Protoss-PW11

RS485 to Wi-Fi

User Manual

V 1.2

Overview of Characteristic

- ✧ **Support 802.11bgn Wireless Standard**
- ✧ **Support STA/AP/AP+STA Mode**
- ✧ **Support SmartLink V8 Smart Config (Provide APP)**
- ✧ **Support TCP/UDP/MQTT/HTTP/WebSocket Protocol**
- ✧ **Support Modbus TCP to RTU, Modbus Master Function**
- ✧ **Support RS485 To WiFi Conversion**
- ✧ **Support Webpage Easy Configuration or PC IOTService Tool**
- ✧ **Support Security Protocol Such As TLS/AES/DES3**

- **Support Heartbeat and Resister Packet Function**
- **Support Webpage OTA Wireless Upgrade**
- **Support Industrial Temperature: -40 to +70° C**
- **Multiple Type of Different Power Input：**
  - **Protoss-PW11-H：100～240VAC@50～60Hz**
  - **Protoss-PW11-M：9～48VDC@1A**
  - **Protoss-PW11-L： 9～24VDC@1A**
- **Size: 102.03 x 64.95 x 27.50 mm (L x W x H)， C45 rail installation**

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Ed. V1.0	02-10-2020	First Version
Ed. V1.1	03-18-2020	Update RS485 interface
Ed. V1.2	01-10-2024	Add - L model

1. PRODUCT OVERVIEW

1.1. General Description

The Protoss-PW11 provides a RS485 interface to TCP/IP data transfer product. The Protoss-PW11 integrate TCP/IP controller, memory, Wi-Fi transceiver, RS485 and integrates a fully developed TCP/IP network stack. Protoss-PW11 also includes an embedded web server used to configure device.

The Protoss-PW11 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.

1.2. Device Paremeters

Table1. Protoss-PW11 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 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/WPAPSK/WPA2PSK
Encryption	WEP64/WEP128/TKIP/ AES
Tx Power	802.11b: +18dBm (Max.) 802.11g: +16dBm (Max.) 802.11n: +15dBm (Max.)
Rx Sensitive	802.11b: -89dBm 802.11g: -81dBm 802.11n: -71dBm
Antenna	SMA Interface Antenna
Serial Port	
Port Number	RS485
Data Bits	7,8

Stop Bit	1,2
Check Bit	None, Even, Odd
Baud Rate	TTL: 300 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	102.03 x 64.95 x 27.50 mm
Operating Temp.	-40 ~ 70°C
Storage Temp.	-40 ~ 85°C, 5 ~ 95% RH（no condensation）
Input Voltage	Protoss-PW11-H：100～240VAC@50～60Hz Protoss-PW11-M：9～48VDC@1A Protoss-PW11-L： 9～24VDC@1A
Working Current	~200mA
Power	<700mW

1.3. Key Application

The Protoss-PW11 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 Protoss-PW11 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. Through Ethernet cable connect router with Protoss-PW11 serial server for data transfer, which makes the data transformation very simple.

Figure 1. Protoss-PW11 Appearance

2.1. Interface Definition

Figure 2. Protoss-PW11 Interface

Table2. Protoss-PW11-H Interface Definition

Pin	Description	Net Name	Signal Type	Comment
1	AC Power Input	L	Power	100～240VAC Input
2	AC Power Input	N	Power	
5		RS485_B-	IO	RS485 B-
6	Signal GND	GND	Power	Used for RS485 GND, usually leave it unconnected
7		RS485_A+	IO	RS485 A+
ANT	Antenna	ANT		Wi-Fi 2.4G SMA Antenna
Reload	Restore to factory setting button	Reload	I	**Detailed functions see <Notes>**
Reset	Reset button	Reset	I	Hardware reset button
Net	Network status LED	Net	O	Boot On: Boot 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
Active	UART 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.
Power	Power LED	Power	O	On: Power input OK Off: Power input NG.
Link	Server connection LED	Link	O	On: netp Socket connection OK. Off: no netp Socket connection.

Table3. Protoss-PW11-M Interface Definition

Pin	Description	Net Name	Signal Type	Comment
1	DC Power Input	VCC+	Power	9～48VDC@1A Input
2	DC Power Input	GND-	Power	
5		RS485_B-	IO	RS485 B-
6	Signal GND	GND	Power	Used for RS485 GND, usually leave it unconnected
7		RS485_A+	IO	RS485 A+
ANT	Antenna	ANT		Wi-Fi 2.4G SMA Antenna
Reload	Restore to factory setting button	Reload	I	**Detailed functions see <Notes>**
Reset	Reset button	Reset	I	Hardware reset button
Net	Network status LED	Net	O	Boot On: Boot 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
Active	UART 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.
Power	Power LED	Power	O	On: Power input OK Off: Power input NG.
Link	Server connection LED	Link	O	On: netp Socket connection OK. Off: no netp Socket connection.

Table4. Protoss-PW11-L Interface Definition

Pin	Description	Net Name	Signal Type	Comment
1	DC Power Input	VCC+	Power	9～24VDC@1A Input
2	DC Power Input	GND-	Power	
5		RS485_B-	IO	RS485 B-
6	Signal GND	GND	Power	Used for RS485 GND, usually leave it unconnected
7		RS485_A+	IO	RS485 A+
ANT	Antenna	ANT		Wi-Fi 2.4G SMA Antenna
Reload	Restore to factory setting button	Reload	I	**Detailed functions see <Notes>**
Reset	Reset button	Reset	I	Hardware reset button
Net	Network status LED	Net	O	Boot On: Boot 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
Active	UART Data Transfer	Active	O	Off: No data transfer 0.3s Off -> 0.9s On: UART TX Output

Pin	Description	Net Name	Signal Type	Comment
				0.3s Off -> 0.3s On: UART RX Receive On: UART bidirection.
Power	Power LED	Power	O	On: Power input OK Off: Power input NG.
Link	Server connection LED	Link	O	On: netp Socket connection OK. Off: no netp Socket connection.

<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. Download SmartLink V8 APP as following link:** http://www.hi-flying.com/download-center-1/applications-1/download-item-smartlink-v8
2. **After module is powered up, long press this button ("Low" > 4s) and loose to make the module recover to factory setting.**

2.2. 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 RS485 device. The cable maximum length is 1200 meters. Need to add 120Ohm terminal resistor for over 300 meters.

2.3. Mechanical Size

The dimensions of Protoss-PW11 are defined as following picture (mm):

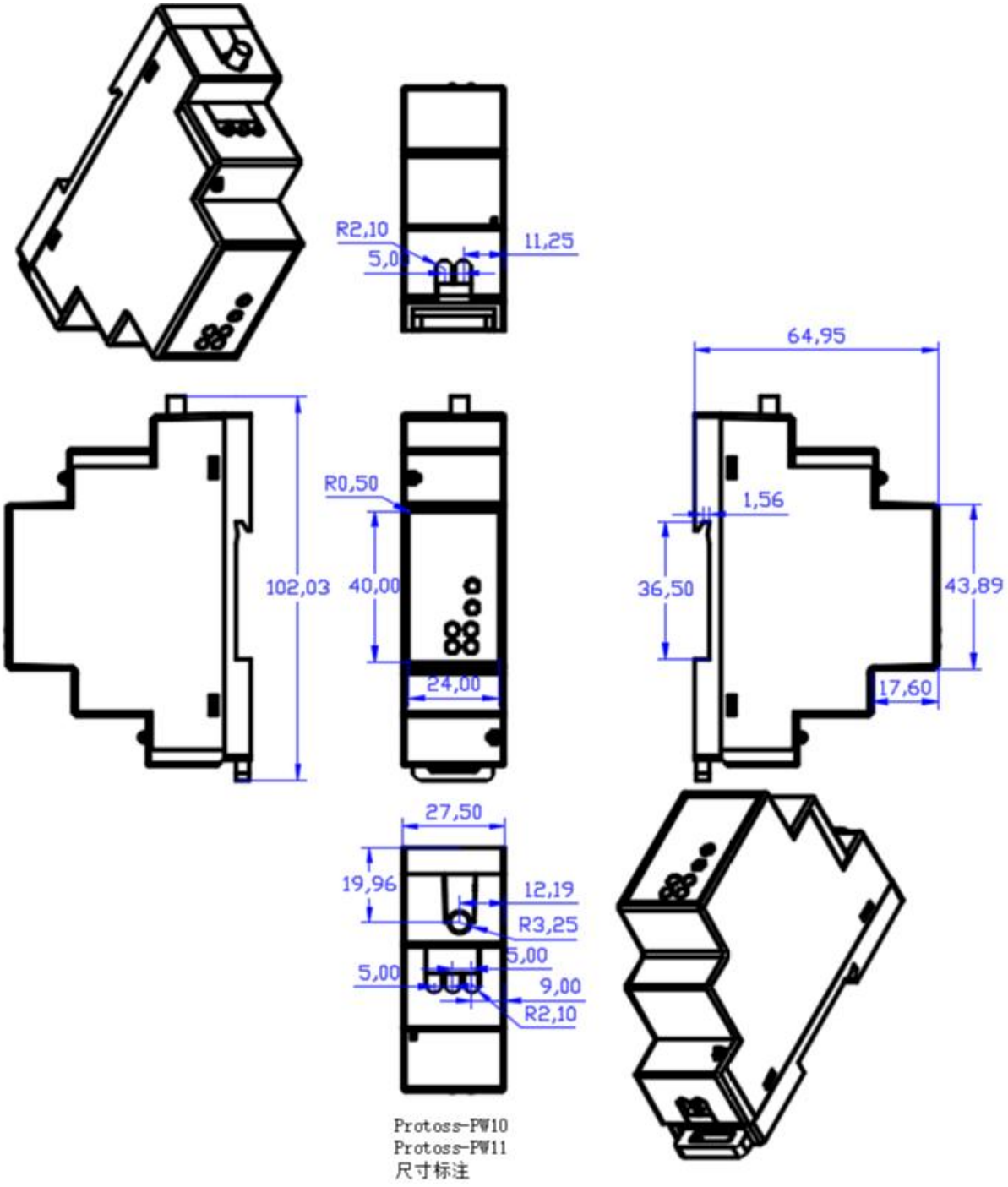

R2,10
5,00
11,25
64,95
R0,50
1,56
102,03
40,00
36,50
43,89
24,00
17,60
27,50
19,96
12,19
R3,25
5,00
5,00
9,00
R2,10
Protoss-PW10
Protoss-PW11
尺寸标注

Figure 3. Protoss-PW11 Mechanical Dimension

2.4. Product Installation

Figure 4. C45 Rail Installation

2.5. Order Information

Base on customer detailed requirement, Protoss-PW11 provide different configuration version, Details as below:

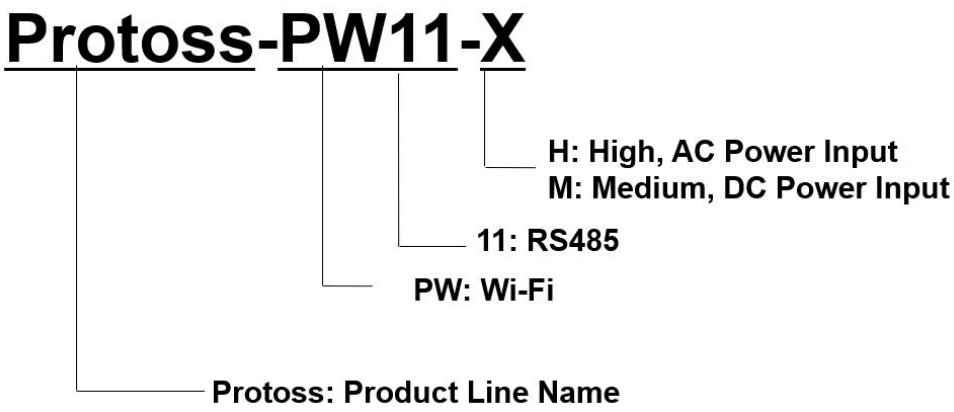


Figure 5. Protoss-PW11 Product Order Information

3. NETWORK STRUCTURE

3.1. Wireless Network

Product 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 it can provide flexible networking method and network topology.

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

All the STA devices connect to the device AP transfer data to PLC device. Note the STA devices can not communicate to each other due to PW11 does not support router function, if need this function, use PW21/HF2211/HF2221

Figure 6. General AP Network

3.1.2. STA Wireless Network

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

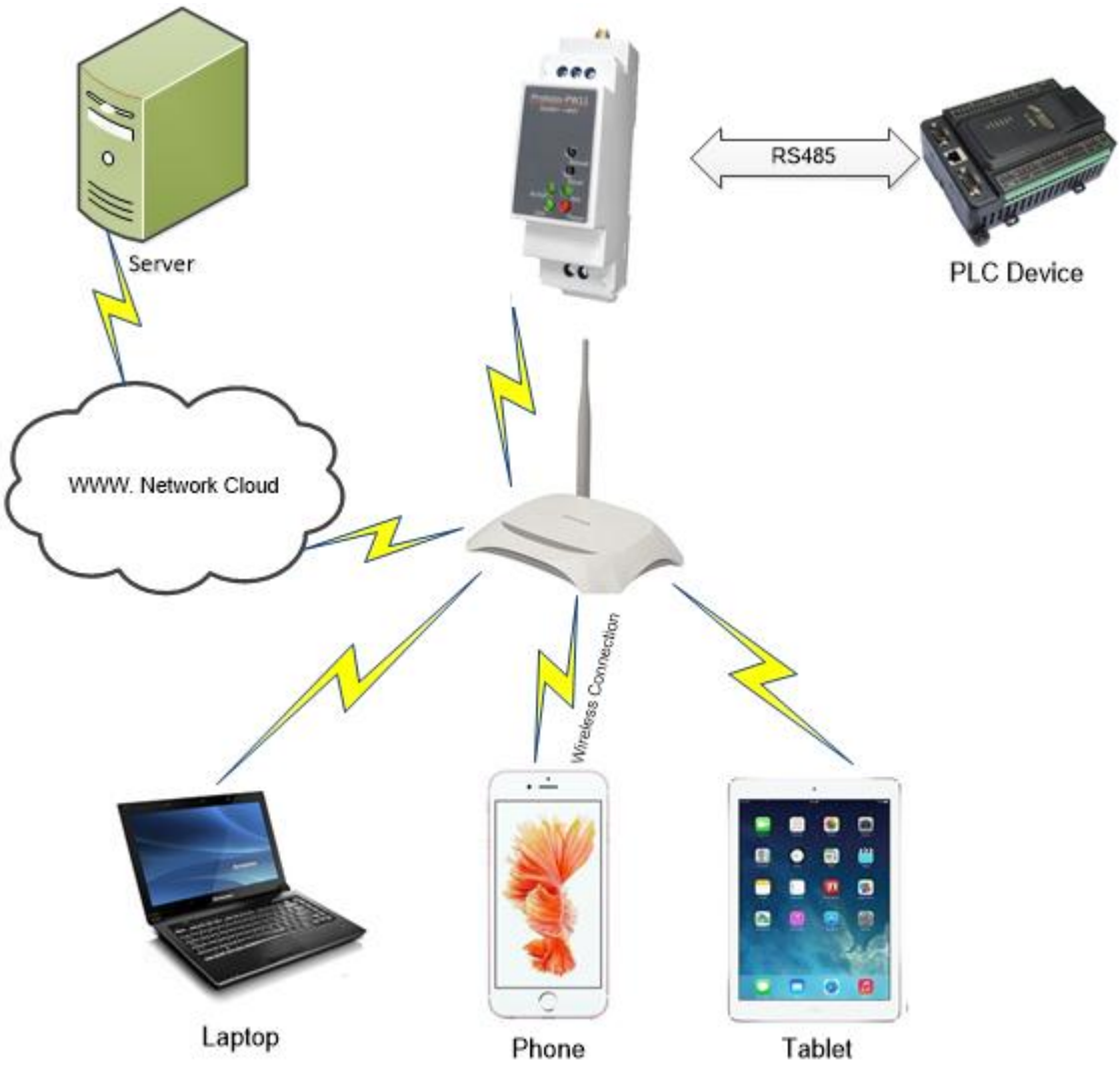


Figure 7. STA Application

3.1.3. AP+STA Wireless Network

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

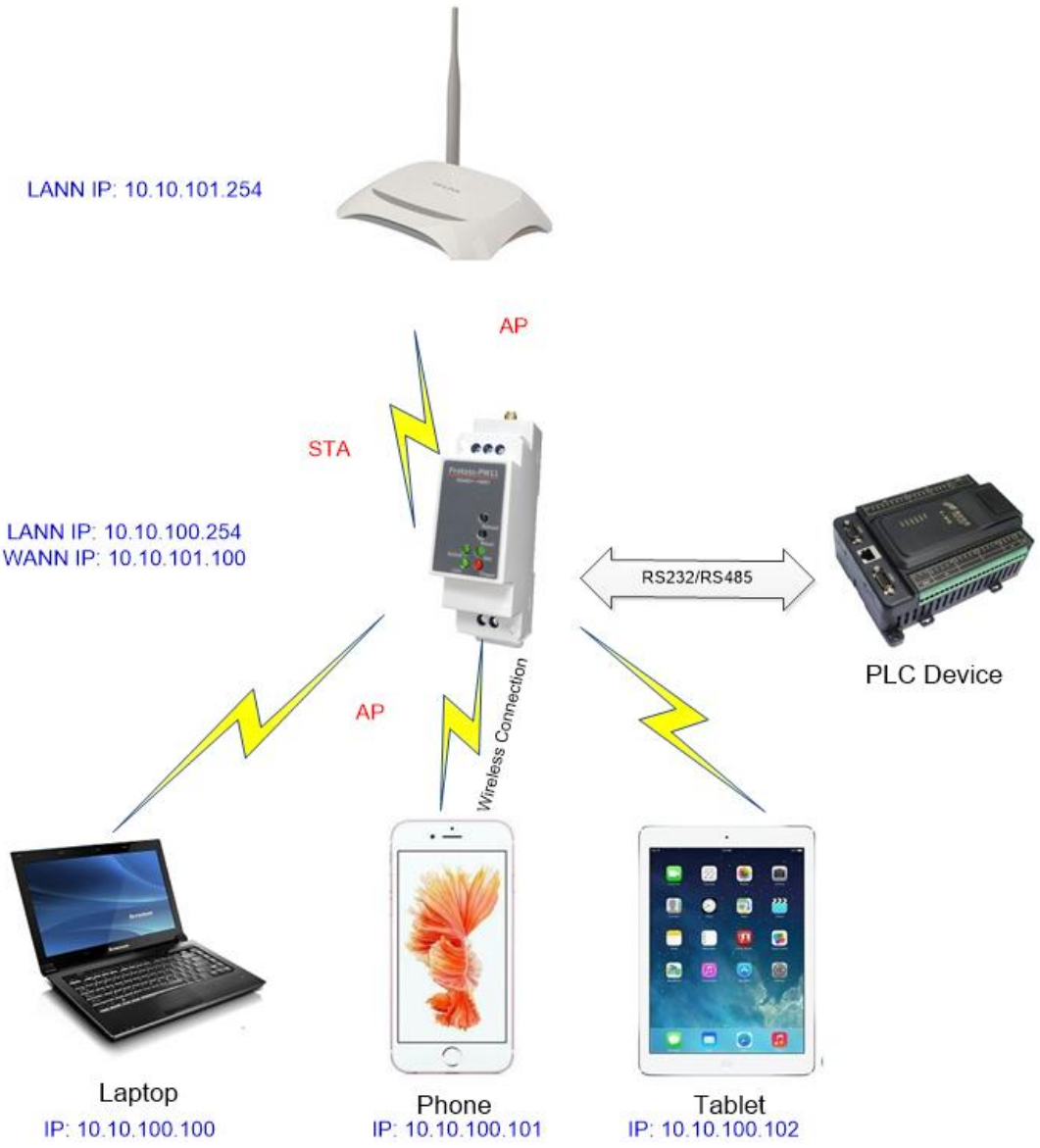


Figure 8. AP+STA Wireless Network

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 PW21/HF2211/HF2221)

3.1.4. IOTService Software

Open the IOTService after PC connect to the AP hotspot generated by product, then config the parameter.

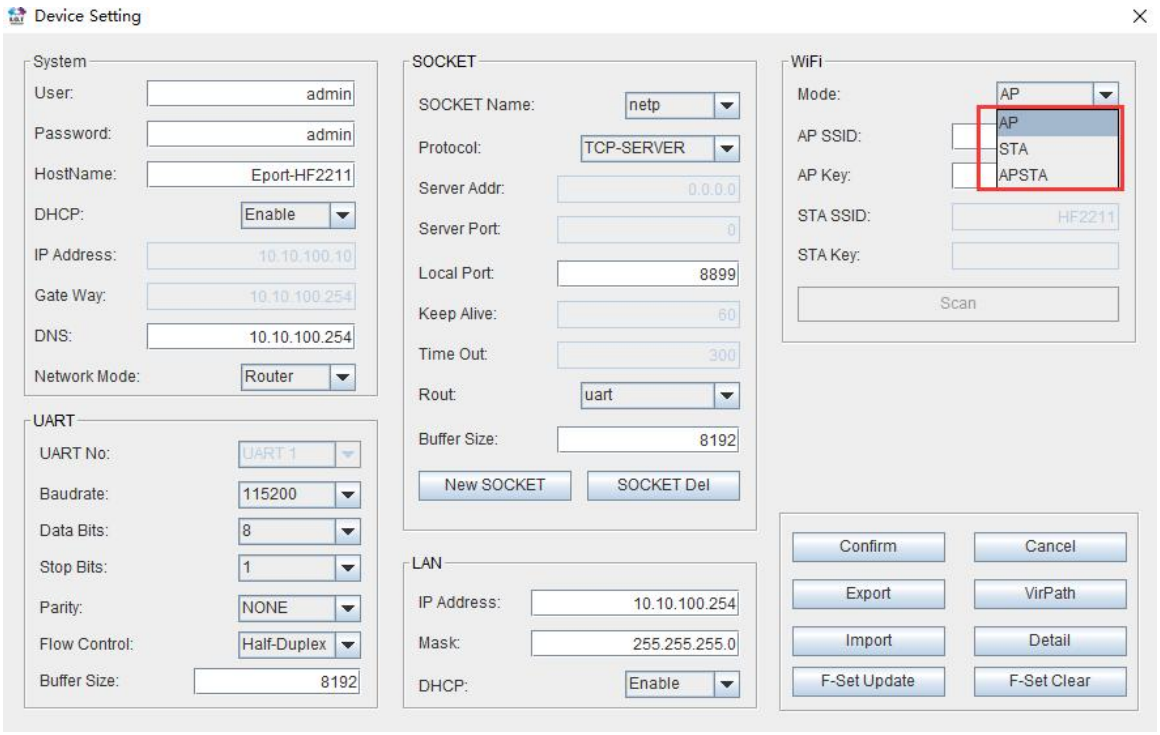
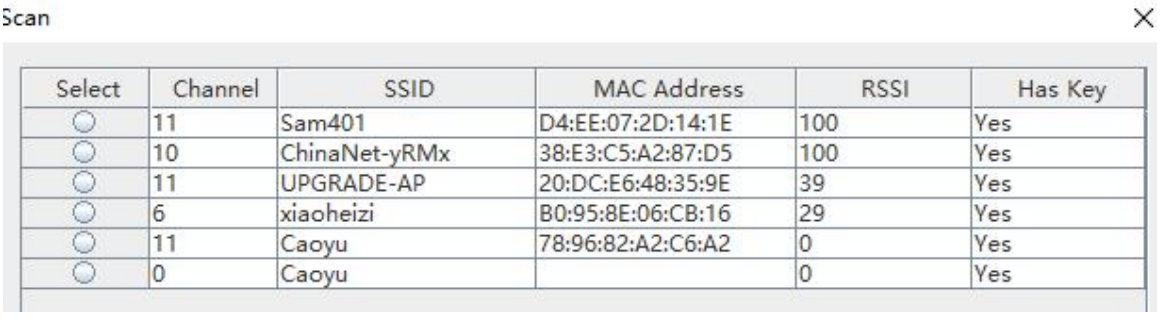


Figure 9. Config Wi-Fi Parameter



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

Figure 10. STA Scan Parameter

3.1.5. Webpage Configuration

Use PC to connect with product's AP. Input the default IP(10.10.100.254, default username and password: admin/admin) to login the webpage to configure the parameter.

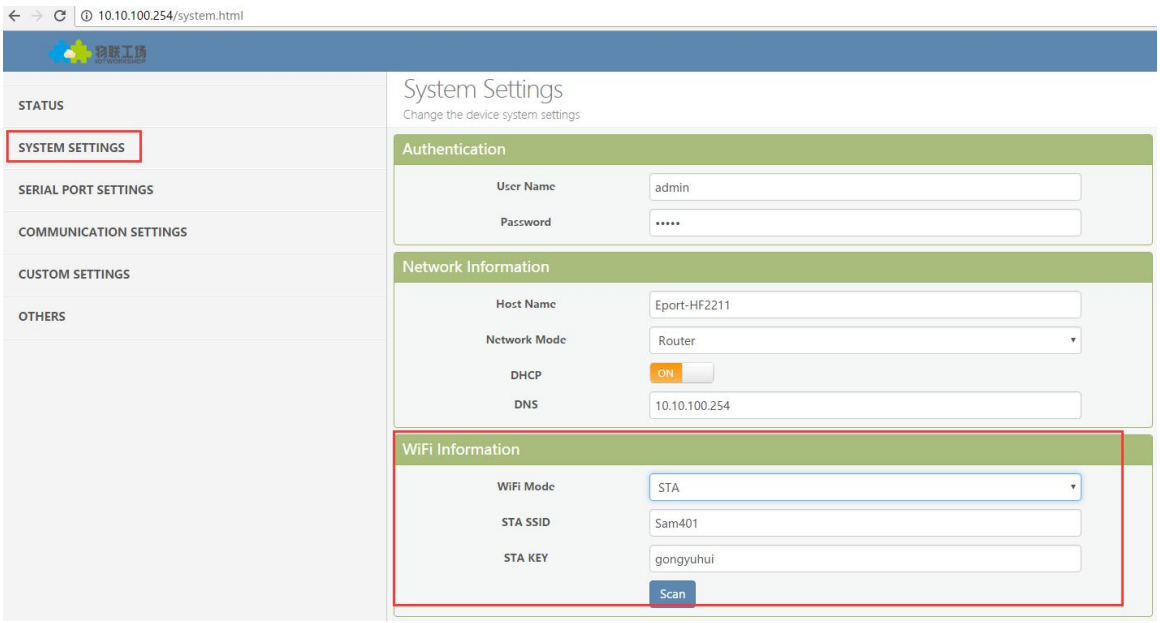
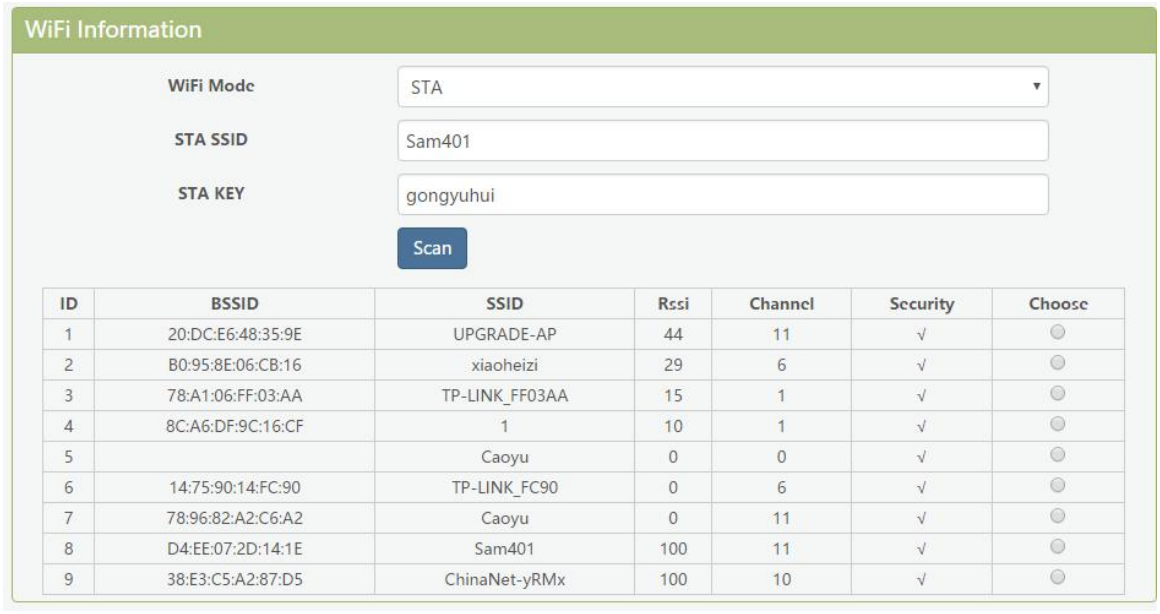


Figure 11. Configure the Wi-Fi Parameter



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

Figure 12. STA Scan

4. FUNCTION DESCRIPTION

Refer to “IOT_Device_Series_Software_Funtion” document for more detailed function.

APPENDIX A: CONTACT INFORMATION

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