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Femto Lite Indoor Gateway User Manual



Revision History

Revision	Date	Description	Author
.001	Feb. 09, 2021	First release	Gary
.002	June. 06, 2021	<ul style="list-style-type: none">● Update WEB GUI● Power input 5V DC/2A	Jason/Joey



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Contents

REVISION HISTORY	1
COPYRIGHT	2
NOTICE	2
TRADEMARKS	2
CONTENTS	3
CHAPTER 1 – INTRODUCTION	4
Purpose and Scope	4
Product Design	4
Definitions, Acronyms and Abbreviations.....	4
Reference	4
CHAPTER 2 – HARDWARE DETAILS	5
LED Indicators	5
I/O Ports	5
Back Label.....	6
Package Label.....	7
Package Content.....	7
CHAPTER 3 – USER MANUAL	8
3.1 Connect Femto Lite	8
3.2 Femto Lite Setting	8
STEP 1 : Firmware Upgrade.....	10
STEP 2 : SET LORA.....	10
STEP 3 : SET WAN	16

DIREKTRONIK

Chapter 1 – Introduction

Purpose and Scope

The purpose of this document is to describe the main functions, user manual, supported features, and system architecture of the WLRRTES-106 Femto Lite Indoor Gateway based on the latest LoRaWAN specification.

Product Design

The dimension of WLRRTES-106 Femto Lite Indoor Gateway is with the dimension of 116 x 91 x 27 mm, and with one LAN port, one Micro-USB port for 5V DC/2A power input, four LED indicators, and one reset button.



Definitions, Acronyms, and Abbreviations

Item	Description
LPWAN	Low-Power Wide-Area Network
LoRaWAN™	LoRaWAN™ is a Low Power Wide Area Network (LPWAN) specification intended for wireless battery operated Things in a regional, national or global network.
ABP	Activation by Personalization
OTAA	Over-The-Air Activation
TBD	To Be Defined

Reference

Document	Author
LoRaWAN Specification v1.0.3	LoRa Alliance
RP002-1.0.1 LoRaWAN Regional Parameters	LoRa Alliance

Chapter 2 – Hardware Details

LED Indicators

LED sequence: Power(System), WAN, WiFi, LoRa

One Orange, Three Green

Solid LED is for static status, blanking means the system is upgrading or active devices linked to the corresponding port

	Solid On	Blinking	Off
Power System(Orange)	Power ON	Booting (ignore bootloader)	Power Off
WAN(Blue)	Ethernet Plug and got IP Addr	Connecting	Unplug
Wireless(Blue)	WiFi Station Mode and got IP Addr	Connecting	Wireless Disable
LoRa(Blue)	LoRa is work	Connecting	LoRa is not work

Table 1 LED Behaviors

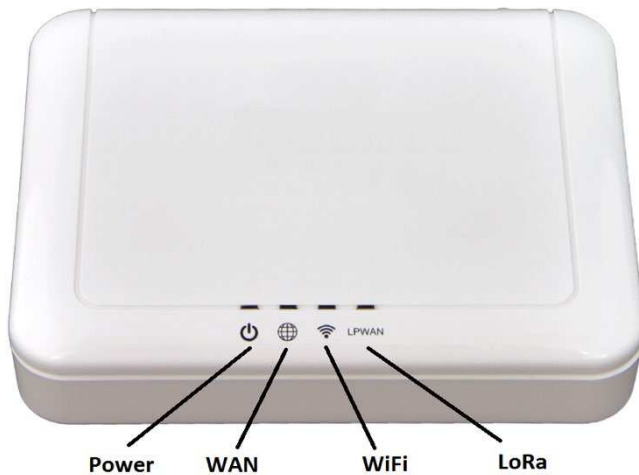


Figure 1 – IO Ports

I/O Ports

Port	Count	Description
RJ45	1	WAN port of the device
Reset	1	Reset to default (5 seconds to reset settings to factory default)
Micro USB	1	Power input via USB adaptor(5VDC/2A)

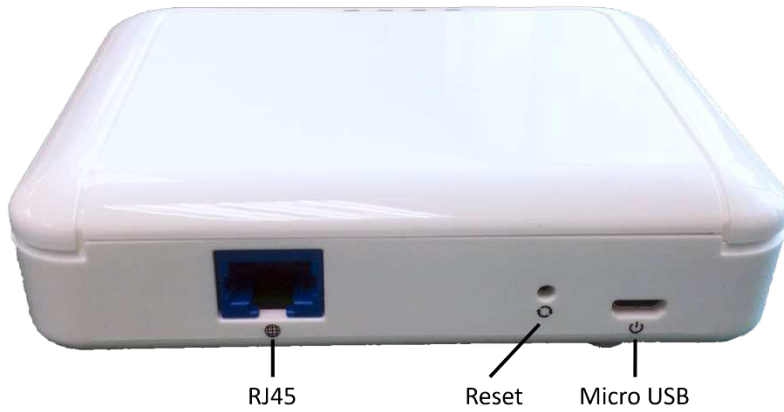


Figure 2 – IO Ports

Back Label

The marking information is located at the bottom of the apparatus.

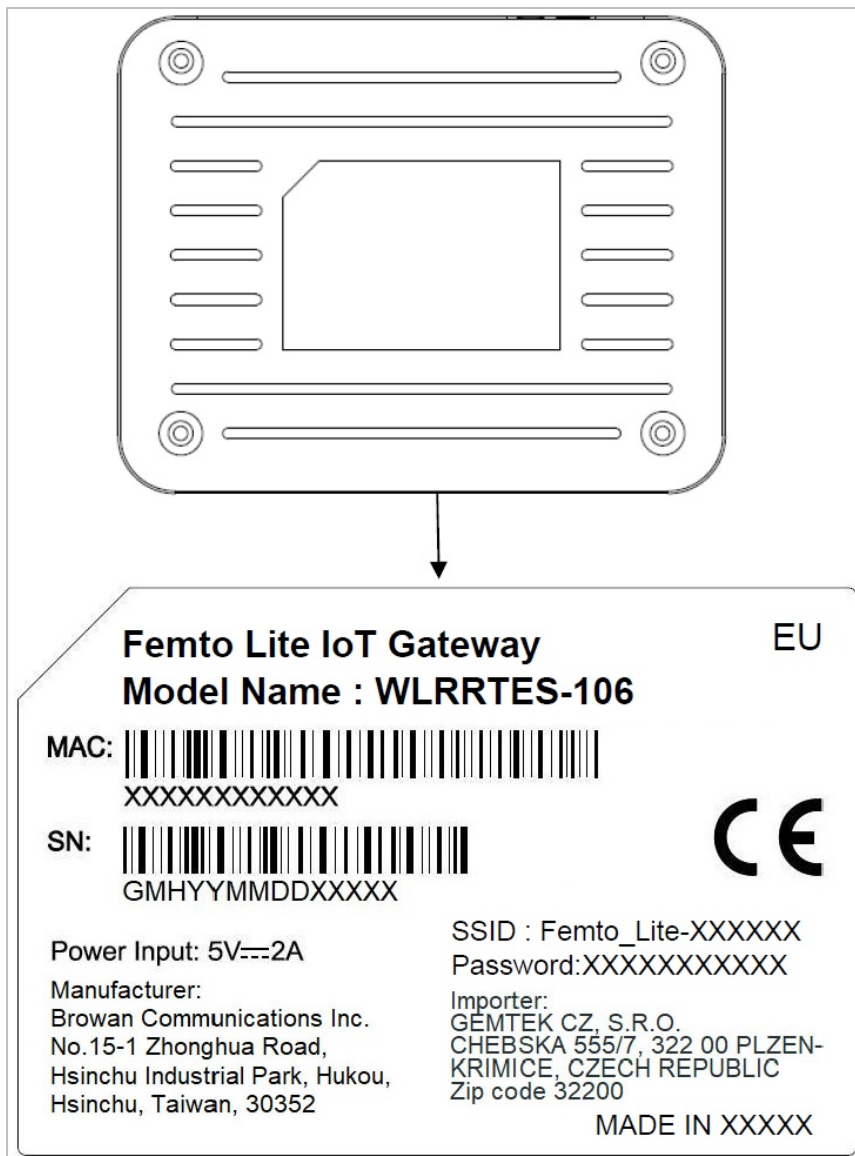


Figure 3 – Back Label



BROWAN

Package Label

No.	Item	Description
1	Product BOX	Brown Box
2	Labeling	Model/ MAC/ Serial Number/ Type Approval

Package Content

No.	Description	Quantity
1	Femto Lite IoT Gateway	1
2	Power adapter (100-240VAC 50/60Hz to 5VDC/2A)	1
3	Ethernet Cable 1 meter (UTP)	1

Chapter 3 – User Manual

3.1 Connect Femto Lite

You can connect to the gateway via WiFi interface which the SSID and password are printed on the back label by default.

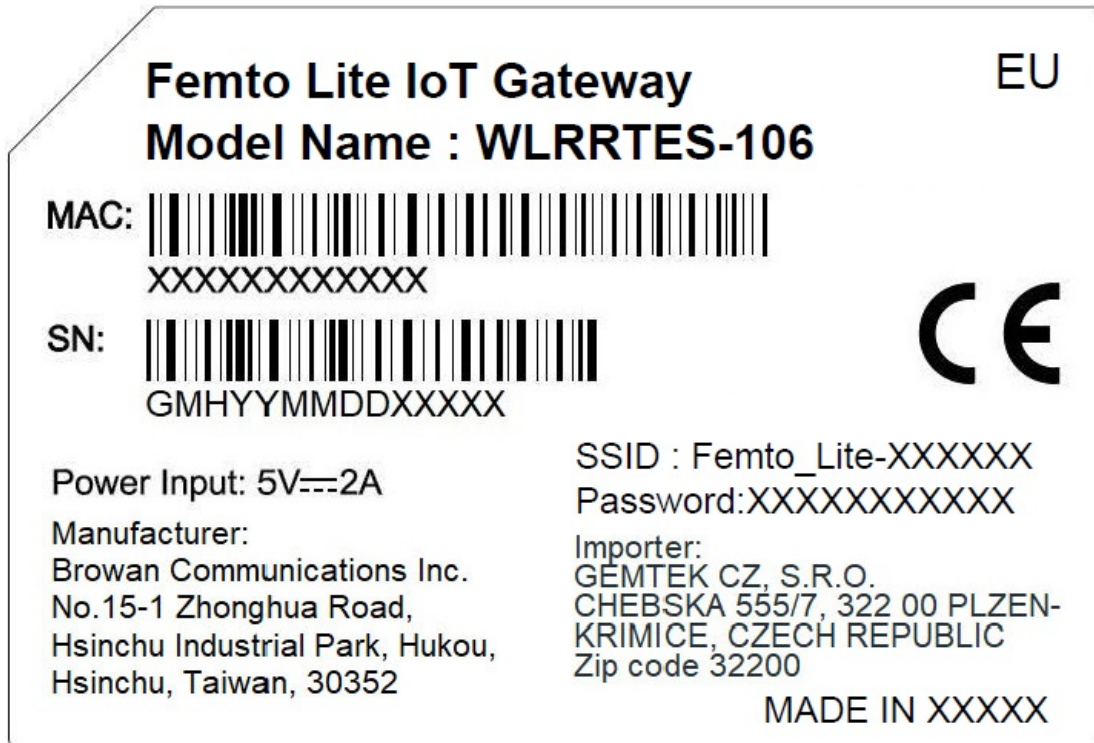


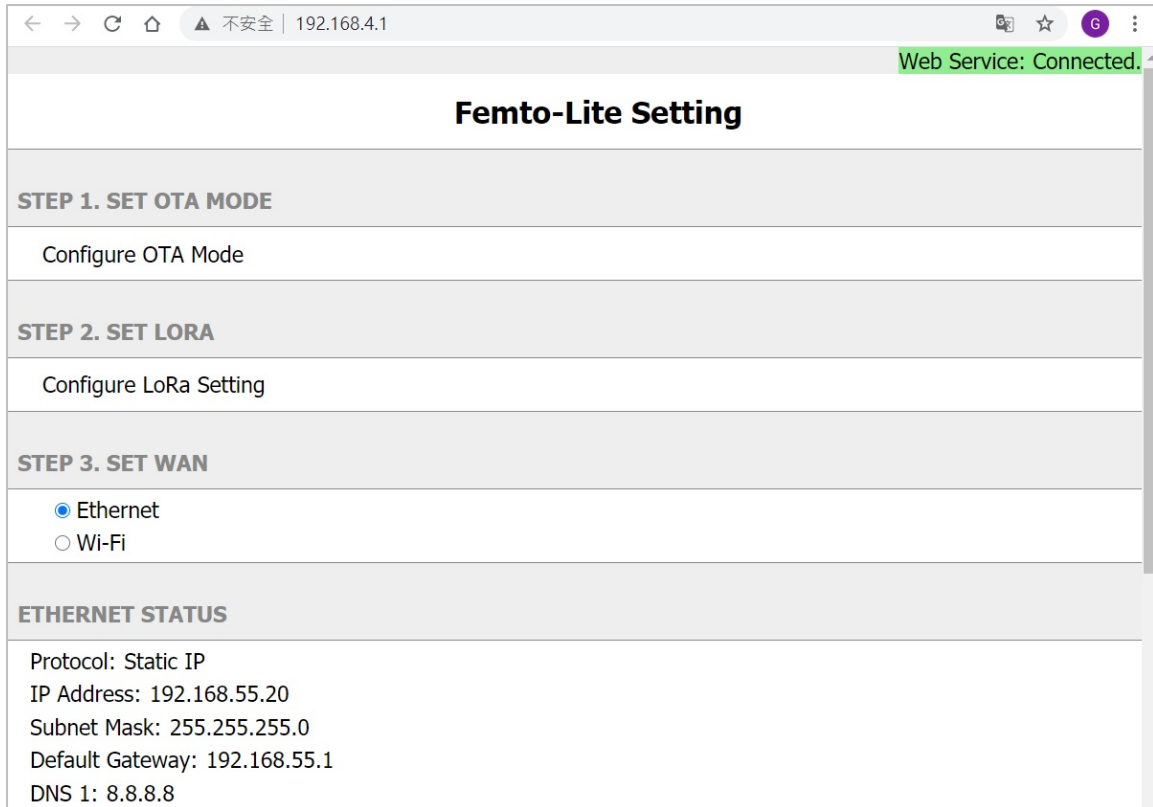
Figure 4 – Back Label

The rule of gateway SSID is Femto_Lite-xxxxxx where the last digits are the last 6 digits of the MAC address

The PC will fetch the IP address of range 192.168.4.x except 192.168.4.1 assigned by the AP.

3.2 Femto Lite Setting

Open the web browser(ex: Chrome) after connecting to the gateway via IP address “192.168.4.1”



← → ↻ 🏠 ⚠️ 不安全 | 192.168.4.1 🔍 ☆ G ⋮

Web Service: Connected.

Femto-Lite Setting

STEP 1. SET OTA MODE

Configure OTA Mode

STEP 2. SET LORA

Configure LoRa Setting

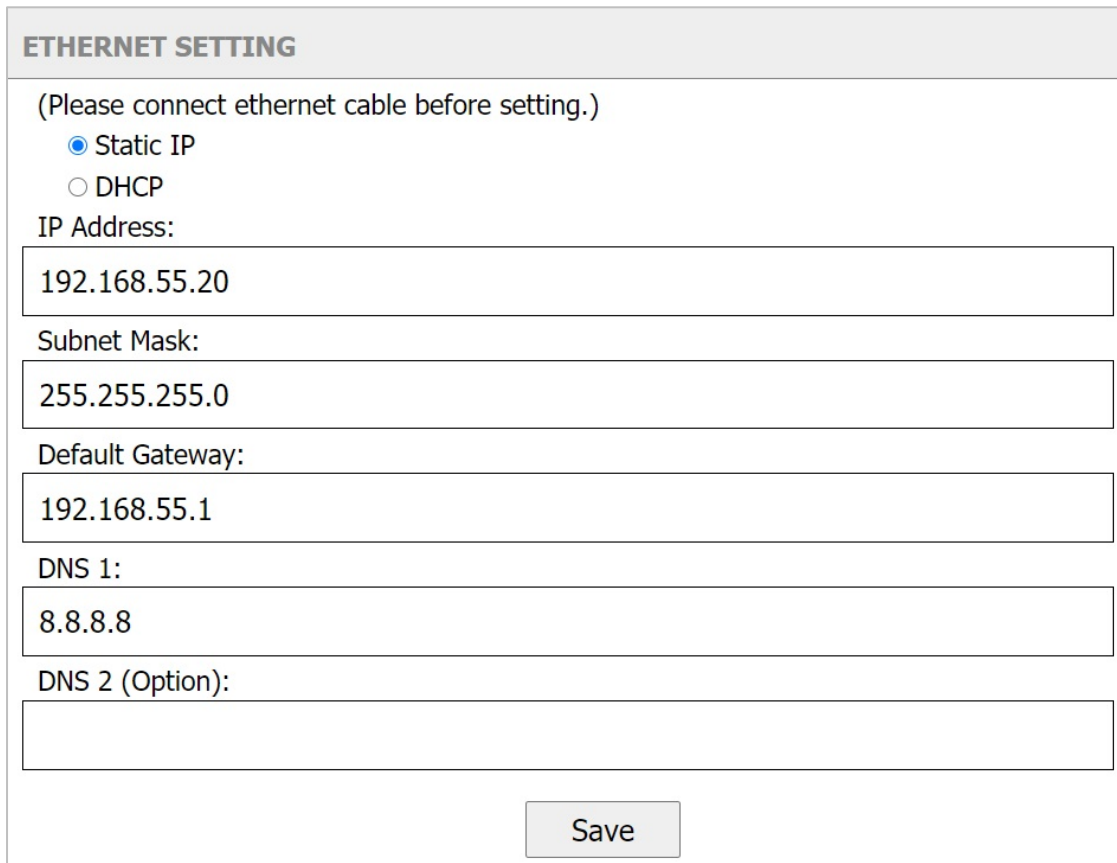
STEP 3. SET WAN

Ethernet
 Wi-Fi

ETHERNET STATUS

Protocol: Static IP
IP Address: 192.168.55.20
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.55.1
DNS 1: 8.8.8.8

Figure 5 – WEB UI-1



ETHERNET SETTING

(Please connect ethernet cable before setting.)

Static IP
 DHCP

IP Address:

Subnet Mask:

Default Gateway:

DNS 1:

DNS 2 (Option):

Figure 6 – WEB UI-2

Now you can configure the gateway through the WEB UI.

STEP 1 : Firmware Upgrade

The gateway support firmware upgrade through the OTA method.

STEP 1. SET OTA MODE
Configure OTA Mode

Figure 7 – Configure OTA Mode


Click the “Configure OTA Mode”.

CURRENT FIRMWARE VERSION
v1.0.14
OTA SERVER DAILY CHECK
<input checked="" type="radio"/> Disable <input type="radio"/> Enable
<input type="button" value="Cancel"/> <input type="button" value="Save"/>

Figure 8 – Configure OTA Mode

CURRENT FIRMWARE VERSION – display the current firmware version.

OTA SERVER DAILY CHECK – Enable or Disable the firmware upgrade through OTA mode. The gateway will check the OTA server every 24 hours interval. It will upgrade automatically if there is the latest firmware on the OTA server.

	The OTA server has to be configured by the python tool. Please contact BROWAN for any support.
---	--

Click the “Enable” and “Save” buttons to enable the OTA or “Disable” function.

OTA SERVER DAILY CHECK
<input type="radio"/> Disable <input checked="" type="radio"/> Enable
<input type="button" value="Cancel"/> <input type="button" value="Save"/>

Figure 9 – Enable OTA

STEP 2 : SET LORA

Click “Configure LoRa Setting” to configure the LoRa function/parameters.

STEP 2. SET LORA

Configure LoRa Setting

Figure 10 – Configure LoRa Setting

There are two modes for the LoRa configuration.[Basic Station and Packet Forwarder]

MODE

- LoRa Basics™ Station
- LoRa Packet Forwarder

Figure 11 – LoRa Mode

STEP 2.1 Basic Station mode

Select the “LoRa Basics Station” mode. The CUPS server and LNS server have to be configured when the gateway is in the Basic Station mode.

MODE

- LoRa Basics™ Station
- LoRa Packet Forwarder

LORA BASICS™ STATION

Gateway EUI: 80029CFFFE2B29E1

Enable CUPS

CUPS

Type: Boot Regular

CUPS URI:

Install CUPS Trust [installed]

No file chosen

Install CUPS CRT [installed]

No file chosen

Install CUPS Key [installed]


No file chosen

Figure 12 –Basic Station mode

Enable CUPS – The CUPS server is a configuration and update server. Enable or Disable the CUPS server according to the network architecture.

Enable the CUPS server if it is necessary for the network.

Type – The certificate type of the CUPS.[Boot/Regular]

	The gateway will search “Regular” type of certificate for the priority if you select the “Boot” type. It will search “Boot” type of certificate if the gateway can not find the “Regular” type of certificate then.
---	---

CUPS URI – The CUPS server address. Enable and install the CUPS trust/CRT/Key if the CUPS server needs a certificate.

Type: Boot Regular
 CUPS URI:

 Install CUPS Trust [installed]
 No file chosen
 Install CUPS CRT [installed]
 No file chosen
 Install CUPS Key [installed]
 No file chosen

Figure 13 – Install CUPS certificates

LNS Server – The LNS server is the LoRaWAN® Network Server. LNS establishes a data connection between a LoRa Basics™ Station and a LoRaWAN® network server.

LNS

LNS URI:

 Install LNS Trust [non-install]
 lns.trust
 Install LNS CRT [non-install]
 9864a869-7b2a-4...a7da8f6.cert.pem
 Install LNS Key [non-install]
 9864a869-7b2a-4...da8f6.private.key

Figure 14 – LNS server/certificates

LNS URI – The LNS server address. Enable and install the LNS server trust/CRT/Key if the certificate is necessary for the LNS server.

STEP 2.2 LoRa Packet Forwarder mode

Select the “LoRa Packet Forwarder” mode.

MODE
<input type="radio"/> LoRa Basics™ Station
<input checked="" type="radio"/> LoRa Packet Forwarder

Figure 15 – LoRa Packet Forwarder mode

Configure the **Gateway Info/Radio setting/Channel Assignment/LBT Settings** for the packet forwarder mode.

LORA PACKET FORWARDER
<h3>Gateway Info</h3>
Gateway ID: 000080029C2B29E1
Server Address:
<input type="text" value="localhost"/>
Server Uplink Port (1~65535):
<input type="text" value="1700"/>
Server Downlink Port (1~65535):
<input type="text" value="1700"/>
Keep Alive Interval (seconds):
<input type="text" value="10"/>
Statistics Display Interval (seconds):
<input type="text" value="30"/>
Push Timeout (milliseconds):
<input type="text" value="100"/>

Figure 16 – Gateway settings

Radio Settings – configure the central frequency in Hz.



Radio 0 Settings

Central Frequency (Hz):

902700000

Radio 1 Settings

Central Frequency (Hz):

903400000

Figure 17 – Radio settings

Channel Assignment – configure the center frequency offset of each channel.

Channel Assignment

Enable Channel 0

Radio Interface: radio 0 radio 1

Center Frequency Offset (Hz):

-400000

Enable Channel 1

Radio Interface: radio 0 radio 1

Center Frequency Offset (Hz):

-200000

Enable Channel 2

Radio Interface: radio 0 radio 1

Center Frequency Offset (Hz):

0

Enable Channel 3

Radio Interface: radio 0 radio 1

Center Frequency Offset (Hz):

200000

Figure 18 – Channel Assignment-1



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Enable Channel 4

Radio Interface: radio 0 radio 1

Center Frequency Offset (Hz):

-300000

Enable Channel 5

Radio Interface: radio 0 radio 1

Center Frequency Offset (Hz):

-100000

Enable Channel 6

Radio Interface: radio 0 radio 1

Center Frequency Offset (Hz):

100000

Enable Channel 7

Radio Interface: radio 0 radio 1

Center Frequency Offset (Hz):

300000

Enable Lora Standard Channel

Radio Interface: radio 0 radio 1

Center Frequency Offset (Hz):

300000

Channel Bandwidth (Hz):

250K 500K

Channel Spread Factor:

SF7 SF8 SF9 SF10

Figure 19 – Channel Assignment-2

Check “Enable LBT” to enable the LBT setting or uncheck to disable.

LBT Settings

Enable LBT

RSSI Target (dBm):

0

Frequency (Hz): 902300000

Scan Time: 128 us 5000 us

Frequency (Hz): 902500000

Scan Time: 128 us 5000 us

Frequency (Hz): 902700000

Scan Time: 128 us 5000 us

Frequency (Hz): 902900000

Scan Time: 128 us 5000 us

Frequency (Hz): 903100000

Scan Time: 128 us 5000 us

Frequency (Hz): 903300000

Scan Time: 128 us 5000 us

Frequency (Hz): 903500000

Scan Time: 128 us 5000 us

Frequency (Hz): 903700000

Scan Time: 128 us 5000 us

Figure 20 – LBT Settings

Click “**Save**” to accept or “**Cancel**” to abort.

STEP 3 : SET WAN

The gateway support either “Ethernet” or “Wi-Fi” connection as the internet backhaul.

STEP 3. SET WAN

Ethernet

Wi-Fi

Figure 21 – WAN connection

STEP 3.1 Ethernet Setting

Configure the IP address of WAN.[Static IP/DHCP client]

STEP 3. SET WAN

- Ethernet
- Wi-Fi

ETHERNET STATUS

Protocol: Static IP
IP Address: 192.168.55.20
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.55.1
DNS 1: 8.8.8.8
DNS 2: -

ETHERNET SETTING

(Please connect ethernet cable before setting.)

- Static IP
- DHCP

IP Address:

192.168.11.111

Subnet Mask:

255.255.255.0

Default Gateway:

192.168.11.244

DNS 1:

8.8.8.8

DNS 2 (Option):

168.95.1.1

Figure 22 – WAN connection

ETHERNET STATUS – The information of IP address/Subnet Mask/Gateway/DNS.

ETHERNET SETTING - Configure the IP address of WAN.[Static IP/DHCP client]

Static IP – Setup the IP address/Subnet Mask/Default Gateway/DNS of the static IP.



Contact the network administrator for the static IP address information.

DHCP – The IP address/Subnet Mask/Default Gateway/DNS will be assigned by the DHCP server.

ETHERNET SETTING

(Please connect ethernet cable before setting.)

- Static IP
- DHCP

Figure 23 – DHCP client

STEP 3.2 Wi-Fi

Select “Wi-Fi” to be the internet backhaul connection.



The gateway WiFi interface is the Access Point by default which SSID is “Femto_Lite-XXXXXX” printed on the back label. The administrator can only access the WEB UI through the Access Point mode to configure the gateway. The gateway will be the WiFi client and will not be able to access the WEB UI after enabling the WiFi interface as the internet backhaul connection.

STEP 3. SET WAN

- Ethernet
- Wi-Fi

MANUAL CONNECT

ADD (HIDDEN) SSID

OR CHOOSE A NETWORK...

garyhome	 
SSAK3	 
ALHN-8B78	 
HITRON-C150	 
Eric	 
dlink-E4DC	 
YT-VLC-2G	 

Figure 24 – Wi-Fi connection



MANUAL CONNECT – Specify the remote AP SSID and enter the password if necessary.

Click “**Join**” to accept or “**Cancel**” to abort.

A dialog box titled "MANUAL CONNECTION" with a light gray header. The main area contains the text "LoRa gateway" and a password field with ten black dots and a vertical cursor on the right. At the bottom, there are two buttons: "Cancel" on the left and "Join" on the right.

Figure 25 – Wi-Fi manual connection

The gateway will scan the nearby access point automatically. Just click the SSID for the WiFi connection.

A dialog box titled "OR CHOOSE A NETWORK..." with a light gray header. The main area is a list of seven Wi-Fi networks, each with its SSID on the left and a lock icon followed by a Wi-Fi signal icon on the right. The networks listed are: garyhome, SSAK3, ALHN-8B78, HITRON-C150, Eric, dlink-E4DC, and YT-VLC-2G.

Figure 26 – Wi-Fi manual connection

Enter a WiFi password if it is necessary for the connection.

A dialog box titled "PASSWORD FOR ALHN-8B78" with a light gray header. The main area contains the text "Password" and a password input field. At the bottom, there are two buttons: "Cancel" on the left and "Join" on the right.

Figure 27 – Wi-Fi password

Click “**Join**” to accept or “**Cancel**” to abort.