

HF2221

Serial Server Device User Manual

V 1.0



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 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)
- ◇ FCC/CE/RoHS Certificated

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HISTORY

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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 Features

- MIPS MCU with 4MB Flash and 8MB SRAM
- Support ECos Operation System
- Support TCP/IP、UDP、DHCP、DNS、HTTP Server/Client、ARP、BOOTP、AutoIP、ICMP、Telnet、FTP、TFTP、uPNP、NTP、ModbusTCP Protocol
- Support two channel RS232/RS422/RS485 to 10/100M Ethernet Conversion, Serial Speed Upto 230400 bps
- Support 10/100M Ethernet Auto-Negotiation
- Support STA/AP/AP+STA Wireless Working Mode
- Support Easy Configuration Through a Web Interface
- Support Security Protocol Such As TLS/AES/DES3
- Support Web Wireless Upgrade
- Wide 5~36VDC
- Size: 108 x 146 x 25mm (L x W x H)
- FCC/CE/RoHS Certificated

1.3. 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
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, FTP, TFTP, uPNP, NTP, SNMP, Modbus TCP
Security Protocol	TLS v1.2 AES 128Bit DES3
IPV6 Support	Plan to Support
Wi-Fi Interface	
Standard	802.11 b/g/n
Frequency	2.412GHz-2.484GHz
Network Mode	STA/AP/STA+AP
Security	WEP/WPAPSK/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, Space, Mark



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
SDK For Dev.	Plan to Provide
Basic Parameter	
Size	108 x 146 x 25 mm
Operating Temp.	-45 ~ 85°C
Storage Temp.	-45 ~ 105°C, 5 ~ 95% RH (no condensation)
Input Voltage	5~36VDC
Working Current	~200mA
Power	<700mW
Other Information	
Certificate	CE, FCC, RoHS

1.4. 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

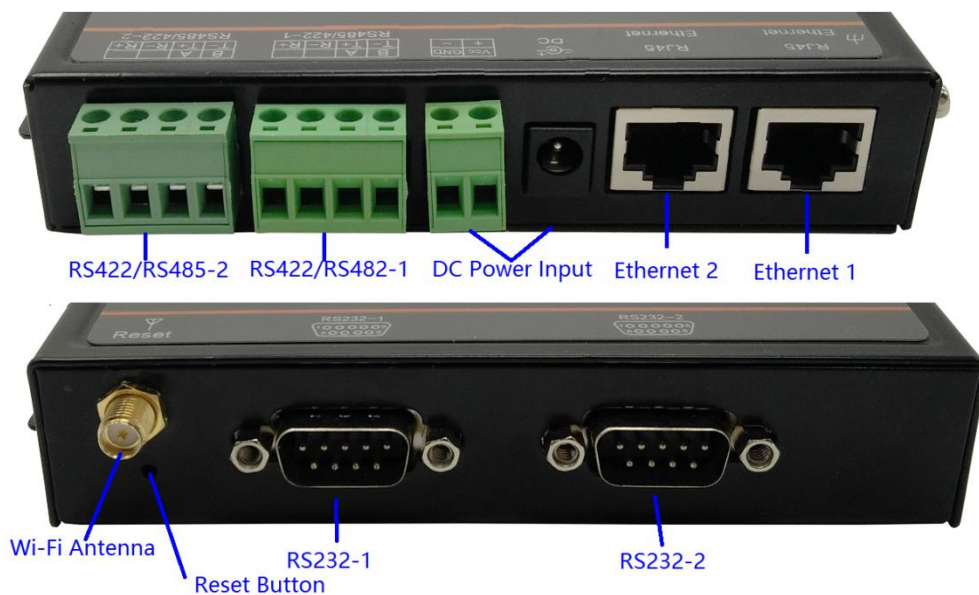


Figure 3. HF2221 Side View

Table 2. HF2221 Interface Definition

Function	Name	Description
External Interface	Ethernet 1	10/100M Ethernet. It works in LANN function
	Ethernet 2	10/100M Ethernet Default is WANN function when APmode. Can connect to router LANN port. If in STA mode, it is working in LANN function.
	Wi-Fi Antenna	Antenna SMA Interface
	RS232/RS422 /RS485-1	UART0 Channel
	RS232/RS422 /RS485-2	UART1 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
	NET-1	Ethernet 1 Connection Indicator On: Ethernet connection is OK

Function	Name	Description
		Off: No Ethernet connection
	NET-2	Ethernet 2 Connection Indicator On: Ethernet connection is OK Off: No Ethernet connection
	Active-1	UART0 channel data transfer Indicator Flash : Data is transferring. Off : No data transfer
	Active-2	UART1 channel data transfer Indicator Flash : Data is transferring. Off : No data transfer
	WiFi	WiFi Connection Indicator(Function is reserved) On: WiFi connection is OK Off: No WiFi connection
Button	Reset	Reset device

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-

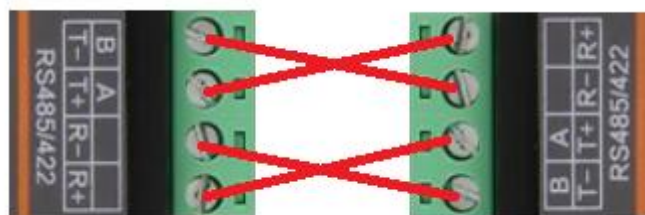


Figure 5. HF2221 RS422 Connection

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.

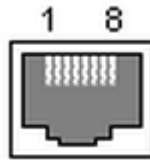


Figure 6. RJ45 Pin Definition

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.

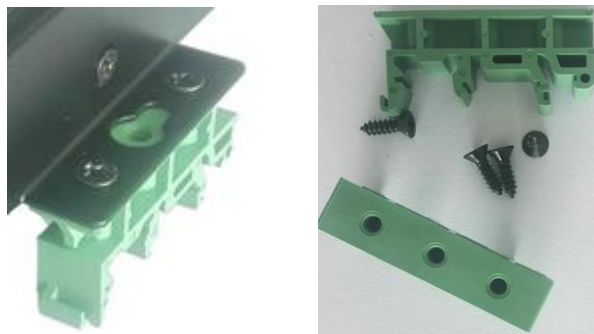


Figure 8. HF2221 Rail

2.8. Order Information

Base on customer detailed requirement, HF2221 provide different configuration version, Details as below:

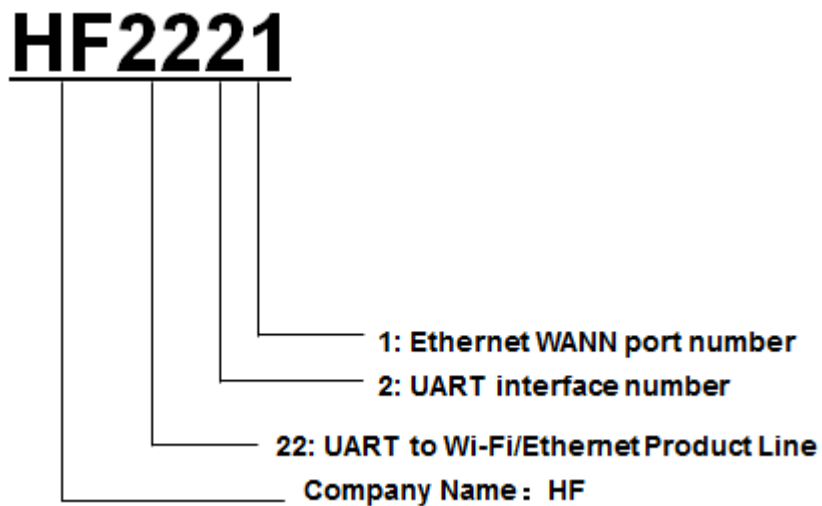


Figure 9. HF2221 Product Order Information

2.9. Package Information

1 * HF2221

1 * 12V/1A DC adapter

1 * RS232 cable

1 * Ethernet cable

1 * SMA Antenna

3. FUNCTIONAL DESCRIPTION

The HF2221 has the following feature:

- Connect customer’s device with PC or server via TCP/UDP/Telnet.
- Contain a HTTP web server allow user to configure through browser with PC or phone.
- Have multi-programmable I/O pins used to monitor or control device directly.

3.1. Basic Network Protocol

The HF2221 device uses the IP address for network communications. If uses the TCP to assure that no data is lost or duplicated. If use UDP to assure that data can be fast and effective to Destination address.

Supported protocols include:

- ARP, UDP, TCP, ICMP, DHCP, Telnet, DHCP, HTTP Server/Client Web socket
- Telnet command configuration, Web server configuration
- Security Protocol: TLS, AES, DES3 encryption

HF2221				
Application Programming Interface	Protocols		Security	Configuration
	DHCP	DNS/DDNS	TLS/TLS	Web
	IGMP	TCP/IP	AES	CLI
	WebSocket	HTTP	DES	Telnet
	TCP/UDP			Log
	IP/ICMP			
	Ethernet			
FreeRTOS OS			Drivers	
Cortex-M3 MCU				

Figure 10. HF2221 Software Protocol Structure

3.2. 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. So the it can provide flexible networking method and network topology. Functions is as follow:

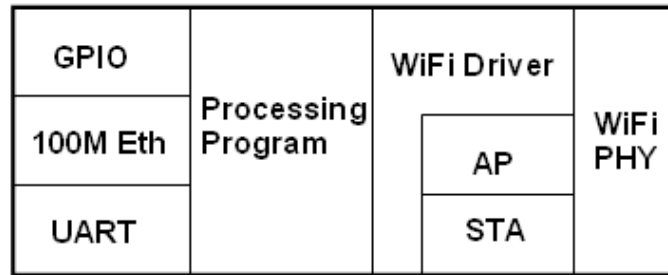


Figure 11. HF2221 Function Structure

<Introductions>

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

3.2.1. 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:

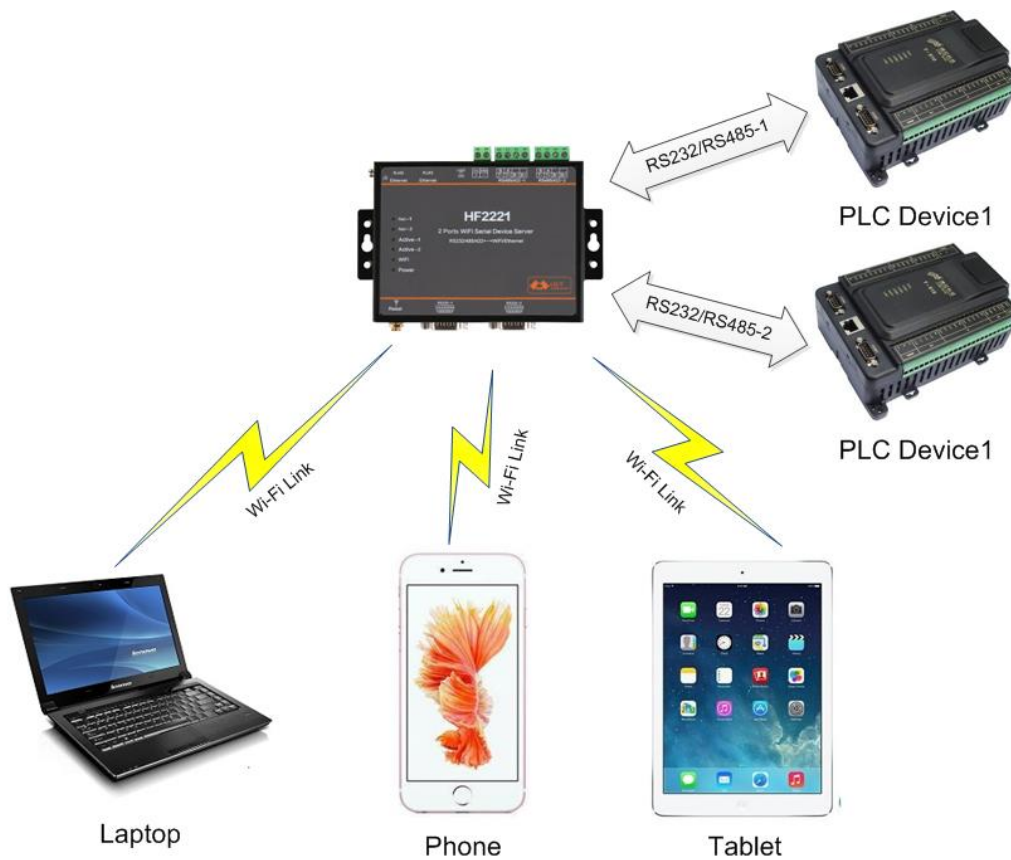


Figure 12. General AP Network

3.2.2. 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.

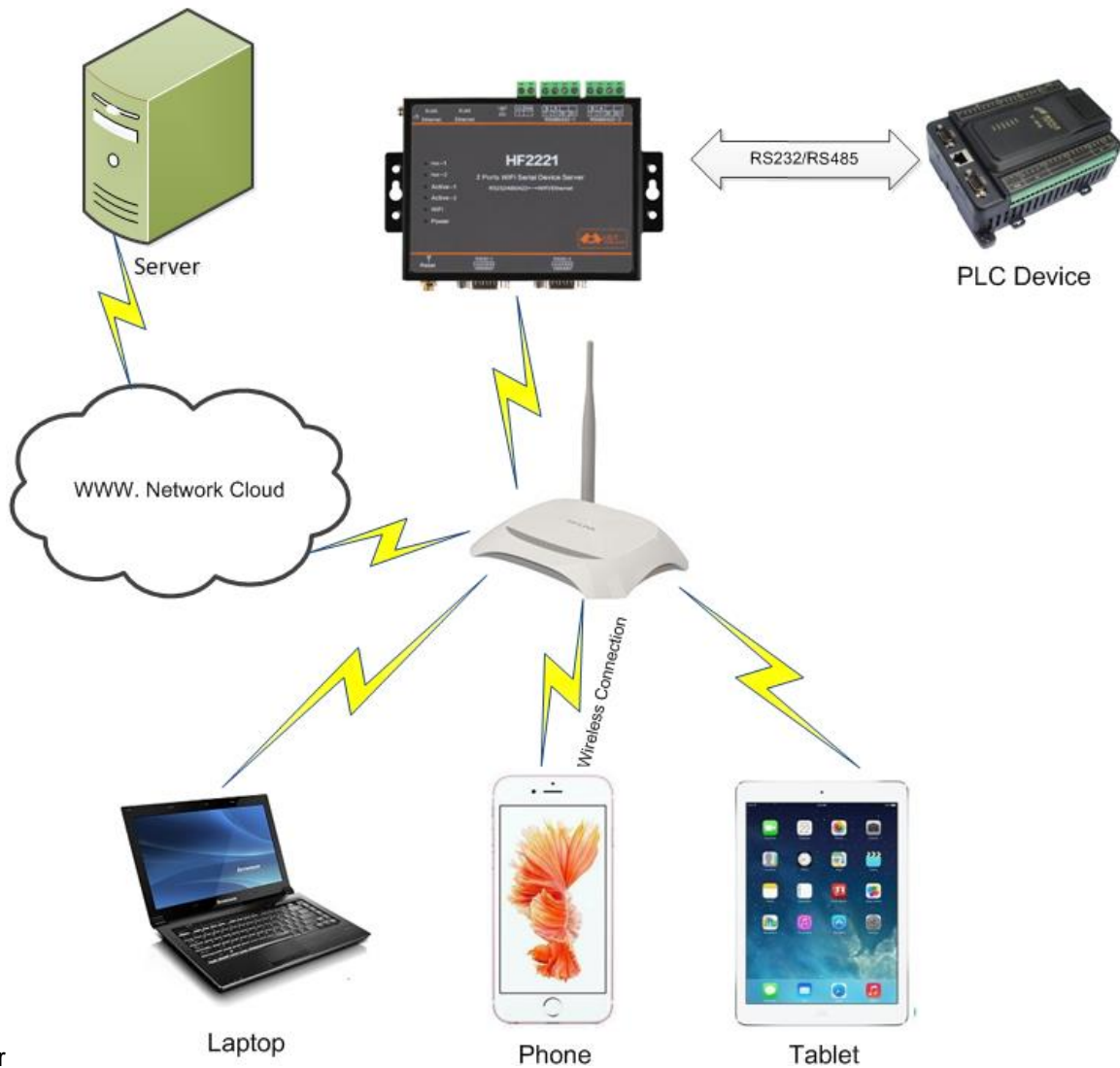


Figure 13. STA Application

3.2.3. AP+STA Wireless Network(Reserved)

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

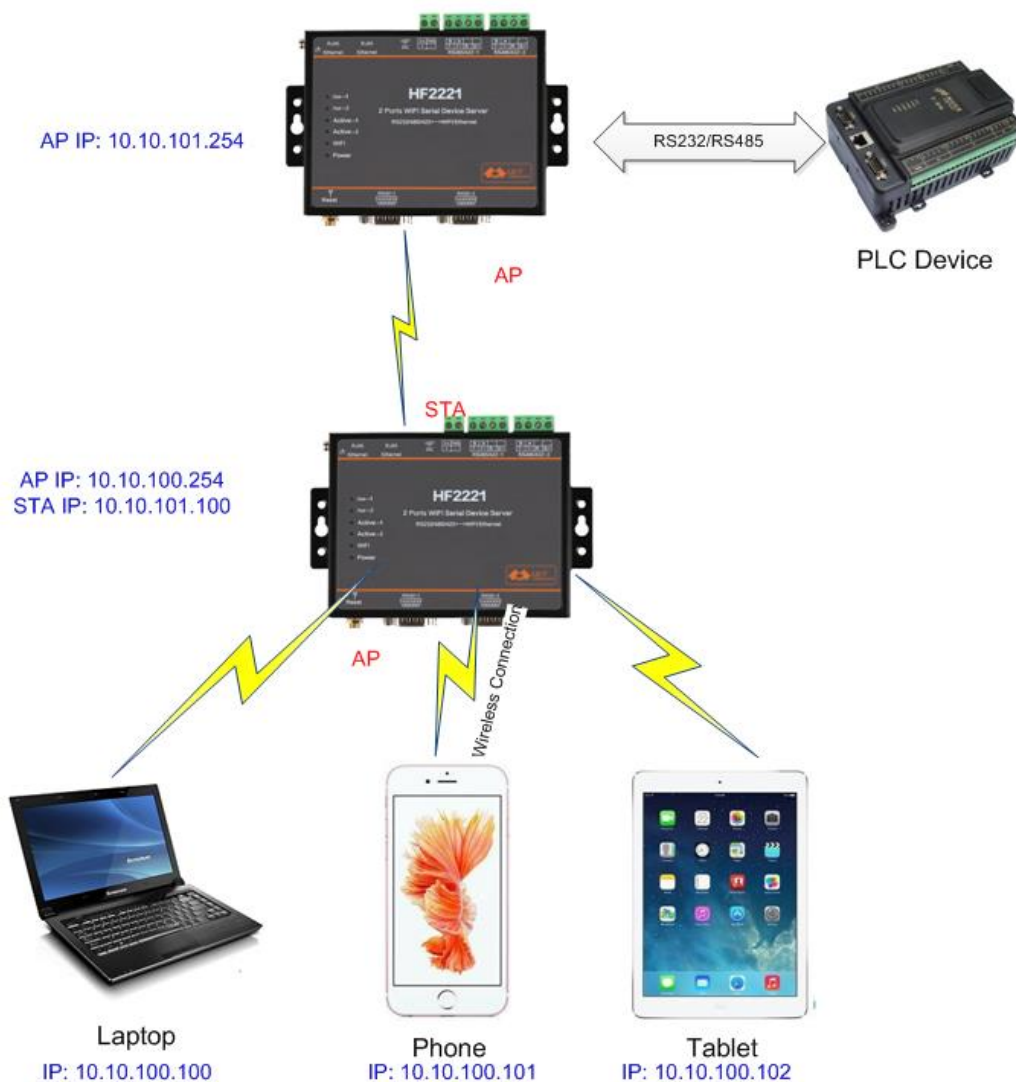


Figure 14. AP+STA Wireless Network

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 other router. Otherwise, STA interface will endleTLSy 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.

3.2.5. IOTService Software

Open the IOTService after connect to the AP hotspot generated by HF2221 or PC and HF2221 connect to same router(Ethernet 1 port connect to router LANN port) , then configure the parameter.

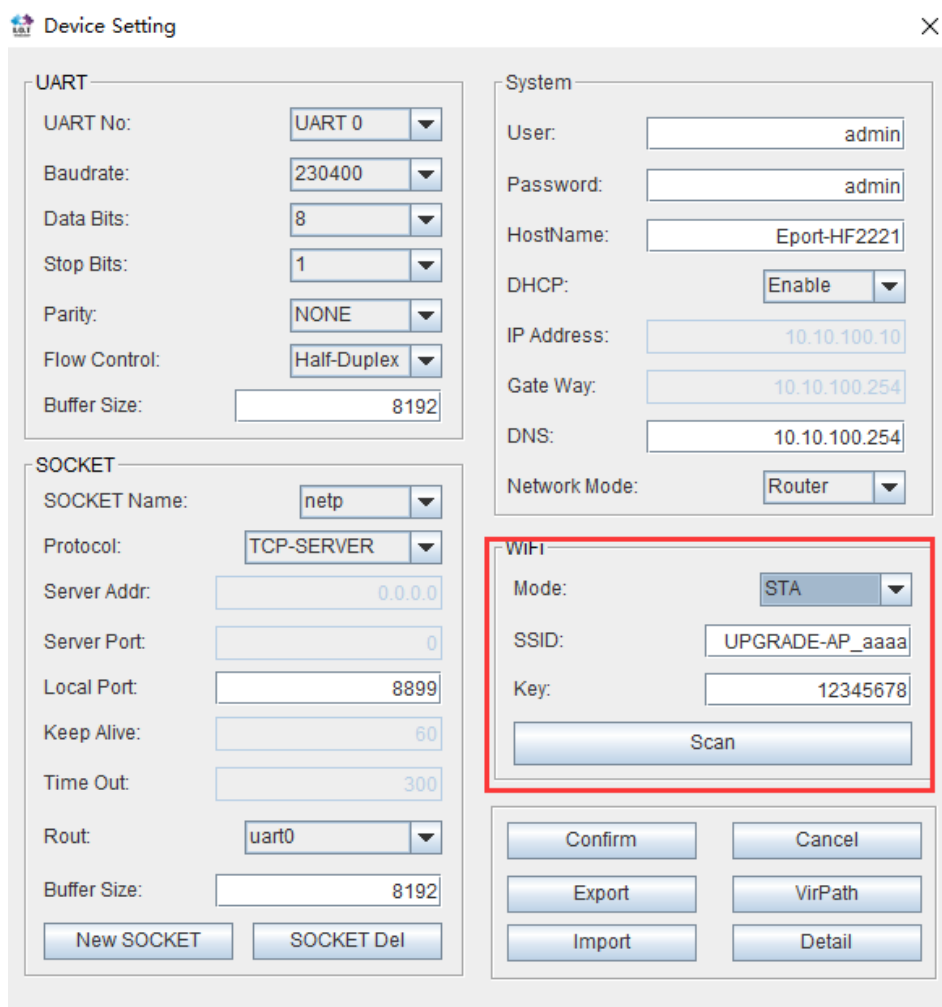


Figure 16. Configure Wi-Fi Parameter

Select	Channel	SSID	MAC Address	RSSI	Has Key
<input type="radio"/>	9	HF2211_7664	F0:FE:6B:38:76:64	100	No
<input type="radio"/>	6	UPGRADE-AP_aaaa	C8:3A:35:54:B3:70	100	Yes
<input type="radio"/>	6	Soneter	10:BF:48:E6:F3:98	100	Yes
<input type="radio"/>	1	HF-TEST	28:2C:B2:D2:E5:96	100	No
<input type="radio"/>	1	aF-TEST	AC:CF:23:30:98:F4	100	No
<input type="radio"/>	10	LQJ-AP	14:75:90:B5:BE:3A	96	Yes
<input type="radio"/>	11	TOTOLINK_LiLi	00:0E:E8:B6:57:2C	86	Yes
<input type="radio"/>	9	HF-Demo_Specia	00:0E:E8:B6:49:B0	81	Yes
<input type="radio"/>	6	NETGEAR60	04:A1:51:15:22:6A	81	Yes
<input type="radio"/>	6	wanstar211257	AC:CF:23:33:C8:C0	70	Yes
<input type="radio"/>	10	aaron	00:34:FE:5E:7E:EC	65	Yes
<input type="radio"/>	1	UPGRADE-AP-NSZ	BC:5F:F6:17:26:07	65	Yes
<input type="radio"/>	1	HF_ORANGE	08:86:3B:FD:F4:AC	60	Yes
<input type="radio"/>	6	TP-LINK_9276	EC:26:CA:75:92:76	55	Yes
<input type="radio"/>	4	Aqingshanz-PC	E8:4E:06:2B:94:B5	55	Yes
<input type="radio"/>	6	WooWoo	14:75:90:0B:C6:96	50	Yes

Figure 17. STA Scan Parameter

3.2.6. Webpage Configuration

Use PC to connect with HF2221 through its AP hotspot(IP:10.10.100.254) or PC and HF2221 connect to same router(Ethernet 1 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.

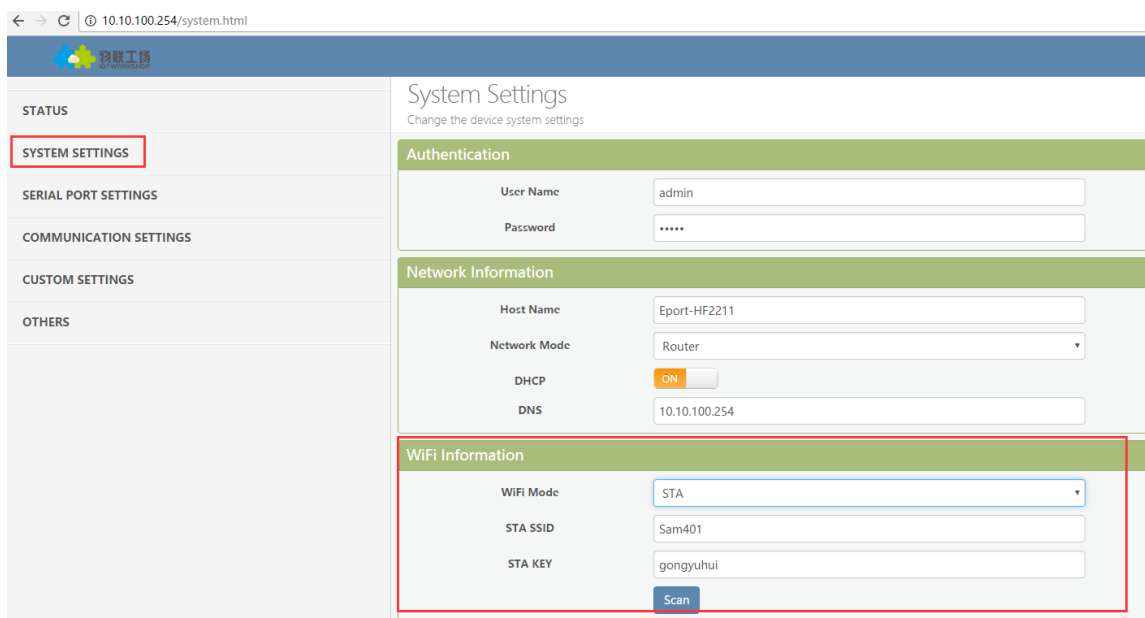


Figure 18. Configure the Wi-Fi Parameter

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

3.3. 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.

3.3.1. Ethernet Port with Wi-Fi

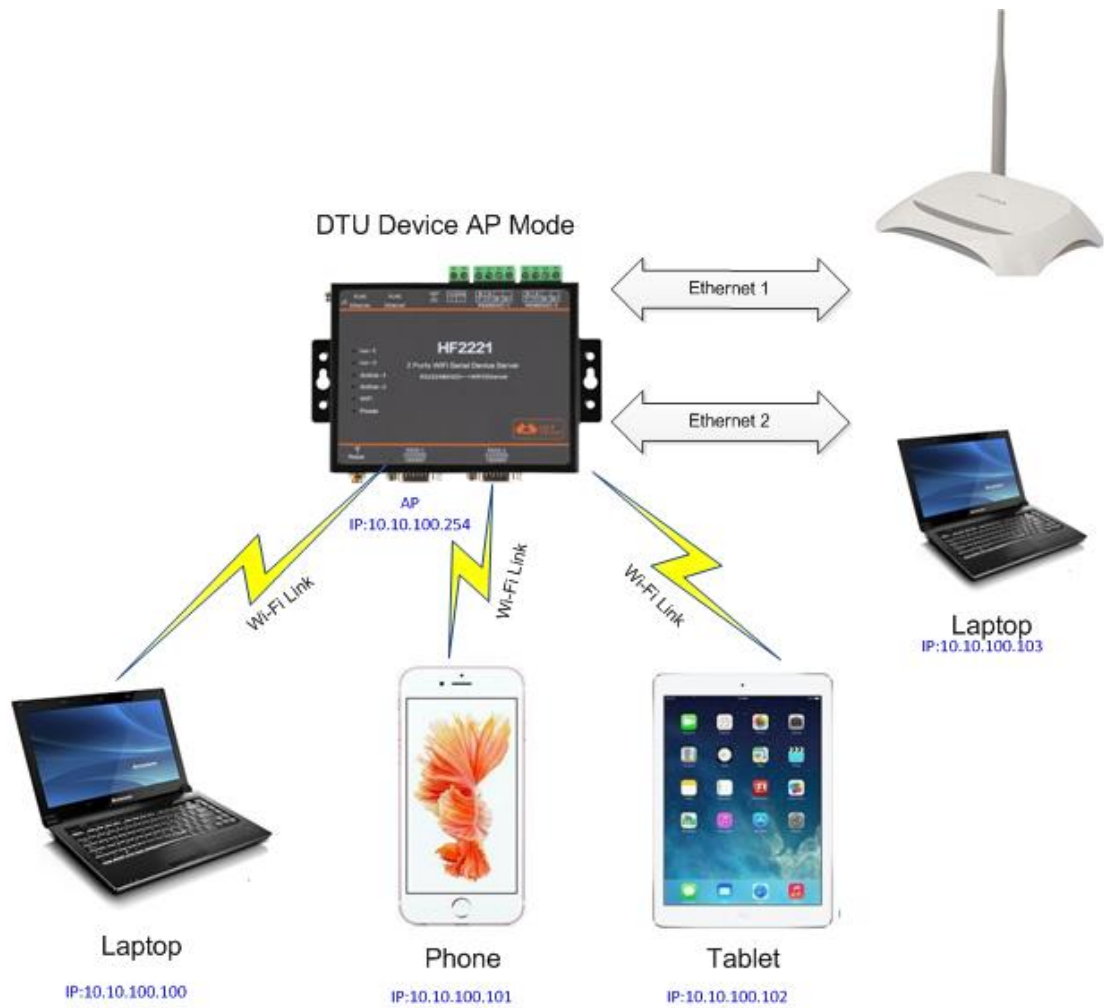


Figure 20. Ethernet Interface Function(AP)

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

3.3.2. Ethernet Interface Function(Router)



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).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.



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 is assigned IP address by module(as figure 192.168.1.100).

3.3.3. Ethernet Port Function(Bridge)



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.

3.3.4. Cascade Mode

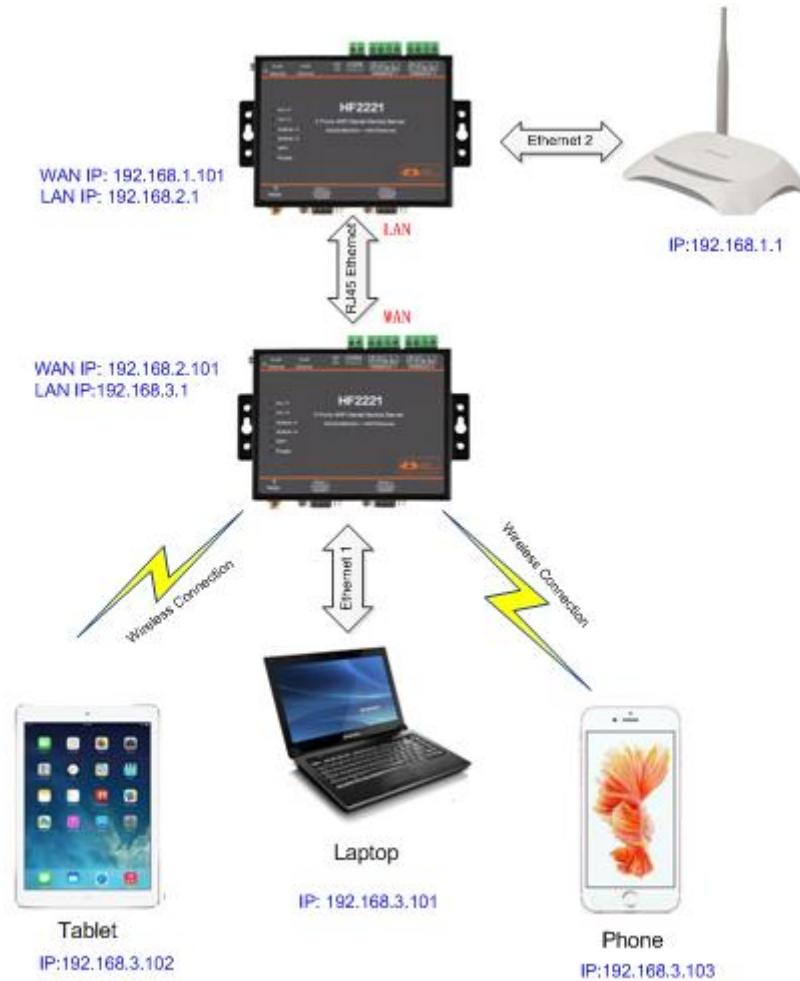


Figure 24.Cascade Mode

Devices can work as cascade to add connection nodes. Multiple HF2221 LAN(Ethernet 1) 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.

3.4. Working Mode

3.4.1. Transparent Transmission Mode

The HF2221 Device support transparent transmission mode of serial interface, In this mode, User only need to set some necessary parameter(network communication parameter). After power on, the device can auto connect to default socket setting(TCP/UDP). Use web page or PC IOTService software to set commucation parameter.

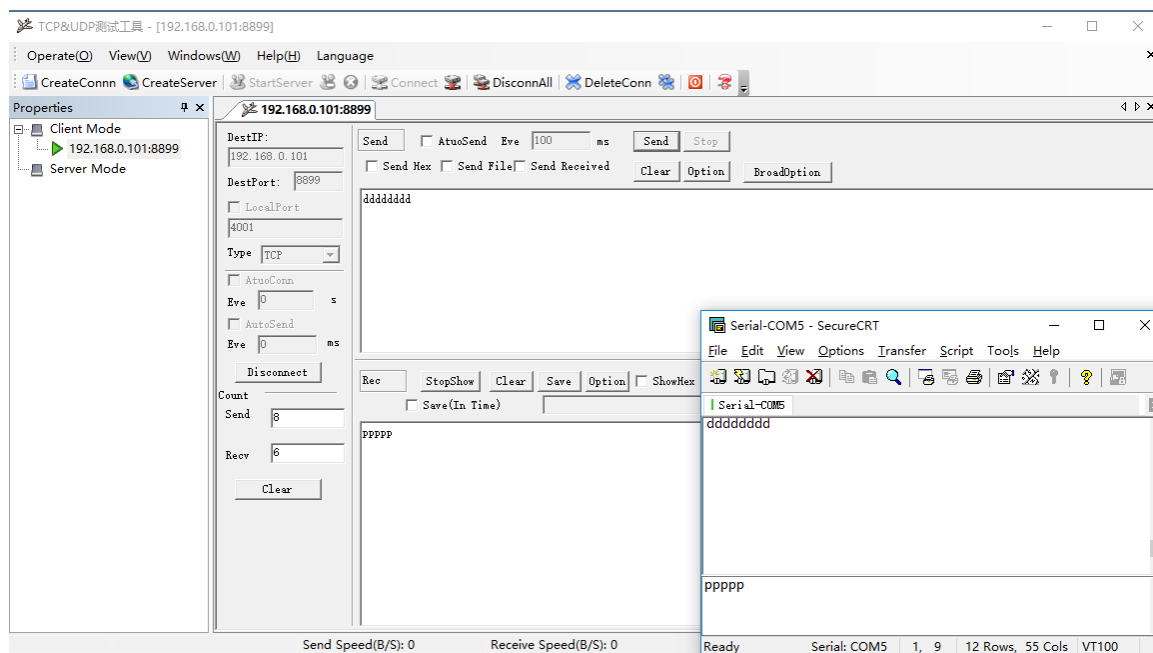


Figure 25. Transparent data transmission example

3.4.2. TCP Server

Transparent transmission mode support TCP Server、TCP Client、UDP Server、UDP Client communication application, UDP Server is special function, Details see following Cli instruction. There is a default tcp server socket created. The Socket can be modified to work at one of the above working mode. When Socket works as TCP server, It will support multiple TCP connection(max 5 TCP client). Multiple TCP connection will work in below structure:

Upload data flow: All the different TCP connection or the Client's data will be continuously transmitter to UART.

Download data flow: All data received from UART will be copied and broadcast to every TCP client.

Detailed multiple TCP connection structure drawing as below:

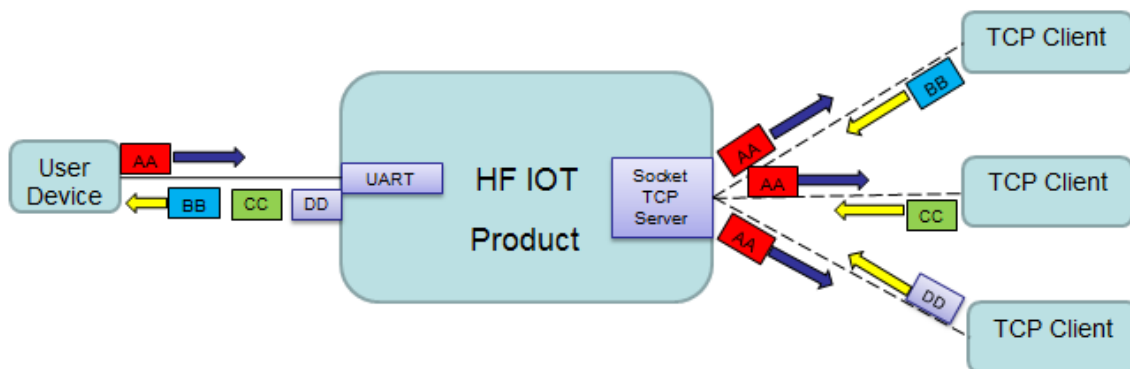


Figure 26. TCP Server data transmission example

The device support max 5 Socket channel, each socket can work individual at TCP/UDP, Multi Socket simultaneous communication of data stream is as following.

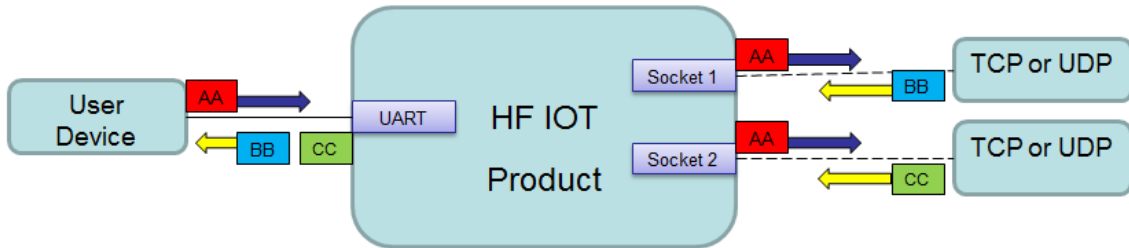


Figure 27. Multi Socket data transmission example

Multi Socket can be created through software configure or webpage configure. The below set up 3 socket channel.

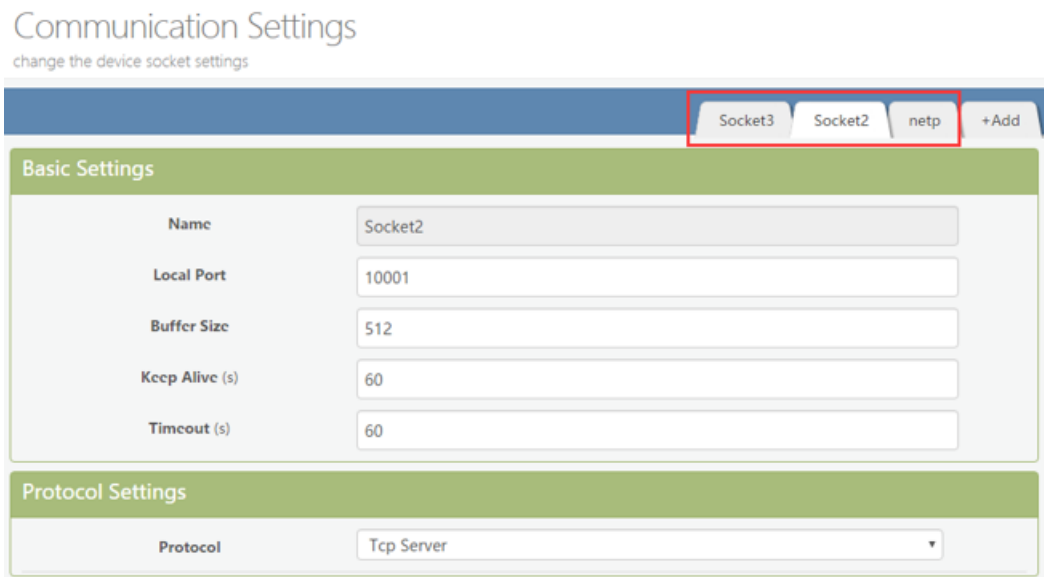


Figure 28. Webpage set up multi Socket channel

3.4.3. HTTP Mode

HF2211 device support sending data in HTTP format to HTTP server(Set product working mode by IOTService software or webpage). When device socket works in HTTP mode, All received UART data will automaticly transform to HTTP format(add HTTP header) and transmit to HTTP server. For the received HTTP data from HTTP server, will automaticly remove HTTP header and only output the data packet to UART.

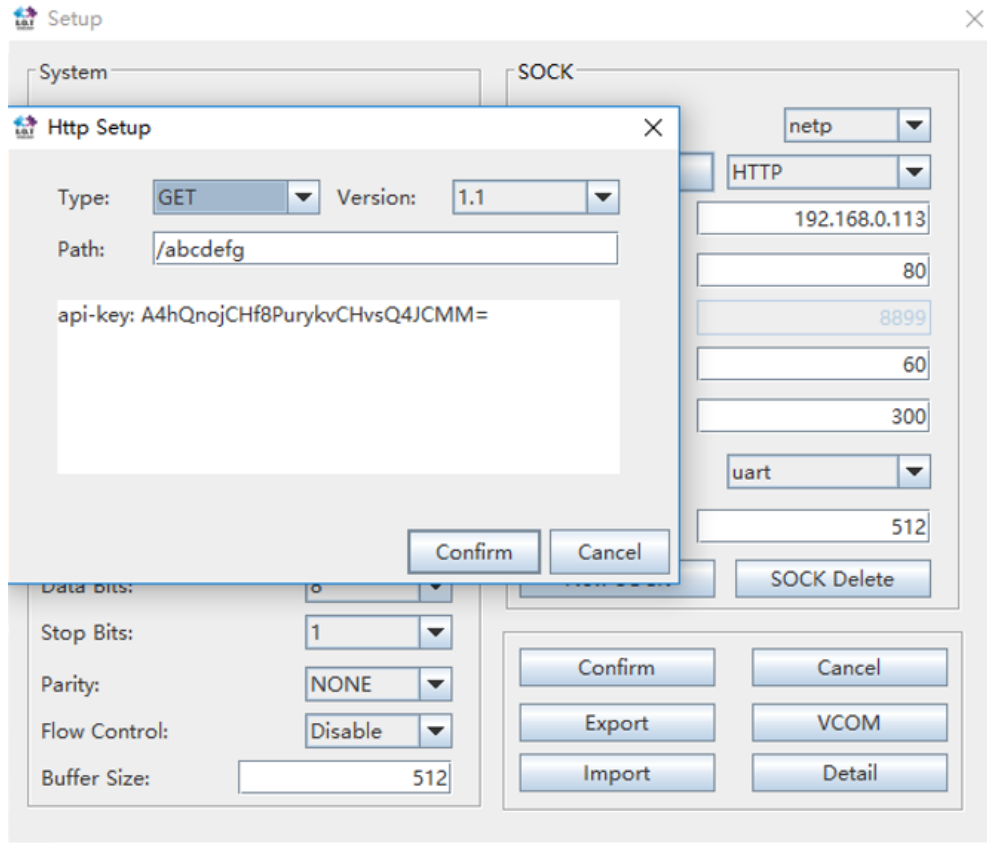


Figure 29. IOT Manager Software Configure

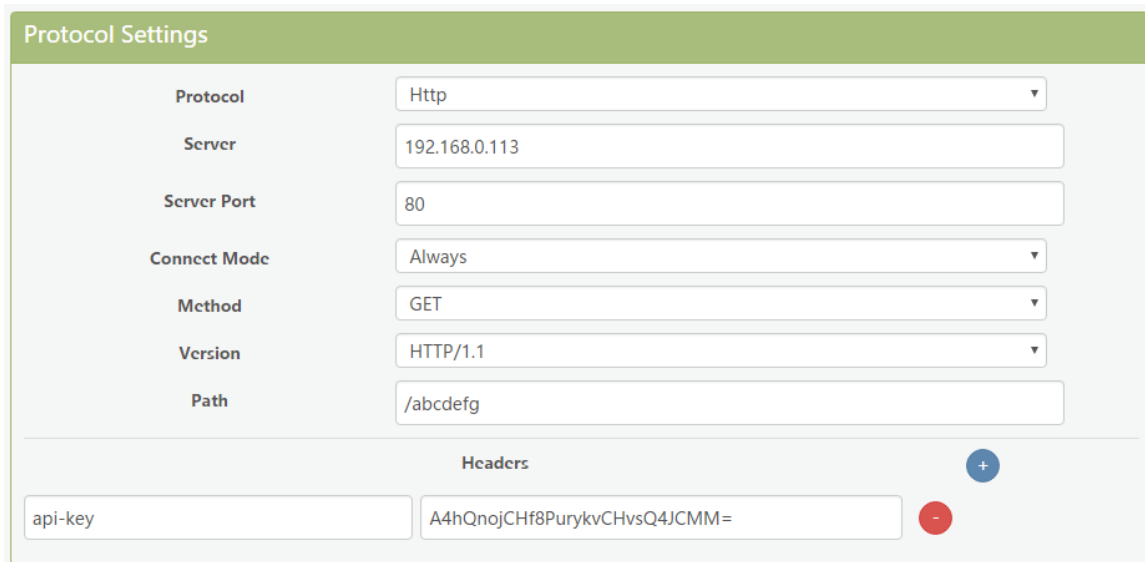


Figure 30. Web Page Configure

HF2221 UART received“pppp”data, send below data to HTTP Server.

GET /abcdefg HTTP/1.1

api-key: A4hQnojCHf8PurykvCHvsQ4JCMM=

pppp

HTTP Server send below data, HF2221 serial output“abcde”

GET /abcdefg HTTP/1.1

api-key: A4hQnojCHf8PurykvCHvsQ4JCMM=

abcde

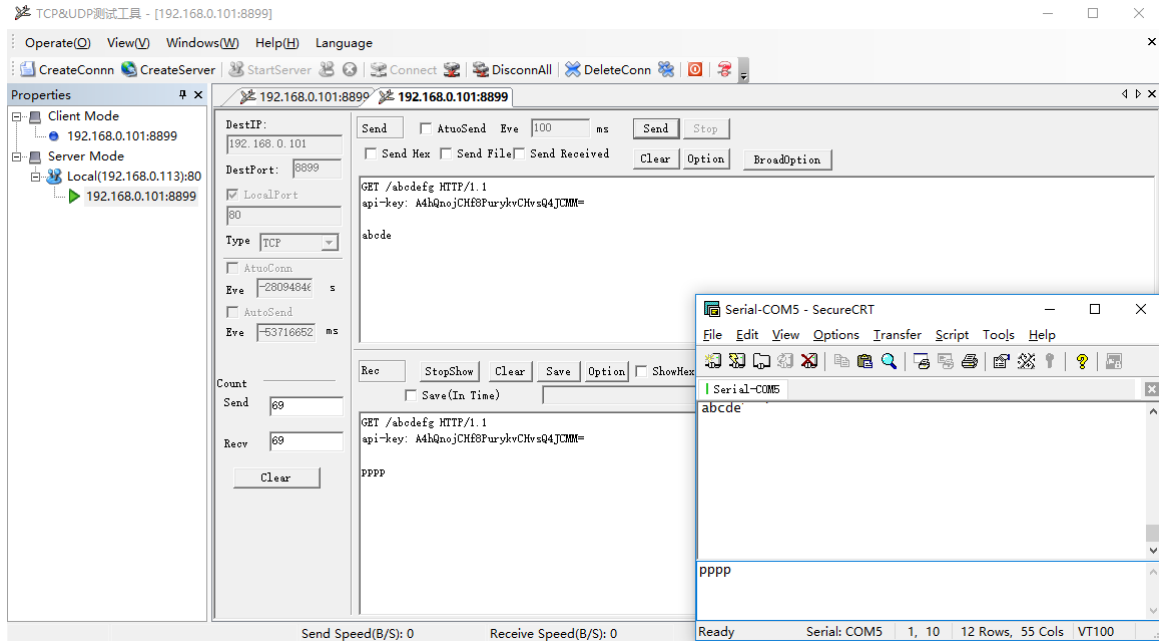


Figure 31. HTTP transmit example

3.4.4. Telnetd Mode

When device work in Telnetd mode, UART port can connect to user device console port(some gateway and switch device may have this console port to set parameters of its working mode). May use HF2221 to config user device via Telnetd mode.

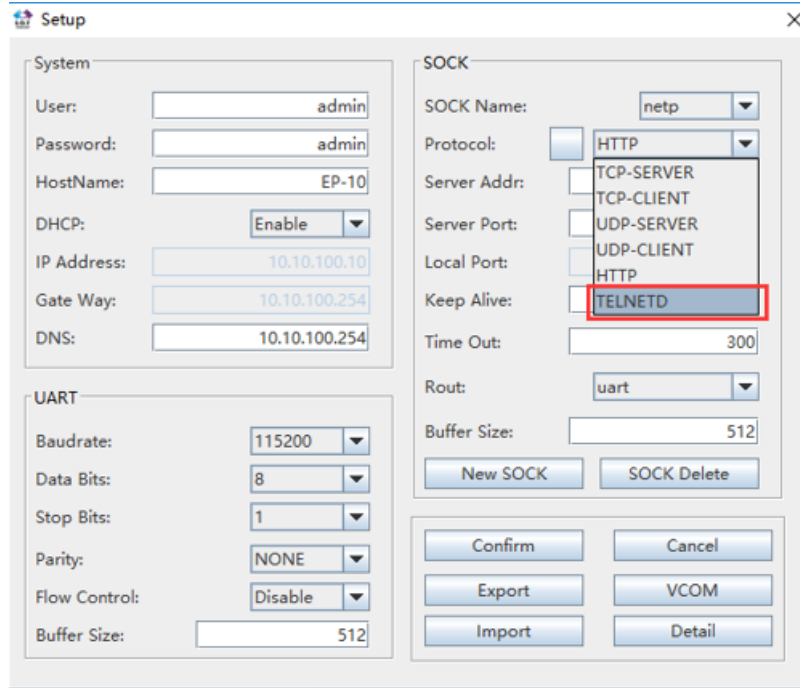


Figure 32. IOTService Software Configure Protocol

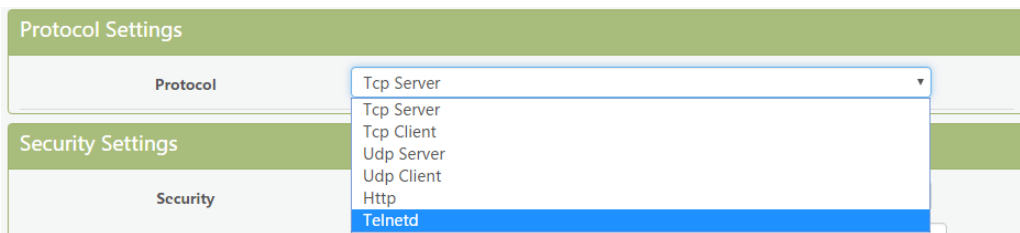


Figure 33. Web page configure protocol

Connect device UART to user device console port(The example use NC916) and create Telnet connection. Then It can directly configure user device.

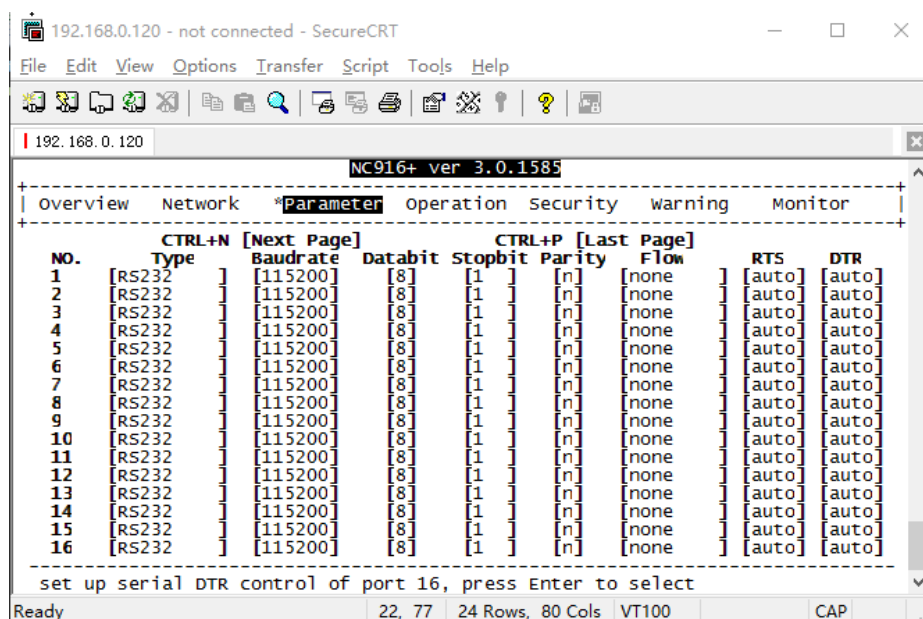


Figure 34. Telnet details example

3.5. AES/DES3/TLS Data Encryption

To improve device security and ensure the data won't be cracked and illegal used, The HF2221 device can do encryption to UART data before transmit to network.

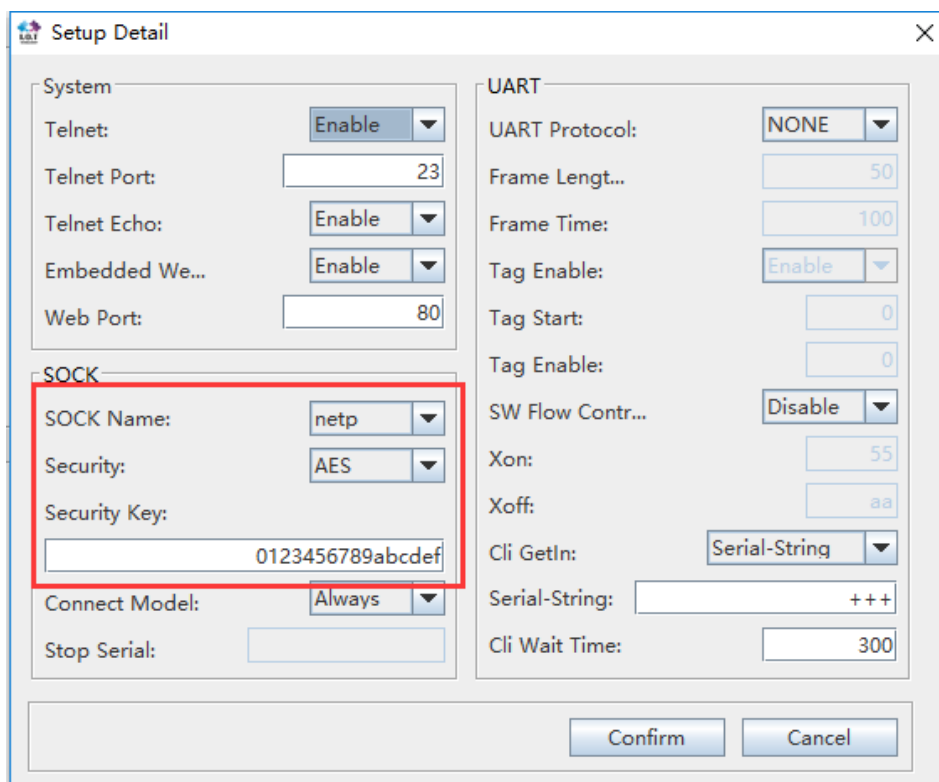


Figure 35. IOTService Software Configure Encryption

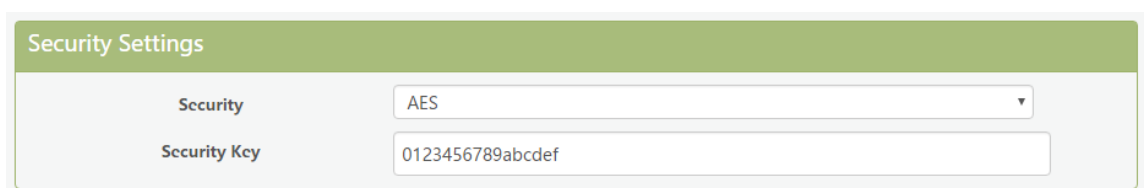


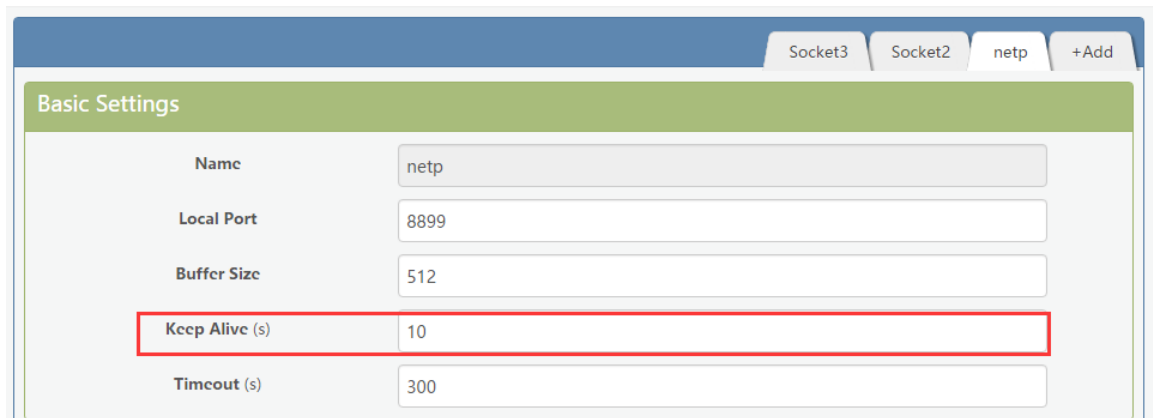
Figure 36. Web Page Configure Encryption

3.6. Keepalive

When TCP connection between device and server became abnormal. The device will check the abnormal status and reconnect to server (when the device working in TCP Client Mode), When the device working in TCP Server, It will break the TCP client and wait for next connection.

Communication Settings

change the device socket settings

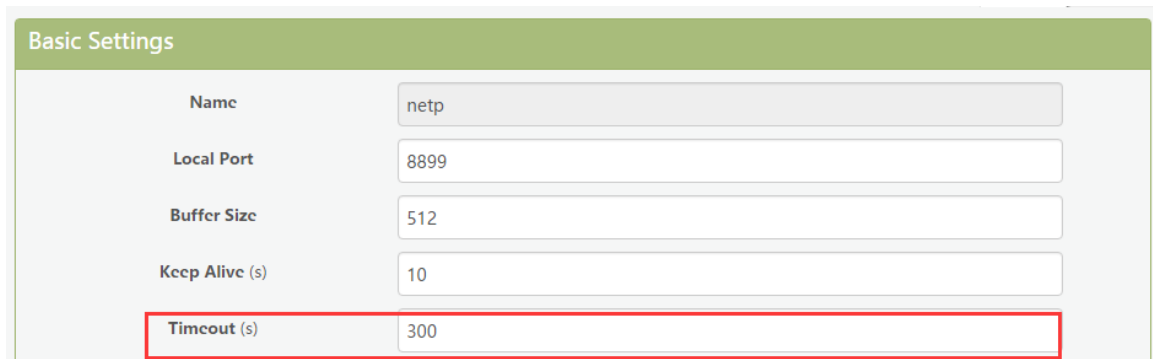


Basic Settings	
Name	netp
Local Port	8899
Buffer Size	512
Keep Alive (s)	10
Timeout (s)	300

Figure 37. Web Page Config Keepalive

3.7. Timeout

The device will break the TCP connection after some time(default is 300 seconds and it can be modified)if there is no data packet received from Destination TCP target . It will reconnect to server(When device works in TCP Client mode). When device working in TCP Server, It will disconnect with TCP Clien. This mechanism can effectively restore TCP abnormal connection.If set it to “0”, this function will be close.



Basic Settings	
Name	netp
Local Port	8899
Buffer Size	512
Keep Alive (s)	10
Timeout (s)	300

Figure 38. Web Page Configure Timeout

3.8. Route Setup

The data received from Socket channel can be set to another socket channel. (Default: socket Destination channel is UART, It also can be other Socket channel, Or take the Socket as log print usage)

The below example shows the default netp Socket channel route setting to Socket1, Socket1 configure as TCP Server mode and route setting to UART. So the netp Socket channel received UART data will output to Socket1, and Socket1 channel will output to serial output.

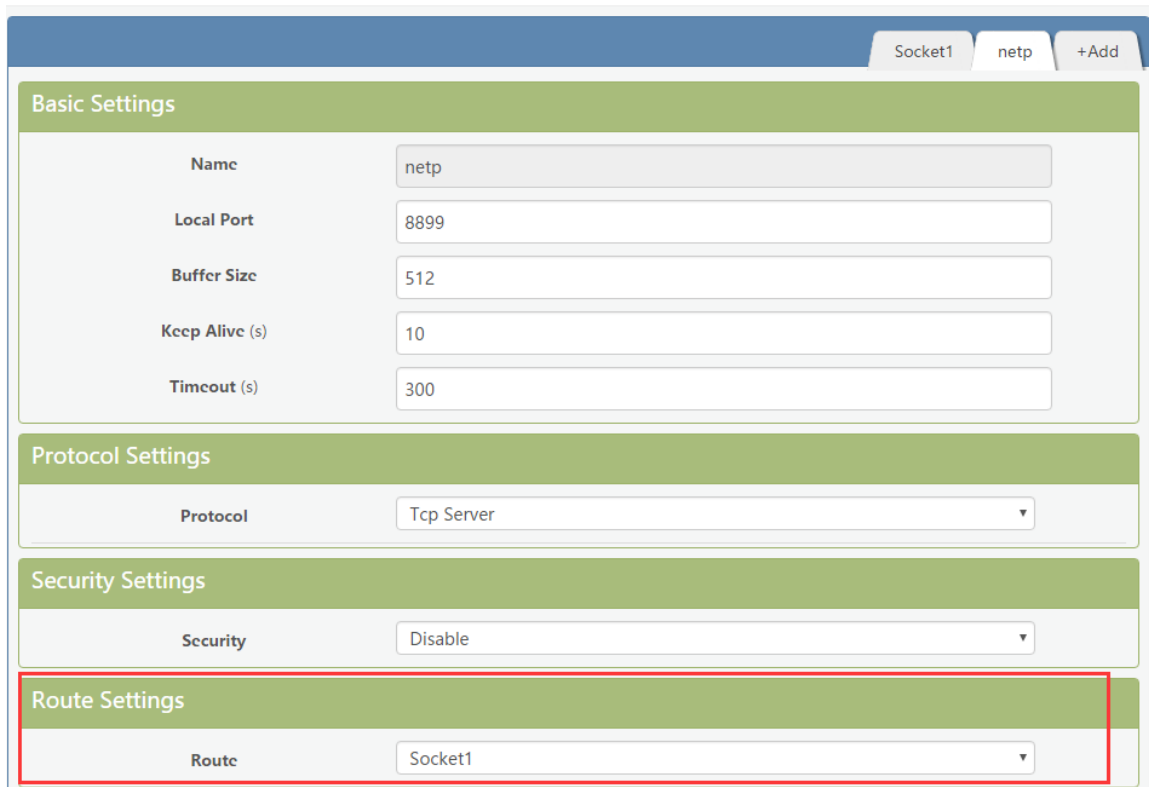


Figure 39. Route function setup example

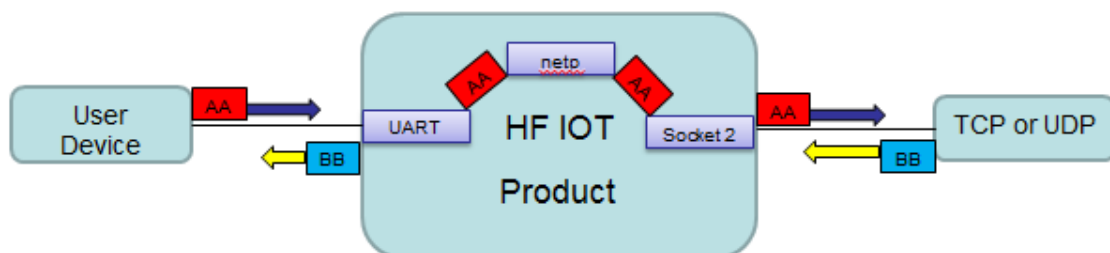


Figure 40. Route Function Data Flow Example

3.9. UART Frame Scheme

3.9.1. UART Free-Frame

HF2221 support UART Free-Frame function, If user select to open this function,Module will check the intervals between any two bytes when receiving UART data, If the interval time exceed the setting value, It will think it as the end of one frame, Or it will receive data until greater than internal buffer bytes(Default: 512, the largest 1400 bytes), then transfer to Socket Channel.

Module default UART Free-Frame interval time is 50ms, it will packaged into another frame if received UART data interval time is greater than 50ms. User also can set this interval time to minimum 10ms through Cli command and webpage.



If interval time is set to 10ms and customer MCU cannot send next byte within 10ms, The serial data will be break into two frame.

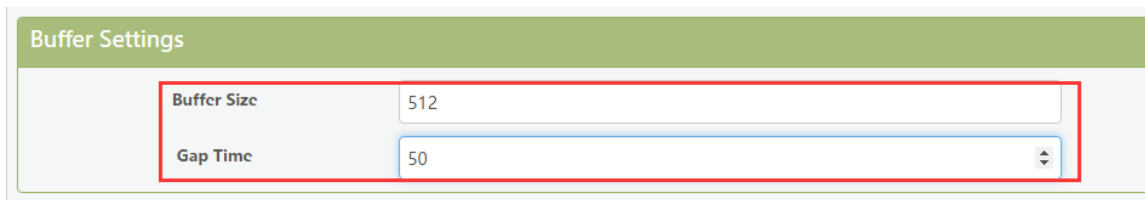


Figure 41. UART free-frame function

3.9.2. UART Auto-Frame

HF2221 support UART Auto-Frame function, If user select to open this function, setting frame trigger length and auto frame trigger time parameters, Then the product will auto framing the data which received from UART port and transmitting to the network as pre-defined data structure.

Auto-Frame trigger length: The fixed data length that product used to transmitting to the network.

Auto-Frame trigger time: After the trigger time, If UART port received data can't reach auto-frame trigger length, Then product will transmitting available data to network and bypass the auto-frame trigger length condition.

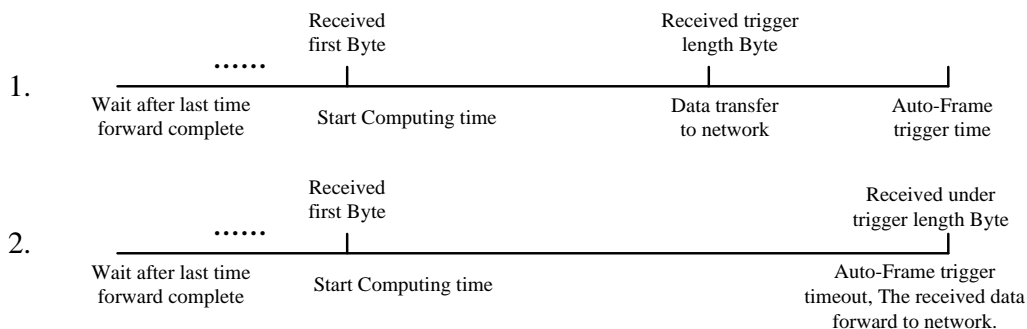


Figure 42. UART Auto-Frame Function

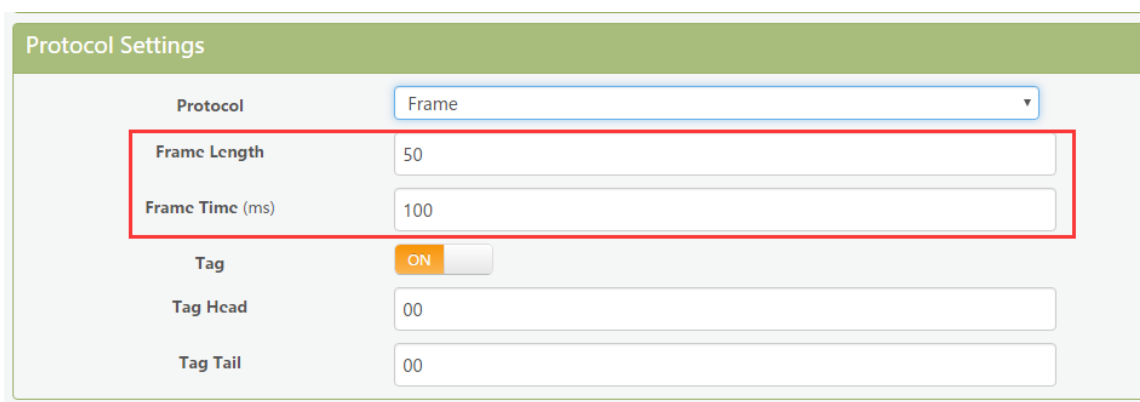


Figure 43. UART Auto-Frame Function

3.9.3. Tag Function

Eport E10 support lable function, If user select to open this function, The UART port will send all suitable one frame data to network.

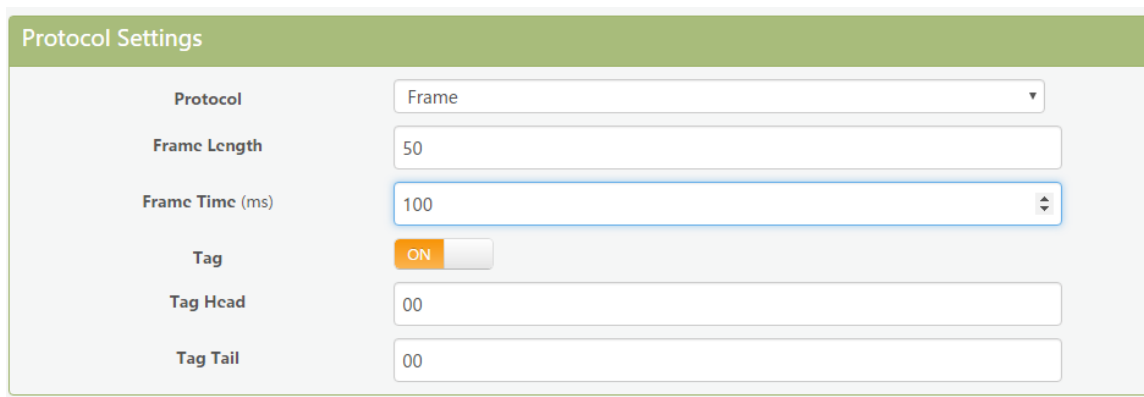


Figure 44. UART Auto-Frame Tag Function

3.10. Modbus Protocol

HF2221 support ModbusRTU to ModbusTCP and ModbusTCP to ModbusRTU. It's very convenient to connect with Modbus device. Modbus protocol setting as below:

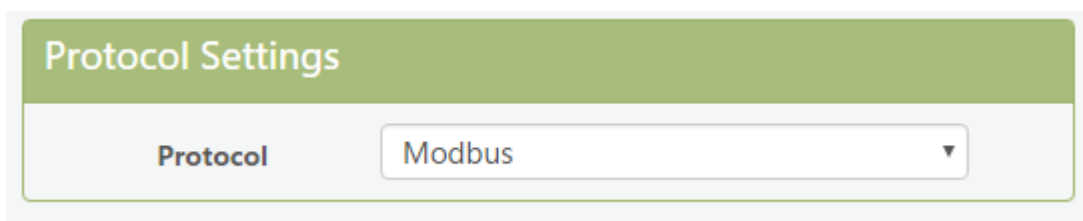


Figure 45. UART Modbus Function

3.11. Cli Command

Cli command is used for setting module configure parameters. Detailed command function and setting is in next chapter, Cli command can be set through UART port or Telnet function (Appendix C), The waiting time of below picture means use timeout time. If it exceed default 300s when no Cli command is input, it will exit Cli command mode. When the HF2221 receive continuous UART data of “+++”, it will enter into Cli command. (The device working in transparent transmission mode by default) May also set the device working in Cli command mode by default or disable this function .

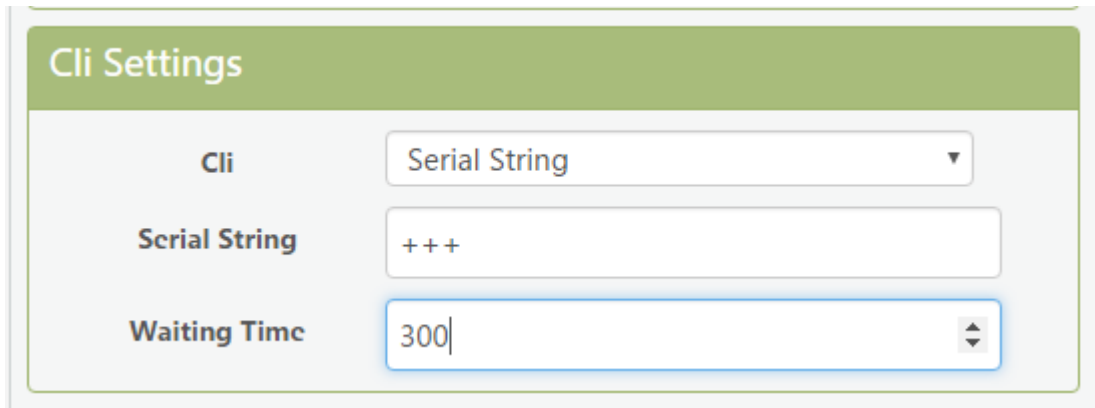


Figure 46. Cli Command Setting

3.12. UART Flow Control and RS485 Function

HF2221 support software and hardware UART flow control. If use hardware follow control, must use RS232 interface. If use software follow control, then It allowed the device output UART data after receive single UART 0x11 data(Default: value can be modified). It will stop output UART data after receive single UART 0x13 data(Default: value can be modified).



Figure 47. UART Flow Control

If set to “Half Duplex”, the product enable RS485 interface. **The flow control by default is set as “Disable”, it need to use RS485, set it to “Half Duplex” as the following picture.**

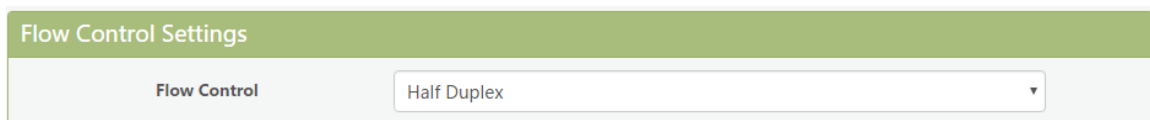


Figure 48. UART Half Duplex Function

3.13. Firmware Upgrade

HF2221 support OTA(over the air) firmware upgrade. User can use webpage to upgrade its firmware, whether external or internal webpage(192.168.0.101/hide. Internal webpage can be used for upgrade external webpage). Please check below example. IP address is assigned by router.



Figure 49. External web page

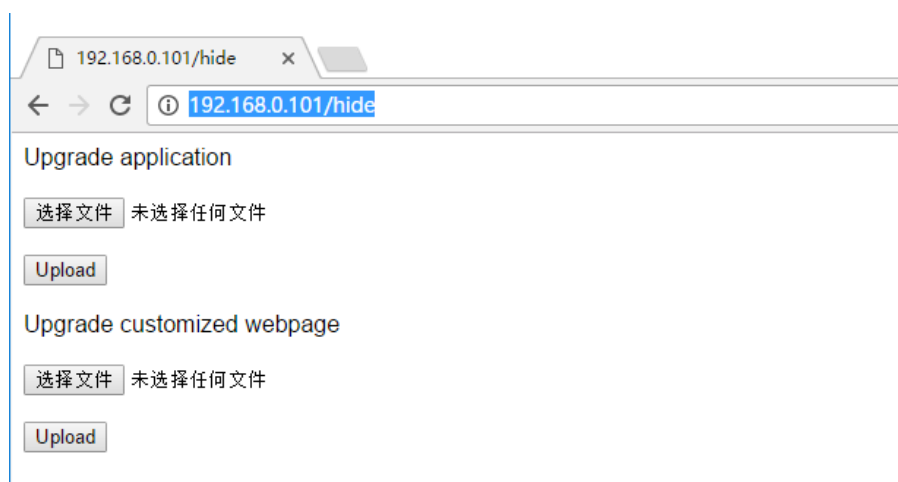


Figure 50. Internal web page

3.14. Web Page Function

Web page function can be enabled or disabled.

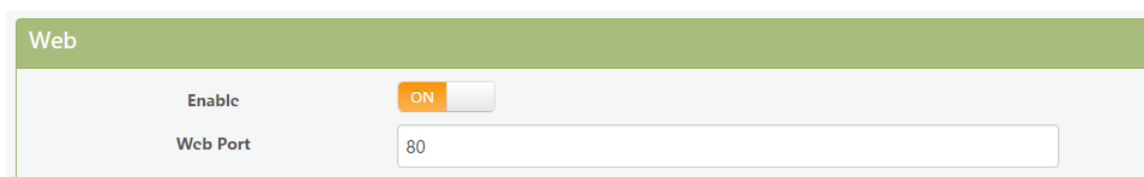


Figure 51. Web Page Function Setting

3.15. Auto-IP Function

Connect device Ethernet with PC, the device will use default auto IP. The PC may use this IP to config the device or transfer data(PC will need about 15 seconds to use default 169.254.xxx.xxx IP, then this communication can be created). As the following example, 169.254.173.207(If occur IP conflict, it will use other ip instead)



Figure 50. AUTO-IP Connection

3.16. NTP Function

Support NTP function(default is disabled). Support set NTP server, port, time zone information, more detailed usage see application document of “UART Fast Config”.(112.124.43.15 is High-Flying test NTP server)

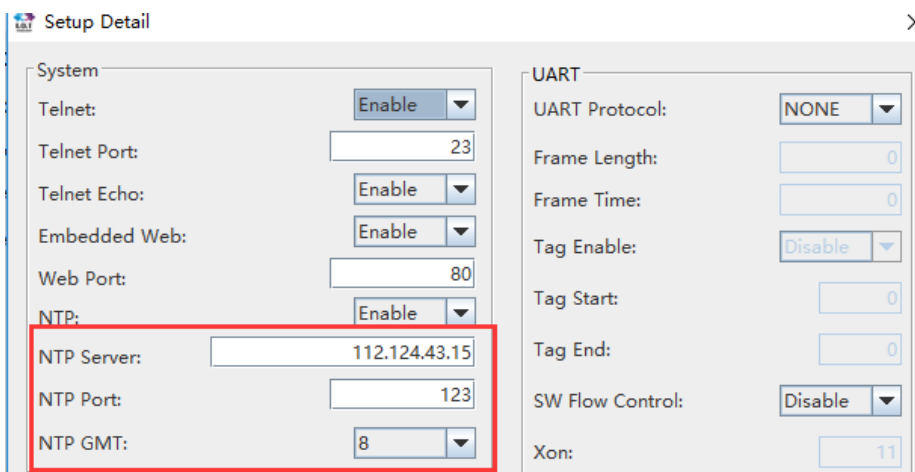


Figure 51. IOTService Tools NTP Setting

```

EPORT>SYS NTP
Enable
Server:112.124.43.15
Port:123
GMT:8
EPORT>Show

===System State===
Product ID:HF5111B
Software Version:V1.07c
Config Protected:OFF
System time:2017-1-23 13:48:38 Mon
Up Time: 0-Day 2:44:32
Total Free Memory: 32880
MAX Block size:31164
    
```

Figure 52. Cli Command NTP Setting and Query

3.17. Heartbeat Function

Support heartbeat function, can set the heartbeat time and content(heartbeat time is the same as keepalive setting), if the product does not receive data from TCP server within heartbeat time, it will send heartbeat to server. The heartbeat function can only be enabled when socket is set as TCP client.

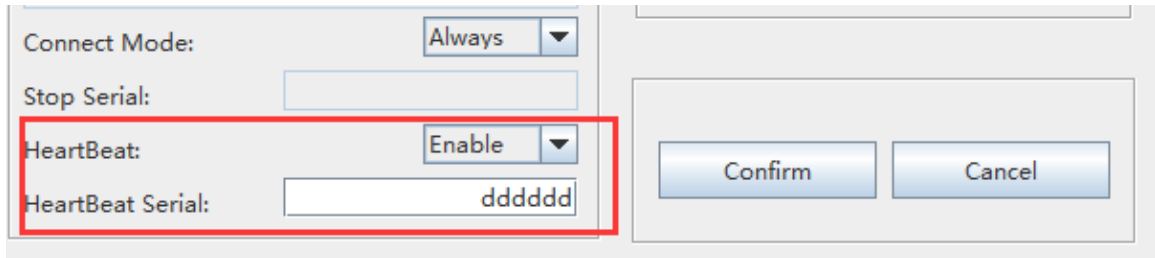


Figure 53. Heartbeat Function

3.18. UART Fast Config

Product support Cli command to config its parameters, but also support special HEX format UART data for fast config, see application manual for detailed usage.

3.19. Other Function

The HF2221 device parameters can be exported and loaded into other equipment..



Figure 54. Other Function

4. CLI COMMAND NOTES

4.1. Working Mode

The device will enter into default transparent transmission mode after powered on. User can switch to Cli command mode through special UART data. Module default UART parameters are as below:

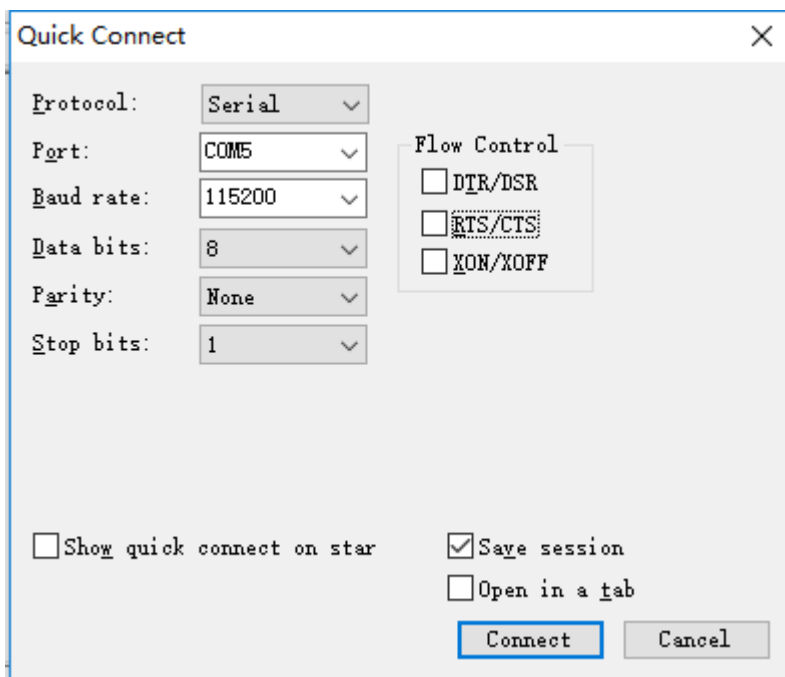


Figure 55. HF2221 Default: UART Parameters

In Command mode, User can use UART port to set module through Cli command.

Notes:

We recommend to use SecureCRT for UART debug tools.

4.1.1. Switch Transparent Transmission Mode to Cli Command Mode

Steps:

- Input “+++” via UART tools, the device will output “EPORT>” after received “+++”. Then the device already enters into Cli command mode.

Notes:

”+++” should be in one frame. Other data is not allowed before or after “+++”

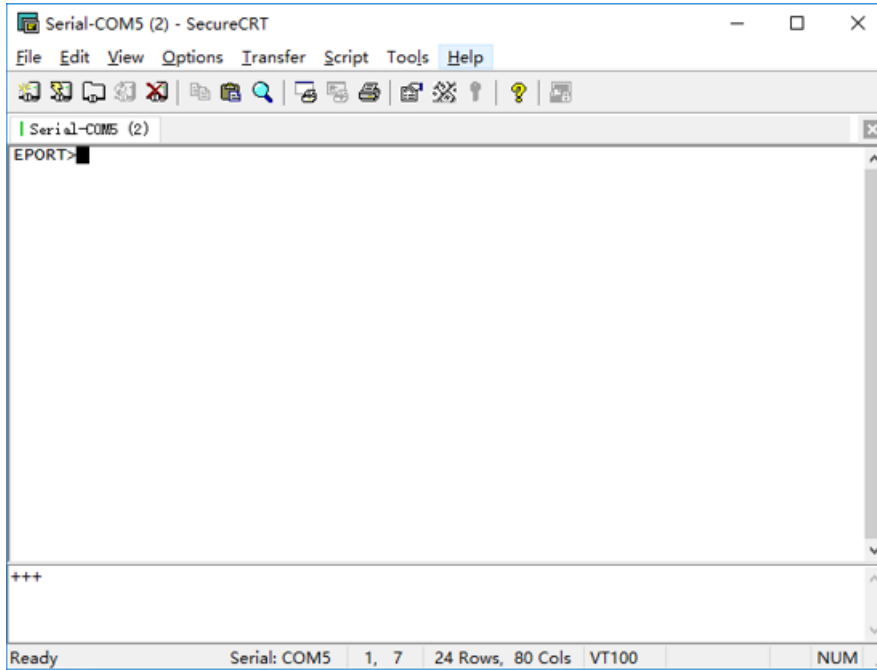


Figure 56. Switch Transparent Transmission Mode to Cli Command Mode

<Notes>:

In Cli command mode, users can set or query parameters. Cli command details see next chapter

4.2. Cli Command Overview

Cli command can be input through terminal (SecureCRT or other UART tools) or by user device MCU programming. As below picture, we use SecureCRT tool. Press “Tab” key, it will list current available Cli command or directory. If input first character and then press “Tab” key, it will show the Cli command fit with the first character.

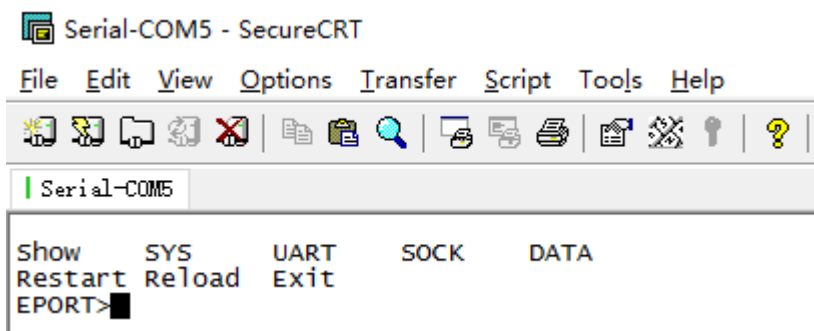


Figure 57. Cli Command Root Directory

SYS	Version		
	Auth	user	
		password	
		quit	
	Network	Show	
		DHCP	Enable
			Disable
		ip address	
		gateway	
		DNS	
		HostName	
	Quit		
	Telnet	Enable	port number
		echo	
	Web	Disable	
		Enable	port number
	MAC		
	JCMD	Enable	
		Disable	
	NTP	Enable	NTP Server Address
			NTP Server port
			GMT
	Disable		
Quit			

Figure 58. Cli Command SYS Tree

UART	Show		
	Baudrate		
	Databits		
	Stopbits		
	Parity		
	Buf	BufSize	
		GapTime	
		Quit	
	FlowCtrl	FlowCtrl	
		Half-Duplex	
		Disable	
	SWFlowCtrl	Enable	
		Disable	
	Cli-Getin	Disable	
		Serial-String	
		Always	
	Cli-WaitTime		
	Proto	NONE	
		Modbus	
		Frame	
	Frame	FrameLen	
		FrameTime	
		Tag	
Quit			
Edit			
Clean			
Quit			

Figure 59. Cli Command UART Tree

SOCK	New	Show	
		Proto	Name
			TCP-SERVER
			TCP-CLIENT
			UDP-SERVER
			UDP-CLIENT
			HTTP
		Telneted	
		Server	
		ServerPort	
		LocalPort	
		BufSize	
		KeepAlive	
		Timeout	
		HeartBeat	
		Security	Disable
			TLS
			AES
		ConnectMode	DES
			Always
	Rout	Burst	
		uart	
		log	
	netp		
	netp	Show	
		Proto	Name
			TCP-SERVER
			TCP-CLIENT
			UDP-SERVER
			UDP-CLIENT
			HTTP
		Telneted	
		Server	
		ServerPort	
		LocalPort	
BufSize			
KeepAlive			
Timeout			
HeartBeat			
Security		Disable	
		AES	
		DES	
ConnectMode		TLS	
		Always	
Rout		Burst	
		uart	
		log	
netp			
Save			
Clean			
Del			
Quit			
Quit			

Figure 60. Cli Command SOCK Tree

DATA	Str
	Hex
	Quit
FwUpgrade	
Restart	
Reload	
Exit	

Figure 61. Cli Other Command

4.2.1. Cli Command Format

Cli command is in ASCII format. The usage is similar to Linux terminal. Command format as following:

- Format Notes
 - <>: Cli command name or directory.
 - []: Cli command parameters.

- Command Message

<CMD> [para-2 para-3 para-4...]<CR>

- <CMD>: Main directory or command name;
- [para-n] : command parameters. If have multiple directory, it can also can be the son directory. As below example;

```
EPORT>SYS Auth
User          Passwrod      Quit
```

- <CR>: Command Terminator, "Enter" key, HEX data: 0x0a or 0x0d

<Notes>

If the input command not existed, UART will output again "EPORT>" to allow next command input. The Cli command is case sensitive.

```
EPORT>sys
EPORT>SYS
EPORT/SYS>
```

If need enter into son directory, press "space" key between the directories.

```
EPORT>SYS Auth
EPORT/SYS/Auth>
```

If need to display all the directory or commands in the current directory, press "Tab" key to query.

```
EPORT/SYS>
Auth      Network Telnet  web      Ipv6
MAC       JCMD      Quit
```

If need to display current command parameter, press Tab key to query.

```
EPORT/SYS/Network>DHCP
Enable  Disable
```

4.2.1.1. Show Command

- Function: Show all system information, including the system running status, Network status, UART status and socket status.
- Format:
 - ◆ Query



Show [SYS/UART/SOCK]

- Parameter:
 - Show all information if no parameters. Parameter can be one of the following:
 - ◆ SYS: System running status
 - ◆ UART: UART status
 - ◆ SOCK: Socket status

```

EPORT>Show
===System State===
Product ID:E-10
Software Version:V1.04
Up Time: 0-Day 0:21:39
Total Free Memory: 48400
MAX Block Size:46816
===NETWORK===
MAC:ACCF23FF4771
Ip Address:192.168.0.106
Gateway:192.168.0.1
===UART Status===
Config:115200,8,1,NONE,NONE
State:In CLI
Recv Bytes:26   Recv Frames:24
Send Bytes:0   Send Frames:0
Failed Bytes:0 Failed Frames:0
===SOCK Status===
SOCK Name:netp
State:Server Created
Client IP:
Recv Bytes:0   Recv Frames:0
Send Bytes:0   Send Frames:0
Failed Bytes:0 Failed Frames:0
    
```

4.2.1.2. SYS Directory

- Function: Display/Set all system related information
- Format:
 - ◆ Tab Query

```

EPORT/SYS>
Version Auth   Network Telnet  web
NTP          MAC          JCMD         Quit
    
```

4.2.1.3. SYS/Auth Directory

- Function: Display/Set web or Telnet Cli command login directory. (see appendix for detail)
- Format:
 - ◆ Tab Query

```

EPORT/SYS/Auth>
User          Password      Quit
    
```

4.2.1.4. SYS/Auth/User Command

- Function: Display/Set web or Telnet Cli command login user name. (function see appendix)
- Format:
 - ◆ Query
 - <User>
 - ◆ Set
 - <User> [value]
- Parameter:
 - Setting is valid immediately.
 - ◆ User: Login user name. Default: **admin**



- ◆ value: set value. Length range 1~29 characters

4.2.1.5. SYS/Auth/Password Command

- Function: Display/Set web or Telnet Cli command login password(function see appendix)
- Format:
 - ◆ Query
 - <Password>**
 - ◆ Set
 - <Password> [value]**
- Parameter:
 - Setting is valid immediately
 - ◆ Password: Login password. Default: **admin**
 - ◆ value: set value. Length range 1~29 characters

4.2.1.6. SYS/Network Directory

- Function: Display/Set related network information.
- Format:
 - ◆ Tab Query

EPORT/SYS/Network>				
Show	DHCP	DNS	HostName	Quit

4.2.1.7. SYS/Network/Show Command

- Function: Display network related information
- Format:
 - ◆ Query
 - <Show>**

4.2.1.8. SYS/Network/DHCP Command

- Function: Display/Set DHCP Client function
- Format:
 - ◆ Query
 - <DHCP>**
 - ◆ Set
 - <DHCP> [Enable/Disable]**
- Parameter:
 - Setting is valid after reboot.
 - ◆ Enable: Enable DHCP function. The device will get DHCP IP from router when Ethernet port is connected to router LANN port. Default: **Enable**.
 - ◆ Disable: Disable DHCP function. Allocate device static IP address according to the hit of inputting IP and gateway address.

4.2.1.9. SYS/Network/DNS Command

- Command: Display/Set DNS IP address.
- Format:
 - ◆ Query

<DNS>

- ◆ Set

<DNS> [IP]

- Parameter:
When DHCP function is Disabled, this setting is valid. Setting is valid after reboot.
 - ◆ IP Address: DNS server address. Default: **10.10.100.254**.

4.2.1.10. SYS/Network/Mode Command

- Command: Display/Set working mode.
- Format:
 - ◆ Query

<Mode>

- ◆ Set

<Mode> [Router/Bridge]

- Parameter:
Setting is valid after reboot.
 - ◆ Router: Router mode, Default value.
 - ◆ Bridge: Bridge mode.

4.2.1.11. SYS/Network/Hostname Instruction

- Function: Display/Set Hostname.
- Format:
 - ◆ Query

<Hostname>

- ◆ Set

<Hostname> [name]

- Parameter:
Hostname is the name which show in router DHCP client list. Setting is valid immediately.
 - ◆ Name Address: Hostname, length range: 1~30 characters. Default: **HF2221**.

4.2.1.12. SYS/Telnet Instruction

- Function: Display/Set Telnet function.
- Format:
 - ◆ Query

<Telnet>

- ◆ Set

<Telnet> [Enable/Disable]

- Parameter:
See appendix for detailed Telnet function usage. Telnet is used for remote send Cli command or transmit data, Setting is valid after reboot.
 - ◆ Enable: Enable Telnet function. Default: **Enable**.
 - Input Port Numbver: Telnet Port Number. Default: **23**
 - Input Echo Mode: Enable/Disable Cli command echo function. Default: **Enable**

- ◆ Disable: Disable Telnet function.

4.2.1.13. SYS/Web Instruction

- Function: Display/Set Web config function.

- Format:

- ◆ Query

<Web>

- ◆ Set

<Web> [Enable/Disable]

- Parameter:

Webpage is used for config module working parameters. Setting is valid after reboot.

- ◆ Enable: Enable Web config function. Default: **Enable**.
 - Input Port Number: Web Port Number. Default: **80**
- ◆ Disable: Disable Web config function

4.2.1.14. SYS/MAC Instruction

- Function: Display/Set MAC address.

- Format:

- ◆ Query

<MAC>

- ◆ Set

<MAC> [8888 value]

- Parameter:

Global unique MAC Address. It is not allowed to modify it.

- ◆ value: MAC address value.

4.2.1.15. SYS/JCMD Instruction

- Function: Display/Set Jason command function.

- Format:

- ◆ Query

<JCMD>

- ◆ Set

<JCMD> [Enable/Disable]

- Parameter:

Jason command is used for config module. IOTManage software use this mechanism. If disable JCMD function, IOTManage is no longer valid. Setting is valid after reboot.

- ◆ Enable: Enable JCMD function. Default: **Enable**.
- ◆ Disable: Disable JCMD function.

4.2.1.16. SYS/NTP Instruction

- Function: Display/Set NTP function.

- Format:

- ◆ Query

<NTP>

- ◆ Set



<NTP> [Enable/Disable]

- Parameter:
NTP is used for product to get and output real time. See uart fast config application manual to fast query. Setting is valid immediately.
 - ◆ Enable: Enable NTP Function.
 - NTP Server Address: NTP Server address, domain name or IP address
 - NTP Server Port: port number, Default:123, Range;0~127
 - GMT: Time zone, default is 0, Range:-12~12.
 - ◆ Disable Disable NTP Function, Default value.

4.2.1.17. UART Directory

- Function: Display/Set UART information directory.
- Format:
 - ◆ Tab key query

EPORT/UART>	Baudrate	Databits	Stopbits	Parity
Show	FlowCtrl	SWFlowCtrl	Cli-Getin	Cli-waitTime
Buf	Frame	Edit	Clean	Quit
Proto				

4.2.1.18. UART/Show Instruction

- Function: Display UART information function.
- Format:
 - ◆ Query

<Show>

4.2.1.19. UART/Baudrate Instruction

- Function: Display/Set UART baud rate function.
- Format:
 - ◆ Query

<Baudrate>

- ◆ Set

<Baudrate>[num][value]

- Parameter:
Setting is valid immediately.
 - ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
 - ◆ Value: Default: **115200**. Can choose 2400, 4800, 9600, 38400, 57600, 115200, 230400

4.2.1.20. UART/Databits Instruction

- Function: Display/Set UART data bits function.
- Format:
 - ◆ Query

<Databits>

- ◆ Set

<Databits> [num][value]

- Parameter:

Setting is valid immediately.

- ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
- ◆ Value: Default: **8bits**. Can choose 8.

4.2.1.21. UART/Stopbits Instruction

- Function: Display/Set UART stop bits function.
- Format:
 - ◆ Query

<Stopbits>

- ◆ Set

<Stopbits> [num][value]

- Parameter:

Setting is valid immediately.

 - ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
 - ◆ Value: Default: **1bits**. Can choose 1, 1.5, 2.

4.2.1.22. UART/Parity Instruction

- Function: Display/Set UART parity function.
- Format:
 - ◆ Query

<Parity>

- ◆ Set

<Parity> [num][value]

- Parameter:

Setting is valid immediately.

 - ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
 - ◆ Value: Default: **None**. Can choose NONE, EVEN, ODD.

4.2.1.23. UART/Buf Directory

- Function: Display/Set UART Buffer directory.
- Format:
 - ◆ Tab key query

<pre>EPORT/UART/Buf> BufSize GapTime Quit</pre>
--

4.2.1.24. UART/Buf/Bufsize Instruction

- Function: Display/Set UART buffer size function.
- Format:
 - ◆ Query

<Bufsize>

- ◆ Set

<Bufsize> [num][value]

- Parameter:

Buffer is used for cache UART received data. If the received data of one frame is larger than buffer size. The data frame will be break into two packet send to network. Setting is valid after reboot.

- ◆ Value: Default: **512**. Length range: 32~1400 bytes.

4.2.1.25. UART/Buf/GapTime Instruction

- Function: Display/Set UART free frame gap time.

- Format:

- ◆ Query

<GapTime>

- ◆ Set

<GapTime> [num][value]

- Parameter:

GapTime is used for setting UART free frame time gap. If the received data gap time is more than setting value, the data packet will be breaked into two frame.

- ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
- ◆ Value: Default: **50ms**. Length Range: 10~1000ms.

4.2.1.26. UART/Buf/FlowCtrl Command

- Function: Display/Set UART flow control function.

- Format:

- ◆ Query

<FlowCtrl>

- ◆ Set

<FlowCtrl> [num][Enable/Disable]

- Parameter:

Flow control includes software flow control and hardware flow control. Software flow control priority is higher than hardware. If enable software flow control, the hardware flow control pin(CTS/RTS) will be useless. Software flow control use special UART data for control. Hardware flow control use CTS/RTS pin control. Setting is valid immediately.

- ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
- ◆ Flow Control: Flow control function.
- ◆ Half-Duplex: Enable RS485 half-duplex function, UART0_RTS is used for RS485 chip control function.
- ◆ Disable: Flow control function. Default: **Disable**.

4.2.1.27. UART/Buf/SWFlowCtrl Command

- Function: Display/Set UART software flow control function.

- Format:

- ◆ Query

<SWFlowCtrl>

- ◆ Set

<SWFlowCtrl> [num][Enable/Disable]

- Parameter:

Enable software flow control function. The device UART can output data After UART received Xon single-byte enable data. When UART received Xoff single-byte disable data. It will disable the device UART output data.

- ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
- ◆ Enable: Enable software flow control function, When in enable status, it allow UART data output when bootup by default.
 - Xon: Enable UART output data. Default: **0x11**.
 - Xoff: Disable UART output data. Default: **0x13**.
- ◆ Disable: disable software flow control function. Default: **Disable**.

4.2.1.28. UART/Cli-Getin Command

- Function: Display/Set Cli command function

- Format:

- ◆ Query

<Cli-Getin>

- ◆ Set

<Cli-Getin> [Serial-String/Always/Disable]

- Parameter:

Set Cli command parameters. Setting is valid immediately.

- ◆ Serial-String: Enable specific data to enter into Cli command mode.
 - [Input Serail String]: Default: **+++**, Range1~10 bytes. Also can input hex format data. The HEX data are separated by Spaces, Like **【30 31 32 33 34】**, When it recieved string data "01234", then It can enter into Cli command.
- ◆ Always: Always work in Cli command mode when device power on.
- ◆ Disable: Disable Cli command mode. UART and Telnet both can't use Cli Command.

4.2.1.29. UART/Cli-WaitTime Command

- Function: Display/Set Cli command wait time

- ◆ Format

<Cli-WaitTime>

- ◆ Set

<Cli-WaitTime> [num][timeout]

- Parameter:

Set Cli command mode timeout exit time. If there is no Cli command sent for the waitfime, It will exit Cli command mode to transparent transmission, Setting is valid immediately.

- ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
- ◆ timeout: Default: **300s**, Range 0: Disable WaitTime function, 1~300s.

4.2.1.30. UART/Proto command

- Function: Display/Set UART protocol function

- Format:

- ◆ Query



<Proto>

- ◆ Set

<Proto>[num] [NONE/Modbus/Frame]

- Parameter:
Setting is valid immediately.
 - ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
 - ◆ NONE: Default: **None**, transparent transmission, the received UART data will be directly sent to network.
 - ◆ Modbus: Modbus RTU to Modbus TCP.
 - ◆ Frame: Enable auto-frame function. Relevant parameters are set in Frame command.

4.2.1.31. UART/Frame Directory

- Function: Display/Set UART frame directory.
- Format:
 - ◆ Tab key query

EPORT/UART/Frame>			
FrameLen	FrameTime	Tag	Quit

4.2.1.32. UART/Frame/FrameLen Command

- Function: Display/Set UART auto-frame frame length
- Format:
 - ◆ Query

<FrameLen>

- ◆ Set

<FrameLen> [num][value]

- Parameter:
Set UART auto-frame length, Setting is valid immediately.
 - ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
 - ◆ value: Default: **8**, Range: 8~1400.

4.2.1.33. UART/Frame/FrameTime Command

- Function: Display/Set UART auto-frame time
- Format:
 - ◆ Query

<FrameTime>

- ◆ Set

<FrameTime> [num][value]

- Parameter:
Set UART auto-frame time, Setting is valid immediately.
 - ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
 - ◆ value: Default: **100ms**, Range: 100~10000.

4.2.1.34. UART/Frame/Tag Command

- Function: Display/Set UART auto-frame Tag



- Format:
 - ◆ Query
 - <Tag>**
 - ◆ Set
 - <Tag> [num][Enable/Disable]**
- Parameter:

Set UART auto-frame tag. Only transmit data from tag head to tag tail. Filter the other datas. Setting is valid immediately.

 - ◆ Num: 1 or 2 optional, UART0 and UART1 respectively.
 - ◆ Enable: Enable auto-frame tag function.
 - TagHead: LabelHead. Default: **0x55**, Single byte data.
 - TagTail: LabelTail. Default: **0xAA**, Single byte data.
 - ◆ Disable: Default: Value.

4.2.1.35. UART/Edit Command

- Function: Set UART parameter
- Format:
 - ◆ Set
 - <Edit> [baudrate databits stopbits parity]**
- Parameter:

Set all UART communication parameter including baud rate, data bit, stop bit and parity.

4.2.1.36. UART/Clean Command

- Function: Clear UART transmit-receive data information
- Format:
 - ◆ Set
 - <Clean>**
- Parameter:

Clear the UART data count(Data packet/Frame/Error packet and so on) shown in webpage.

4.2.1.37. SOCK Directory

- Function: Display/Set Socket channel directory.
- Format:
 - ◆ Tab key query

```
EPORT/SOCK>
Show      New      netp    UDP      quit
```

Netp and UDP are created socket channel. Itsupport maximum 5 Sockets.

4.2.1.38. SOCK/Show Command

- Function: Display Socket information function.
- Format:
 - ◆ Query
 - <Show>**

4.2.1.39. SOCK/New Command

- Function: Set new Socket information

- Format:

- ◆ Set

<New> [name]

- Parameter:

There is a default socket created(netp). It support max 5 socket channel. Every channel can be set as TCP/UDP/HTTP and so on. Setting is valid immediately.

- ◆ Name: Socket name. Range 1~19 characters.
 - Input Sock Proto: Choose one communication method of the following.
 - TCP-SERVER: TCP Server Mode. It support max 5 TCP Client connection.
 - TCP-CLIENT: TCP Client Mode. It is used for connecting server.
 - UDP-SERVER: UDP Server Mode. Special function. Product will record the last received UDP package source IP and Port information. The received UART data will be send to this IP and port, not the setting Destination .
 - UDP-CLIENT: UDP Client Mode.
 - HTTP: HTTP Protocol transmission. The received UART data will transform to HTTP format and it will remove the HTTP header information and only output the HTTP data to UART.
 - TELNETD: Telnetd Mode. Use Telnet to config the UART Console equipment.
 - TLS: **Function is reserved. We will update it soon.**

TCP Server Mode:

- Input Local Port[0]: Set local port, Range 1~65535, 0 is random port. For TCP Server and UDP application, set it to a fixed 1~65535(TCP port 80 is used for its webpage). For TCP Client application, usually set it to 0.
- Input Buffer size[512]: Set Buffer size. Default: 512 bytes, Range:1~1400.
- Input KeepAlive[60]: Set TCP keepalive, Heartbeat time, Defalut 60s, Range: >=0.
- Input Timeout[300]: Set TCP timeout, If exceed setted time and don't received any network data package, It will break TCP connection. If working in TCP client mode, it will reconnect immediately. If it work in TCP server mode, the TCP client need to create the connction. Set this value to 0 is to close the function. The function is used for TCP to restore abnormal connection. Recommend to enable. Default: 300s, Range 0~600.
- Input Sock Security[Disable]: Security options, Used for data special encryption. Default: disable no encryption.
 - Disable: No encryption
 - TLS: TLS1.2 encryptioin, only support in TCP client mode.
 - AES: AES encryption, TCP/UDP all support this.
 - DES3: DES3 encryption, TCP/UDP all support this.

- ◆ Input key: AES or DES3 key. For AES encryption, the key is fixed 16 bytes length, the IV value is the same as key. For DES3 encryption, the key is fixed 24 bytes length, the IV value the first 8 Bytes of key. The key can be ASCII or Hex format data. Hex format data need to use “space” character as separator, ex, “01 02 03...”
- Input Rout[uart]: Set the Socket channel output, Can choose UART and other created Socket or use as Log print using.

TCP Client Mode (Only list out difference)

- Input Server Address: Set server IPv4 address or domain name.
- Input Server Port: Set server port
- Input Local Port[0]: Same as above
- Input Buffer size[512]: Same as above
- Input KeepAlive[60]: Same as above
- Input Timeout[300]: Same as above.
- Input Sock Security[Disable]: Same as above
- Set HeartBeat[Disable]: Set Heartbeat function, default is Disable
- Input HeartBeat Serial[F0FE6B1C3D35]: Set Heartbeat content, default is MAC address
- Input Connect Mode[Always]: Set TCP Client connection mode
 - Always: TCP persistent connection. If TCP break, it will reconnect immediately.
 - Burst: It will establish connection once UART received data. If set stop function, It will disconnect after network received stop data.
 - ◆ Input Stop Serial: Set Burst Mode Stop bits. It can be ASCII or Hex format data, Hex format data need use space as separator , 1~10 bytes.
- Input Rout[uart]: Same as above

UDP Server/ UDP Client

HTTP Mode

- Input HTTP type[POST]: HTTP request type. Default: POST. Can choose POST or GET.
- Input HTTP path[/]: HTTP request path, Need start by“/”. The longest byte is 63 bytes.
- Input HTTP version[1.0]: HTTP Protocol Version. Default: 1.0, Can choose 1.0 or 1.1
- Input HTTP parameters: Add HTTP head information, end by “Enter” key.If want to end the input, direct input “Enter” key. All HTTP header data length should be less than 250 bytes.

4.2.1.40. SOCK/netp directory

- Function: Display/Set Socket netp channel directory.
- Format:
 - ◆ Tab key query



EPORT/SOCK/netp>				
Show	Name	Proto	Server	ServerPort
LocalPort	BufSize	KeepAlive	Timeout	Security
HeartBeat	ConnectMode	Rout	Save	Clean
Del	Quit			

Every created Socket channel can be modified through name. The above command function is the same as New Socket command description

4.2.1.41. SOCK/netp/clean Command

- Function: Clear netp channel data packets information
- Format:
 - ◆ Set

<Clean>

- Parameter:

The network data packets information can be checked from webpage. The command will reset the data count.

4.2.1.42. DATA Directory

- Function: Display/Set Cli command mode communication
- Format:
 - ◆ Tab Query

EPORT/DATA-Str>	
Hex	Quit

Default: data sent in ASCII format. Also can change to send by HEX, The command is used for Cli command mode to transfer data.

4.2.1.43. Restart Command

- Function: Restart instruction.
- Format:
 - ◆ Set

<Restart>

4.2.1.44. Reload Instruction

- Function: Restore Factory setting instruction.
- Format:
 - ◆ Set

Reload [SYS/UART/SOCK]

- Parameter:

Reload to factory setting, if add the following parameters, it will only restore corresponding parameters. Parameter can including one of the below three:

 - ◆ SYS: Restore system setting relevant paramter
 - ◆ UART: Restore UART setting relevant paramter
 - ◆ SOCK: Restore Socket relevant paramter

4.2.1.45. WIFI Catalog

- Function: Display/Set WIFI function



- Format:
 - ◆ Tab query

```
EPORT>WIFI
EPORT/WIFI>
Show      Mode      Status  Scan      Quit
```

4.2.1.46. WIFI/Show Command

- Function: Display WIFI status
- Format:
 - ◆ Tab query

```
EPORT/WIFI>Show

===WIFI Status===
Mode:AP
AP SSID:DDDD
Connected

STA SSID:Sam401
Disconnected
```

4.2.1.47. WIFI/Mode Command

- Function: Display/Set WIFI work mode.
- Format:
 - ◆ Query
 - <Mode>
 - ◆ Set
 - <Mode> [AP/STA/APSTA]
- Parameter:
 - Set WIFI work mode. Valid after restart.
 - ◆ AP mode: Default, AP mode
 - Input AP SSID: Input the name of AP, 1~31 characters
 - Input AP Key: Input the password of AP, no password default, 8~63 characters.
 - ◆ STA: STA mode
 - Input STA SSID: Input the name of router, 1~31 character
 - Input STA Key: Input the password of router
 - ◆ APSTA: (reserved)

4.2.1.48. WIFI/Status Command

- Function: Same as Show command.

4.2.1.49. WIFI/Scan Command

- Function: Search the AP nearby.
- Format:
 - ◆ Query

<Query>

```

EPORT/WIFI>Scan
CH,SSID,BSSID,RSSI
11,Caoyu,78:96:82:A2:C6:A2,10
11,Sam401,D4:EE:07:2D:14:1E,100
11,UPGRADE-AP,20:DC:E6:48:35:9E,39
10,ChinaNet-yRMx,38:E3:C5:A2:87:D5,100
6,xiaohuizi,B0:95:8E:06:CB:16,34
6,Caoyu,AA:25:93:B8:45:E2,5
6,Caoyu,D0:C7:C0:24:6C:40,20
1,TP-LINK_FF03AA,78:A1:06:FF:03:AA,15
    
```

4.2.1.50. Exit Command

- Function: Exit Cli command mode
- Format:
 - ◆ Set

<Exit>

4.2.1.51. Quit Command

- Function: Quit the current and go the father Cli command directory.
- Format:
 - ◆ Set

<Quit>

4.2.1.52. FwUpgrade Instruction

- Function: Upgrade product firmware.
- Format:
 - ◆ Set

FwUpgrade [url]

- Parameter:

Do upgrade function, if upgrade success, it will feedback "Upgrade OK", if fail, output "Upgrade FAIL", reboot to run with new firmware if success

- ◆ url: firmware url resources, Ex: <http://192.168.0.101/mfw.bin>

APPENDIX A: REFERENCES

A.1. Test Tools

IOTService Configure Software:

<http://gb.hi-flying.com/downloadsfront.do?method=picker&flag=all&id=8c366199-b599-47a4-8d9c-20fa0b68bfcf&fileId=89&v=0.zip>

Overview of Characteristic	Parameters	Documents	Order Information
Data Sheet			
Title	Description	Version	Time
HF5111B User Manual	HF5111B User Manual	1.0	2016.11.16
Eport&HF51 Series Function and Cli Command	Eport&HF51 Series Function and Cli Command	1.0	2016.10.21
Eport&HF51 Series Application Manual	Eport&HF51 Series Application Manual	1.0	2016.08.31
IOTManager Config Tools	IOTManager Config Tools	2.5	2017.01.20

UART、Network Test software:

http://www.hi-flying.com/download_list_dc/&downloadcategoryid=14&isMode=false&comp_stats=comp-FrontDownloadsCategory_show01-1376450727769.html

A.2. Quick Start Manual

See our product application on website:

http://www.hi-flying.com/products_detail/productId=95.html

APPENDIX B: TELNET COMMUNICATION FUNCTION

B.1. Telnet Use Scene:

- a) Remote management device
- b) Remote management uart equipment

B.2. Telnet Features:

- a) Telnet support echo mode,
- b) Telnet only support one Client port.
- c) Telnet port number is 23
- d) Telnet connected with TCP, If Client port don't transmit data in 300s, It will auto disconnect.

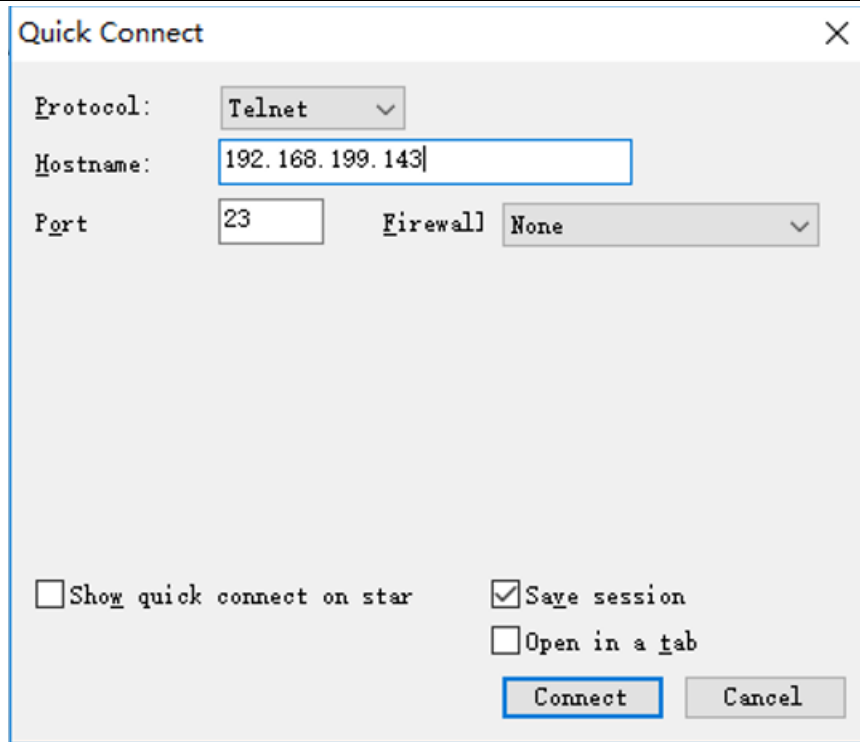
B.3. Telnet Usage:

Telnet function default as ON, If can't connect, Pls use webpage or configuration to check the function is on or off.

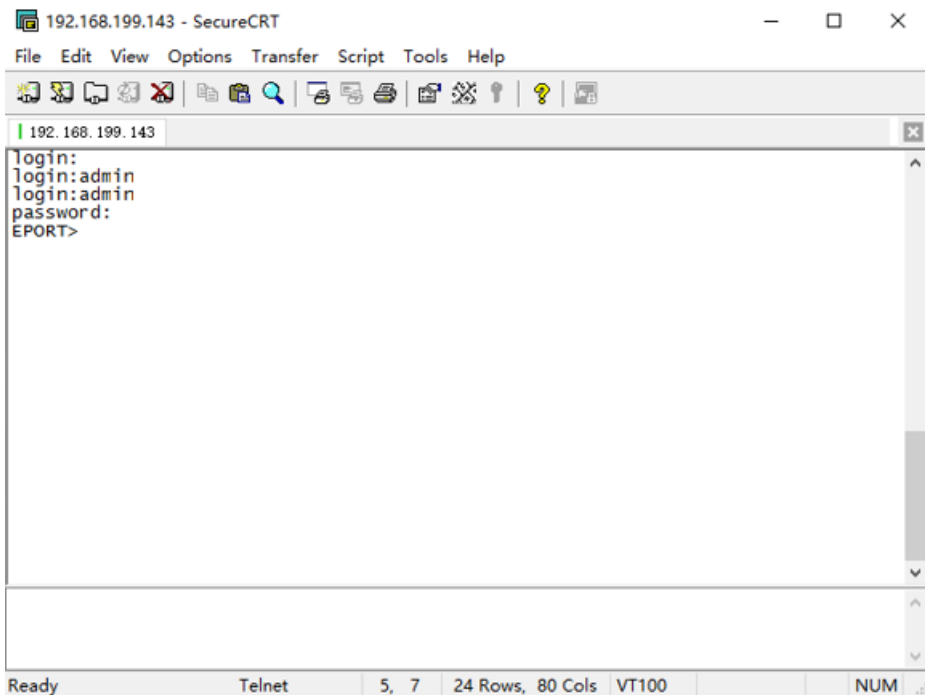


Telnet	
Enable	<input checked="" type="checkbox"/>
Telnet Port	<input type="text" value="23"/>
Echo	<input checked="" type="checkbox"/>

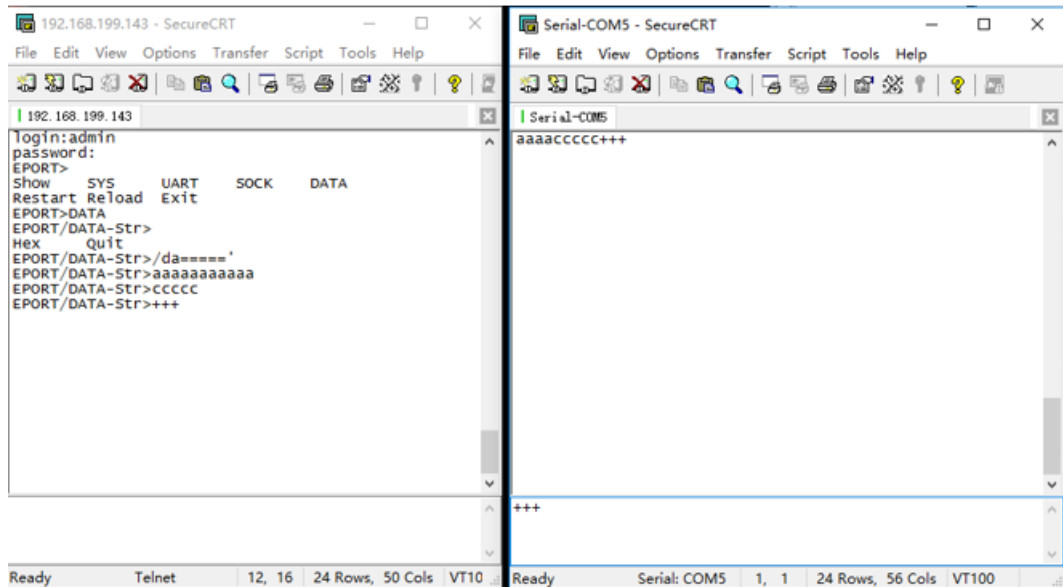
- a) Configure Secure CRT module and connect parameter, Equipment need to connect with LAN, Can use equipment LAN IP to access , If need remote to access the equipment, It need router have public IP address as port and mapped to internal website, Then can remote access equipment.



b) Use webpage account and password login in module, Then interface will show “EPORT>” .



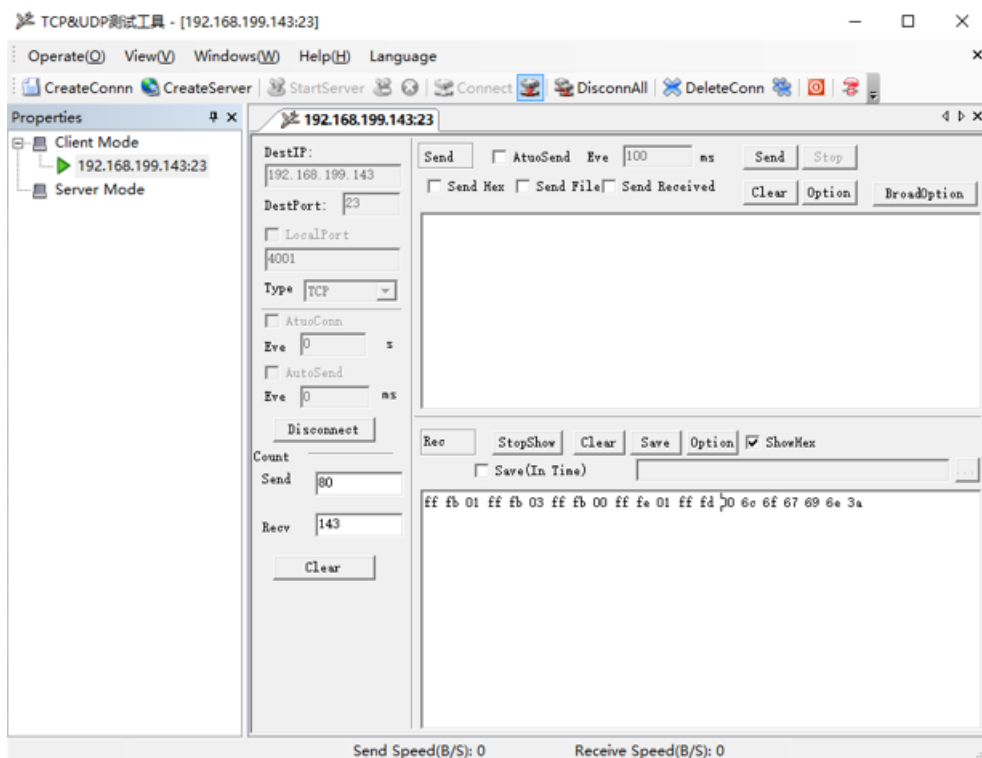
c) Later use are same as UART cli command, And can realise Telnet data with UART data transparent transmission application.,



Telnet Software implementation principle:

Step 1 Establish TCP connection with module

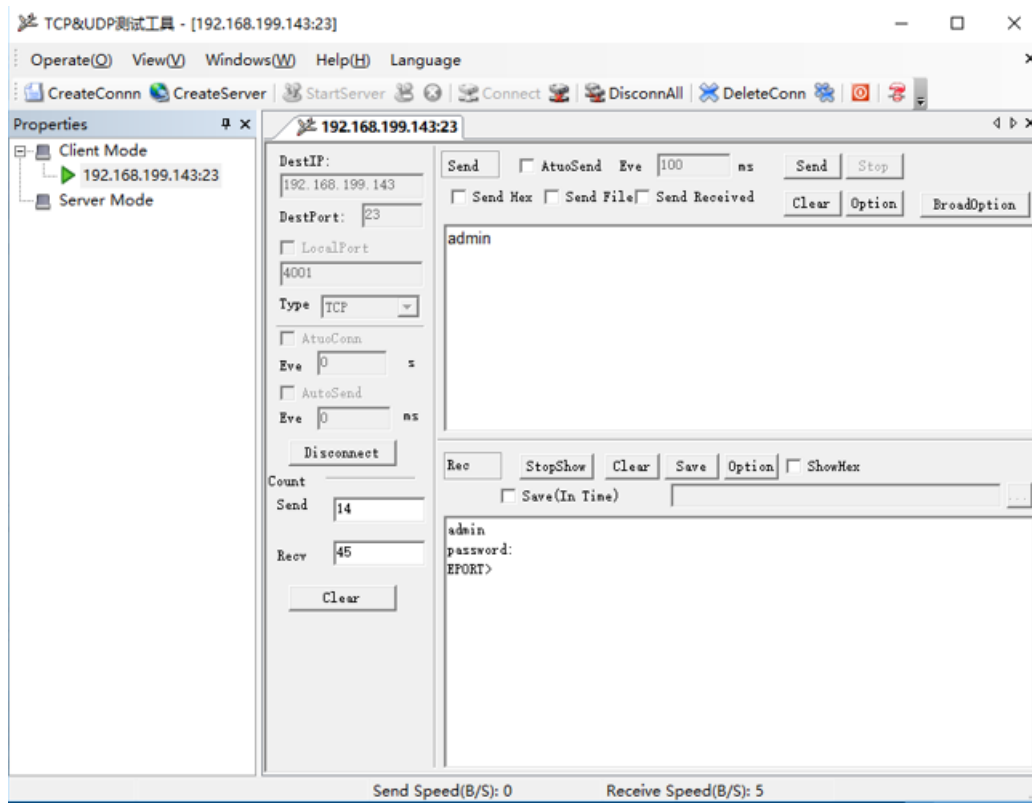
Step 2 Module send “login”, Client port send user name(need end with Enter key,Tools can type Ctrl+Enter)



Step 3 Module send 0xFF 0xFB 0x01 Close telnet input display.

Step 4 Module send password, Client port send login password

Step 5 Module send 0xFF 0xFC 0x01 Open telnet input display



Step 6 It can send and receive Cli command After Enter into Cli command mode.

APPENDIX C: CONTACT INFORMATION

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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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