

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

Document Number BQW_02_0031.007

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
.003	Apr. 28, 2022	Add WiFi Station configuration
.004	Aug. 5, 2022	Add Packet Forwarder Whitelist Filter, OpenVPN Client configuration, and Professional Installation instructions
.005	Oct. 6, 2022	Add firmware upgrade details. Update Whitelist Filter and Channel Scan
.006	Oct. 31, 2022	Add passive PoE data
.007	Jan. 13, 2023	Add Auto OTA update, file export, PLMN ID for LTE, and packet forwarder restore to default



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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 interferencewill 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 anyinterference 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 followingtwo 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 :

- 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.

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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Professional Installation Instructions

1. Installation personal

This product is designed for specific applications and needs to be installed by a qualified person who has RF and related rules knowledge. The general user shall not attempt to install or change the settings.

2. Installation location

The product shall be installed at a location where the radiating antenna can be kept 20 cm from nearby persons in normal operation conditions to meet regulatory RF exposure requirements.

3. External antenna

Use only the antennas that have been approved by the applicant. Non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power, which may lead to the violation of FCC/IC limits and is prohibited.

4. Installation procedure

Please refer to user's manual for details.

5. Warning

Please carefully select the installation position and make sure that the final output power does not exceed the limits set forth in relevant rules. Violation of the rules could lead to serious federal penalties.



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Instructions d'installation professionnelle

1. Installation

Ce produit est destine a un usage specifique et doit etre installe par un personnel qualifie maitrisant les radiofrequences et les regles s'y rapportant. L'installation et les reglages ne doivent pas etre modifies par l'utilisateur final.

2. Emplacement d'installation

En usage normal, afin de respecter les exigences reglementaires concernant l'exposition aux radiofrequences, ce produit doit etre installe de facon a respecter une distance de 20 cm entre l'antenne emettrice et les personnes.

3. Antenn externe.

Utiliser uniiquement les antennes approuvees par le fabricant. L'utilisation d'autres antennes peut conduire a un niveau de rayonnement essentiel ou non essentiel depassant les niveaux limites definis par FCC/IC, ce qui est interdit.

4. Procedure d'installation

Consulter le manuel d'utilisation.

5. Avertissement

Choisir avec soin la position d'installation et s'assurer que la puissance de sortie ne depasse pas les limites en vigueur. La violation de cette regle peut conduire a de serieuses penalites federales.



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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.



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1.4 I/O Ports

Front Panel -



Back Panel -





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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.

*Please note that the GPS antenna needs to be purchased separately. *



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 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.



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2.1.3.1 Passive PoE

Passive PoE, passive Power over Ethernet, is a non-standard PoE. It can deliver power over the Ethernet lines, but without the negotiation or communication process; the power is "always-on". It requires using passive PoE injectors for networks, which send electric current out over the Ethernet cable at a certain voltage.

Pins at RJ45 Connector	Passive PoE (DC on Spares)
Pin 1	Rx+
Pin 2	Rx-
Pin 3	Tx+
Pin 4	DC +9V~+30V
Pin 5	DC +9V~+30V
Pin 6	Tx-
Pin 7	Ground
Pin 8	Ground

In general, a Passive PoE Injector has three connectors: DC jack, RJ45 for PoE and RJ45 for LAN. Simply connect a power source (output range of power adapter must be between 10V~30V) to the DC jack on the injector and the LED indicator will turn on. Then, use an ethernet cable to connect the LAN port on injector to your network, and use another ethernet cable to connect the PoE port on injector to your PicoNext Gateway.



DC 12V & Internet



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2.2 Upgrade Firmware

Upgrade to the newest firmware with Web GUI following below "**3.1 Open Admin GUI**" page 13 instructions and upgrading with "**4.3 System Firmware**" page 15 instructions. By clicking the "Check New Firmware" button, the gateway may upgrade to the latest firmware version.

Figure 2.2-A Firmware Upgrade

Firmware Information	
Current firmware version: 0.1.7	
Online OTA Firmware Version: - CHECK NEW FIRMWARE	
Please select a file to upgrade: Choose File No file chosen UPGRADE	

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 Ad	min GUI
-----------------	---------

Pico N	ext Gateway	
	Authoriz	zation Required
	Please enter your user	name and password.
	Username	
	Password	
		LOGIN



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Figure 3.1-B Admin GUI

System LoRa settings	WAN Status WAN Settings 3G/4G LTE Log
Network	WAN Status
Diagnostics	Ethernet WAN Status
<u>Logout</u>	MAC-Address: 00:16:16:31:10:2C IPv4 Address: 192.168.11.222 WAN Subnet Mask: 256.255.255.256.0 Cateway: 10.194.111.214 eth0 DNS Server: 8.8.8; 168.95.1.1
	3G/4G LTE Status (main outgoing interface)
	SIM card status: Detected IME: 861107039270556 Max Module Info: Quectel, Product:EC25, Revision:EC25AUFAR02A04M4G Network Info: LTE BAND 7 APN: Internet IP: 10.194.111.213 Network Status: Connected

4 System

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

4.1 Administration

Pico Next login password can be configured on this page.

Figure 4.1-A Router Password

Router Password		
Changes the administrator password for ac	cessing the device	
Password		
Confirmation	<i>#</i>	
	SAVE	CANCEL



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4.2 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: PERFORM RESET	

4.3 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 4.3-A System Firmware

Firmware Information
Current firmware version: 0.1.7
Online OTA Firmware Version: - CHECK NEW FIRMWARE
Please select a file to upgrade: Choose File No file chosen UPGRADE

The Auto Firmware Update can be enabled, and the device will check the OTA server for new firmware versions daily.

Figure 4.3-B System Firmware

Auto Firmware Update		
Enable auto firmware update :	APPLY	



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4.4 Support

Click the "EXPORT" button to download the log and config files.

Figure 4.4-A Export Log

Support

Click "EXPORT" button to download the log and config files. EXPORT

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 Se	election	
Mode:	Disable ~ Disable Packet Forwarder Basic Station	APPLY

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.



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Figure 5.1.1-A LoRa Mode Selection - Packet Forwarder

Applying settings	
LoRa Mode Se	election
Mode:	Packet Forwarder ~
	APPLY

Figure 5.1.1-B LoRa Settings - Packet Forwarder menu

🙈 BROWAN			
System	Gateway Info Gain Radio and Channel Setting	gs	
LoRa settings			
Mode Selection	Gateway Info		
Packet Forwarder	,		
Whitelist Filter			
Logs	Cataway ID:	80020CEEEE0EE012	
Network	Galeway ID:	00029CFFFE0FF913	
	Server Address:	browan.eu1.cloud.thething	ò
Logout	Server Uplink Port:	1700	(1~65535)
	Server Downlink Port:	1700	(1~65535)



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5.1.1.1 Gateway Info

This page is for setting 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:	1c497bfffefb5e56	
Server Address:	browan.eu1.cloud.thethings	
Server Uplink Port:	1700	(1~65535)
Server Downlink Port:	1700	(1~65535)
Keep Alive Interval:	10	(seconds)
Statistics display Interval:	30	(seconds)
Push Timeout:	100	(milliseconds)

5.1.1.2 Antenna Gain

This page is for setting up the *antenna gain* of Lora.

Figure 5.1.1.2-A Antenna Gain

Antenna Gain:	0	(0 ~ 15)	
			APPLY



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5.1.1.3 Radio and Channel Settings

This page is for configuring 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 0 Radio 1 Central Frequency: 867400000 (Hz) RSSI Offset: -167 (dBm) RSSI Offset: -167 (dBm) Channel Assignment RSSI Offset: -167 (dBm) RSSI Offset: -167 (dBm) Channel Assignment Radio Interface: 0 × CenterFreqOffset: -300000 (40000~+40000) CH 0 Status: Enable × Radio Interface: 0 × CenterFreqOffset: -300000 (40000~+40000) CH 1 Status: Enable × Radio Interface: 0 × CenterFreqOffset: -100000 (40000~+400000) CH 2 Status: Enable × Radio Interface: 0 × CenterFreqOffset: 100000 (40000~+400000) CH 3 Status: Enable × Radio Interface: 0 × CenterFreqOffset: 100000 (40000~+400000) CH 3 Status: Enable × Radio Interface: 0 × CenterFreqOffset: 300000 (40000~+400000) CH 4 Status: Enable × Radio Interface: 1 × CenterFreqOffset: 300000 (40000~+400000) (40000~+400000)	Radio Settings Here you can modify Certral frequency of Radio 0 or Radio 1 to change channel frequencies.							
Central Frequency: 867400000 (Hz) Central Frequency: 868200000 (Hz) RSSI Offset: -167 (dBm) RSSI Offset: -167 (dBm) Channel Assignment CH 0 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: -300000 (-400000-+400000) CH 1 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: -100000 (-400000-+400000) CH 2 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: 100000 (-400000-+400000) CH 3 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: 100000 (-400000-+400000) CH 3 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: 300000 (-400000-+400000) CH 4 Status: Enable ~ Radio Interface: 1 ~ CenterFreqOffset: -300000 (-400000-+400000)	Radio 0			Radio 1				
RSSI Offset: -167 (dBm) RSSI Offset: -167 (dBm) Channel Assignment	Central Frequency:	867400000	(Hz)	Central Frequency:	868200000	(Hz)		
CH 0 Status: Enable v Radio Interface: 0 v CenterFreqOffset: -300000 (-400000~+400000) CH 1 Status: Enable v Radio Interface: 0 v CenterFreqOffset: -100000 (-400000~+400000) CH 2 Status: Enable v Radio Interface: 0 v CenterFreqOffset: 100000 (-400000~+400000) CH 2 Status: Enable v Radio Interface: 0 v CenterFreqOffset: 100000 (-400000~+400000) CH 3 Status: Enable v Radio Interface: 0 v CenterFreqOffset: 300000 (-400000~+400000) CH 4 Status: Enable v Radio Interface: 1 v CenterFreqOffset: -300000 (-400000~+400000)	RSSI Offset:	-167 (dBm)		RSSI Offset:	-167 (dBm)			
CH 0 Status:Enable vRadio Interface:0 vCenterFreqOffset:-300000(-400000~+400000)CH 1 Status:Enable vRadio Interface:0 vCenterFreqOffset:-100000(-400000~+400000)CH 2 Status:Enable vRadio Interface:0 vCenterFreqOffset:100000(-400000~+400000)CH 3 Status:Enable vRadio Interface:0 vCenterFreqOffset:300000(-400000~+400000)CH 4 Status:Enable vRadio Interface:1 vCenterFreqOffset:-300000(-400000~+400000)CH 4 Status:Enable vRadio Interface:1 vCenterFreqOffset:-300000(-400000~+400000)	Channel As	signment						
CH 1 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: -100000 (-400000-+400000) CH 2 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: 100000 (-400000-+400000) CH 3 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: 300000 (-400000-+400000) CH 4 Status: Enable ~ Radio Interface: 1 ~ CenterFreqOffset: -300000 (-400000-+400000)	CH 0 Status: Enable	e v Radio Interface: 0 v	CenterFreqOffset:	-300000	(-400000~+400000)			
CH 2 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: 100000 (-400000~+400000) CH 3 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: 300000 (-400000~+400000) CH 4 Status: Enable ~ Radio Interface: 1 ~ CenterFreqOffset: -300000 (-400000~+400000)	CH 1 Status: Enabl	e v Radio Interface: 0 v	CenterFreqOffset:	-100000	(-400000~+400000)			
CH 3 Status: Enable ~ Radio Interface: 0 ~ CenterFreqOffset: 300000 (-400000~+400000) CH 4 Status: Enable ~ Radio Interface: 1 ~ CenterFreqOffset: -300000 (-400000~+400000)	CH 2 Status: Enabl	e v Radio Interface: 0 v	CenterFreqOffset:	100000	(-400000~+400000)			
CH 4 Status: Enable V Radio Interface: 1 V CenterFreqOffset: -300000 (-400000~+400000)	CH 3 Status: Enable	e v Radio Interface: 0 v	CenterFreqOffset:	300000	(-400000~+400000)			
	CH 4 Status: Enabl	e v Radio Interface: 1 v	CenterFreqOffset:	-300000	(-400000~+400000)			
CH 5 Status: Enable Radio Interface: 1 CenterFreqOffset: -100000 (-400000~+400000)	CH 5 Status: Enabl	e v Radio Interface: 1 v	CenterFreqOffset:	-100000	(-400000~+400000)			
CH 6 Status: Enable ~ Radio Interface: 1 ~ CenterFreqOffset: 100000 (-400000~+400000)	CH 6 Status: Enabl	e 🗸 Radio Interface: 1 🗸	CenterFreqOffset:	100000	(-400000~+400000)			
CH 7 Status: Enable ~ Radio Interface: 1 ~ CenterFreqOffset: 300000 (-400000~+400000)	CH 7 Status: Enabl	e 🗸 Radio Interface: 1 🗸	CenterFreqOffset:	300000	(-400000~+400000)			
CH 8 Status: Enable v Radio Interface: 1 v CenterFreqOffset: 100000 (-375000~+375000) Channel Bandwidth: 250	CH 8 Status: Enabl	e v Radio Interface: 1 v	CenterFreqOffset:	100000	(-375000~+375000)	Channel Bandwidth: 250K ~		
	4							

APPLY



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5.1.1.4 LBT Settings

For some regions (i.e. Japan), the Listen Before Talk (LBT) function is a must. This page is for setting 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 ~	

5.1.2 Whitelist Filter

To reduce unnecessary data traffic, this page configures the whitelist filter for the Packet Forwarder through *Fport Filter* and *DevAddr Filter*.

If the "FPort" or the "DevAddr" of an end-device matches with the information on the whitelist, the lora package will then be forwarded to the network server. On the other hand, Join-Request packages are always allowed to be forwarded to the network server.

FPort:

The filter port range is from 1 to 223. Fill in with "-1" if Fport checking is not needed.

DevAddr:

If the end-device is activated by OTAA, the DevAddr can usually be found on the network server. Each DevAddr (4 bytes) can be split into 64 bits. Every 4 bits form a group which is called "NABBLE". The DevAddr filter will check each "NABBLE" individually. Fill in with the alphabet "X" if DevAddr checking is not needed.



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Figure 5.1.2-A Whitelist Filter

nable		Fport Filter	-1	(-1 or 1~223)	DevAddr Filter	27XXXXXX	
nable	~	Fport Filter	100	(-1 or 1~223)	DevAddr Filter	48009527	
nable	~	Fport Filter	136	(-1 or 1~223)	DevAddr Filter	XXXXXXXX	

Figure 5.1.2-B LoRaWAN frame format elements



5.1.2.1 Examples of Whitelist Filter

Case 1:

Only forward messages from Fport=120 to the network server. DevAddr is not checked in this case.

Enable 🗹	Fport Filter	120	(-1 or 1~223)	DevAddr Filter	XXXXXXXX
Enable 🛛	Fport Filter	0	(-1 or 1~223)	DevAddr Filter	XXXXXXXX
Enable 🗆	Fport Filter	0	(-1 or 1~223)	DevAddr Filter	XXXXXXXX



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Figure 5.1.2.1-B Network Server Case 1

Gat	Gateways > pico-5813D3FFFE2984D2 > Live data							
Time	Туре	Data preview	Verbose stream 💽 🗶 Export as JSON 🛛 II Pause					
↑ 13:56:21	Receive uplink message	DevAddr: 88 88 88 88 🐼 6 FCnt: 1 FPort: 128 Data rate: SF7	'BW125 SNR: 9.3 RSSI: -83					
↑ 13:56:15	Receive uplink message	JoinEUI: 00 16 16 00 00 00 00 02 🗘 🕒 DevEUI: 00 16 16 00 00 00 2	4 5A ↔ 🖺 Data rate: SF7BW125 SNR: 10 RSSI: -97					
↑ 13:56:13	Receive uplink message	DevAddr: 99 99 99 99 99 🚯 🕼 FCnt: 3 FPort: 120 Data rate: SF7	'BW125 SNR: 9 RSSI: -80					
↑ 13:56:01	Receive uplink message	JoinEUI: 00 16 16 00 00 00 00 02 🔗 🚡 DevEUI: 00 16 16 00 00 00 2	4 5A ↔ 🕼 Data rate: SF7BW125 SNR: 10 RSSI: -92					

Case 2:

Only forward the messages from DevAddr: "XX**1122**XX" to the network server. Fport is not checked in this case.

Figure 5.1.2.1-C Whitelist Filter Case 2

Whitelis	t Filter				
Enable 🗹	Fport Filter	-1	(-1 or 1~223)	DevAddr Filter	XX1122XX
Enable	Fport Filter	0	(-1 or 1~223)	DevAddr Filter	XXXXXXXX
Enable 🗆	Fport Filter	0	(-1 or 1~223)	DevAddr Filter	XXXXXXXX

Figure 5.1.2.1-D Network Server Case 2

Gate	eways > pico-5813D3FFFE2984D2 >	Live data	
Time	Туре	Data preview V	erbose stream 🔿 生 Export as JSON 🛛 Pause 🥤
↑ 14:16:08	Receive uplink message	DevAddr: CC 11 22 DD ↔ 🚡 FCnt: 2 FPort: 100 Data rate: SF78W:	25 SNR: 9.3 RSSI: -61
↑ 14:16:05	Receive uplink message	JoinEUI: 00 16 16 00 00 00 00 02 🔹 🖬 DevEUI: 00 16 16 00 00 00 24 5	A 😯 🚡 Data rate: SF7BW125 SNR: 9.3 RSSI: -94
↑ 14:15:59	Receive uplink message	DevAddr: CC 11 22 DD 🗘 🕼 FCnt: 1 FPort: 22 Data rate: SF7BW12	5 SNR: 9.8 RSSI: -58
7 14:15:51	Receive gateway status	<pre>Metrics: { rxin: 18, rxok: 17, rxfw: 17, ackr: 0, txin: 0, txok: 0 }</pre>	Versions: { ttn-lw-gateway-server: "3.21.2-rc1-SNAP
↑ 14:15:51	Receive uplink message	JoinEUI: 00 16 16 00 00 00 00 02 🔹 🕼 DevEUI: 00 16 16 00 00 00 24 5	A 🗘 Tata rate: SF7BW125 SNR: 9.5 RSSI: -91
↑ 14:15:37	Receive uplink message	JoinEUI: 00 16 16 00 00 00 00 02 💠 🖻 DevEUI: 00 16 16 00 00 00 24 5	A 🗘 Tata rate: SF7BW125 SNR: 7.5 RSSI: -92
↑ 14:15:30	Receive uplink message	DevAddr: AA 11 22 BB 🗘 🔚 FCnt: 2 FPort: 22 Data rate: SF7BW12	5 SNR: 9.5 RSSI: -60
↑ 14:15:23	Receive uplink message	JoinEUI: 00 16 16 00 00 00 00 02 💎 🚡 DevEUI: 00 16 16 00 00 00 24 5	A 🗘 Tata rate: SF7BW125 SNR: 10 RSSI: -97
7 14:15:21	Receive gateway status	<pre>Metrics: { ackr: 0, txin: 0, txok: 0, rxin: 11, rxok: 10, rxfw: 10 }</pre>	Versions: { ttn-lw-gateway-server: "3.21.2-rc1-SNAP
↑ 14:15:16	Receive uplink message	DevAddr: AA 11 22 BB 🗘 盾 FCnt: 1 FPort: 123 Data rate: SF7BW:	25 SNR: 7.5 RSSI: -56
<i>≡</i> 14:15:13	Console: Events cleared	The events list has been cleared	



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Case 3:

Only forward the messages from DevAddr=0922ABCD and Fport=99 to the network server.

Figure 5.1.2.1-E Whitelist Filter Case 3

Whitelist Filter

Enable 🗹	Fport Filter	99	(-1 or 1~223)	DevAddr Filter	0922ABCD
Enable	Fport Filter	0	(-1 or 1~223)	DevAddr Filter	XXXXXXXX
Enable	Fport Filter	0	(-1 or 1~223)	DevAddr Filter	XXXXXXXX

Figure 5.1.2.1-F Network Server Case 3

Gate	ways > pico-5813D3FFFE2984D2 >	Live data
Time	Туре	Data preview Verbose stream Y Export as JSON
↑ 14:21:52	Receive uplink message	DevAddr: 09 22 AB CD 🗘 🖪 FCnt: 3 FPort: 99 Data rate: SF8BW125 SNR: 11 RSSI: -59
↑ 14:21:43	Receive uplink message	DevAddr: 09 22 AB CD 🗘 🕼 FCnt: 2 FPort: 99 Confirmed uplink Data rate: SF88W125 SNR: 9.5 RSSI: -58
↑ 14:21:41	Receive uplink message	JoinEUI: 00 16 16 00 00 00 00 02 💠 🚡 DevEUI: 00 16 16 00 00 00 24 5A 💠 🚡 Data rate: SF7BW125 SNR: 7.5
7 14:21:38	Receive gateway status	Metrics: { ackr: 0, txin: 0, txok: 0, rxin: 10, rxok: 10, rxfw: 10 } Versions: { ttn-lw-gateway-server: "3.2
↑ 14:21:34	Receive uplink message	DevAddr: 09 22 AB CD 😯 🖪 FCnt: 2 FPort: 99 Confirmed uplink Data rate: SF7BW125 SNR: 9.5 RSSI: -59
↑ 14:21:25	Receive uplink message	DevAddr: 09 22 AB CD 😯 🖪 FCnt: 1 FPort: 99 Data rate: SF7BW125 SNR: 7.5 RSSI: -58

5.1.3 Config Restore

Click the "APPLY" button to restore LoRa Packet Forwarder settings to the default value.

Figure 5.1.3-A LoRa Packet Forwarder Config Restore

 LoRa Packet Forwarder Config Restore

 To restore LoRa Packet Fowarder settings to default, click "APPLY".

 Restore LoRa settings to default:



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5.1.4 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 5.1.4-A LoRa Mode Selection - Basic Station

Applying settings	
LoRa Mode Selection	
Mode: Basic Station ~	
	APPLY

Figure 5.1.4-B LoRa Mode Selection - Basic Station menu

🔬 BROWA	N	
System	Radio Info Connection Configuration	
LoRa settings		
Mode Selection		
Basic Station	Gateway EUI: 1C497BFFFEFB5E56	
Channel Scan	Radio 0	Radio 1
Log	Radio Type: SX1257	Radio Type: SX1257
Network	RSSI Offset:	RSSI Offset:
Logout		
<u>2090u</u>		
		RESTART SERVICE APPLY



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5.1.4.1 Radio Info

This page shows the Gateway EUI information.

Figure 5.1.4.1-A Radio Info

Radio 0	Radio 1	
Radio Type: SX1257	Radio Type: SX1257	
RSSI Offset:	RSSI Offset:	

5.1.4.2 Connection Configuration

This page is for setting 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.



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Figure 5.1.4.2-A LNS Mode

Basic Station Mode:	LNS Mode 🗸	
Protocol:	WebSocket Secure ~	
Server Address:	browan.eu1.cloud.thethings.	
Server Port:	8887	
Trust:	Choose File No file chosen	UPLOAD
Trust Status:	Installed DELETE	
CRT:	Choose File No file chosen	(Optional) UPLOAD
CRT Status:	Not Installed	
Key:	Choose File No file chosen	(Optional) UPLOAD
Key Status:	Installed DELETE	
		RESTART SERVICE APPLY

- CUPS Mode

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

	Figure	5.1.4.2-B	CUPS	Mode
--	--------	-----------	------	------

Basic Station Mode:	CUPS Mode ~	
Protocol:	HTTPS ~	
Туре:	Boot 🗸	
Server Address:	browan.eu1.cloud.thethings.	
Server Port:	443	
Trust:	Choose File No file chosen	UPLOAD
Trust Status:	Installed DELETE	
CRT:	Choose File No file chosen	(Optional) UPLOAD
CRT Status:	Not Installed	
Key:	Choose File No file chosen	(Optional) UPLOAD
Key Status:	Installed DELETE	
		RESTART SERVICE APPLY



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5.2 Channel Scan

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

Figure 5.2-A Channel RSSI Scan

The device can scan all supported channels ba	ased on ISM band regulation.	
Note: The scanning process may take few min	utes to complete, please wait until the end of process.	
Scanning channel now		
11 Country Charles House		
Channel Index	Channel Frequency	Noise indication
Channel Index	Channel Frequency	Noise indication
Channel Index	Channel Frequency	Noise indication

Figure 5.2-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.

Select your target scan range : US915 ~

Channel Index	Channel Frequency(Hz)	Noise indication(dBm)
Channel 0	902300000	-103
Channel 1	902500000	-103
Channel 2	902700000	-103
Channel 3	902900000	-103
Channel 4	903100000	-103
Channel 5	903300000	-103
Channel 6	903500000	-103
Channel 7	903700000	-103
Channel 8	903900000	-101
Channel 9	904100000	-100



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5.3 Log

The LoRa logs will be shown on this page, showing recent LoRa logs with a maximum limit of 500 lines.

Figure 5.3-A 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=0/0
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 **Diagnostics**. 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.



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6.1.1 WAN Status

The current network status will be shown on this page.

Figure 6.1.1-A WAN Status

WAN Status		
Ethernet WAN	Status	
WAN Eth0	MAC-Address: 00:16: IPv4 Address: 192.168 Subnet Mask: 255.256 Gateway: 10.248.18.17 DNS Server: 8.8.8.8; 1	16:31:10:2C 3.11.222 5.255.0 7 68.95.1.1
3G/4G LTE	Status (main outgoir	ng interface)
WAN IMEI: 861107039270856 IMSI: 466011700357331 Module Info: Quectel, Product:EC25, Revision:EC25AUFAR02A04M4G Network Info: LTE BAND 3 APN: internet IP: 10.248.18.16 Network Status: Connected		
LTE		
General	Information	State: Connected Network Operator: Far EasTone Technology: NA Uptime: 0 day 0 hr 57 min 8 sec Signal Strength: 29 (dBm)
LTE In	formation	Downlink Bandwidth: 20 (MHz) Uplink Bandwidth: 20 (MHz) RSRP: -88 (dBm) RSRQ: -12 (dBm) SINR: 10 (dB) PCI: 503 Cell ID: 36C040C
Uplin	ık Status	Tx Date Rate: 20 (MHz) Tx bytes: 635 (bytes) Tx Packets: 52074
Downl	ink Status	Rx Date Rate: 20 (MHz) Rx bytes: 630 (bytes) Rx Packets: 35936



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6.1.2 WAN Settings

Pico Next supports 5 WAN Modes: *Ethernet WAN, 3G/4G LTE, Wi-Fi Station, Dual WAN* (*Ethernet+3G/4G*) and *Dual WAN*(*Ethernet+WiFi*).

Figure 6.1.2-A WAN Mode

WAN Settings			
System will reboot if settings are applied su	uccessfully.		
WAN Mode	Ethernet WAN	~	
	Ethernet WAN		
	Wireless Station		
	3G/4G LTE		
	Dual WAN (Ethernet + 3G/4G)		
	Dual WAN (Ethernet + WiFi)		

6.1.2.1 Ethernet WAN

- DHCP Client

Figure 6.1.2.1-A DHCP Client

Ethernet WAN
WAN Type DHCP Client ~



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- 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 Wireless Station

Configure "WiFi Access Point" information.

Figure 6.1.2.2-A Wireless Station Settings

Wireless Station				
Click "Scan" to get Access Point List				
SSID:	Box_Box			
Security:	WPA/WPA2-PSK ~			
KEY:	•••••			
SCAN	Box_Box	*		



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6.1.2.3 3G/4G LTE

Configure "APN" information according to mobile service provider requirements. The PLMN ID also can be supported.

Figure 6.1.2.3-A LTE Settings

3G/4G LTE		
APN	internet	
Use PLMN ID	* PLMN ID = MCC (3 digits) + MNC (2	or 3 digits)
MCC	466	
MNC	03	
PIN		(optional) 🖑
Authentication	NONE	(optional)
Username		(optional)
Debug mode	Disable	-
	(After enabling this feature, you can export the de	bug log in "3G/4G LTE Log" section when you have connection issues.)

6.1.2.4 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 6.1.2.4-A Network Primary

WAN Settings		
System will reboot if settings are applied s	uccessfully.	
WAN Mode	Dual WAN (Ethernet + 3G/4G)	×
Network priority	3G/4G LTE	\checkmark (Specify which WAN is Primary, the other one will be backup)



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Figure 6.1.2.4-B Ethernet and LTE Configuration

Ethernet WAN		
WAN Type	DHCP Client ~	
3G/4G LTE		
APN	internet	
Use PLMN ID	PLMN ID = MCC (3 digits) + MNC (2 digits)	or 3 digits)
MCC		
MNC		
PIN		(optional) 🖑
Dial number	~	(optional)
Authentication	NONE ~	(optional)
Username		(optional)
Password		(optional) 🌌
Debug mode	Disable ~	
	(After enabling this feature, you can export the de	bug log in אויא LIE Log" section when you have connection issues.)

6.1.2.5 Dual WAN (Ethernet+WiFi)

Configure the Ethernet Setting and Wi-Fi Station 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	6125-4	Network	Primary
inguie	0.1.2.3-	INCLWOIR .	riinaiy

WAN Settings		
System will reboot if settings are applied so	uccessfully.	
WAN Mode	Dual WAN (Ethernet + WiFi)	~
Network priority	WiFi	✓ (Specify which WAN is Primary, the other one will be backup.)



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Figure 6.1.2.5-B Ethernet and WiFi Station Configuration

Ethernet WAN		
WAN Typ	DHCP Client ~	
Wireless Station		
Click "Scan" to get Access Point List SSID: Security: KEY: SCAN	Box_Box WPA/WPA2-PSK ~ select one ~	

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	
4	• • • • • • • • • • • • • • • • • • •	•

REFRESH

EXPORT



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6.2 VPN

The VPN menu consists of the following categories: *VPN Settings* and *VPN Log*. An introduction for each category and input procedures are described in the following paragraphs.

6.2.1 VPN Settings

This page is for configuring OpenVPN Client settings, including *Import a config file* or *Customize a config file*.

OpenVPN Client Settings					
Here you can import a config file or manually config a VPN setting file.					
Service State	Enable	▼			
Config Type	Import a config file	~			
Import config file:	Choose File No file chosen	UPLOAD			
Username/Password Authentication	 (Please add "auth-user-pass /etc/openvp 	n/auth.cfg" in the imported config file while enabling this.)			
Username	test-user				
Password		22 22			
Config Status	Installed DELETE				
Note: Due to dual WAN mode is running, gateway info pushed from VPN server will be ignored					

Figure 6.2.1-A Import a config file



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Figure 6.2.1-B Customize a config file

ou can import a config file or manua	lly config a VPN setting file.			
Service State	Enable	~		
Config Type	Customize a config file	~		
Interface Type	TUN	~		
Protocol	UDP	~		
Server Hostname/IP	172.16.99.111			
Server Port	1194			
Username/Password Authentication				
Encryption Cipher	AES-256-CBC	~		
Minimum TLS Version	Default	~		
Certificate and Keys	CONFIGURE			
Other settings (Optional, max 1024 characters)	persist-tun remote-cert-tls server auth SHA256 data-ciphers AES-256-CBC route 10.99.1.0 255.255.255.0 route-metric 50 comp- <u>lzo</u> verb 3 allow-compression yes		×	



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6.2.2 VPN Log

The VPN connection log will be shown on this page.

Figure 6.2.2-A VPN Log

VPN Settings VPN Log

2022-07-05	10:59:21	Incoming Data Channel: Cipher 'AES-128-CBC' initialized with 128 bit key
2022-07-05	10:59:21	Incoming Data Channel: Using 160 bit message hash 'SHA1' for HMAC authentication
2022-07-05	10:59:21	net_route_v4_best_gw query: dst 0.0.0.0
2022-07-05	10:59:21	net_route_v4_best_gw result: via 192.168.11.244 dev eth0
2022-07-05	10:59:21	ROUTE_GATEWAY 192.168.11.244/255.255.255.0 IFACE=eth0 HWADDR=00:16:16:2b:aa:ac
2022-07-05	10:59:21	TUN/TAP device tun0 opened
2022-07-05	10:59:21	net_iface_mtu_set: mtu 1500 for tun0
2022-07-05	10:59:21	net_iface_up: set tun0 up
2022-07-05	10:59:21	net_addr_ptp_v4_add: 10.99.1.6 peer 10.99.1.5 dev tun0
2022-07-05	10:59:21	net_route_v4_add: 10.99.1.0/24 via 10.99.1.5 dev [NULL] table 0 metric 50
2022-07-05	10:59:21	GID set to nogroup
2022-07-05	10:59:21	UID set to nobody
2022-07-05	10:59:21	WARNING: this configuration may cache passwords in memory use the auth-nocache option to prevent this
2022-07-05	10:59:21	Initialization Sequence Completed



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

6.3 Diagnostics

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

Figure 6.3-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				
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				