Elfin-EW4XB

TTL/RS232/RS485/ to Wi-Fi&BLE

User Manual

V 1.0

Overview of Characteristic

- ✧ **Support for the 802.11b/g/n and BLE 5.0 wireless standard**
- ✧ **Support for Bluetooth mode SmartBLELink distribution network**
- ✧ **Support TCP / UDP / MQTT / WebSocket / HTTP and other network communication protocols**
- ✧ **Support TTL/RS232/RS485 to Wi-Fi Conversion, Serial Speed Up to 230400 bps**
- ✧ **Support STA/AP/AP+STA Mode**
- ✧ **Support SmartLink V8 Smart Config (Provide APP)**
- ✧ **Support Easy Configuration Through Web Interface or PC IOTService Tool**
- ✧ **Support Security Protocol Such As TLS/AES/DES3**
- ✧ **Support Webpage OTA Wirelss Upgrade**
- ✧ **Support Internal PCB Antenna and External SMA antenna**
- ✧ **Wide power supply is 5~36V power supply**
- ✧ **Dimensions: 68.5 x 35 x 17.8mm**
- ✧ **FCC/CE/SRRC/IC Certificated**

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1. PRODUCT OVERVIEW

1.1. General Description

The Elfin-EW4XB provides RS232/RS485 interface to Wi-Fi connectivity. The Elfin-EW4XB integrate TCP/IP controller, memory, high-speed serial port and integrates a fully developed TCP/IP network stack and mbed OS. Elfin-EW4XB also support remotely configure, monitor with IOTService.

The Elfin-EW4XB 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 Elfin-EW4XB integrates all serial to Wi-Fi functionality with 61 x 26 x 17.8mm size.

1.2. Device Paremeters

Table1. Elfin-EW4XB Technical Specifications

Item	Parameters
System Information	
Processor/Frequency	160MHz
Flash/SDRAM	2MB/352KB
Operating System	mbed
Network Protocol	
Network Protocol	IP，TCP，UDP，DHCP，DNS，HTTP Client，ARP， BOOTP，AutoIP，ICMP，Web socket， Telnet， uPNP， NTP， Modbus TCP，MQTT
Security Protocol	TLS v1.2 AES 128Bit DES3
Wi-Fi Interface	
Standard	802.11 b/g/n
Frequency	2.412GHz-2.472GHz
Network Mode	STA/AP/STA+AP
Security	WEP/WPAPSK/WPA2PSK
Encryption	WEP64/WEP128/TKIP/ AES
Tx Power	802.11b: +17dBm±1.5dBm (Max.@11Mbps) 802.11g: +15dBm±1.5dBm (Max.@54Mbps) 802.11n: +14dBm±1.5dBm (Max.@HT20,MCS7)
Rx Sensitive	802.11b: -89dBm 802.11g: -76dBm 802.11n: -73dBm
Antenna	SMA external antenna

BLE parameter	
Standard	BLE 5.0
Frequency	2402GHz-2480GHz
Tx Power	Max 15dBm
Rx Sensitive	-97dBm
Serial Port	
Port Number	EW40B:1 RS232 EW41B:1 RS485 EW42B:1 TTL
Data Bits	7,8
Stop Bit	1,2
Check Bit	None, Even, Odd
Baud Rate	TTL: 1200 bps~230400 bps
Flow Control	No Flow Control 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
Basic Parameter	
Size	61mm x 26mm x 17.8mm
Operating Temp.	-40 ~ 85°C
Storage Temp.	-45 ~ 125°C， 5 ~ 95% RH（无凝水）
Input Voltage	5～36VDC
Working Current	峰值(100 毫秒中 1ms)：<350mA 平均(STA，联网待机)：40mA 平均(STA，1KB/s)：60mA 平均(AP)：70mA
Power	<800mW

1.3. Key Application

The Elfin-EW4XB device connects serial device to networks using the TCP/IP protocol:

- Remote equipment monitoring
- Asset tracking and telemetry
- Security Application
- Industrial sensors and controls
- Medical devices
- 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 Elfin-EW4XB unit is a complete solution for serial port device connecting to network. This powerful device supports 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.

Elfin-EW4XB serial server for data transfer via Wi-Fi, which makes the data transformation very simple.

Figure 1. Elfin-EW40B Appearance

Figure 2. Elfin-EW41B Appearance

Figure 3. Elfin-EW42B Appearance

2.1. Elfin-EW40B Pins Definition

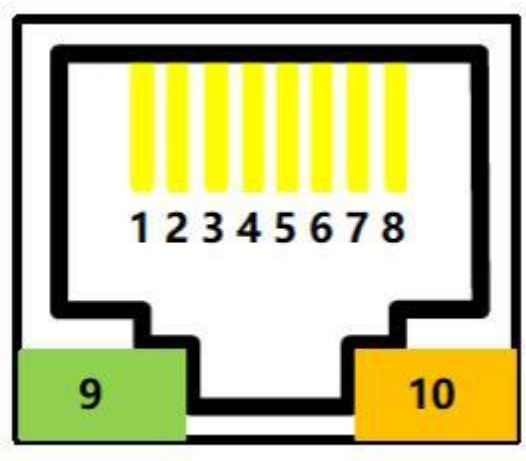

Figure 4. Elfin-EW40B RJ45 Interface Pin

Table2. Elfin-EW40B Interface Definition

Pin	Description	Net Name	Signal Type	Comment
1	GPIO	GPIO	IO	Reserved
2	GPIO	GPIO	IO	Reserved
3	GPIO	GPIO	IO	Reserved
4	Restore to Factory	nReload	I	**Default pulled-high.** **Detailed functions see <Notes>**
5	UART1_TXD	UART1_TXD	O	RS232 Voltage
6	UART1_RXD	UART1_RXD	I	RS232 Voltage
7	Power VCC	VCC	Power	5～18VDC
8	Power GND	GND	Power	
9	**Green LED** Net Status	Net	O	Boot On: Power is OK. 0.1s Off -> 0.1s On: SmartLink Config Mode 0.3s Off -> 3s On: STA mode connect to router or AP mode being connected by other STA. 0.3s Off ->0.3s On: No Wi-Fi Connection
10	**Amber LED** Data Transfer	Active	O	Off: No data transfer 0.3s Off -> 0.9s On: UART TX Output 0.3s Off -> 0.3s On: UART RX Receive On: UART bidirection.

2.2. Elfin-EW41B Pins Definition

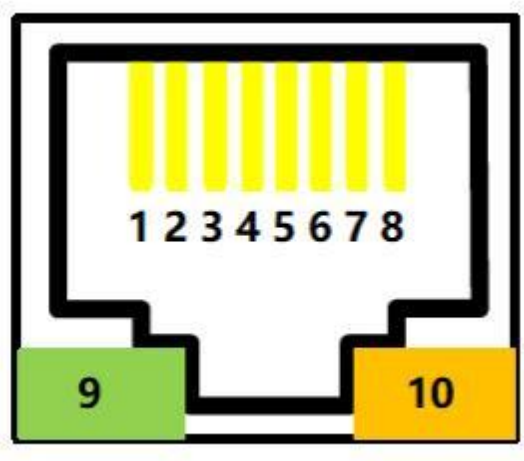

Figure 5. Elfin-EW41B RJ45 Interface Pin

Table3. Elfin-EW41B Interface Definition

Pin	Description	Net Name	Signal Type	Comment
1	Debug TX	UART2_TXD	O	TTL voltage
2	Debug RX	UART2_RXD	I	TTL voltage
3	GPIO	GPIO	IO	Reserved
4	Restore to Factory	nReload	I	**Default pulled-high.** **Detailed functions see <Notes>**
5	UART1_TXD	RS485_A+	IO	RS485 A+
6	UART1_RXD	RS485_B-	IO	RS485 B-
7	Power VCC	VCC	Power	5～18VDC
8	Power GND	GND	Power	
9	**Green LED** Net Status	Net	O	Boot On: Power is OK. 0.1s Off -> 0.1s On: SmartLink Config Mode 0.3s Off -> 3s On: STA mode connect to router or AP mode being connected by other STA. 0.3s Off ->0.3s On: No Wi-Fi Connection
10	**Amber LED** Data Transfer	Active	O	Off: No data transfer 0.3s Off -> 0.9s On: UART TX Output 0.3s Off -> 0.3s On: UART RX Receive On: UART bidirection.

2.3. Elfin-EW42B Pins Definition

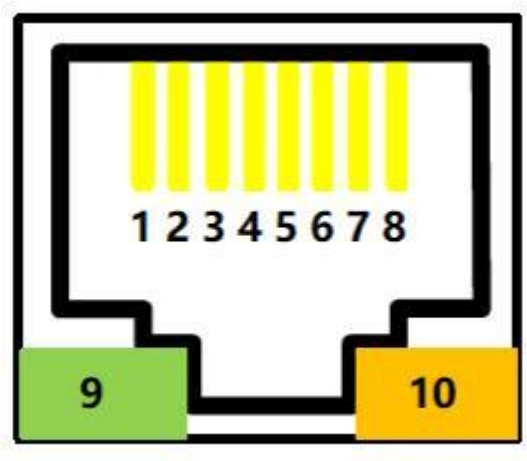

Figure 6. Elfin-EW42B RJ45 Interface Pin

Table4. Elfin-EW42B Interface Definition

管脚	描述	网络名	信号类型	说明
1	GPIO	GPIO	IO	保留
2	GPIO	GPIO	IO	保留
3	GPIO	GPIO	IO	保留
4	恢复出厂配置	nReload	I	默认高， **功能详见<说明>**
5	通讯串口 1TX	UART1_TXD	O	3.3V TTL 电平
6	通讯串口 1RX	UART1_RXD	I	3.3V TTL 电平
7	电源供电输入	VCC	Power	5～36VDC
8	电源地	GND	Power	
9	**绿色** 状态灯	Net	O	上电时亮：供电正常。 灭 0.1 秒，亮 0.1 秒： 进入 SmartLink、SmartBLELink 配网状态 灭 0.3 秒，亮 3 秒： STA 模式连接上路由器或者 AP 模式有其他设备连接上来。 灭 0.3 秒，亮 0.3 秒： Wi-Fi 未建立连接
10	**琥珀色** 数据传输指示灯	Active	O	灭：无数据交互 灭 0.3 秒，亮 0.9 秒： 串口输出数据 灭 0.3 秒，亮 0.3 秒： 串口接收数据 常亮：双向收发。

<Notes>

I — Input; O — Output; I/O: Digital I/O; Power—Power Supply

nReload Pin (Button) function:

1. **After module is powered up, short press this button (0.2< "Low" <1.5s) and loose to make the module go into "SmartLink" config mode, waiting for APP to set password and other information. (See Appendix to download SmartLink APP)**

2. **After module is powered up, long press this button ("Low" > 4s) and loose to make the module recover to factory setting.**

2.4. RS232 Interface

Device RS232 does not support hardware flow control. The physical voltage is about ±7V.

2.5. RS485 Interface

RS485 use two wire links, A(DATA+), B(DATA-). Connect A(+) to A(+), B(-) to B(-) for communication. Suggest to connect GND together when interference is very severe.

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

2.6. TTL Interface

The serial port of this device has no hardware flow control function, and the physical level is ±3.3V TTL

2.7. Mechanical Size

The dimensions of Elfin-EW4XB are defined as following picture (mm):

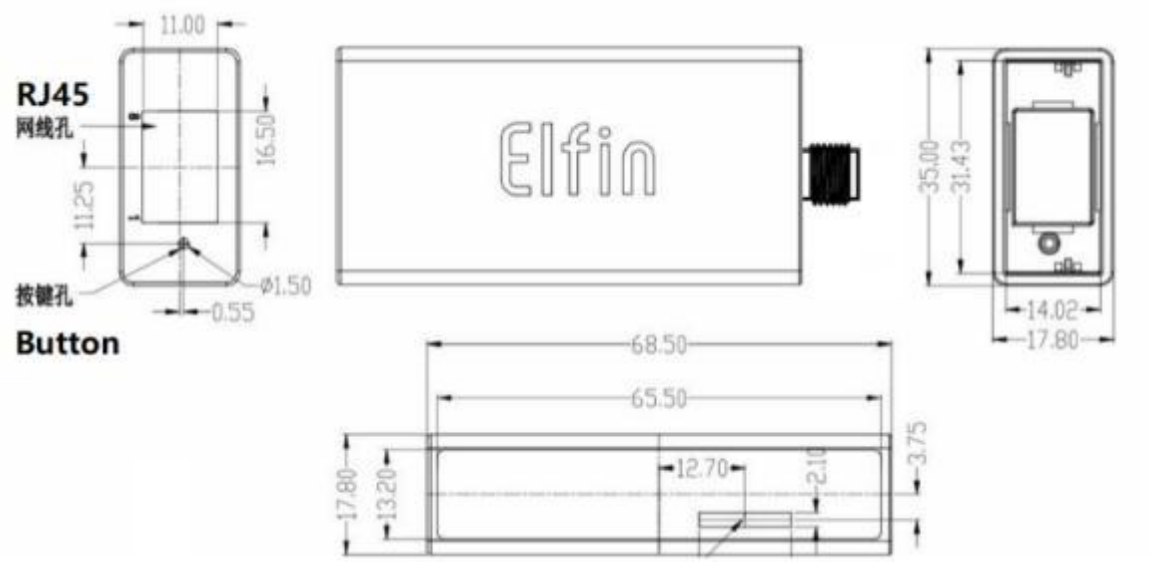

Figure 7. Elfin-EW4XB Mechanical Dimension

2.8. RJ45 8PIN Connector

Figure 8. RJ45 8PIN Connector

Figure 9. EW40B +8PIN Connector

Figure 10. EW41B+8PIN Connector

Figure 11. EW42B+8PIN Connector

2.9. RJ45 4PIN Connector

Figure 12. RJ45 4PIN Connector

Figure 13. EW40B +4PIN Connector

Figure 14. EW41B+4PIN Connector

Figure 15. EW42B+4PIN Connector

2.10. RJ45 Conversion cable

Figure 16. RJ45 Conversion cable

Figure 17. EW40B+RJ45 Conversion cable

Figure 18. EW41B+RJ45 Conversion cable

Figure 19. EW42B+RJ45 Conversion cable

2.11. Homemade cable

Customers can make their own RJ45 conversion cable, add 232 DB9 interface, DC power connector, reset button and so on according to the following sequence.

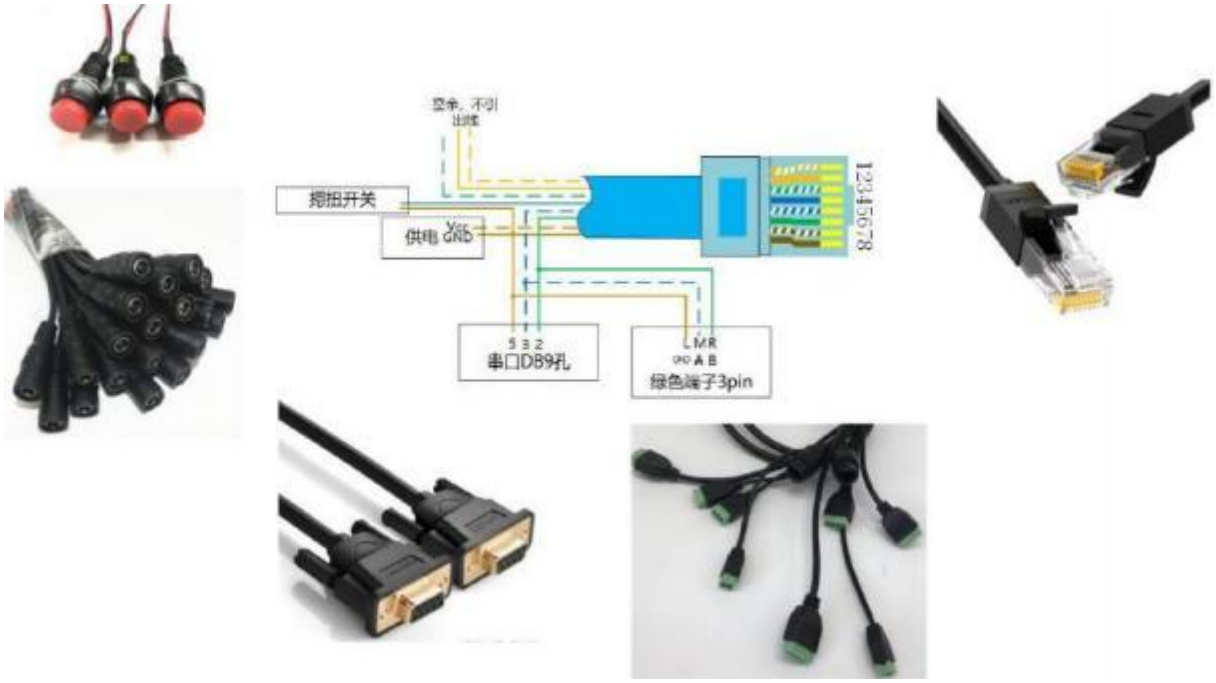

Figure 20. Cable fabrication diagram

2.12. Fixed Bracket

Figure 21. Fixed Bracket

2.13. Rail Bracket

Figure 22. Rail Bracket

2.14. Bracket

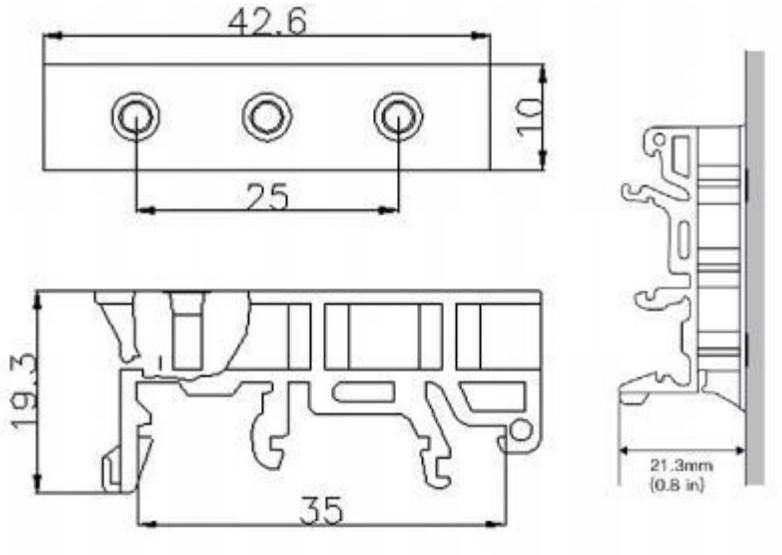

Figure 23. Bracket Size

Figure 24. Bracket Install Picture

2.15. Product Installation

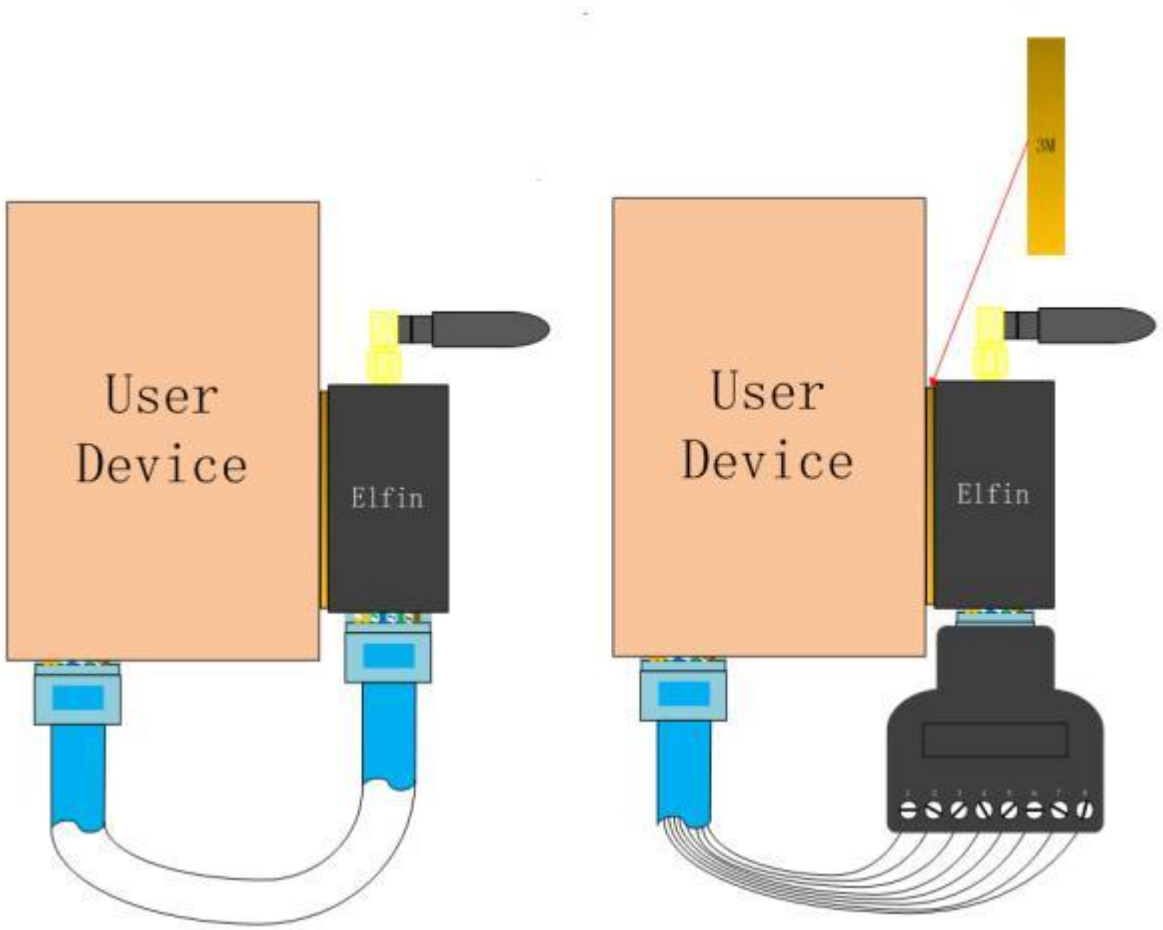

Figure 25. Product Installation

2.16. EVK

EVK indluce one Elfin device, one RJ45 Connector and one screw driver.

Figure 26. EVK Package

2.17. Order Information

Base on customer detailed requirement, Elfin-EW4XB provide different configuration version, Details as below:

Function / Model	Power Input	Type	Antenna	UART	UART Number
Elfin-EW40B-0	5~36VDC	Wi-Fi&BLE	External SMA	RS232	1
Elfin-EW41B-0	5~36VDC	Wi-Fi&BLE	External SMA	RS485	1
Elfin-EW42B-0	5~36VDC	Wi-Fi&BLE	External SMA	3.3V TTL	1
Elfin-EW40B	5~36VDC	Wi-Fi&BLE	built-in aerial	RS232	1
Elfin-EW41B	5~36VDC	Wi-Fi&BLE	built-in aerial	RS485	1
Elfin-EW42B	5~36VDC	Wi-Fi&BLE	built-in aerial	3.3V TTL	1

Figure 27. Elfin-EW4XB Product Order Information

3. NETWORK STRUCTURE

3.1. Wireless Network

The default AP mode of this product is AP mode. The AP hotspot is EW4xB plus the last four bits of the MAC address. It can be configured as STA mode and connected to the local area network (LAN) of other routers. Therefore, this product provides a very flexible networking mode and network topology to transfer data from serial devices to any place.

<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

HF2211 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 28. General AP Network

3.1.2. STA Wireless Network

Take the following picture as example. When router works in AP mode, HF2211 connects to the user’s devices by RS232/RS485 interface. In this topology, the whole wireless network can be easily stretched.

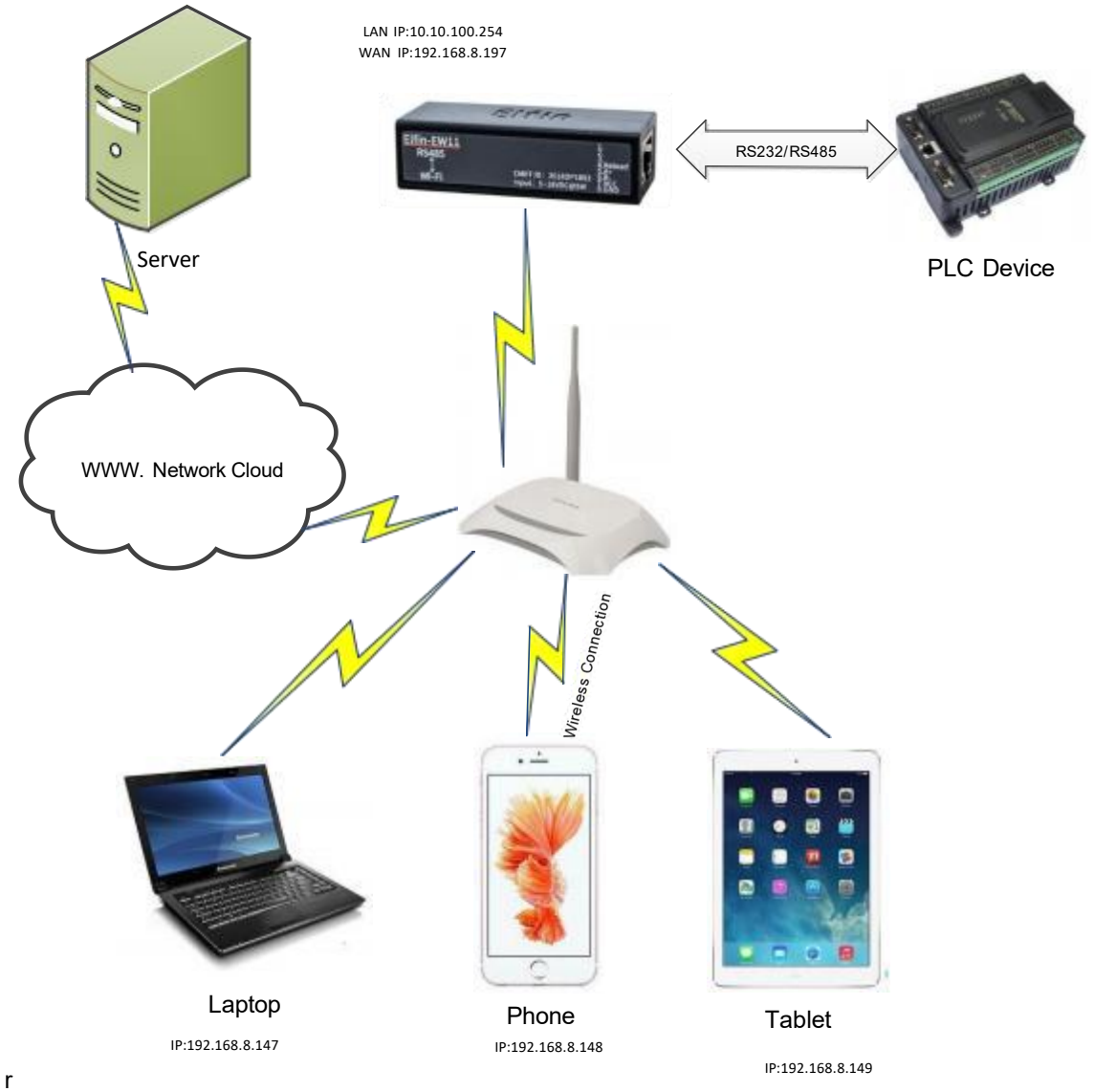

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Figure 29. STA Application

3.1.3. AP+STA Wireless Network

HF2211 can support AP+STA method. It can support AP and STA interface at the same time.Shown as follow:

Figure 30. AP+STA Wireless Network

In this picture, 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.

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.

Does not support Wi-Fi repeater function that means device works in AP+STA(STA connects to router), PC connects to device AP, but can not access to internet (If need this router function, use HF2211/HF2221)

3.1.4. IOTService Software

Open the IOTService after connect to the AP hotspot generated by HF2211 or connect to Product Ethernet port to PC, then configure the parameter.

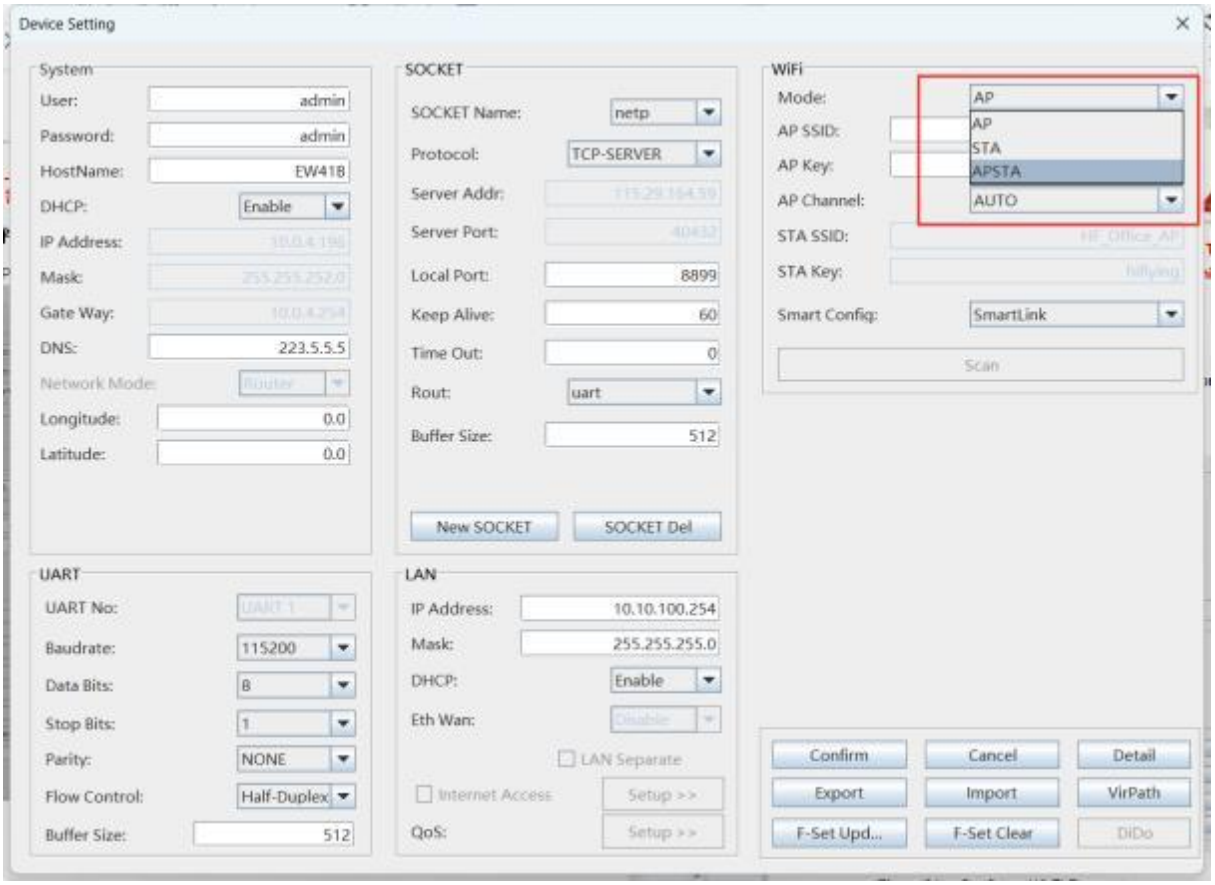

Figure 31. Configure Wi-Fi Parameter

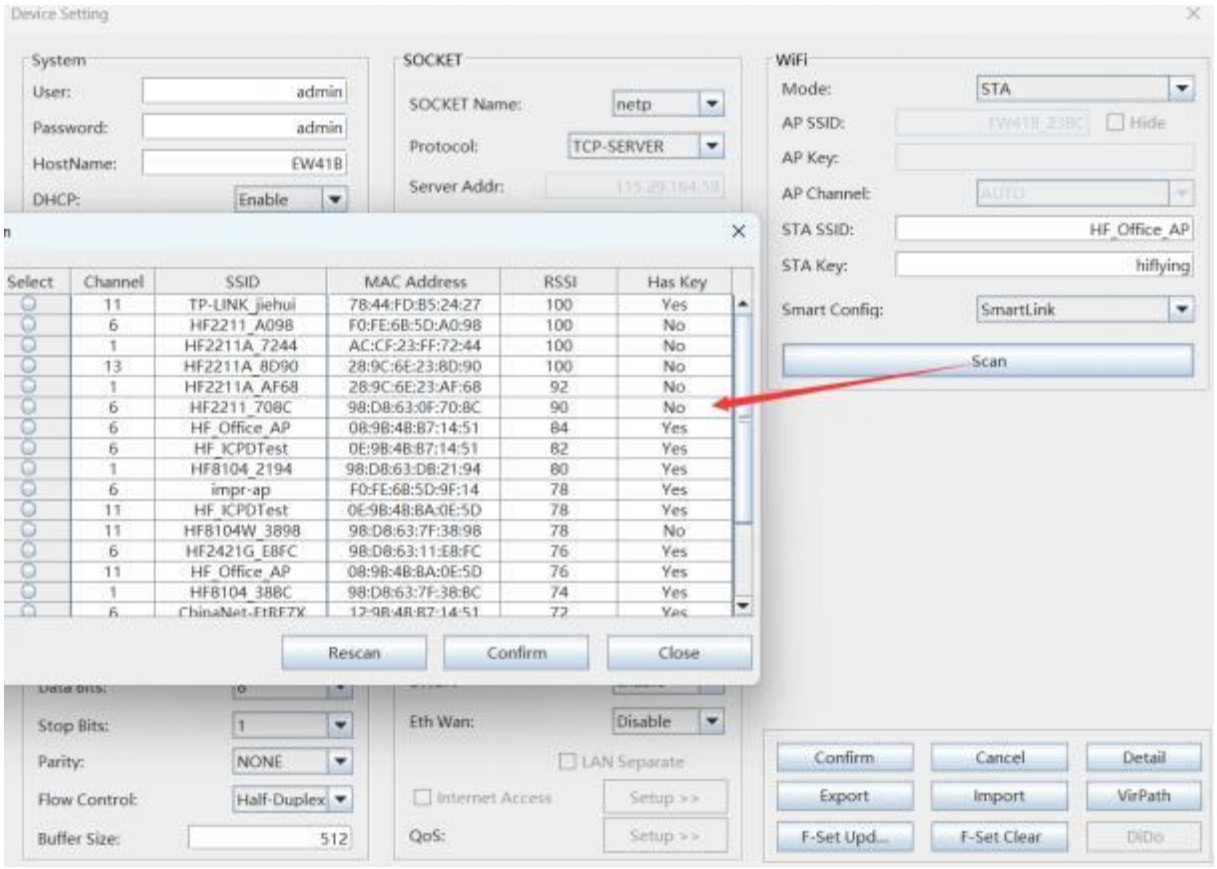

Figure 32. STA Scan Parameter

3.1.5. Webpage Configuration

Use PC to connect with HF2211 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.

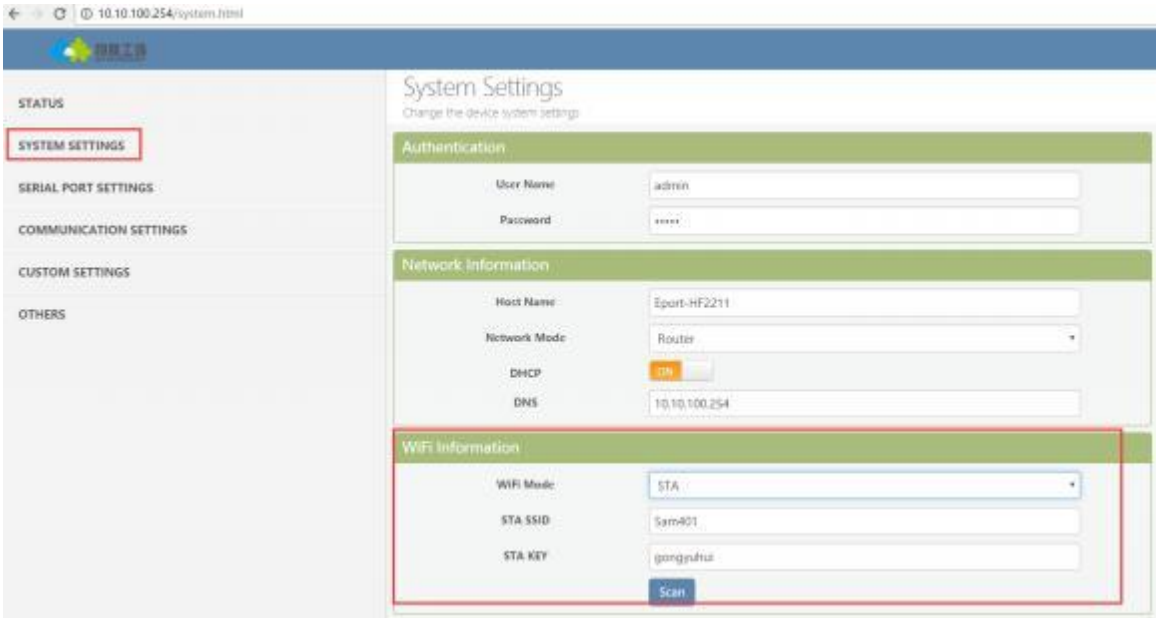

Figure 33. Configure the Wi-Fi Parameter

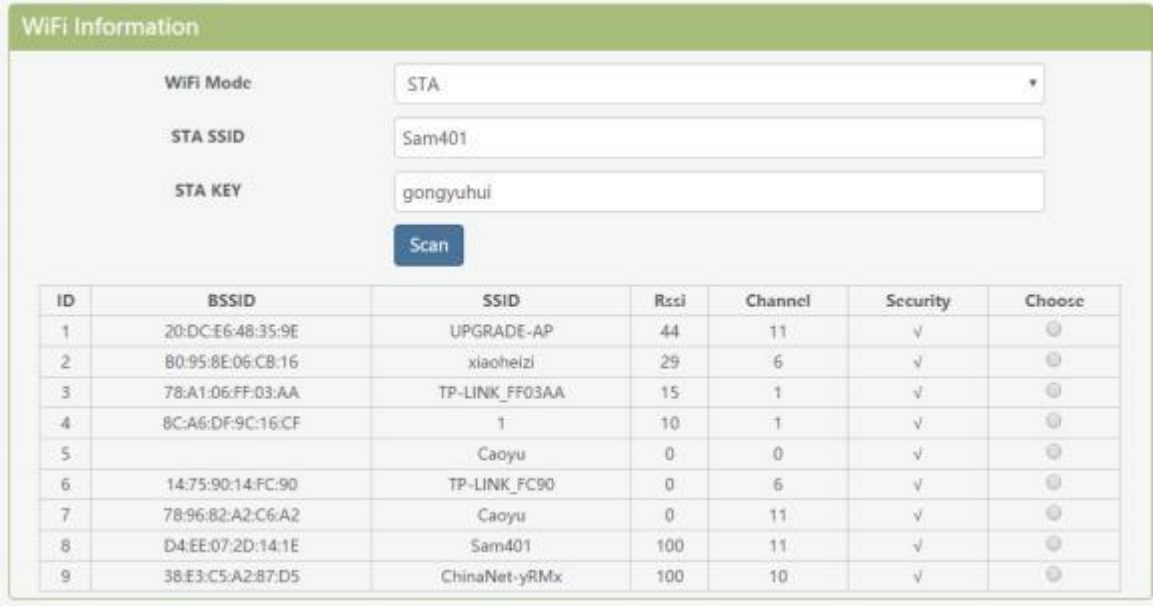

Figure 34. STA Scan

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: CONTACT INFORMATION

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