

HF2221

Serial Server Device User Manual

V 1.2



Overview of Characteristic

- ✧ MIPS MCU with 4MB Flash and 8MB SRAM. Run on eCos
- ✧ Support TCP/IP/Telnet /Modbus TCP Protocol
- ✧ Support 2 channel 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 2 Channel 10/100M Ethernet Auto-Negotiation
- ✧ 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: 108 x 146 x 25 mm (L x W x H)**

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HISTORY

Ed. V1.0	05-11-2017	First Version.
Ed. V1.1	01-16-2018	Modify LED and button description.
Ed. V1.2	02-15-2019	Fix LED description

1. PRODUCT OVERVIEW

1.1. General Description

The HF2221 provides RS232/RS485/RS422 interface to Ethernet/Wi-Fi connectivity to web enable any device. The HF2221 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 HF2221 also includes an embedded web server used to remotely configure, monitor, or troubleshoot the attached device.

The HF2221 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 HF2221 integrates all serial to Ethernet functionality with 108 x 146 x 25mm size.

1.2. Device Parameters

Table 1. HF2221 Technical Specifications

Item	Parameters
System Information	
Processor/Frequency	MIPS/320MHz
Flash/SDRAM	4MB/8MB
Operating System	eCos
Ethernet Port	
Port Number	2 RJ45 1 WAN/LAN switchable 1 LAN
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 v1.2 AES 128Bit DES3
Wi-Fi Interface	
Standard	802.11 b/g/n
Frequency	2.412GHz-2.484GHz
Network Mode	STA/AP/STA+AP

Security	WEP/WPA2PSK/WPA2PSK
Encryption	WEP64/WEP128/TKIP/ AES
Tx Power	802.11b: +20dBm(Max.) 802.11g: +18dBm(Max.) 802.11n: +15dBm(Max.)
Rx Sensitive	802.11b: -89dBm 802.11g: -81dBm 802.11n: -71dBm
Antenna	3dBi Stick Antenna
Serial Port	
Port Number	2 RS232/RS485/RS422
Interface Standard	RS232: DB9 RS485/RS422: 5.08mm connector 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 Hardware RTS/CTS、DSR/DTR Software Xon/ Xoff flow control
Software	
Web Pages	Http Web Configuration Customization of HTTP Web Pages
Configuration	Web CLI XML import Telnet IOTService PC Software
Firmware Upgrade	Web
Basic Parameter	
Size	108 x 146 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 HF2221 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 HF2221 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.

Through Ethernet cable connect router with HF2221 serial server for data transfer, which makes the data transformation very simple. HF2221 meet EMC Class B security level, It can pass every countries relevant certification test



Figure 1. HF2221 Appearance

2.1. Pins Definition



Figure 2. HF2221 Interface

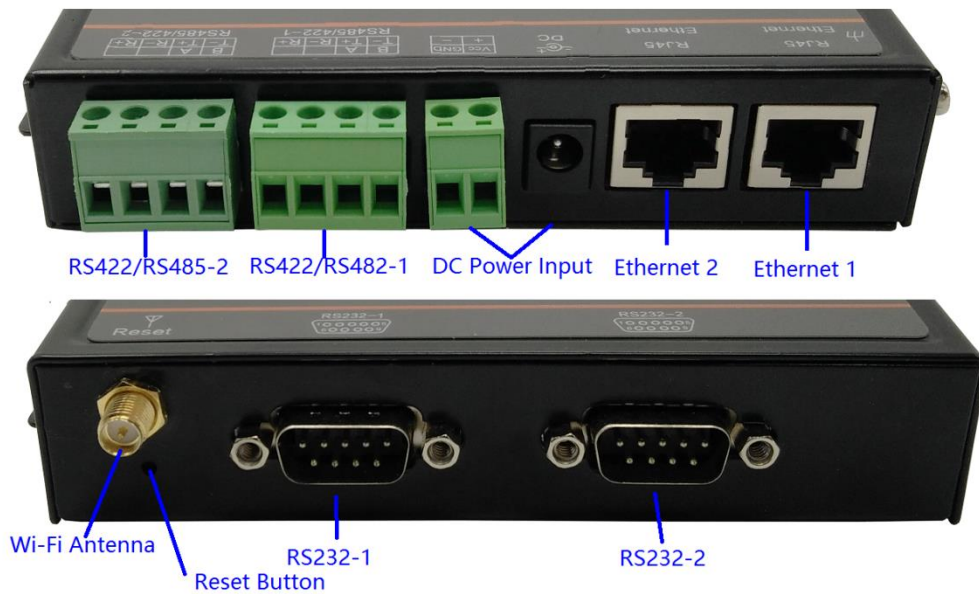


Figure 3. HF2221 Side View

Table 2. HF2221 Interface Definition

Function	Name	Description
External Interface	Ethernet 1	10/100M Ethernet LAN function
	Ethernet 2	10/100M Ethernet Default is WAN function in AP mode (Can be configured to LAN Function), connect to router LAN port for network access. In STA mode, it works in LAN function.
	Wi-Fi Antenna	SMA Antenna Interface
	RS232/RS422/RS485-1	UART1 Channel
	RS232/RS422/RS485-2	UART2 Channel
	Earth	Protect Earth
	DC Power Input	DC Power 5~36V
LED Indicator	Power	Internal Power Supply Indicator On: Power is OK Off: Power is NG
	LAN(Net-2)	Ethernet 1 Connection Indicator On: Ethernet connection is OK Off: No Ethernet connection
	Active-1	UART1 channel data transfer Indicator Flash: Send data Off: No data sent
	Active-2	UART2 channel data transfer Indicator Flash: Send data. Off: No data sent
	Link(WiFi)	Network Connection Indicator On: Include the following condition. <ul style="list-style-type: none"> ● Ethernt 2 connection OK ● Wi-Fi STA connect to AP ● Wi-Fi AP being connected by other STA device Off: No network connection
Button	Reload(Reset)	Press down for 4 seconds and then up, the device will restore to factory setting and reboot.

2.2. RS232 Interface

Device serial port is male(needle), RS232 voltage level(can connect to PC directly), Pin Order is consistent 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 definition.



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

Table 3. RS232 Interface

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-

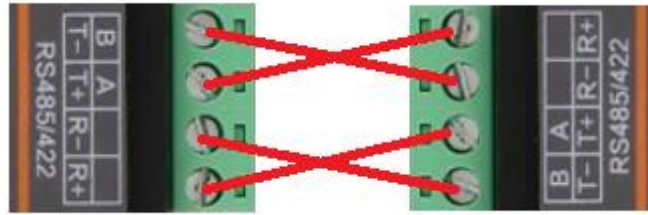


Figure 5. HF2221 RS422 Connection

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.

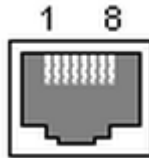


Figure 6. RJ45 Pin Definition

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 HF2221 are defined as following picture (mm):



Figure 7. HF2221 Mechanical Dimension

2.7. Rail Mounting

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

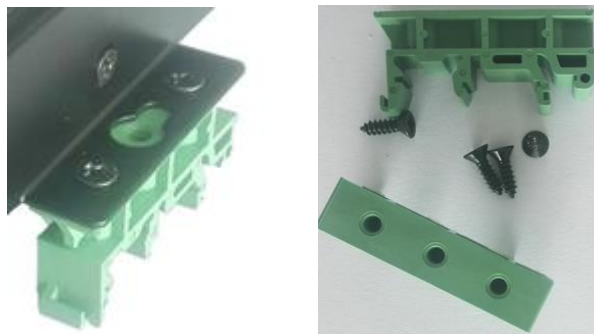


Figure 8. HF2221 Rail

2.8. Order Information

HF2221 is defined as following.

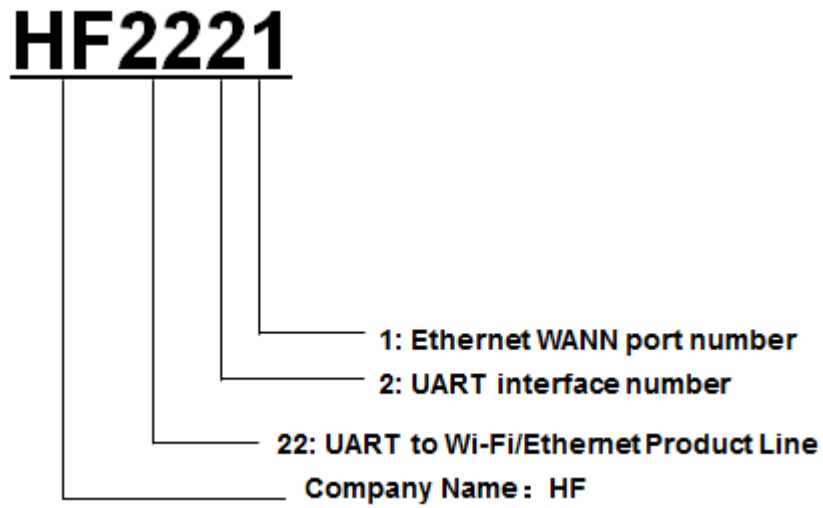


Figure 9. HF2221 Product Order Information

3. NETWORK STRUCTURE

3.1. Wireless Network

HF2221 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. It can provide flexible networking method and network topology. Functions is as follow:

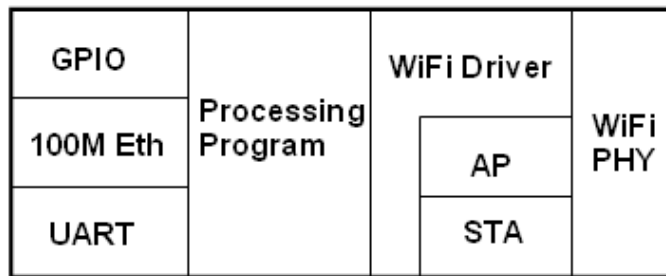


Figure 11. HF2221 Function Structure

<Introductions>

AP: Wireless access point which is the central joint. Usually, wireless router is 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

HF2221 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:

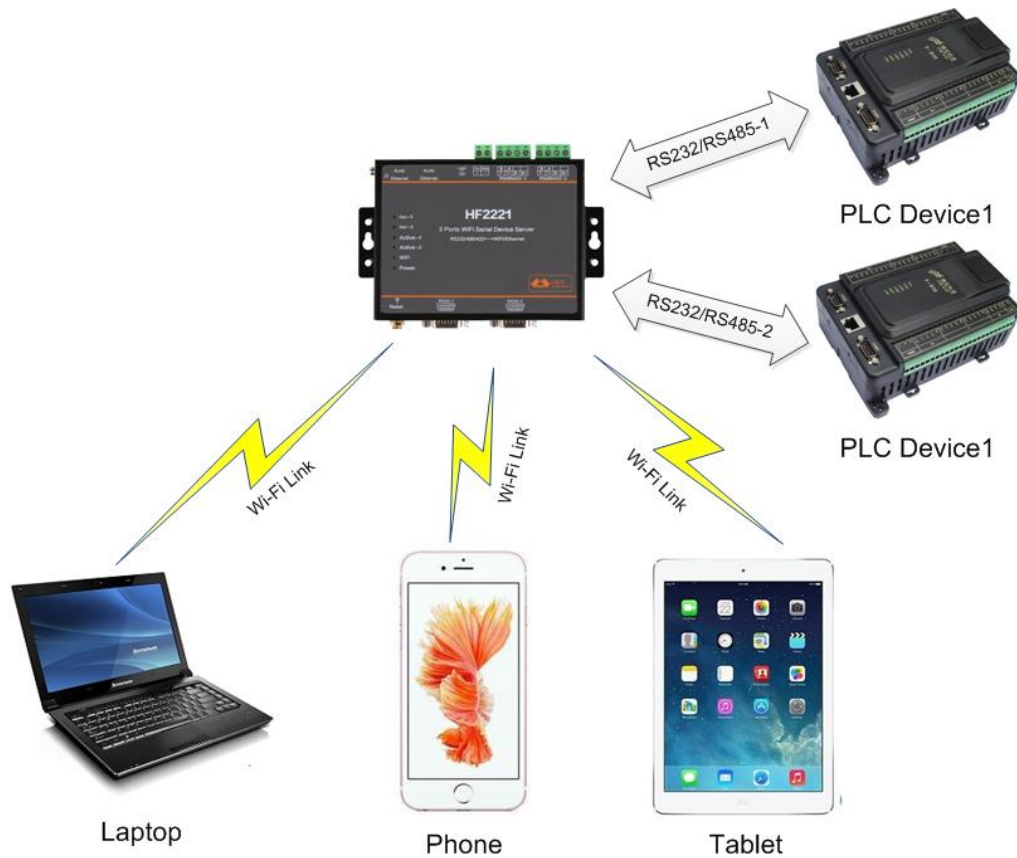


Figure 12. General AP Network

3.1.2. STA Wireless Network

Take the following picture as example. When router works in AP mode, HF2221 connects to the user's devices by RS232/RS485 interface. In this topology, the whole wireless network can be easily stretched.

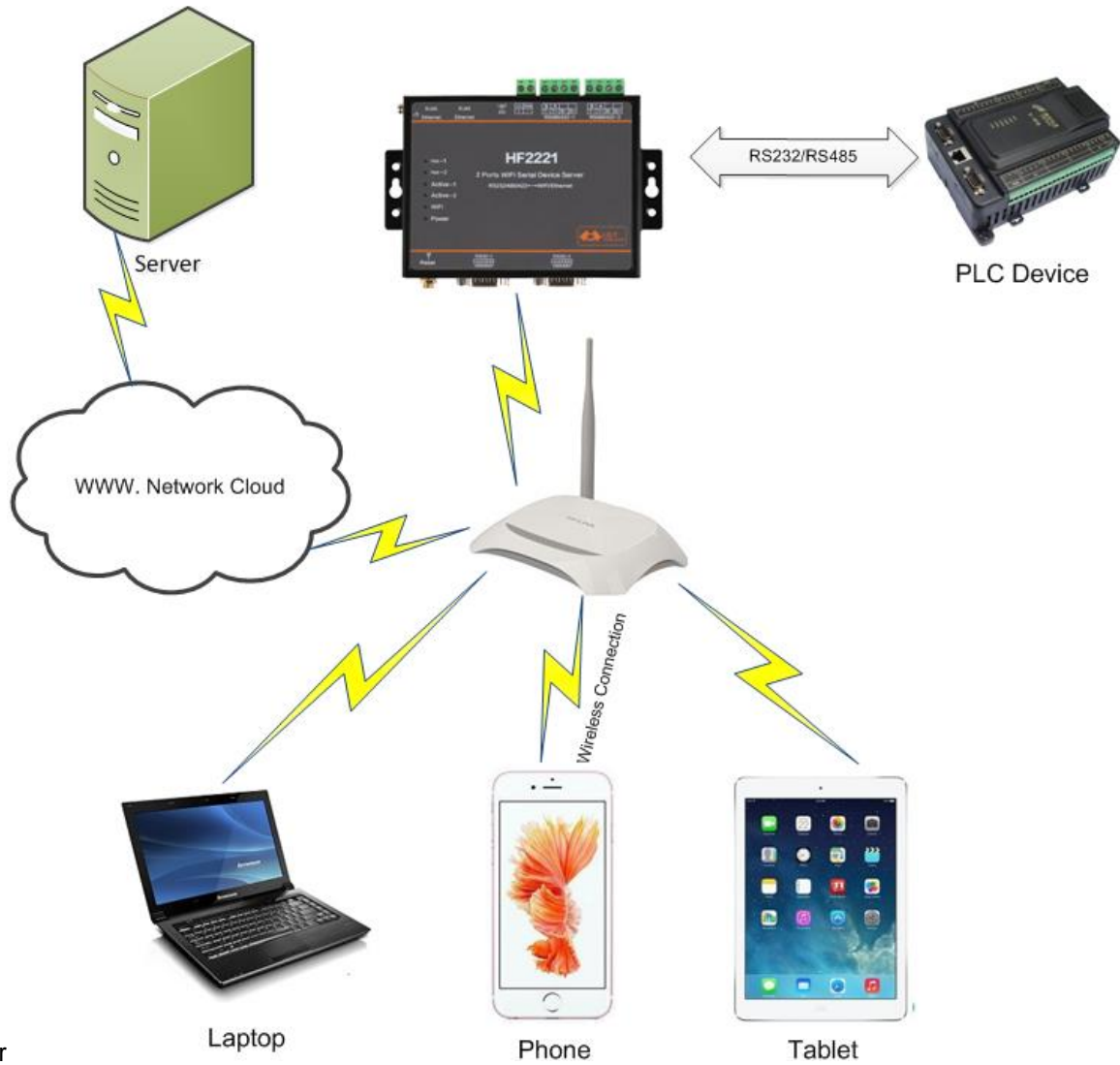


Figure 13. STA Application

3.1.3. AP+STA Wireless Network

HF2221 can support AP+STA method. It can support AP and STA interface at the same time shown as follow:

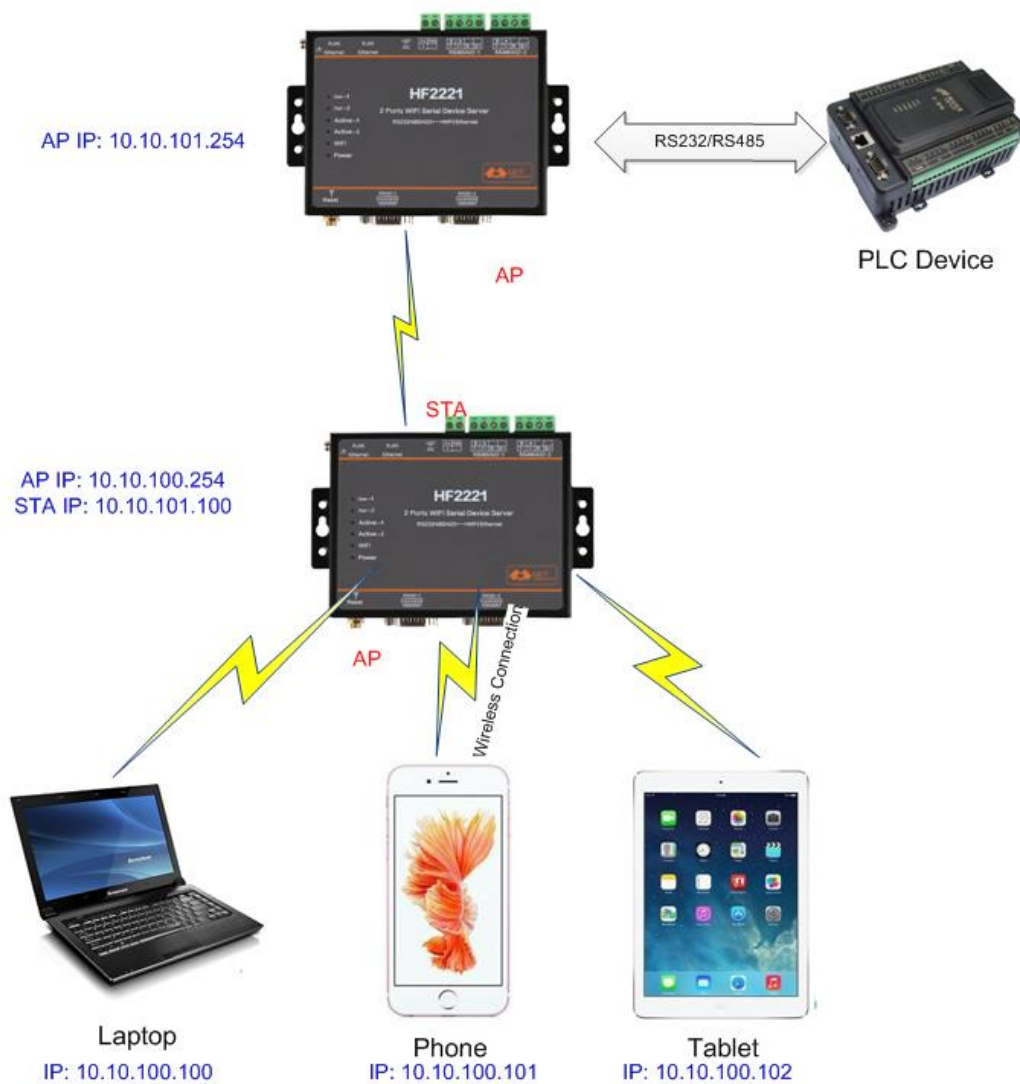


Figure 14. AP+STA Wireless Network

In this picture, HF2221 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 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.

Note:

AP and STA parts must set to the different sub-network.

3.1.4. IOTService Software

Open the IOTService after connect to the AP hotspot generated by HF2221 or PC and HF2221 connect to same router (WAN port connect to router LAN port). Then configure the parameter.

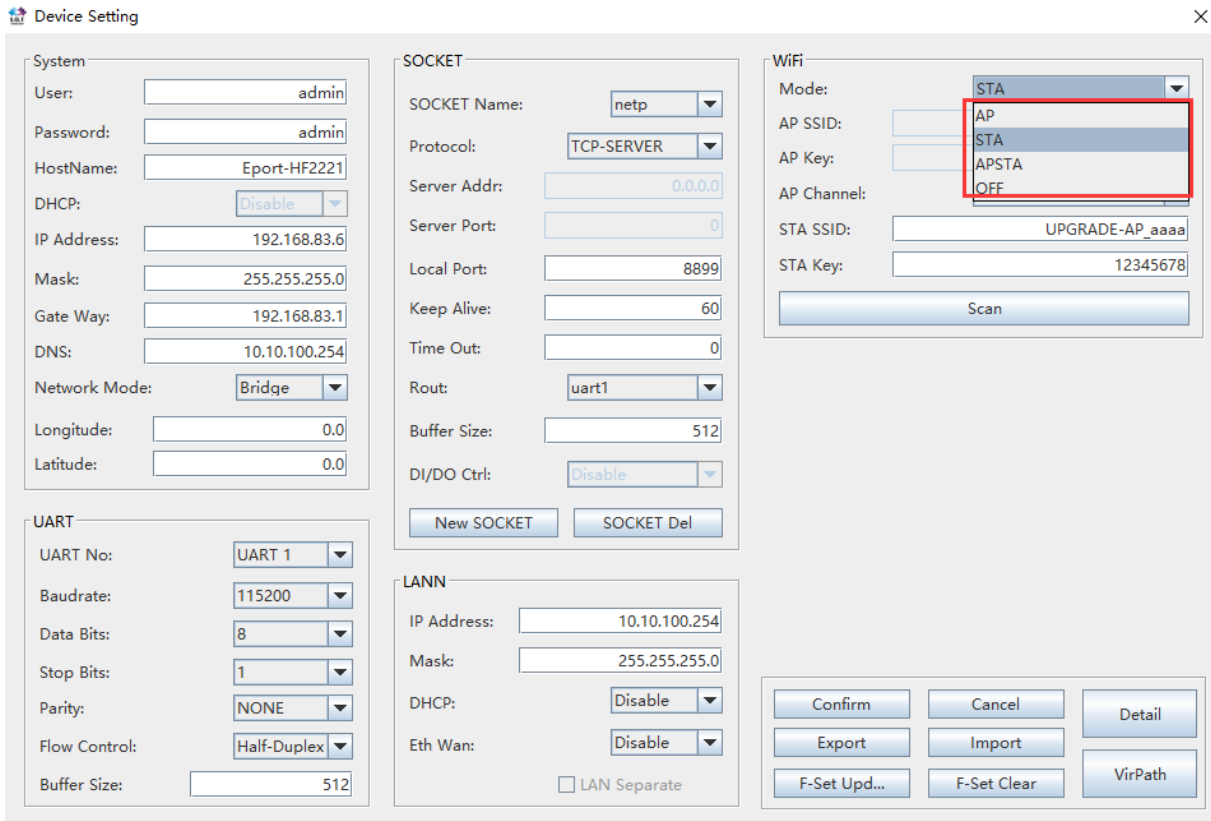


Figure 16. Configure Wi-Fi Parameter

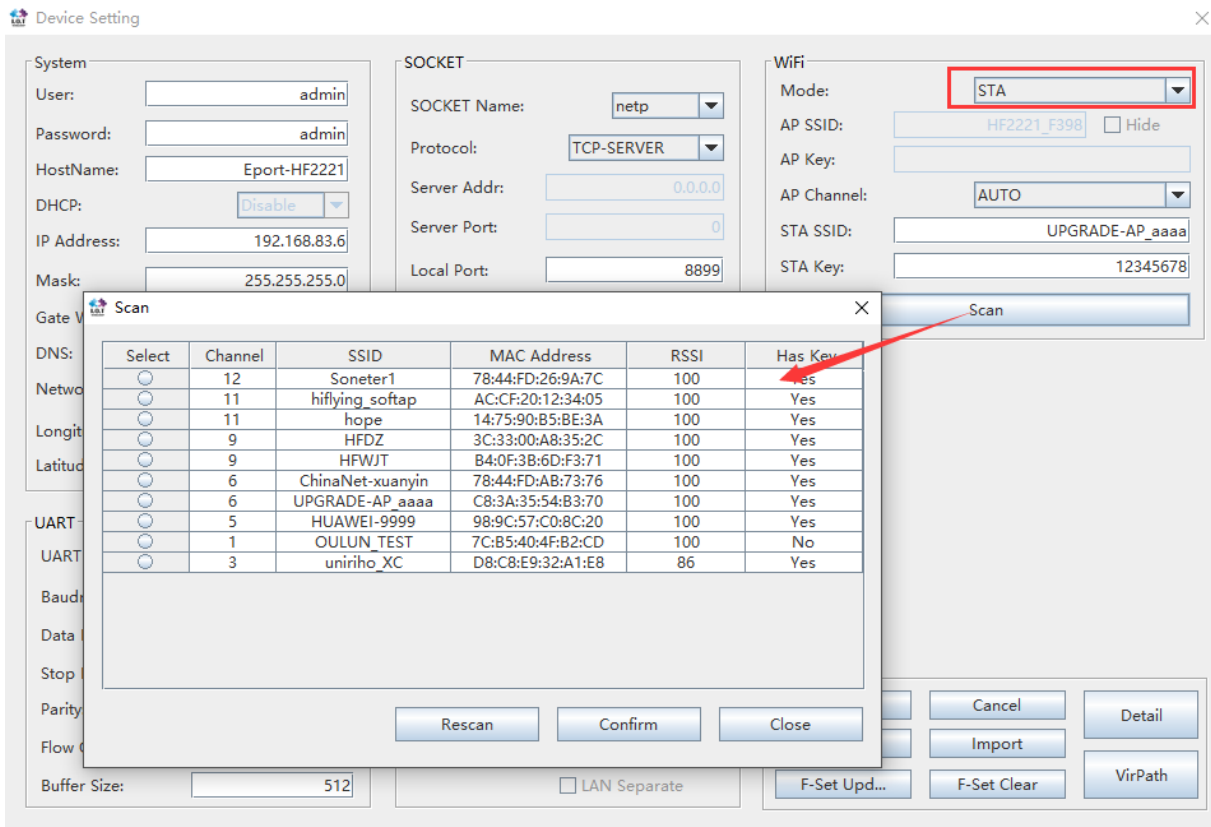


Figure 17. STA Scan Parameter

3.1.5. Webpage Configuration

Use PC to connect with HF2221 through its AP SSID (IP:10.10.100.254) or PC and HF2221 connect to same router (WAN port connect to router LANN port, IP is assigned by router). Type the product IP, default username and password: admin/admin) to login the webpage to configure the parameter.

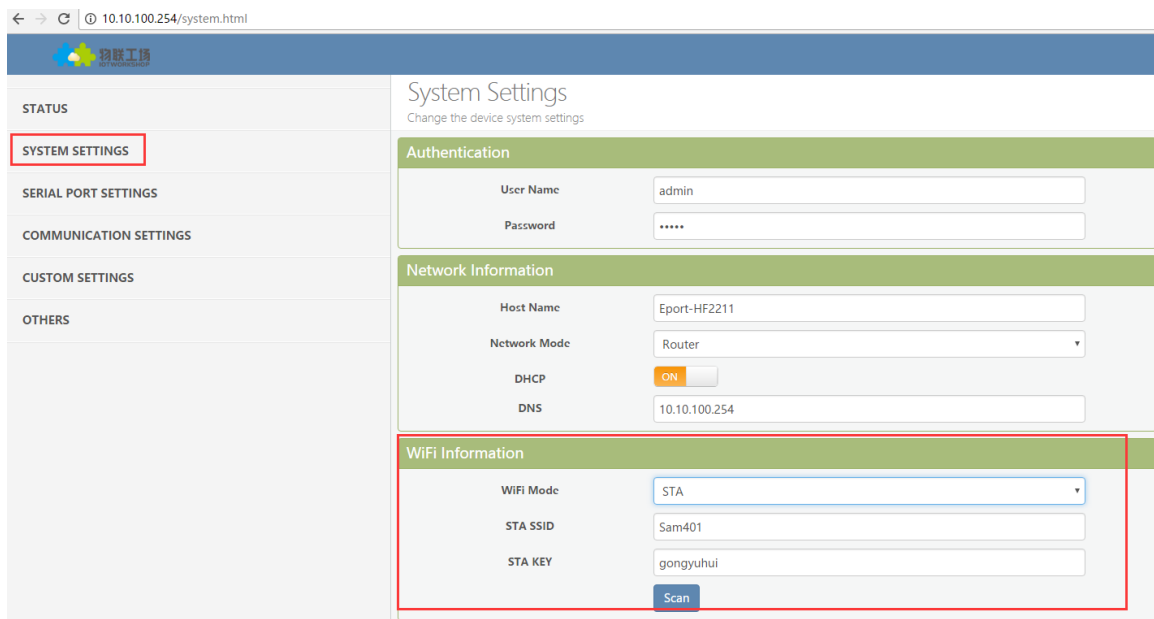


Figure 18. Configure the Wi-Fi Parameter

WiFi Information

WiFi Mode:

STA SSID:

STA KEY:

ID	BSSID	SSID	Rssi	Channel	Security	Choose
1	20:DC:E6:48:35:9E	UPGRADE-AP	44	11	√	<input type="radio"/>
2	B0:95:8E:06:CB:16	xiaoheizi	29	6	√	<input type="radio"/>
3	78:A1:06:FF:03:AA	TP-LINK_FF03AA	15	1	√	<input type="radio"/>
4	8C:A6:DF:9C:16:CF	1	10	1	√	<input type="radio"/>
5		Caoyu	0	0	√	<input type="radio"/>
6	14:75:90:14:FC:90	TP-LINK_FC90	0	6	√	<input type="radio"/>
7	78:96:82:A2:C6:A2	Caoyu	0	11	√	<input type="radio"/>
8	D4:EE:07:2D:14:1E	Sam401	100	11	√	<input type="radio"/>
9	38:E3:C5:A2:87:D5	ChinaNet-yRMx	100	10	√	<input type="radio"/>

Figure 19. STA Scan

3.2. Ethernet Interface Function

HF2221 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

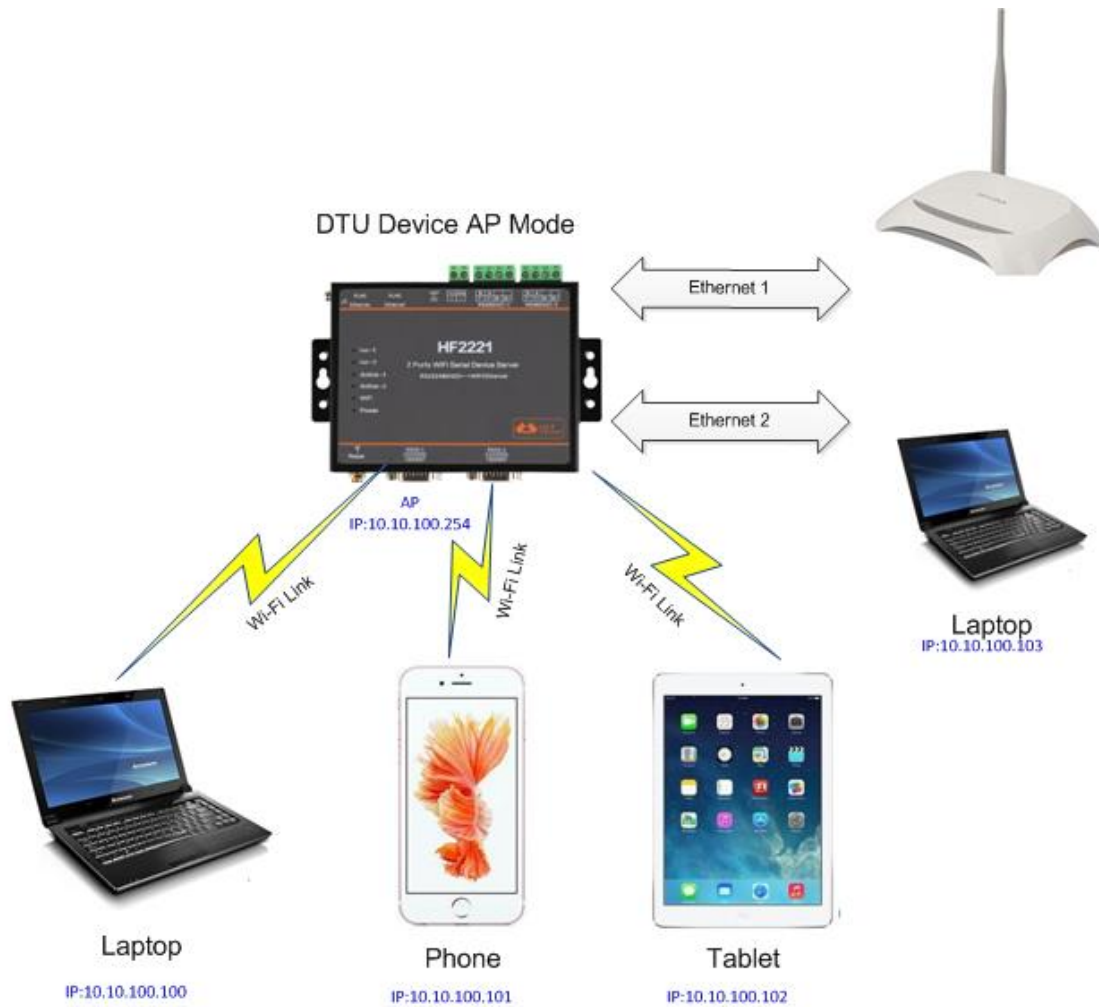


Figure 20. Ethernet Interface Function (AP)

HF2221 servers as AP and generate a central network. The IP addresses of all the devices and modules are in the same network segment.

3.2.2. Ethernet Interface Router Function



Figure 21. Ethernet Interface Function 1 (Router)

The HF2221 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). 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.



Figure 22. Ethernet Interface Function 1 (Router)

The HF2221 device Ethernet interface work in router mode. Default Ethernet 2 is WAN which is used to IP address (as figure 192.168.1.100). Default Ethernet 1 is LAN, and the device itself constitute a subnet (10.10.100.254 default). The device IP is assigned by module (as figure 192.168.1.100).

3.2.3. Ethernet Port Bridge Function



Figure 23. Ethernet Port Function1 (Bridge)

The HF2221 device Ethernet interface work in bridge 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)



Figure 24. Ethernet Port Function2 (Bridge)

The HF2221 device Ethernet interface work in bridge mode. Default Ethernet 2 is WAN for connecting to the router while the Ethernet 1 is LAN to connect to the PC. PC acquire the IP address (192.168.1.101 as figure). In the whole network, device is like a transparent. PC1 and PC2 can connect each other without any constraint. But iif need to connect other device, it will set as LAN IP address (192.168.1.10 as figure).

Notes:

Webpage, IOTService, or Cli command to set working mode, by default is router mode.

3.2.4. Cascade Mode

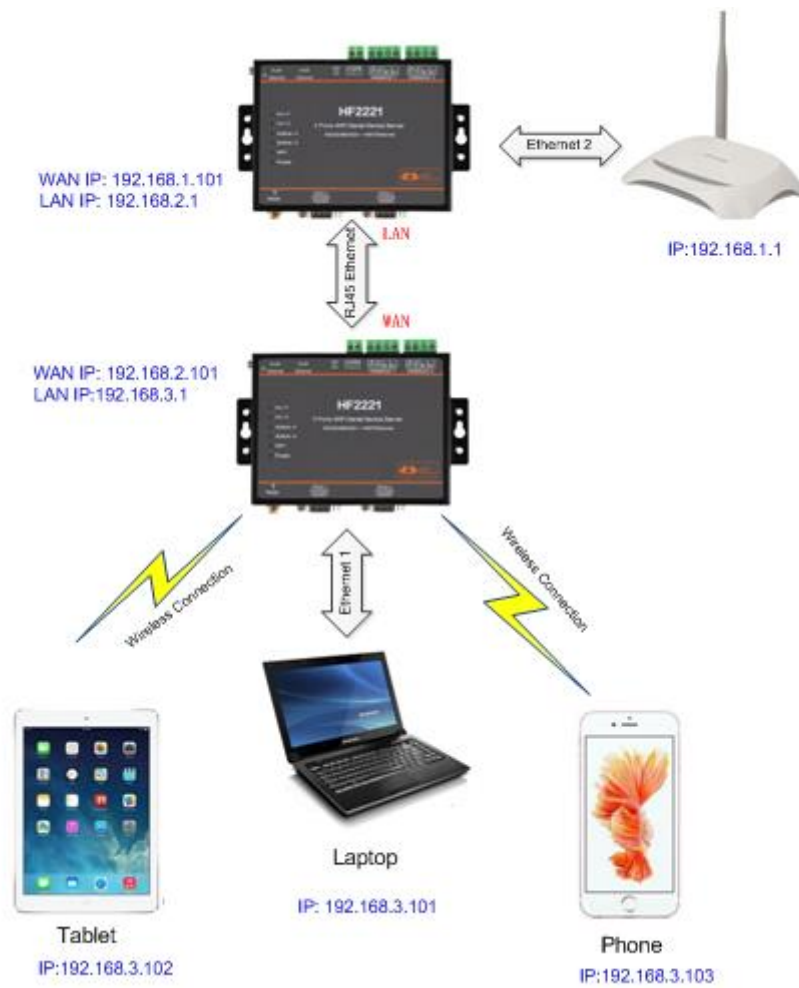


Figure 24 Cascade Mode

Devices can work as cascade to add connection nodes. Multiple HF2221 LAN and gateway address is not constraint each other (LAN1: 192.168.2.1, LAN2: 192.168.3.1 as figure). By ethernet connection, modules can acquire upper router IP address to become cascade mode.

4. FUNCTION DESCRIPTION

Refer to “IOT_Device_Series_Software_Funtion” document for more detailed function.

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

A.2. Quick Start Manual

See our product application on website:

<http://www.hi-flying.com/network-device/hf2221>

APPENDIX B: CONTACT INFORMATION

Address: Room 1002,Building 1,No.3000,Longdong Avenue,Pudong New Area,Shanghai,China,201203

Web: www.iotworkshop.com or www.hi-flying.com

Contact:

Sales: sales@iotworkshop.com

Support: support@iotworkshop.com

Service: service@iotworkshop.com

Business: business@iotworkshop.com

For more information about IOTworkshop modules, applications, and solutions, please visit our web site www.iotworkshop.com

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