



Browan Communications Inc.

No.15-1, Zhonghua Rd.,
Hsinchu Industrial Park,
Hukou, Hsinchu,
Taiwan, R.O.C. 30352
Tel: +886-3-6006899
Fax: +886-3-5972970

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Pico Next Gateway User Guide





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Revision History

Revision	Date	Description
.001	Aug. 19, 2021	Browan first release
.002	Feb. 15, 2022	Add Regulatory and change LED function



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Regulatory

Federal Communication Commission Statement (FCC, U.S.)

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 an 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 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.

Radiation Exposure Statement

This device complies with RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This device must operate with a minimum distance of 20 cm between the radiator and user body.

FCC Caution:

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



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IC WARNING

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device

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 :

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

Radiation Exposure Statement:

This equipment complies with Canada 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.

Déclaration d'exposition aux radiations:

Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20cm entre le radiateur et votre corp.

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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 at parking lots, exhibition centers, and campuses.

1.2 LED Functions

LED Functions	Constant	Flashing	Off
Power	Power On	Booting /OTA	OFF
Internet	Internet Available	Checking Internet	RFU
Service	LNS Connected	RFU	LNS Not Connected
LoRa	LoRa Working	Initializing	LoRa Not Working

1.3 Reset Button

Reboot:

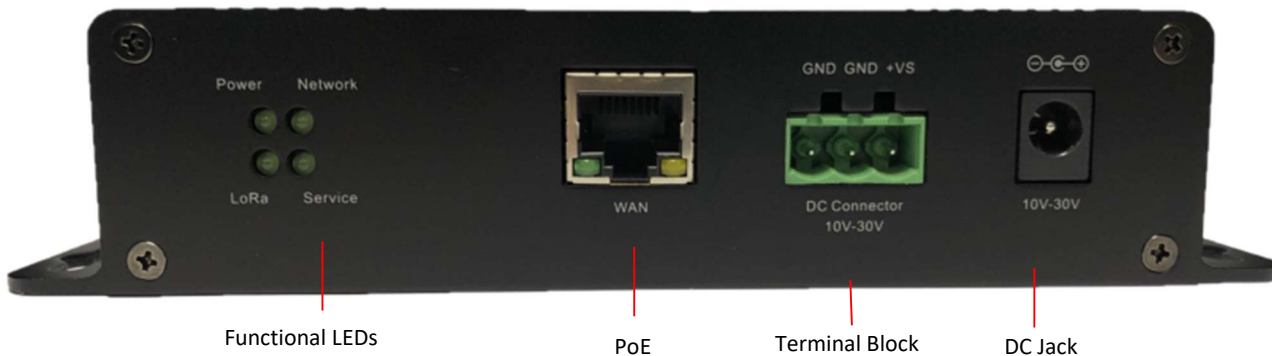
By pressing and holding the RESET Button, the Power LED will start flashing. The “reboot” procedure will be triggered when the RESET Button is released while the Power LED light is flashing.

Restore to Default:

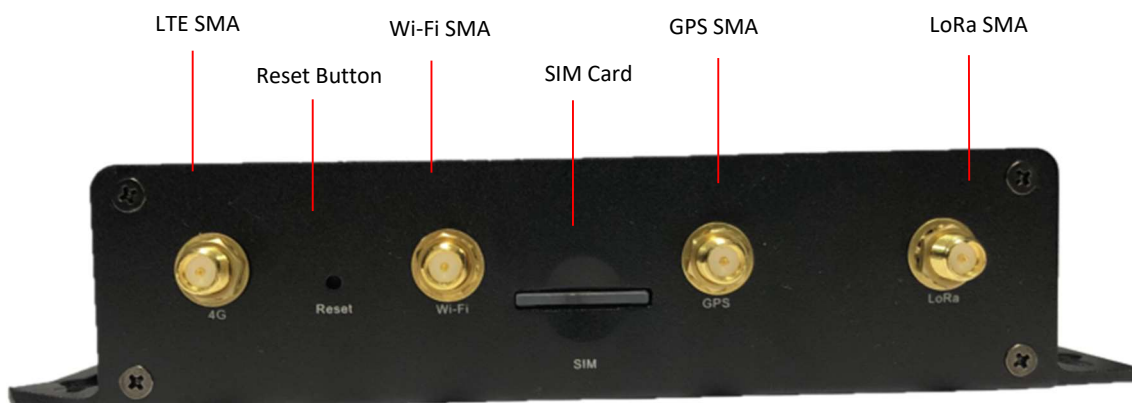
By pressing and holding the RESET Button, the Power LED will start flashing. The “restore to default” procedure will be triggered when the RESET Button released after the Power LED light becomes constant.

1.4 I/O Ports

Front Panel



Back Panel -



1.5 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.

2.2 DC Adapter

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

2.3 Terminal Block

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

2.4 Ethernet

Connect a 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

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 from 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 3.1-A Admin GUI

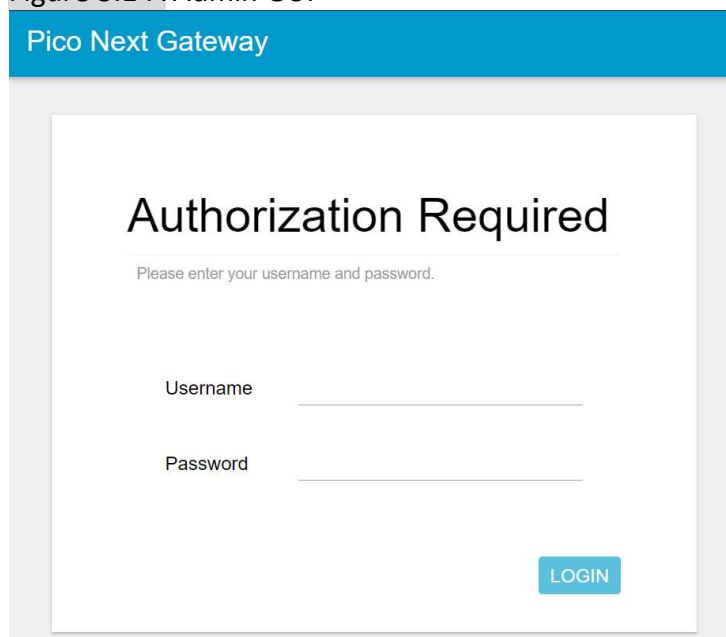
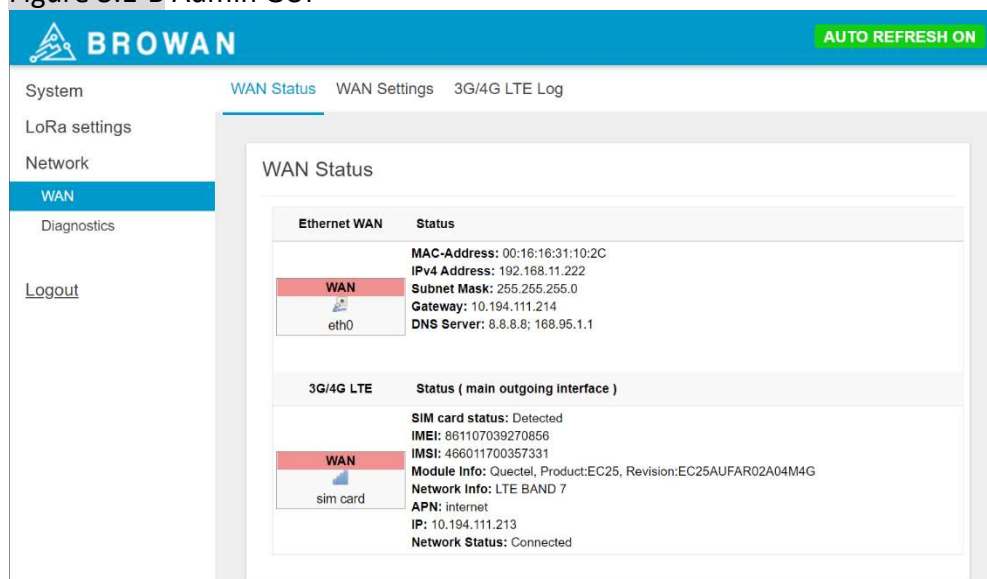


Figure 3.1-B Admin GUI





3.2 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.


4 Administration


Pico Next login password can be configured on this page.

Figure 4-A Router Password

Router Password

Changes the administrator password for accessing the device

Password 

Confirmation 

4.1 Restore

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

Figure 4.2-A Restore

Restore

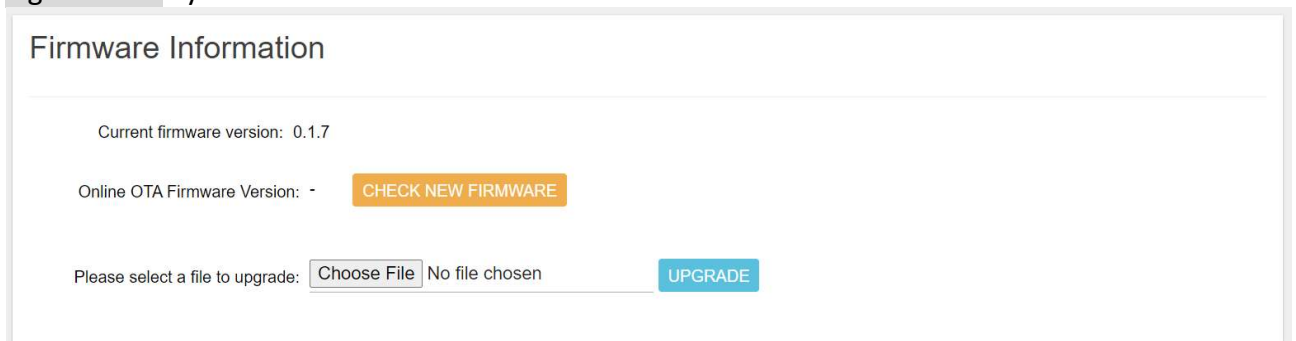
To reset the firmware to its initial state, click "Perform reset".

Reset to defaults:

4.2 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 4.2-A System Firmware



Firmware Information

Current firmware version: 0.1.7

Online OTA Firmware Version: - [CHECK NEW FIRMWARE](#)

Please select a file to upgrade: No file chosen

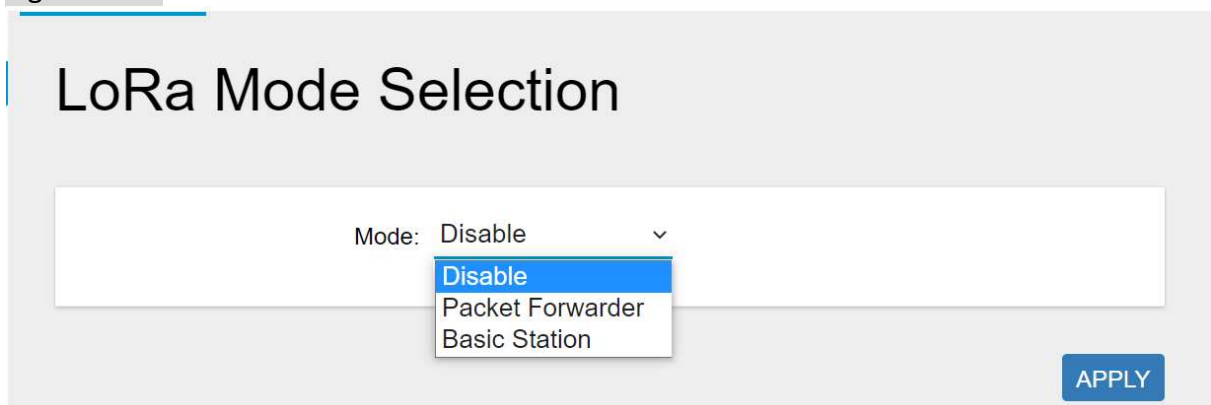
5 LoRa Settings

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.

5.1 Mode Selection

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

Figure 5.1-A LoRa Mode Selection



LoRa Mode Selection

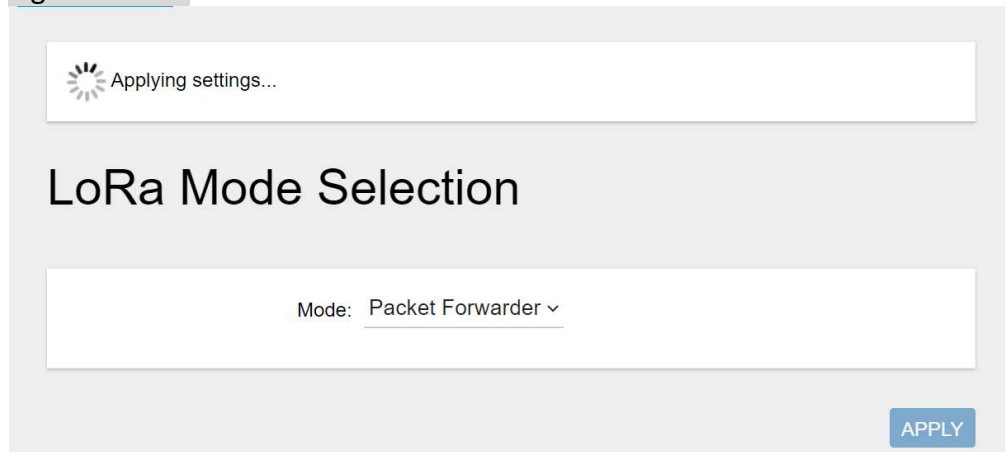
Mode: Disable

- Disable
- Packet Forwarder
- Basic Station

5.1.1 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 5.1.1-A LoRa Mode Selection - Packet Forwarder



The screenshot shows a web interface for LoRa Mode Selection. At the top, there is a status bar with a loading icon and the text "Applying settings...". Below this, the title "LoRa Mode Selection" is displayed. A dropdown menu is set to "Mode: Packet Forwarder". At the bottom right, there is a blue button labeled "APPLY".

Figure 5.1.1-B LoRa Mode Selection - Packet Forwarder menu



The screenshot shows the Browan web interface. The top navigation bar includes the Browan logo and the text "BROWAN". Below the navigation bar, there are tabs for "Gateway Info", "Gain", "Radio and Channel Settings", and "LBT Settings". The "Gateway Info" tab is active. On the left sidebar, the "Packet Forwarder" option is selected under the "LoRa settings" section. The main content area displays the "Gateway Info" details:

Gateway ID:	1c497bfffefb5e56
Server Address:	browan.eu1.cloud.thethings
Server Uplink Port:	1700 (1-65535)
Server Downlink Port:	1700 (1-65535)



5.1.1.1 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 5.1.1.1-A Gateway Info

Gateway Info

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

5.1.1.2 Antenna Gain

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

Figure 5.1.1.2-A Antenna Gain

Antenna Gain:	<input type="text" value="0"/> (0 ~ 15)
---------------	---

5.1.1.3 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 5.1.1.3-A Radio and Channel Settings

Radio Settings

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

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

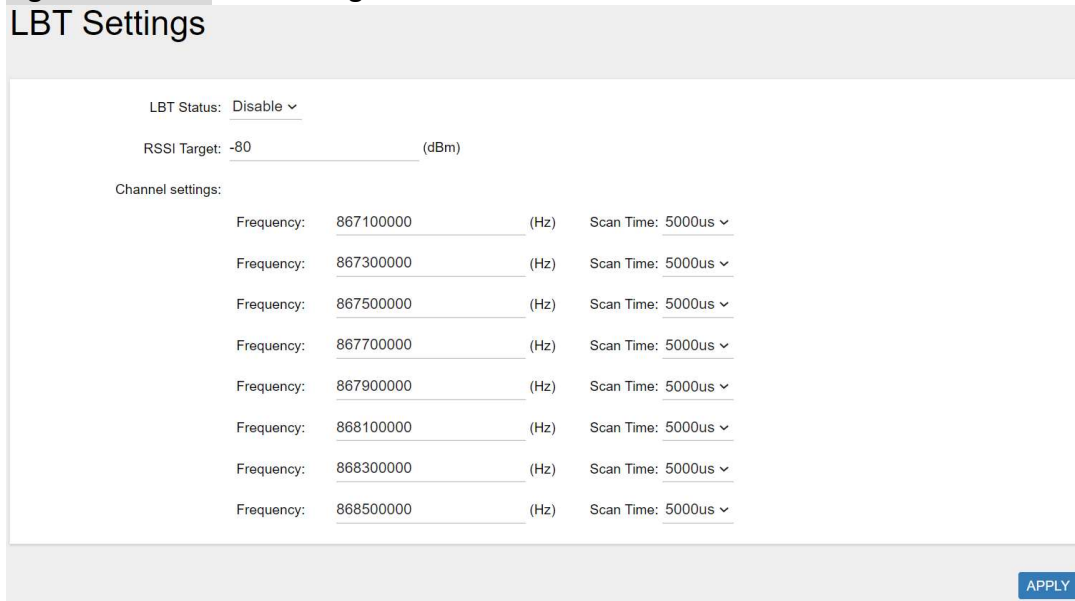
Channel Assignment

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

5.1.1.4 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 5.1.1.4-A LBT Settings
LBT Settings



LBT Status: Disable ▾

RSSI Target: -80 (dBm)

Channel settings:

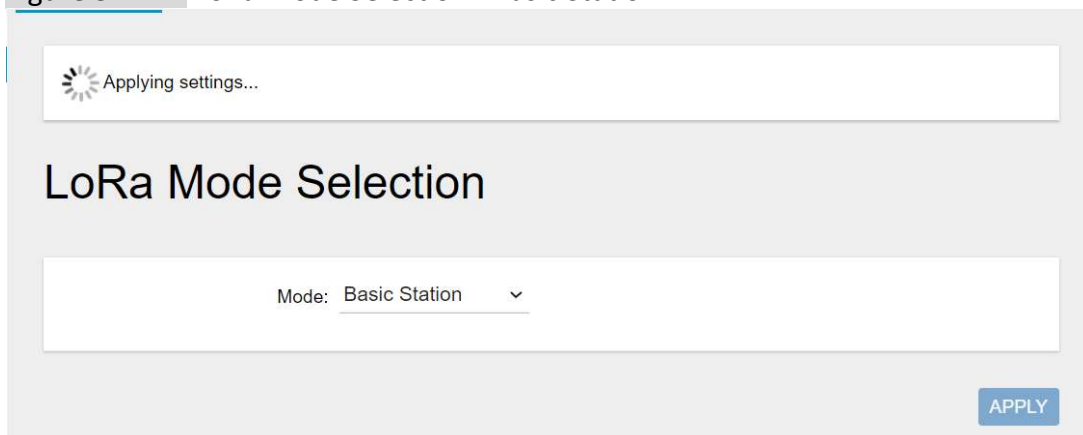
Frequency:	867100000	(Hz)	Scan Time: 5000us ▾
Frequency:	867300000	(Hz)	Scan Time: 5000us ▾
Frequency:	867500000	(Hz)	Scan Time: 5000us ▾
Frequency:	867700000	(Hz)	Scan Time: 5000us ▾
Frequency:	867900000	(Hz)	Scan Time: 5000us ▾
Frequency:	868100000	(Hz)	Scan Time: 5000us ▾
Frequency:	868300000	(Hz)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

APPLY

5.1.2 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 5.1.2-A LoRa Mode Selection - Basic Station



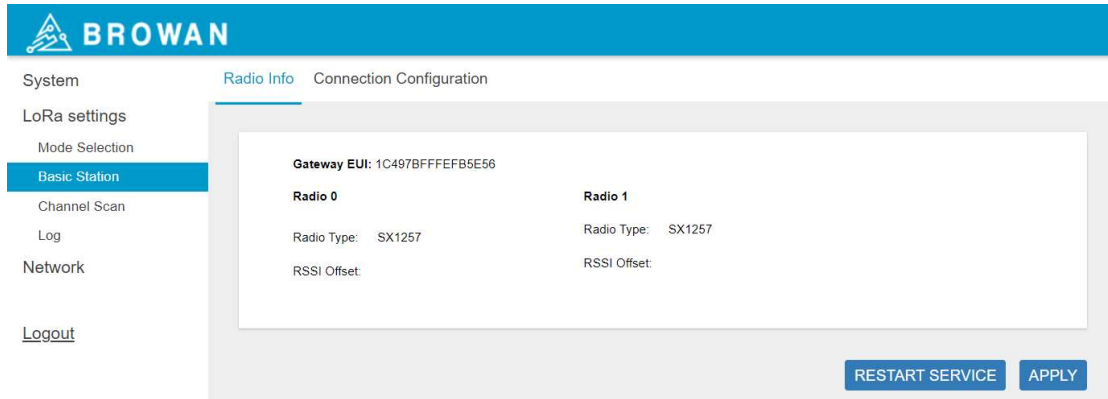
⌄ Applying settings...

LoRa Mode Selection

Mode: Basic Station ▾

APPLY

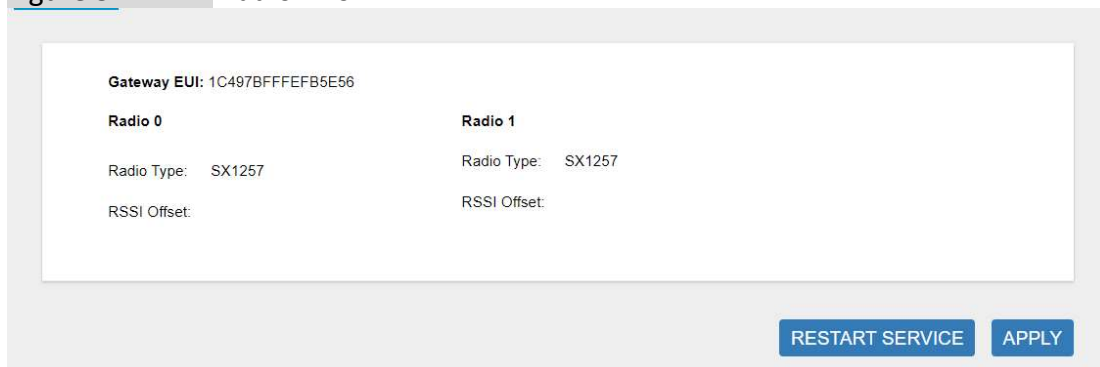
Figure 5.1.2-B LoRa Mode Selection - Basic Station menu



5.1.2.1 Radio Info

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

Figure 5.1.2.1-A Radio Info



5.1.2.2 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 5.1.2.2-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 5.1.2.2-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



5.3 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 5.3-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/ε
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/ε
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

6 Network

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

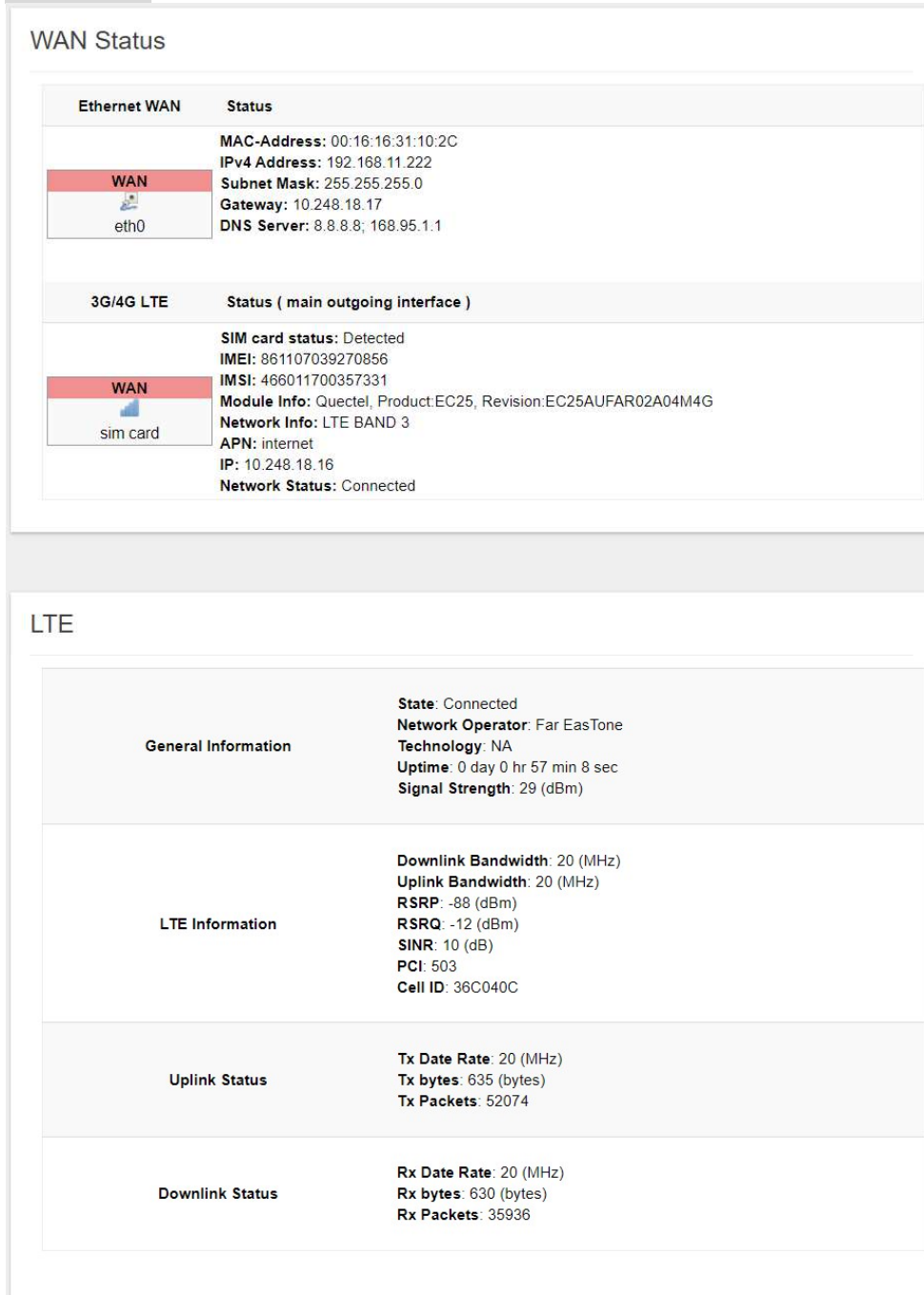
6.1 WAN

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.

6.1.1 WAN Status

The current network status will be shown on this page.

Figure 6.1.1 WAN Status



6.1.2 WAN Settings

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

Figure 6.1.2-A WAN Mode



WAN Settings

System will reboot if settings are applied successfully.

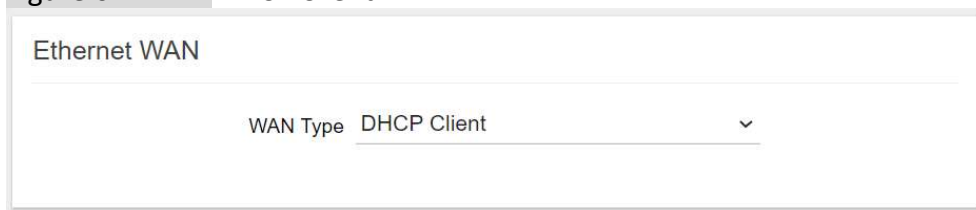
WAN Mode Ethernet WAN

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

6.1.2.1 Ethernet WAN

- DHCP Client

Figure 6.1.2.1-A DHCP Client

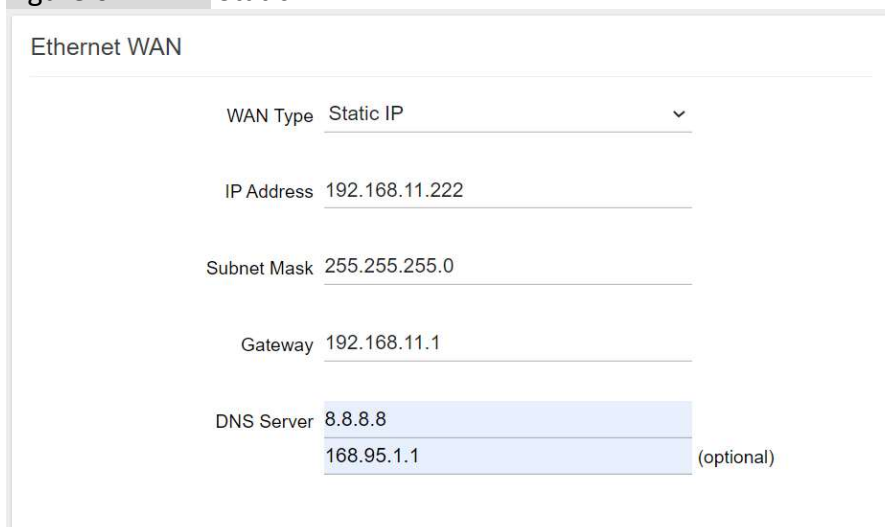


Ethernet WAN

WAN Type DHCP Client

- Static IP

Figure 6.1.2.1-B Static IP



Ethernet WAN

WAN Type Static IP

IP Address 192.168.11.222

Subnet Mask 255.255.255.0

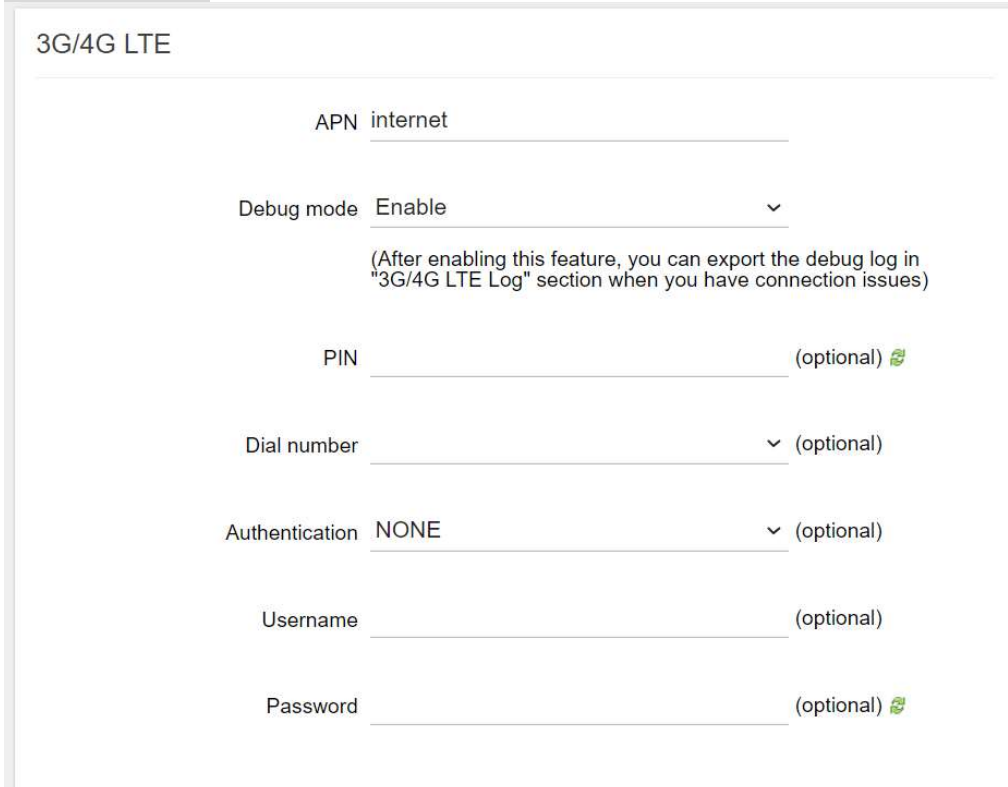
Gateway 192.168.11.1

DNS Server 8.8.8.8
168.95.1.1 (optional)

6.1.2.2 3G/4G LTE

Configure "APN" information according to mobile service provider requirements.

Figure 6.1.2.2-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)

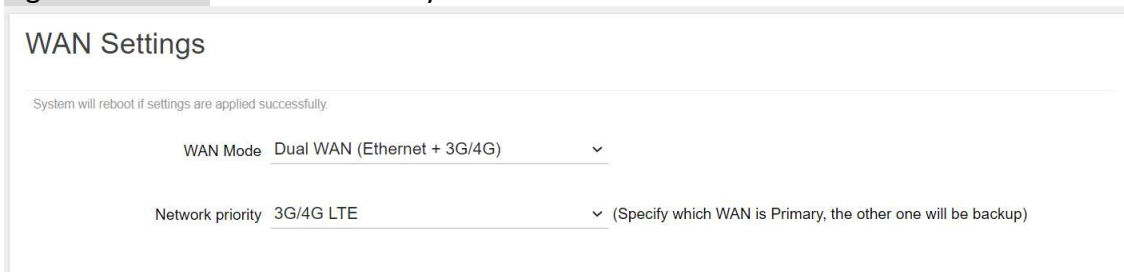
Username _____ (optional)

Password _____ (optional) 

6.1.2.3 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 6.1.2.3-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 6.1.2.3-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) 🔄

6.1.3 3G/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 6.1.3-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](#)



6.2 Diagnostics

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

Figure 6.2-A Network Utilities

Network Utilities

Note :

If the ping test is fail, please check your network setting.

- Ethernet: Please make sure your backhaul network is available.

www.browan.com

PING

Collecting data

```
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
```