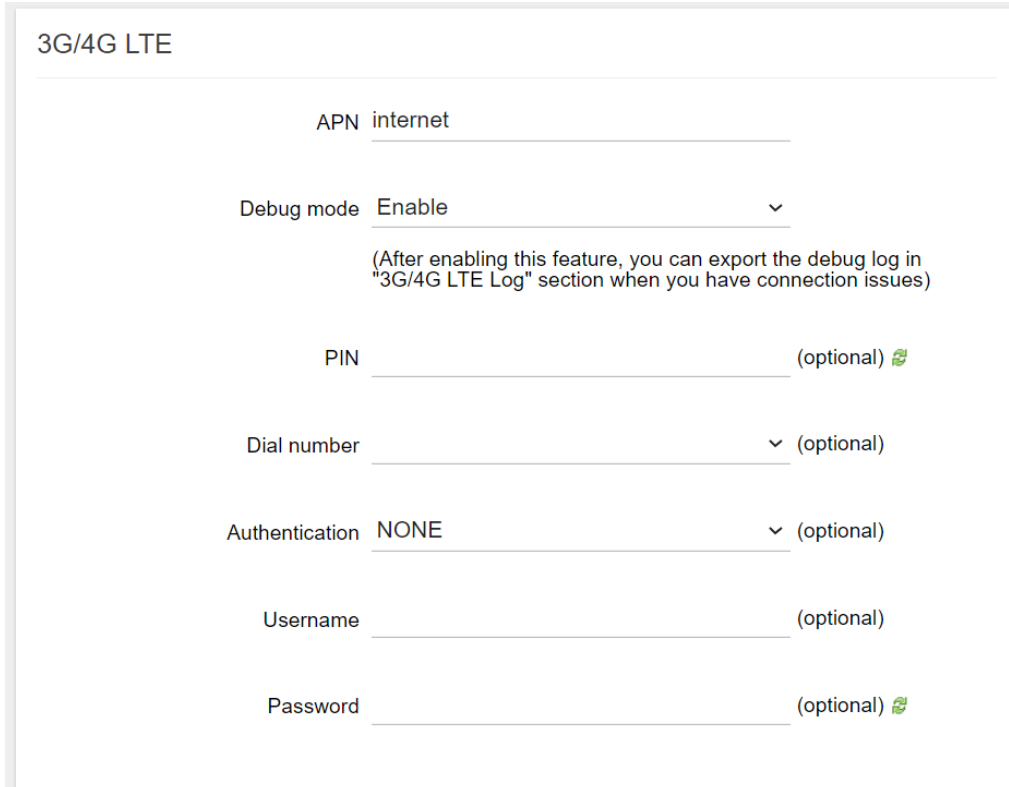
Gateway 192.168.11.1

DNS Server 8.8.8.8  
168.95.1.1 (optional)

### 4.1.2.2 3G/4G LTE

Configure “APN” information according to mobile service provider requirements.

Figure 4.1.2.2-A LTE Settings



3G/4G LTE

APN internet

Debug mode Enable

(After enabling this feature, you can export the debug log in "3G/4G LTE Log" section when you have connection issues)

PIN  (optional)

Dial number   (optional)

Authentication NONE  (optional)

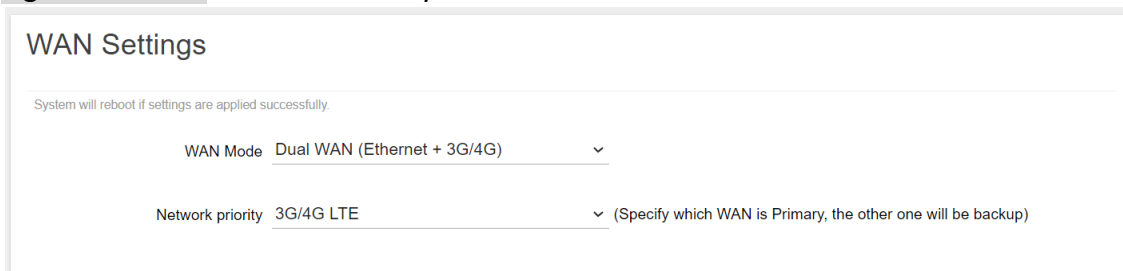
Username  (optional)

Password  (optional)

### 4.1.2.3 Dual WAN (Ethernet+3G/4G)

Configure the Ethernet Setting and LTE Setting at the same time. If the Dual WAN mode is selected, the primary interface needs to be specified by default. Pico Next Gateway will automatically set the other workable interface to be the backhaul.

Figure 4.1.2.3-A Network Primary



WAN Settings

System will reboot if settings are applied successfully.

WAN Mode Dual WAN (Ethernet + 3G/4G)

Network priority 3G/4G LTE  (Specify which WAN is Primary, the other one will be backup)

**Figure 4.1.2.3-B Ethernet and LTE Configuration**

Ethernet WAN

---


WAN Type DHCP Client

3G/4G LTE

---

APN internet


Debug mode Enable   
(After enabling this feature, you can export the debug log in "3G/4G LTE Log" section when you have connection issues)

PIN \_\_\_\_\_ (optional) 

Dial number \_\_\_\_\_  (optional)

Authentication NONE  (optional)

Username \_\_\_\_\_ (optional)

Password \_\_\_\_\_ (optional) 

## 4.1.33G/4G LTE Log

If LTE Debug Mode is enabled, the LTE connection logs will be shown on this page. Click the "EXPORT" button to export the log.

Figure 4.1.3-A 3G/4G LTE Log

### 3G/4G LTE Log

```
[2021-07-09 17:48:33] 0 day 1 hr 2 min 3 sec
[2021-07-09 17:48:44] 0 day 1 hr 2 min 14 sec
[2021-07-09 17:49:58] ServingCell: +QENG: "servingcell", "NOCONN", "LTE", "FDD", 466, 01, 36C040C, 503, 1550, .
[2021-07-09 17:50:07] LTE AT port no response this moment! Please wait for next retry!
[2021-07-09 17:50:08] LTE continuesly connect for: 0 day 1 hr 3 min 38 sec
[2021-07-09 17:54:50] ServingCell: +QENG: "servingcell", "NOCONN", "LTE", "FDD", 466, 01, 36C040C, 503, 1550, .
[2021-07-09 17:54:57] LTE AT port no response this moment! Please wait for next retry!
[2021-07-09 17:54:58] LTE continuesly connect for: 0 day 1 hr 8 min 28 sec
[2021-07-09 17:58:58] 0 day 1 hr 12 min 28 sec
[2021-07-09 17:59:36] ServingCell: +QENG: "servingcell", "NOCONN", "LTE", "FDD", 466, 01, 36C040C, 503, 1550, .
[2021-07-09 17:59:43] RSSI: 29,99
[2021-07-09 17:59:44] LTE continuesly connect for: 0 day 1 hr 13 min 14 sec
[2021-07-09 18:04:27] ServingCell: +QENG: "servingcell", "NOCONN", "LTE", "FDD", 466, 01, 36C040C, 503, 1550, .
[2021-07-09 18:04:33] LTE AT port no response this moment! Please wait for next retry!
[2021-07-09 18:04:34] LTE continuesly connect for: 0 day 1 hr 18 min 4 sec
```

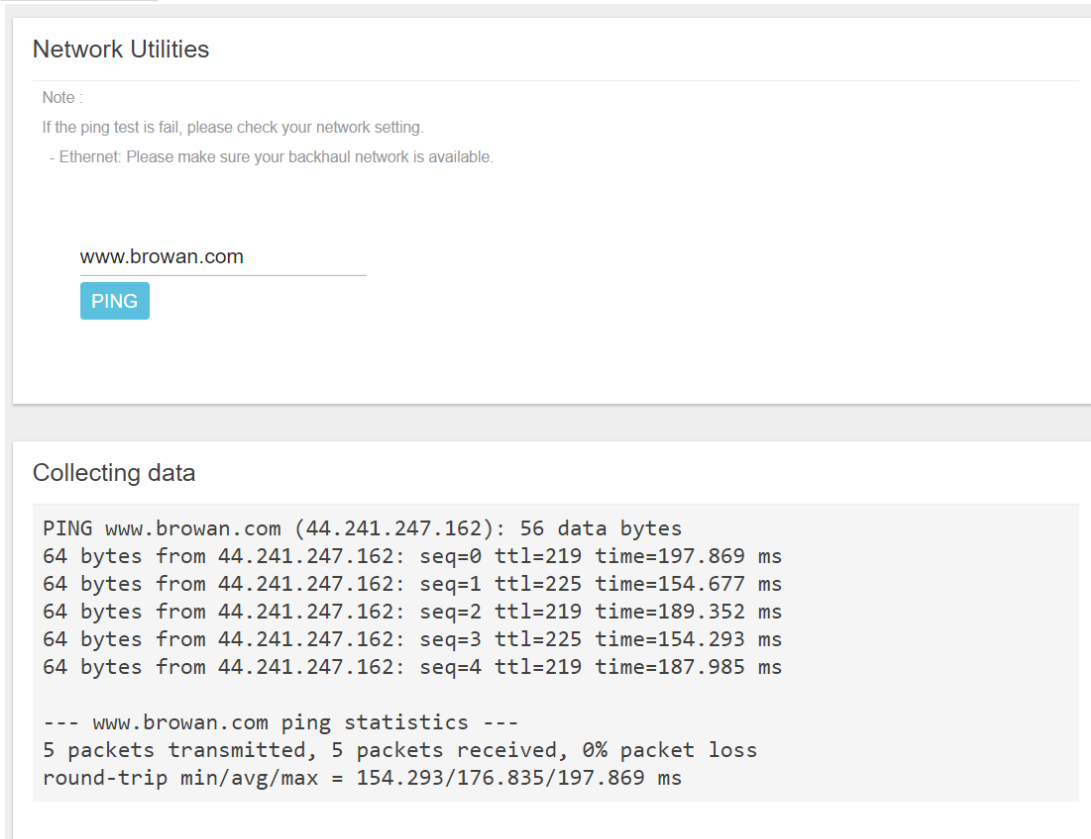
[EXPORT](#) [REFRESH](#)



## 4.2 Diagnostics

Input a specific URL in the text field. Click the “PING” button to ping the URL specified

Figure 4.2-A Network Utilities



The screenshot shows a web interface titled "Network Utilities". It includes a "Note" section with instructions: "If the ping test is fail, please check your network setting." and "- Ethernet: Please make sure your backhaul network is available." Below this is a text input field containing "www.browan.com" and a blue "PING" button. The bottom section, titled "Collecting data", displays the following output:

```
PING www.browan.com (44.241.247.162): 56 data bytes
64 bytes from 44.241.247.162: seq=0 ttl=219 time=197.869 ms
64 bytes from 44.241.247.162: seq=1 ttl=225 time=154.677 ms
64 bytes from 44.241.247.162: seq=2 ttl=219 time=189.352 ms
64 bytes from 44.241.247.162: seq=3 ttl=225 time=154.293 ms
64 bytes from 44.241.247.162: seq=4 ttl=219 time=187.985 ms

--- www.browan.com ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 154.293/176.835/197.869 ms
```

### FCC Statement

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

## **IC Statement**

This device complies with Industry Canada's licence-exempt RSSs. 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.

The term "IC: " before the certification/registration number only signifies that the Industry Canada technical specifications were met. This product meets the applicable Industry Canada technical specifications. This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet équipement est conforme aux limites d'exposition aux rayonnements de la ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.