# HF2211A

# Serial Server Device User Manual

**V 1.1**


## Overview of Characteristic

- ✧ **MIPS MCU with 4MB Flash and 8MB SRAM. Run on eCos**
- ✧ **Support TCP/IP/Telnet /Modbus TCP Protocol**
- ✧ **Support RS232/RS422/RS485 to Ethernet/Wi-Fi Conversion, Serial Speed Upto 230400 bps**
- ✧ **Support STA/AP/AP+STA Mode**
- ✧ **Support Router or Bridge Network Working Mode.**
- ✧ **Support Easy Configuration Through a Web Interface or PC IOTService Tool**
- ✧ **Support Security Protocol Such As TLS/AES/DES3**
- ✧ **Support Web OTA Wirelss Upgrade**
- ✧ **Wide DC Input 5~36VDC**
- ✧ **Size: 95 x 65 x 25 mm (L x W x H)**

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## HISTORY

**Ed. V1.0** 08- 16-2021 First Version

**Ed. V1.1** 05- 10-2022 Revision Version

# 1. PRODUCT OVERVIEW

## 1.1. General Description

The HF2211A provides RS232/RS485/RS422 interface to Ethernet/Wi-Fi connectivity to web enable any device. The HF2211A integrate TCP/IP controller, memory, 10/ 100M Ethernet transceiver, high-speed serial port and integrates a fully developed TCP/IP network stack and ECos OS. The HF2211A also includes an embedded web server used to remotely configure, monitor, or troubleshoot the attached device.

The HF2211A using highly integrated hardware and software platform. It has been optimized for all kinds of applications in the industrial control, smart grid, personal medical application and remote control that have lower data rates, and transmit or receive data on an infrequent basis.

The HF2211A integrates all serial to Ethernet functionality with 95 x 65 x 25mm size.

**HF2211A is the substitute type of HF2211, software function is the same with HF2211**

## 1.2. Device Paremeters

Table 1. HF2211A Technical Specifications

| Item | Parameters |
|---|---|
| **System Information** | |
| Processor/ Frequency | MIPS/320MHz |
| Flash/ SDRAM | 4MB/8MB |
| Operating System | eCos |
| **Ethernet Port** | |
| Port Number | 1 RJ45<br>1 WAN/ LAN switchable |
| Interface Standard | 10/ 100 Base-T Auto-Negotiation |
| Protection | 8KV Isolation |
| Transformer | Integrated |
| Network Protocol | IP, TCP, UDP, DHCP, DNS, HTTP Server/Client, ARP, BOOTP, AutoIP, ICMP, Web socket, Telnet, uPNP, NTP, Modbus TCP |
| Security Protocol | TLS v 1.2<br>AES 128Bit<br>DES3 |
| **Wi-Fi Interface** | |
| Standard | 802. 1 1 b/g/n |
| Frequency | 2.412GHz-2.484GHz |
| Network Mode | STA/AP/STA+AP |
| Security | WEP/ WPAPSK/ WPA2 PSK |
| Encryption | WEP64/WEP128/TKIP/ AES |
| Tx Power | 802. 1 1b: +20dBm (Max.) |

| | |
|---|---|
| | 802 . 11g: + 18dBm (Max.)<br>802 1 1n: + 15dBm (Max ) |
| Rx Sensitive | 802. 1 1b: -89dBm<br>802. 11g: -81dBm<br>802 1 1n: -71dBm |
| Antenna | 3dBi Stick Antenna |
| **Serial Port** | |
| Port Number | 1 RS232/RS485/RS422 |
| Interface Standard | RS232: DB9<br>RS485/RS422: 5 .08mm connector<br>Support one channel of RS232/RS422/RS485. |
| Data Bits | 8 |
| Stop Bit | 1,2 |
| Check Bit | None, Even, Odd |
| Baud Rate | TTL: 2400 bps~230400 bps |
| Flow Control | No Flow Control<br>Hardware RTS / CTS, DSR / DTR (RS232) flow control is not supported<br>Software Xon/ Xoff flow control |
| **Software** | |
| Web Pages | Http Web Configuration<br>Customization of HTTP Web Pages |
| Configuration | Web<br>CLI<br>XML import<br>Telnet<br>IOTService PC Software |
| Firmware Upgrade | Web |
| **Basic Parameter** | |
| Size | 95 x 65 x 25 mm |
| Operating Temp. | -25 ~ 85°C |
| Storage Temp. | -45 ~ 105°C, 5 ~ 95% RH （no condensation） |
| Input Voltage | 5~36VDC |
| Working Current | ~200mA |
| Power | <700mW |

## 1.3. Key Application

The HF2211A device connects serial device to Ethernet networks using the TCP/IP protocol:

- Remote equipment monitoring
- Asset tracking and telemetry
- Security Application
- Industrial sensors and controls
- Medical devices
- ATM machines
- Data collection devices
- Universal Power Supply (UPS) management units
- Telecommunications equipment
- Data display devices

- Handheld instruments
- Modems
- Time/attendance clocks and terminals

# 2. HARDWARE INTRODUCTION

The HF2211A unit is a complete solution for serial port device connecting to network. This powerful device supports a 10/ 100BASE-T Ethernet connection, a reliable and proven operating system stored in flash memory, an embedded web server, a full TCP/IP protocol stack, and standards-based (AES) encryption.

## 2.1. Interface Definition


Figure 2. HF2211A Interface

Table 2. HF2211A Interface Definition

| Function | Name | Description |
|---|---|---|
| External Interface | RJ45 Ethernet | 10/ 100M Ethernet<br>Default is WAN function in AP mode (Can be configured to LAN Function), connect to router LAN port for network access.<br>In STA mode, it works in LAN function. |
| | SMA | Antenna SMA Interface |
| | RS232 | RS232 Communication |
| | RS485/RS422 | RS485/RS422 Communicaton |
| | Earth | Protect Earth |
| | DC Input | DC Power 5~36V |
| LED Indicator | Power | Internal Power Supply Indicator<br>On: Power is OK<br>Off: Power is NG |
| | Link | Network Connection Indicator<br>On: Include the following condition.<br>● Ethernt 2 connection OK<br>● Wi-Fi STA connect to AP<br>● Wi-Fi AP being connected by other STA device<br>Off: No network connection |
| | Active | Data transfer Indicator<br>On: Data is transfering.<br>Off: No data transfer |
| Button | Reload | Restore to factory setting<br>Long press this button for 4 seconds and loose it to restore parameters to factory setting. |
| Switch | Protect | Device parameter protect<br>On: Enable protect, working parameter can not be modified.<br>Off: Disable protect |

## 2.2. RS232 Interface

Device serial port is male(needle), RS232 voltage level(can connect to PC directly), Pin Order is cosistent with PC COM port. Use cross Cable connected with PC(2-3 cross, 7-8 cross, 5-5 direct, 7-8 no connection), see the following table for pin defination.


Figure 4. RS232 Pin Defination(Male/Needle Type)

Table 3. RS232 Interface

| Pin Number | Name | Description |
|---|---|---|

| Pin Number | Name | Description |
|---|---|---|
| 2 | RXD | Receive Data |
| 3 | TXD | Send Data |
| 5 | GND | GND |
| 7 | RTS | Request to Send |
| 8 | CTS | Clear to Send |

## 2.3. RS485 Interface

RS485 use two wire links, A(DATA+), B(DATA-). Connect A(+) to A(+), B(-) to B(-) for communication.

The RS485 interface support maximum 32 485 device, special hardware version can support max 255 device. The cable maximum length is 1200 meters. Need to add 120Ohm terminal resistor for over 300 meters.

## 2.4. RS422 Interface

RS422 interface use T+/T-/R+/R-, cross connect to device as the following picture.

| Name | Description |
|---|---|
| TX+ | Transfer Data+ |
| TX- | Transfer Data- |
| RX+ | Receive Data+ |
| RX- | Receive Data- |

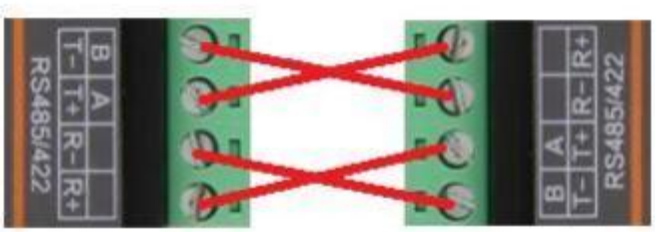



Figure 5. HF2211A RS422 Connection

## 2.5. RJ45 Interface

Ethernet port is 10M/ 100M adaptive, support AUTO MDI/MDIX which means it support direct connecting to PC with Ethernet cable.

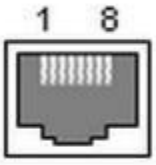



Figure 6. RJ45 Pin Defination

Table 4. RJ45 Interface

| Pin Number | Name | Description |
|---|---|---|
| 1 | TX+ | Transfer Data+ |
| 2 | TX- | Transfer Data- |
| 3 | RX+ | Receive Data+ |
| 4 | PHY-VCC | Transformer Tap Voltage |
| 5 | PHY-VCC | Transformer Tap Voltage |
| 6 | RX- | Receive Data- |
| 7 | N.C. | None Connect |
| 8 | N.C. | None Connect |

## 2.6. Mechanical Size

The dimensions of HF2211A are defined as following picture (mm):


Figure 7. HF2211A Mechanical Dimension

## 2.7. Rail Mounting

We support to provide rail for mounting as the following picture.

Figure 8. HF2211A Rail

## 2.8. Order Information

HF2211A is defined as following:

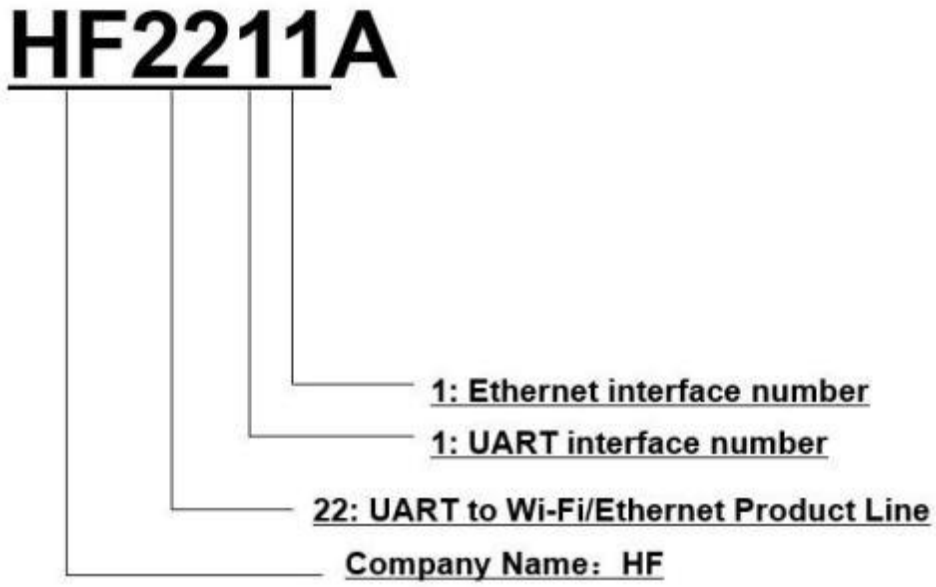



Figure 9. HF2211A Product Order Information

# 3. NETWORK STRUCTURE

## 3.1. Wireless Network

HF2211A can be set as a wireless STA and AP as well. And logically, it supports two wireless interfaces, one is used as STA and the other is AP. Other STA devices can join into the wireless network through AP interface. So the it can provide flexible networking method and network topology. Functions is as follow:

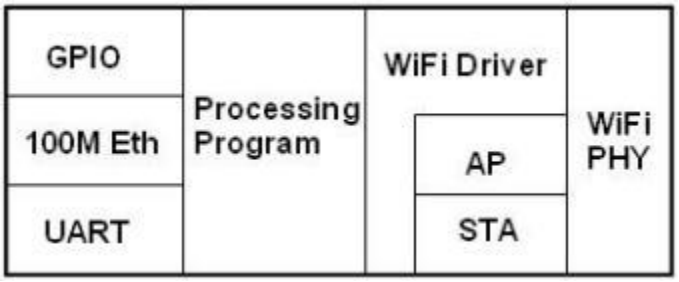



Figure 1 1. HF2211A Function Structure

<Introductions>

AP: Wireless access point which is the central joint. Usually, wireless router is a AP, other STA devices can connect with AP to join the network.

STA: Wireless station which is terminal of a wireless network. Such as laptop and pad etc.

### 3.1.1. AP Network

HF2211A can construct a wireless network as AP. All the STA devices will consider the AP as the centre of the wireless network. The mutual communication can be transponded by AP, shown as follow:


Figure 12. General AP Network

### 3.1.2. STA Wireless Network

Take the following picture as example. When router works in AP mode, HF2211A connects to the user’s devices by RS232/RS485 interface. In this topology, the whole wireless network can be easily stretched.


r

Figure 13. STA Application

### 3.1.3. AP+STA Wireless Network

HF2211A can support AP+STA method. It can support AP and STA interface at the same time. Shown as follow:


Figure 14. AP+STA Wireless Network

In this picture, HF2211A open the AP+STA function and the STA interface can be connected to the remote server by the router. Similarly, the AP interface can also be used. Phone/PAD can be connected to the AP interface and to control the serial devices or set itself.

Through AP+STA function, it is convenient to use Phone/PAD to monitor the user's devices and not change its original settings.

Through AP+STA function, it is convenient to configure the product. And it solves the problem that the formal product can only configure by serial port.

**Notes that:**

**When the AP+STA function is opened, the STA interface needs to connect to other router. Otherwise, STA interface will endlessly scan the router information nearby. When it is scanning, it will bring bad effects to the AP interface, like losing data etc.**

**AP and STA parts must set to the different sub-network for the product working as APSTA mode.**

### 3.1.4. IOTService Software

Open the IOTService after connect to the AP hotspot generated by HF2211A or connect to Product Ethernet port to PC, then configure the parameter.

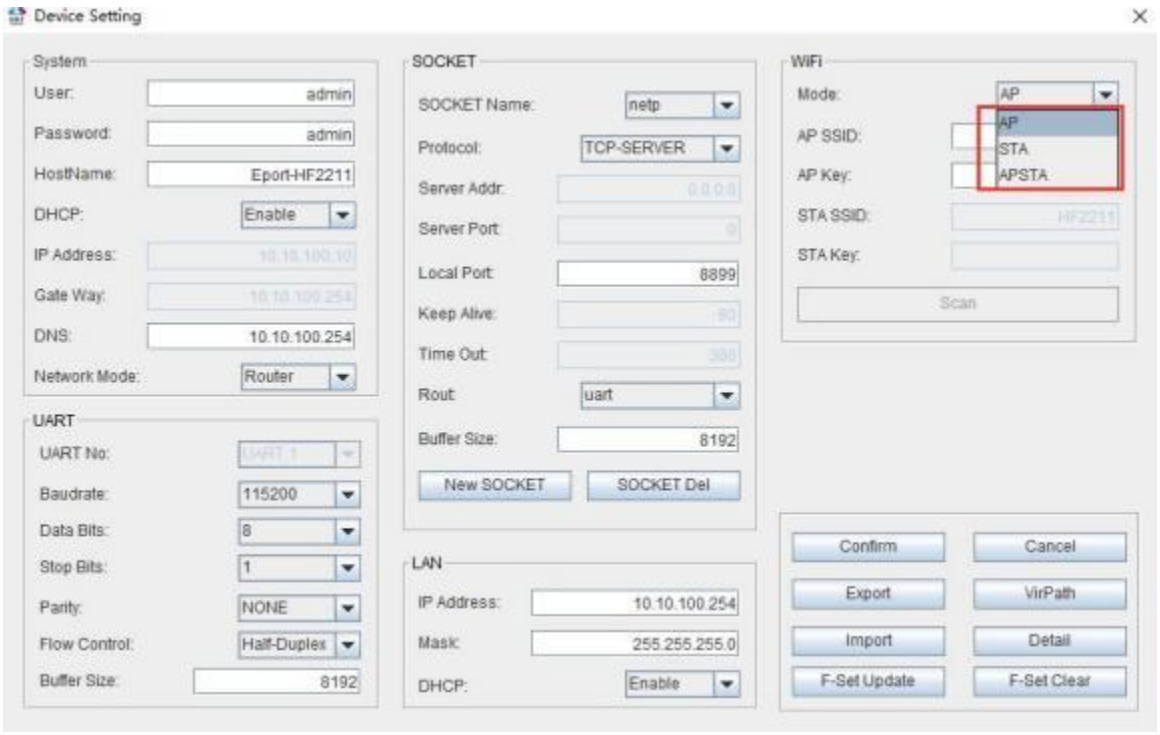



Figure 16. Configure Wi-Fi Parameter


| Select | Channel | SSID | MAC Address | RSSI | Has Key |
|---|---|---|---|---|---|
| ○ | 11 | Sam401 | D4:EE:07:2D:14:1E | 100 | Yes |
| ○ | 10 | ChinaNet-yRMx | 38:E3:C5:A2:87:D5 | 100 | Yes |
| ○ | 11 | UPGRADE-AP | 20:DC:E6:48:35:9E | 39 | Yes |
| ○ | 6 | xiaoheizi | B0:95:8E:06:CB:16 | 29 | Yes |
| ○ | 11 | Caoyu | 78:96:82:A2:C6:A2 | 0 | Yes |
| ○ | 0 | Caoyu | | 0 | Yes |

Figure 17. STA Scan Parameter

### 3.1.5. Webpage Configuration

Use PC to connect with HF2211A through its AP hotspot or Ethernet connection. Input the default IP(10.10.100.254, default username and password: admin/admin) to login the webpage to configure the parameter.

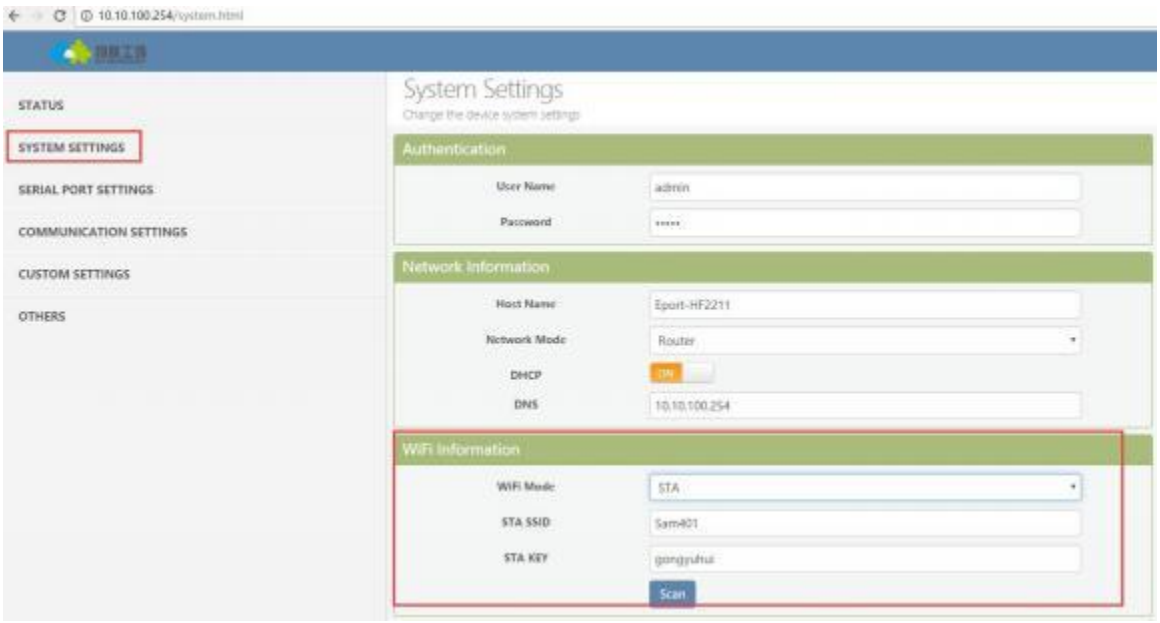



Figure 18. Configure the Wi-Fi Parameter

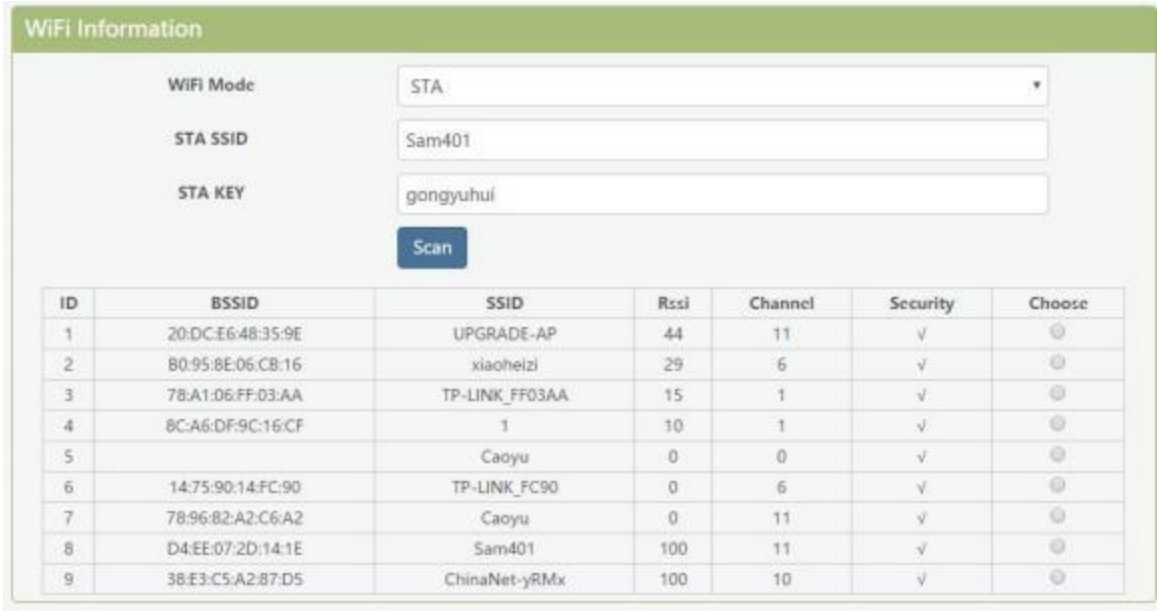



Figure 19. STA Scan

## 3.2. Ethernet Interface Function

HF2211A provides with a 100M Ethernet interface. Through the 100M Ethernet interface, user can achieve the connection among WIFI, serial port and Ethernet port.

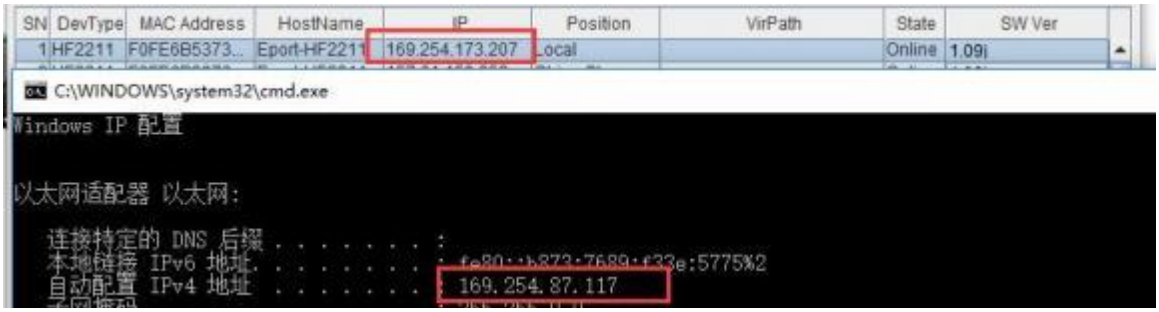
### 3.2.1. Ethernet Port with Wi-Fi


Figure 20. Ethernet Interface Function

HF2211A servers as APSTA and generate a central network. The IP addresses of all the devices and module's are in the same network segment.

Note:

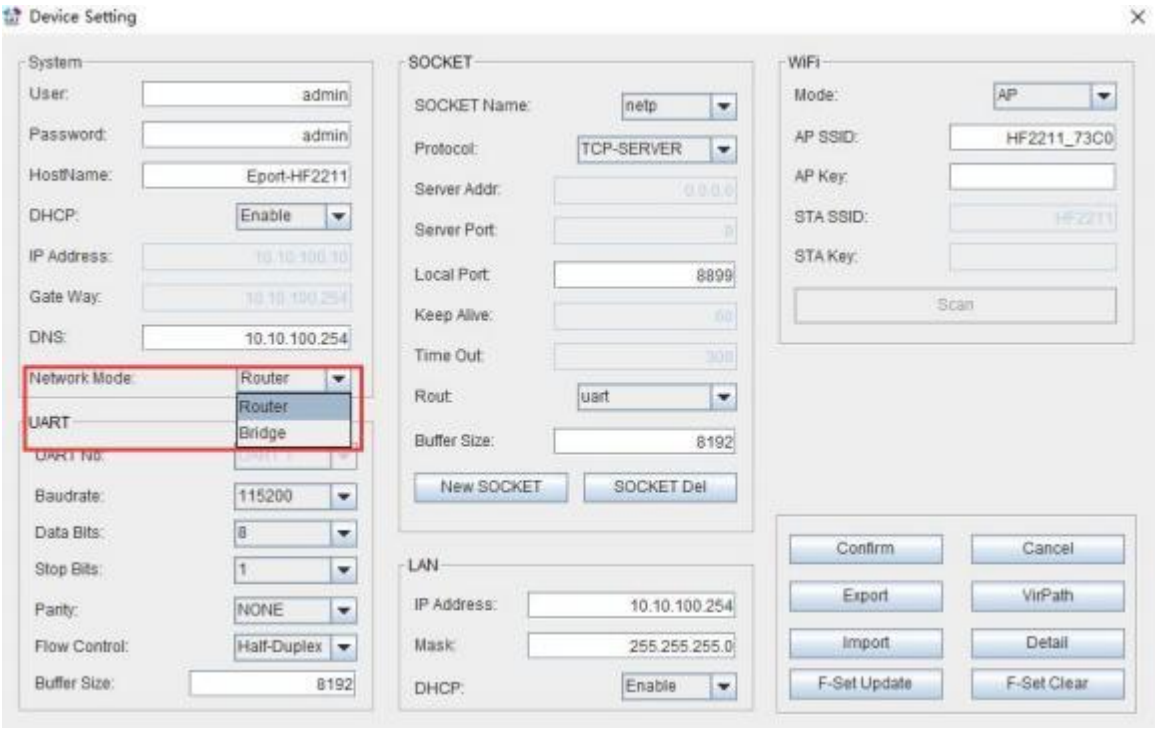
If product works in AP mode, then the Ethernet is working as WAN mode, PC will use Auto-IP to set its IP when connect via Ethernet. Better to change via Wi-Fi, then the PC and other devices are all in same subnetwork.(10.10.100.xxx)

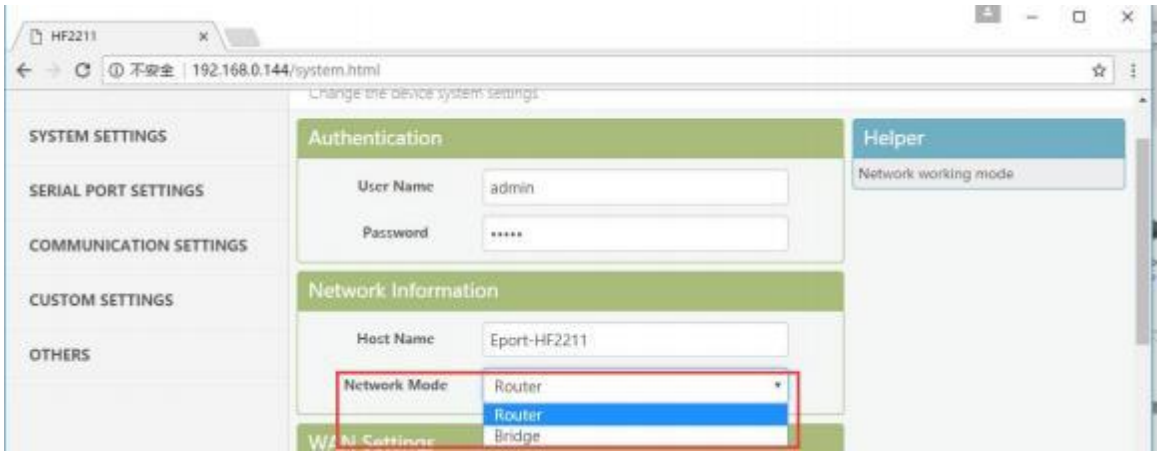


### 3.2.2. Ethernet Interface Function(Router)


Figure 21. Ethernet Interface Function(Router)

The HF2211A device Ethernet interface work in router mode. When connect to router, it will get IP address from router(as picture 192. 168. 1. 100). The product itself generate a subnet(10. 10. 100.254 default). The device from the Ethernet interface is assigned with IP address by module ( 10.10.100.101 ).Then the device and the PC1 are in the same subnet for network communication. A connection fro PC1 to PC2, but PC2 cannot actively connect to PC1.





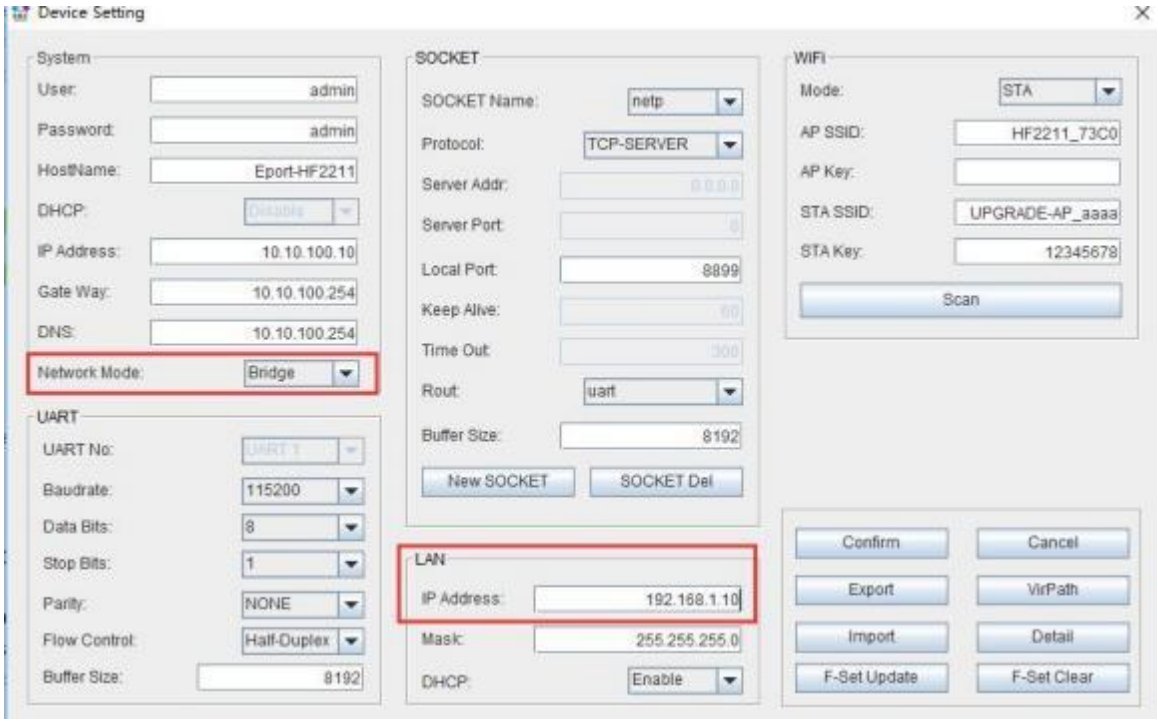

### 3.2.3. Ethernet Port Function(Bridge)


Figure 22. Ethernet Port Function(Bridge)

The HF2211A device Ethernet interface work in router mode. When connect to router, it will get IP address from router(as picture 192. 168. 1. 101). AT the whole network, the product is like an invisible device. PC1 ad PC2 can communicated mutually without any constraint. But if product needs to connect with other devices, it needs set LAN IP address(192. 168. 1. 10 as picture)

Notes:

Webpage, IOTService, or Cli command to set working mode, by default is router mode. **It need reboot when change its working mode.**


Device Setting
System
User: admin
Password: admin
HostName: Eport-HF2211
DHCP: Disable
IP Address: 10.10.100.10
Gate Way: 10.10.100.254
DNS: 10.10.100.254
Network Mode: Bridge
UART
UART No: UART 1
Baudrate: 115200
Data Bits: 8
Stop Bits: 1
Parity: NONE
Flow Control: Half-Duplex
Buffer Size: 8192
SOCKET
SOCKET Name: netp
Protocol: TCP-SERVER
Server Addr:
Server Port:
Local Port: 8899
Keep Alive:
Time Out:
Rout: uart
Buffer Size: 8192
New SOCKET
SOCKET Del
LAN
IP Address: 192.168.1.10
Mask: 255.255.255.0
DHCP: Enable
WIFI
Mode: STA
AP SSID: HF2211_73C0
AP Key:
STA SSID: UPGRADE-AP_aaaa
STA Key: 12345678
Scan
Confirm
Cancel
Export
VirPath
Import
Detail
F-Set Update
F-Set Clear

# 4. FUNCTION DESCRIPTION

Refer to “IOT_ Device_ Series_ Software_ Funtion” document for more detailed function.

## FCC Regulations:

- This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

  —Reorient or relocate the receiving antenna.

  —Increase the separation between the equipment and receiver.

  —Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

  —Consult the dealer or an experienced radio/ TV technician for help.
- Changes or modifications not expressly approved by the manufacturer could void the user’s authority to operate the equipment.

## FCC RF Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. To comply with FCC RF Exposure compliance requirements, this grant is applicable to only Mobile Configurations. The antennas used for the transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

# APPENDIX A: REFERENCES

## A.1 Test Tools

IOTService Configure Software:

http://www.hi-flying.com/download-center-1/applications-1/download-item-iotservice

UART 、Network Test software:

http://www.hi-flying.com/index.php?route=download/category&path=1_4

# APPENDIX B: CONTACT INFORMATION

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