



**BROWAN**

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# **Indoor Femto Gateway**

## **User Guide**

**OPDK**



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Date	Description	Author	Revision
2018/8/14	1st version	Eric, Joey	temp.
2020/3/04	Update doc with FW 3.03.13	Alex	temp.2
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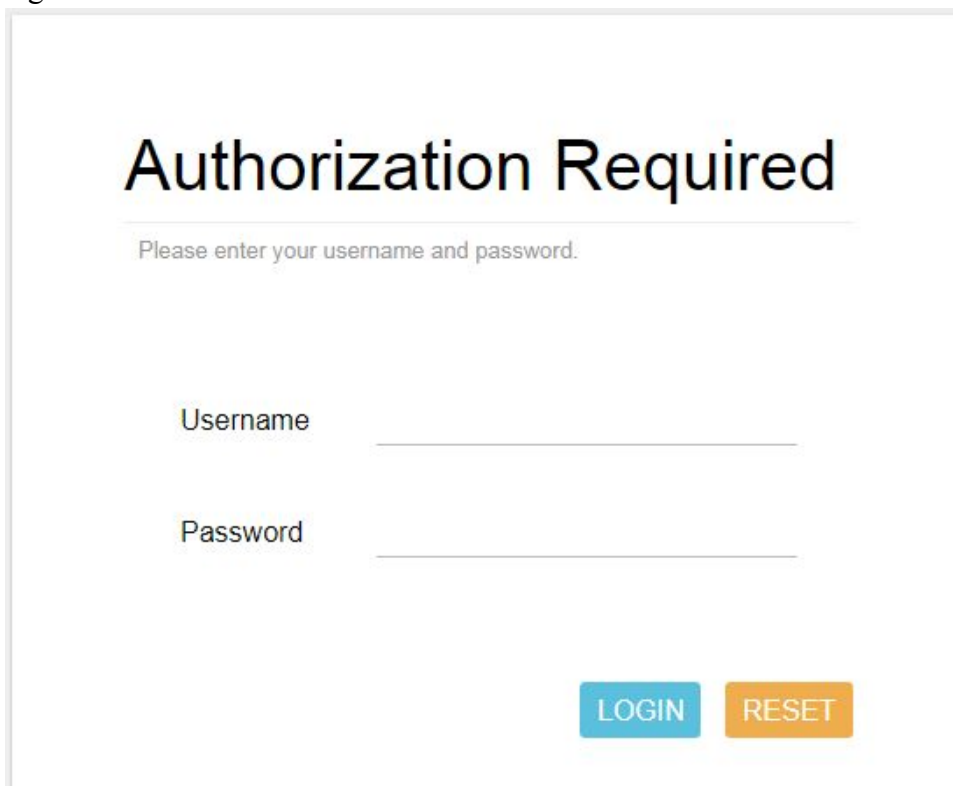
All User Guide will assist you in navigating the system with the following comprehensive guidelines.

## 1 Packet Forward mode

### 1.1 Open Admin GUI

Connect to Femto Cell via wifi (SSID: AP-last 6 numbers of mac address)  
Access Femto Cell WebUI via IP address "**192.168.55.1**".  
The default username is "admin" and the password is "**admin**".

Figure 1.1-A



The screenshot shows a web interface for login. At the top, the text "Authorization Required" is displayed in a large, bold font. Below this, a horizontal line separates the title from the instructions: "Please enter your username and password." There are two input fields: "Username" and "Password", each followed by a text entry line. At the bottom right, there are two buttons: a blue "LOGIN" button and an orange "RESET" button.

## 1.2 Status

The Status menu consists of the following categories: **Overview**, **Routes**, **System Log**, **Kernel Log**, **Processes**, and **Realtime Graphs**. An introduction of each category will be distinctly stated in individual paragraphs.

### 1.2.1 Overview

The purpose of this category is to view the following contents: system status, memory usage, and network settings.

The contents are exhibited on one single page. Please scroll down the Status page to obtain an overall view.

Figure 1.2.1-A System Status

#### System

Hostname	AP-F3CE53
Model	GIOT InDoor FemtoCell
Firmware Version	Version 3.03.13-opdk Fri Nov 9 13:24:42 CST 2018
Kernel Version	3.10.14
Local Time	03/04/20 16:05:58
Uptime	0h 5m 51s
Load Average	0.27, 0.21, 0.12



Figure 1.2.1-B Memory Usage and Network Settings

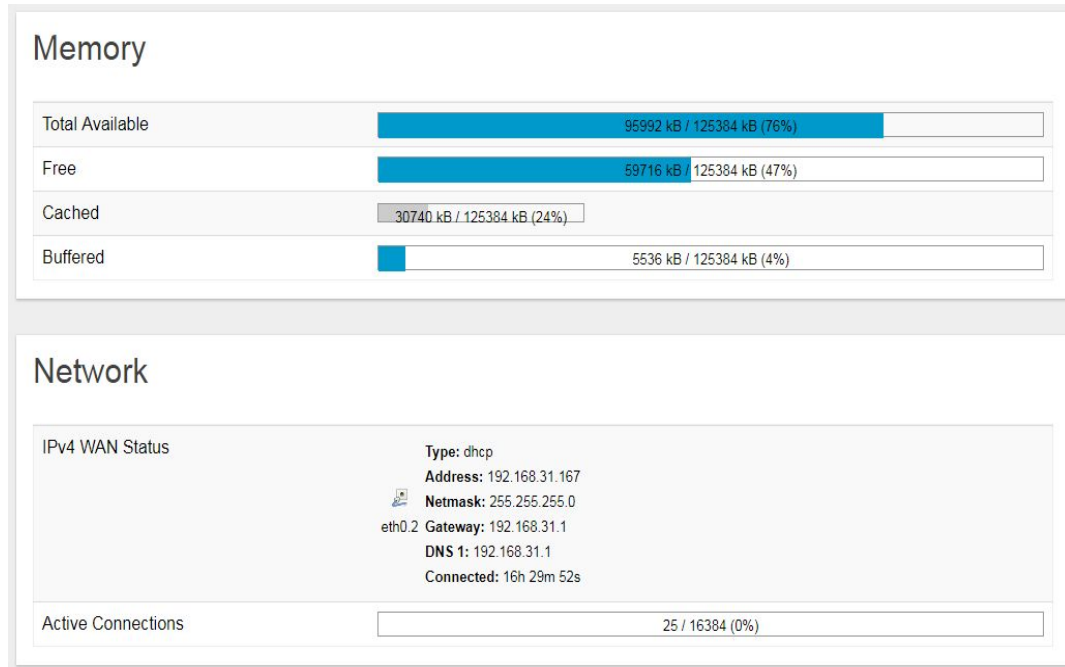
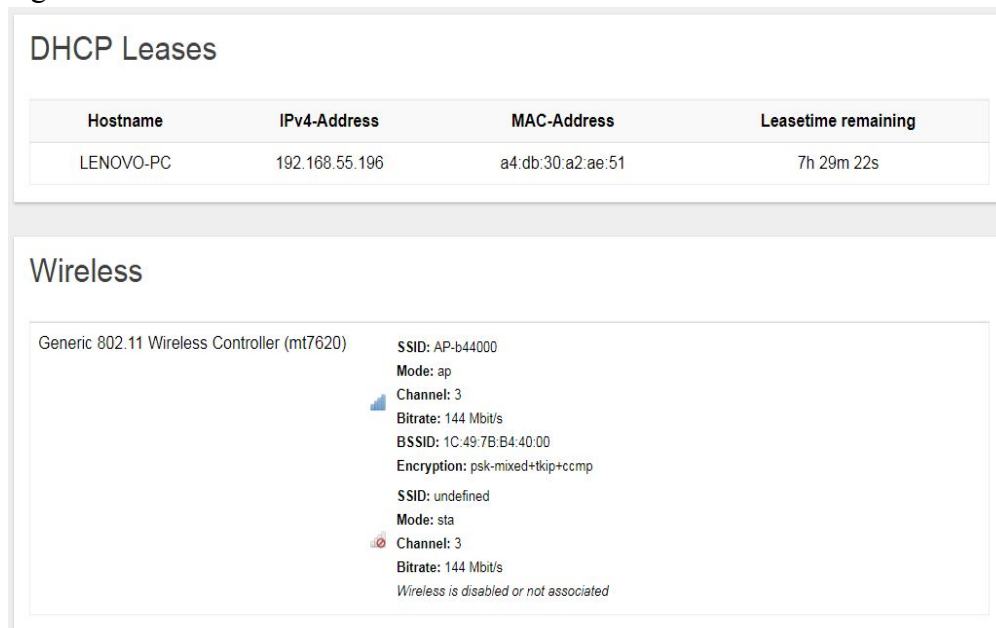


Figure 1.2.1-C DHCP Leases and Wireless Status



An “AUTO REFRESH ON/OFF” button is lodged on the top right of the panel. This function enables the status data to be refreshed every 5 seconds.



Figure 1.2.1-D Status will auto refresh in 5 secs if the “Auto Refresh ON” button is on

The screenshot shows a web interface with a blue header bar containing a green button labeled "AUTO REFRESH ON". Below the header is a grey section titled "Status". Underneath is a white box titled "System" containing a table of system information.

Hostname	AP-F3CE53
Model	GIOT InDoor FemtoCell
Firmware Version	Version 3.03.13-opdk Fri Nov 9 13:24:42 CST 2018
Kernel Version	3.10.14
Local Time	03/04/20 16:08:49
Uptime	0h 8m 42s
Load Average	0.49, 0.31, 0.17

Figure 1.2.1-E Click the “AUTO REFRESH ON/OFF” button to enable/ disable auto-refresh

The screenshot shows the same web interface as Figure 1.2.1-D, but the button in the blue header bar is now grey and labeled "AUTO REFRESH OFF". The "System" table below shows updated values for Local Time, Uptime, and Load Average.

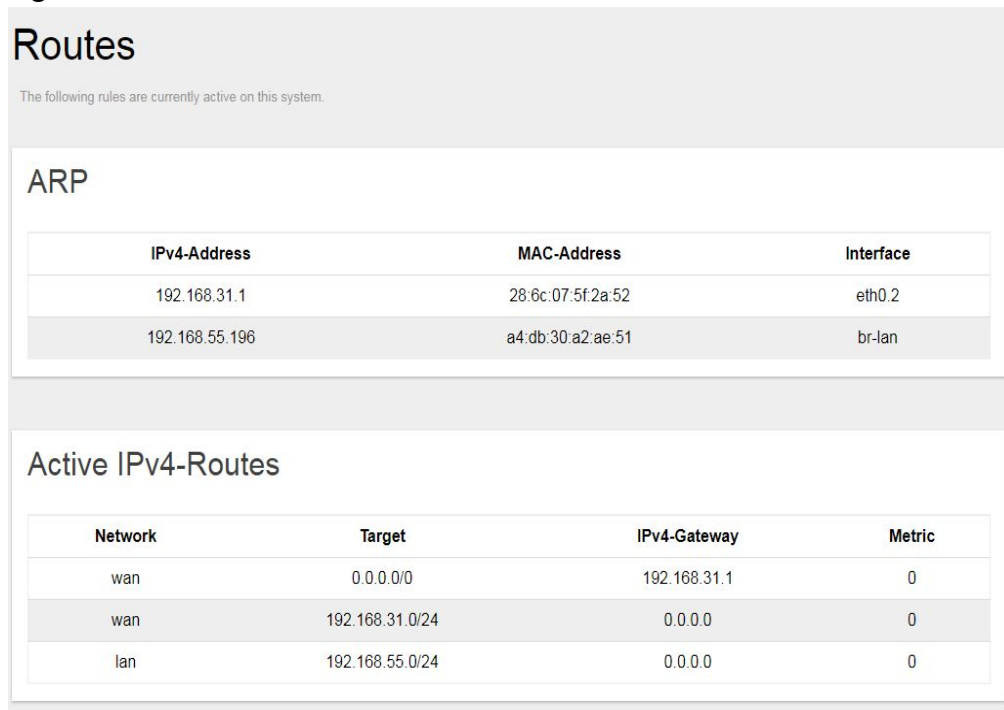
Hostname	AP-F3CE53
Model	GIOT InDoor FemtoCell
Firmware Version	Version 3.03.13-opdk Fri Nov 9 13:24:42 CST 2018
Kernel Version	3.10.14
Local Time	03/04/20 16:09:47
Uptime	0h 9m 40s
Load Average	0.47, 0.37, 0.20

## 1.2.2 Routes

The purpose of this category is to view the ARP table and active IPv4 routes information.



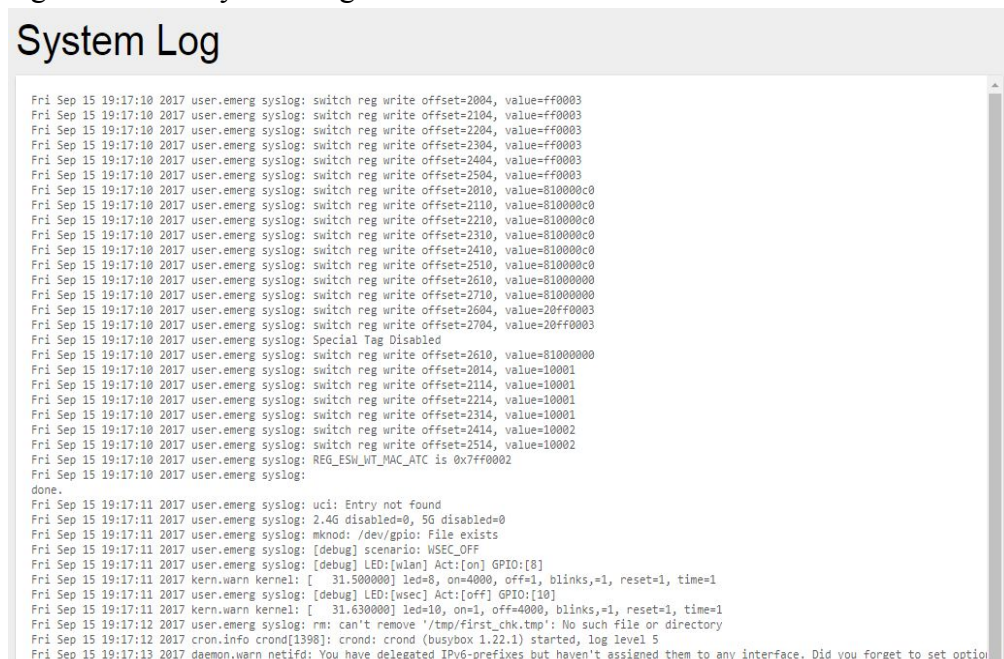
Figure 1.2.2-A ARP table and Active IPv4 Routes



## 1.2.3 System Log

This category is to view system log information.

Figure 1.2.3-A System Log





## 1.2.4 Kernel log

This category is to view kernel log information.

Figure 1.2.4-A Kernel Log

### Kernel Log

```
[ 0.000000] Linux version 3.10.14 (alex@ubuntu) (gcc version 4.8.3 (OpenMrt/Linaro GCC 4.8-2014.04 unknown) ) #3 Thu Sep 7 16:33:51 CST 2017
[ 0.000000]
[ 0.000000] The CPU feqence set to 580 MHz
[ 0.000000] PCIE: bypass PCIE DLL.
[ 0.000000] PCIE: Elastic buffer control: Addr:0x68 -> 0xB4
[ 0.000000] disable all power about PCIE
[ 0.000000] CPU0 revision is: 00019650 (MIPS 24KEc)
[ 0.000000] Software DMA cache coherency
[ 0.000000] Determined physical RAM map:
[ 0.000000] memory: 00000000 @ 00000000 (usable)
[ 0.000000] Initr0 not found or empty - disabling initr0
[ 0.000000] Zone ranges:
[ 0.000000] Normal [mem 0x00000000-0x07ffffff]
[ 0.000000] Movable zone start for each node
[ 0.000000] Early memory node ranges
[ 0.000000] node 0: [mem 0x00000000-0x07ffffff]
[ 0.000000] On node 0 totalpages: 32768
[ 0.000000] free_area_init_node: node 0, pgdat 00428880, node_mem_map 81000000
[ 0.000000] Normal zone: 256 pages used for memmap
[ 0.000000] Normal zone: 0 pages reserved
[ 0.000000] Normal zone: 32768 pages, LIFO batch:7
[ 0.000000] Primary instruction cache 64kB, 4-way, VIPT, linesize 32 bytes.
[ 0.000000] Primary data cache 32kB, 4-way, PIPT, no aliases, linesize 32 bytes
[ 0.000000] pcpu-alloc: s0 r0 d32768 u32768 alloc=1*32768
[ 0.000000] pcpu-alloc: [0] 0
[ 0.000000] Built 1 zonelists in Zone order, mobility grouping on. Total pages: 32512
[ 0.000000] Kernel command line: console=ttyS1,57600n8 root=/dev/mtdblock6 rootfstype=squashfs,jffs2 running_fw=firmware2
[ 0.000000] PID hash table entries: 512 (order: -1, 2048 bytes)
[ 0.000000] Dentry cache hash table entries: 16384 (order: 4, 65536 bytes)
[ 0.000000] Inode-cache hash table entries: 8192 (order: 3, 32768 bytes)
[ 0.000000] Writing ErrCtl register=0000257a
[ 0.000000] Readback ErrCtl register=0000257a
[ 0.000000] Memory: 125164k/131072k available (3412k kernel code, 5908k reserved, 847k data, 220k init, 0k highmem)
[ 0.000000] SLUB: HWalign=32, Order=0-3, MinObjects=0, CPUs=1, Nodes=1
[ 0.000000] NR_IRQS:128
```

## 1.2.5 Processes

The purpose of this category is to view the system processes that are in progress. Processes can be hung up, terminated, and killed for each individual Femto Cell item.

Figure 1.2.5-A Processes

### Processes

This list gives an overview over currently running system processes and their status.

PID	Owner	Command	CPU usage (%)	Memory usage (%)	Hang Up	Terminate	Kill
1	root	/sbin/procd	0%	1%	HANG UP	TERMINATE	KILL
2	root	[kthreadd]	0%	0%	HANG UP	TERMINATE	KILL
3	root	[ksoftirqd/0]	0%	0%	HANG UP	TERMINATE	KILL
4	root	[kworker/0:0]	0%	0%	HANG UP	TERMINATE	KILL
5	root	[kworker/0:0H]	0%	0%	HANG UP	TERMINATE	KILL
6	root	[kworker/u2:0]	0%	0%	HANG UP	TERMINATE	KILL
7	root	[watchdog/0]	0%	0%	HANG UP	TERMINATE	KILL



## 1.2.6 Realtime Graphs

This category is further divided into the following sectors: Load, Traffic, and Connections. These options are lodged and labeled above the graph.

### 1.2.6.1 Realtime Load

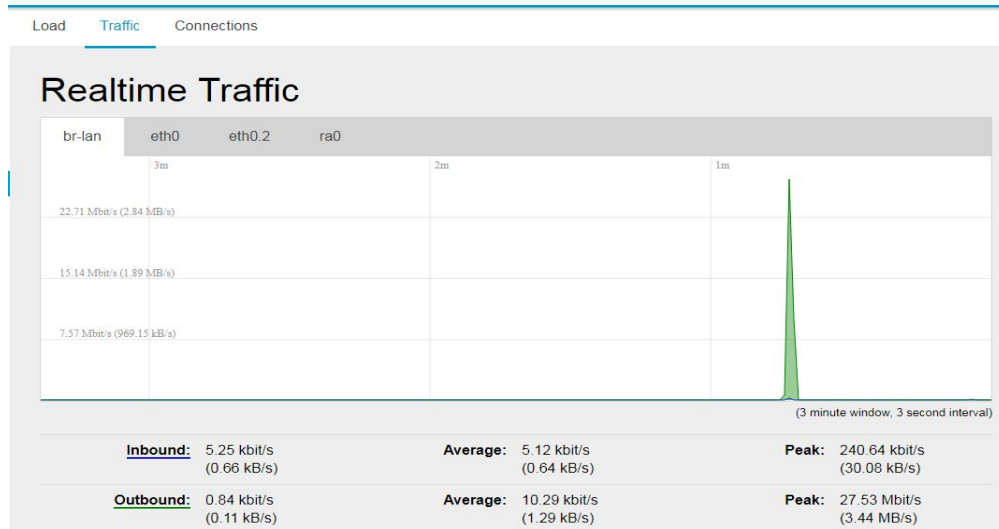
To view the current load value and the average of different time intervals.

Figure 1.2.6.1-A Realtime Load

### 1.2.6.2 Realtime Traffic

To view the network traffic of each interface.

Figure 1.2.6.2-A Realtime Traffic

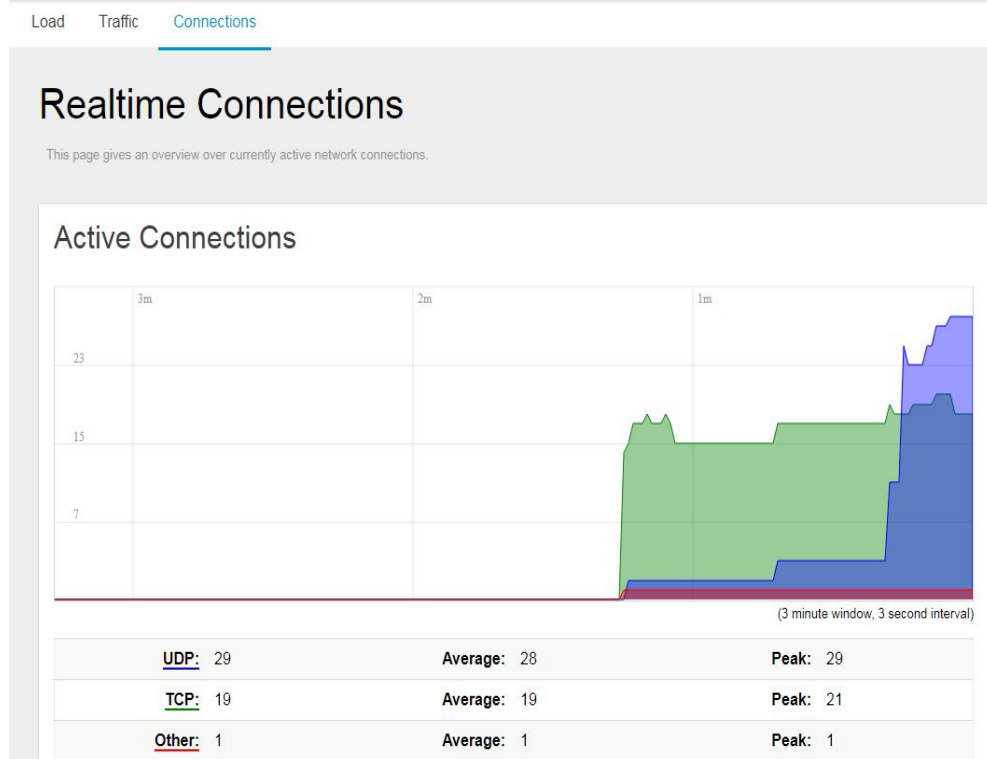


### 1.2.6.3 Realtime Connections

To view the currently active network connections.



Figure 1.2.6.3-A Realtime Connections



## 1.3 System

The System menu consists of the following categories: System, Administration, System Firmware, and Reboot. Introduction and input procedures for each category are described in the following paragraphs.

### 1.3.1 System

Hostname and Timezone can be customized in the system properties. Click the *“Sync with Browser”* button to adjust the local time.

If you choose to use another NTP server, please place a checkmark next to *“Provide NTP server”* and fill out the *“NTP server candidates”* text field.



Figure 1.3.1-A System Properties

### System Properties

Local Time: 03/04/20 16:13:46 SYNC WITH BROWSER

Hostname: AP-F3CE53

Timezone: GMT+08:00 Shanghai, Beijing, Hong Kong, Taipei, Kuala Lumpur ▾

APPLY CANCEL

Figure 1.3.1-B Time Synchronization

### Time Synchronization

NTP server candidates:

- 0.openwrt.pool.ntp.org
- 1.openwrt.pool.ntp.org
- 2.openwrt.pool.ntp.org
- 3.openwrt.pool.ntp.org
- tock.stdtime.gov.tw
- tock.stdtime.gov.tw
- tock.stdtime.gov.tw

APPLY

## 1.3.2 Administration

Femto login password can be configured and change language (support English and Simplified Chinese) on this page.

Figure 1.3.2-A Router Password

### Router Password

Changes the administrator password for accessing the device

Password

Confirmation



Figure 1.3.2-B Language and Style

Language and Style

Language: English

APPLY

## 1.3.3 System Firmware

Click the “*Choose File*” button to upload the new system firmware. Click the “*UPGRADE*” button to upgrade the system firmware.

Figure 1.3.3-A System Firmware

### Firmware Information

Upload a firmware file here to replace the running firmware.

Current firmware version: 3.03.13

Firmware file:  未選擇任何檔案

## 1.3.4 Reboot

Click “*PERFORM REBOOT*” to reboot Femto.

Figure 1.3.4-A Reboot

Reboot

Reboots the operating system of your device

PERFORM REBOOT

## 1.4 Packet Forward

The purpose of this category is to view/edit current Packet Forward settings and logs.

### 1.4.1 Settings



## 1.4.1.1 Gateway Info

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

Figure 1.4.1.1-A GateWay Info

### Gateway Info

Gateway ID:	1c497bb44c4c
Server Address:	127.0.0.1
Server Uplink Port:	1680 (1~65535)
Server Downlink Port:	1680 (1~65535)
Keep Alive Interval:	10 (seconds)
Statistics display Interval:	30 (seconds)
Push Timeout:	100 (milliseconds)

## 1.4.1.2 Gain

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

Figure 1.4.1.2 Gain

### Gain

Antenna Gain:	0 (0 ~ 15)
---------------	------------

APPLY

## 1.4.1.3 Radio 0

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



Figure 1.4.1.3-A Radio 0

## Radio 0

Status:	Enable		
Central Frequency:	902600000 (Hz)		
RSSI Offset:	-166 (dBm)		
TX Status:	Enable		
Channel			
Channel 0 Status:	Enable	CenterFreqOffset:	-300000 (-400000~+400000)
Channel 1 Status:	Enable	CenterFreqOffset:	-100000 (-400000~+400000)
Channel 2 Status:	Enable	CenterFreqOffset:	100000 (-400000~+400000)
Channel 3 Status:	Enable	CenterFreqOffset:	300000 (-400000~+400000)

### 1.4.1.4 Radio 1

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



Figure 1.4.1.4-A Radio 1

### Radio 1

Status:

Central Frequency:  (Hz)

RSSI Offset:  (dBm)

TX Status:

Channel

Channel 4 Status: <input type="button" value="Enable"/>	CenterFreqOffset: <input type="text" value="-300000"/> (-400000~+400000)
Channel 5 Status: <input type="button" value="Enable"/>	CenterFreqOffset: <input type="text" value="-100000"/> (-400000~+400000)
Channel 6 Status: <input type="button" value="Enable"/>	CenterFreqOffset: <input type="text" value="100000"/> (-400000~+400000)
Channel 7 Status: <input type="button" value="Enable"/>	CenterFreqOffset: <input type="text" value="300000"/> (-400000~+400000)

## 1.4.1.5 LBT Settings

This page is to set up the LBT configuration of Lora include **LBT Status**, **RSSI Target**, **Channel settings**.

Figure 1.4.1.5-A LBT Settings

### LBT Settings

Here you can modify Radio 0/1's Central frequency to change channel frequencies.

LBT Status:

RSSI Target:  (dBm)

Channel settings

Frequency: <input type="text" value="902300000"/> (Hz)	Scan Time: <input type="text" value="128 us"/>
Frequency: <input type="text" value="902500000"/> (Hz)	Scan Time: <input type="text" value="128 us"/>
Frequency: <input type="text" value="902700000"/> (Hz)	Scan Time: <input type="text" value="128 us"/>
Frequency: <input type="text" value="902900000"/> (Hz)	Scan Time: <input type="text" value="128 us"/>
Frequency: <input type="text" value="903100000"/> (Hz)	Scan Time: <input type="text" value="128 us"/>
Frequency: <input type="text" value="903300000"/> (Hz)	Scan Time: <input type="text" value="128 us"/>
Frequency: <input type="text" value="903500000"/> (Hz)	Scan Time: <input type="text" value="128 us"/>
Frequency: <input type="text" value="903700000"/> (Hz)	Scan Time: <input type="text" value="128 us"/>

## 1.4.2 Log

Figure 1.4.2 packet forward logs





## Packet Forward Log

```
# GPS sync is disabled
##### END #####

JSON up: {"stat":{"time":"2020-03-04 08:09:23 UTC","rxnb":0,"rxok":0,"rxfw":0,"ackr":0.0,"dwnb":0,"txnb":0}}

##### 2020-03-04 08:09:53 UTC #####
### [UPSTREAM] ###
# RF packets received by concentrator: 1
# CRC_OK: 0.00%, CRC_FAIL: 100.00%, NO_CRC: 0.00%
# RF packets forwarded: 0 (0 bytes)
# PUSH_DATA datagrams sent: 1 (111 bytes)
# PUSH_DATA acknowledged: 0.00%
### [DOWNSTREAM] ###
# PULL_DATA sent: 3 (0.00% acknowledged)
# PULL_RESP(onse) datagrams received: 0 (0 bytes)
# RF packets sent to concentrator: 0 (0 bytes)
# TX errors: 0
# BEACON queued: 0
# BEACON sent so far: 0
# BEACON rejected: 0
### [JIT] ###
# SX1301 time (PPS): 482589888
src/jitqueue.c:448:jit_print_queue(): INFO: [jit] queue is empty
### [GPS] ###
# GPS sync is disabled
##### END #####

JSON up: {"stat":{"time":"2020-03-04 08:09:53 UTC","rxnb":1,"rxok":1,"rxfw":0,"ackr":0.0,"dwnb":0,"txnb":0}}
```

REFRESH

## 1.5 Network

The System menu consists of the following categories: WAN, Wireless, LAN, DHCP, and Diagnostics. Introduction and input procedures for each category are described in the

following paragraphs.

## 1.5.1 WAN


The purpose of this category is to view current WAN settings.

This category is further divided into three sectors: Ethernet Wan and Wireless Extender. These individual options are lodged and labeled above the main content panel.

Figure 1.5.1-A WAN

Ethernet WAN    Wireless Extender

### WAN

WAN Type	DHCP
<b>WAN</b>  eth0.2	<b>Uptime:</b> 0h 32m 47s <b>MAC-Address:</b> 1C:49:7B:F3:CE:54 <b>RX:</b> 837.86 KB (5127 Pkts.) <b>TX:</b> 1.56 MB (3402 Pkts.) <b>IPv4:</b> 192.168.11.9/24, 168.168.168.253/24

### 1.5.1.1 Ethernet WAN

This page is to set up the connection type in terms of Static IP, DHCP client, or PPPoE. The three different options can be selected in the drop-down menu in “wantype”. Please fill in the respective fields exhibited under each selection. Please make sure the Ethernet cable is connected to a WAN port.



Figure 1.5.1.1-A Static IP

Ethernet WAN Wireless Extender

wantype Static IP

IP Address 192.168.11.9

Subnet Mask 255.255.255.0

Gateway 192.168.11.1

DNS Server 192.168.11.1 (optional)

MAC Address 1C:49:7B:f3:ce:54

Figure 1.5.1.1-B DHCP Client

Ethernet WAN Wireless Extender

wantype DHCP Client

MAC Address 1C:49:7B:f3:ce:54

Figure 1.5.1.1-C PPPoE

Ethernet WAN Wireless Extender

wantype PPPoE

Username

Password

MAC Address 1C:49:7B:f3:ce:54



## 1.5.1.2 Wireless Extender

This page is to set up the Wireless Extender Mode for the WAN connection. To activate the extended wireless connection, please select “enable” from the Extender mode drop-down menu. Click the “SCAN” button to obtain the list of available Access Points within your surrounding vicinity.

Figure 1.5.1.2-A Wireless Extender

Ethernet WAN

Wireless Extender

Wireless Extender

Click “Scan” to get Access Point List

Extender mode: disable

SSID:

Security: WPA2-PSK-TKIP

KEY:

SCAN --- select one ---

## 1.5.2 Wireless

2.4G Interface Configuration to setup 2.4G wireless. SSID, encryption type, and channels can be lodged within this sector.



Figure 1.5.2-A Wireless Setting

## Wireless Setting

### 2.4G Interface Configuration

SSID

Hidden Broadcast

encryption

Key

### 2.4G Interface Channel

Channel

## 1.5.3 LAN

LAN IP can be set up on this page.

Figure 1.5.3-A LAN

## LAN

### Local Network

IP Address

## 1.5.4 DHCP

You can manage detailed DHCP server settings, which include the First leased address, the allowed Number of leased addresses, and Lease time.

Information on Active Leases can be viewed at the bottom of this page.



Figure 1.5.4-A DHCP

## DHCP

### DHCP-Server

Enable

Start leased address

End leased address

Lease time(hr)  (1~48)

---

### Active Leases

Hostname	<a href="#">IPv4-Address</a>	<a href="#">MAC-Address</a>	Leasetime remaining
<i>This section contains no values yet</i>			

## 1.5.5 Diagnostic

Diagnostics is divided into three parts on the same page: PING, TRACEROUTE, and NSLOOKUP. Please see the following for input guidelines.



## 1.5.5.1 PING

Input a specific IP address in the text field above “PING”. Click the “PING” button to ping the IP you have specified.

Figure 1.5.5.1-A PING

### Diagnostics

#### Network Utilities

Note:  
If the ping/traceroute/nslookup test is fail, please check your network setting.  
- Ethernet/Wireless Extender:  
Please make sure your backhaul network is available.

openwrt.org	openwrt.org	openwrt.org
<input type="button" value="PING"/>	<input type="button" value="TRACEROUTE"/>	<input type="button" value="NSLOOKUP"/>

#### Collecting data...

```
PING openwrt.org (139.59.209.225): 56 data bytes
64 bytes from 139.59.209.225: seq=0 ttl=52 time=211.844 ms
64 bytes from 139.59.209.225: seq=1 ttl=52 time=211.530 ms
64 bytes from 139.59.209.225: seq=2 ttl=52 time=211.446 ms
64 bytes from 139.59.209.225: seq=3 ttl=52 time=211.626 ms
64 bytes from 139.59.209.225: seq=4 ttl=52 time=211.551 ms

--- openwrt.org ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 211.446/211.599/211.844 ms
```

## 1.5.5.2 TRACEROUTE

Input a specific URL or IP address above “TRACEROUTE”.  
Click the “TRACEROUTE” button to trace the URL or IP address you have specified.



Figure 1.5.5.2-A TRACEROUTE

## Diagnostics

### Network Utilities

Note:  
If the ping/traceroute/nslookup test is fail, please check your network setting.  
- Ethernet/Wireless Extender:  
Please make sure your backhaul network is available.

openwrt.org                      openwrt.org                      openwrt.org

### Collecting data...

```
traceroute to openwrt.org (139.59.209.225), 30 hops max, 38 byte packets
 1 192.168.11.1 0.569 ms
 2 172.16.99.1 0.817 ms
 3 10.6.1.244 0.965 ms
 4 60.250.201.254 1.785 ms
 5 168.95.211.130 1.983 ms
 6 220.128.9.166 3.782 ms
 7 220.128.12.41 3.430 ms
 8 *
 9 220.128.6.33 3.379 ms
10 80.231.200.16 210.025 ms
11 80.231.200.78 222.737 ms
12 195.219.87.195 228.869 ms
13 195.219.50.42 220.296 ms
14 *
15 *
16 139.59.209.225 212.195 ms
```

### 1.5.5.3 NSLOOKUP

Input a specific URL or IP address above “*NSLOOKUP*”.  
Click the “*NSLOOKUP*” button to view the DNS server of the URL or IP address you have specified.





## Figure 1.5.5.3-A NSLOOKUP Diagnostics

### Network Utilities

Note:  
If the ping/traceroute/nslookup test is fail, please check your network setting.  
- Ethernet/Wireless Extender:  
Please make sure your backhaul network is available.

openwrt.org                      openwrt.org                      openwrt.org

[PING](#)                              [TRACEROUTE](#)                      [NSLOOKUP](#)

### Collecting data...

```
Server: 127.0.0.1
Address 1: 127.0.0.1 localhost

Name: openwrt.org
Address 1: 2a03:b0c0:3:d0::1af1:1 wiki-01.infra.openwrt.org
Address 2: 139.59.209.225 wiki-01.infra.openwrt.org
```