# Protoss-PW11

# RS485 to Wi-Fi

# User Manual

**V 1.1**


## 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 +85° C**
- **Multiple Type of Different Power Input：**
  - **Protoss-PW11-H：100～240VAC@50～60Hz**
  - **Protoss-PW11-M：9～48VDC@1A**
- **Size: 102.03 x 64.95 x 27.50 mm (L x W x H)， C45 rail installation**

# TABLE OF CONTENTS TABLE OF CONTENTS

# LIST OF FIGURES

# LIST OF TABLES



## HISTORY

| | | |
|---|---|---|
| **Ed. V1.0** | 02-10-2020 | First Version |
| **Ed. V1.1** | 03-18-2020 | Update RS485 interface |

# 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<br>AES 128Bit<br>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.)<br>802.11g: +16dBm (Max.)<br>802.11n: +15dBm (Max.) |
| Rx Sensitive | 802.11b: -89dBm<br>802.11g: -81dBm<br>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<br>Software Xon/ Xoff flow control |
| **Software** | |
| Web Pages | Http Web Configuration<br>Customization of HTTP Web Pages |
| Configuration | Web<br>CLI<br>XML import<br>Telnet<br>IOTService PC Software |
| **Basic Parameter** | |
| Size | 102.03 x 64.95 x 27.50 mm |
| Operating Temp. | -40 ~ 85°C |
| Storage Temp. | -45 ~ 105°C, 5 ~ 95% RH（no condensation） |
| Input Voltage | Protoss-PW11-H：100～240VAC@50～60Hz<br>Protoss-PW11-M：9～48VDC@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.<br>0.1s Off -> 0.1s On: SmartLink Config Mode<br>0.3s Off -> 3s On: STA mode connect to router or AP mode being connected by other STA.<br>0.3s Off ->0.3s On: No Wi-Fi Connection |
| Active | UART Data Transfer | Active | O | Off: No data transfer<br>0.3s Off -> 0.9s On: UART TX Output<br>0.3s Off -> 0.3s On: UART RX Receive<br>On: UART bidirection. |
| Power | Power LED | Power | O | On: Power input OK<br>Off: Power input NG. |
| Link | Server connection LED | Link | O | On: netp Socket connection OK.<br>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.<br>0.1s Off -> 0.1s On: SmartLink Config Mode<br>0.3s Off -> 3s On: STA mode connect to router or AP mode being connected by other STA.<br>0.3s Off ->0.3s On: No Wi-Fi Connection |
| Active | UART Data Transfer | Active | O | Off: No data transfer<br>0.3s Off -> 0.9s On: UART TX Output<br>0.3s Off -> 0.3s On: UART RX Receive<br>On: UART bidirection. |
| Power | Power LED | Power | O | On: Power input OK<br>Off: Power input NG. |
| Link | Server connection LED | Link | O | On: netp Socket connection OK.<br>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):

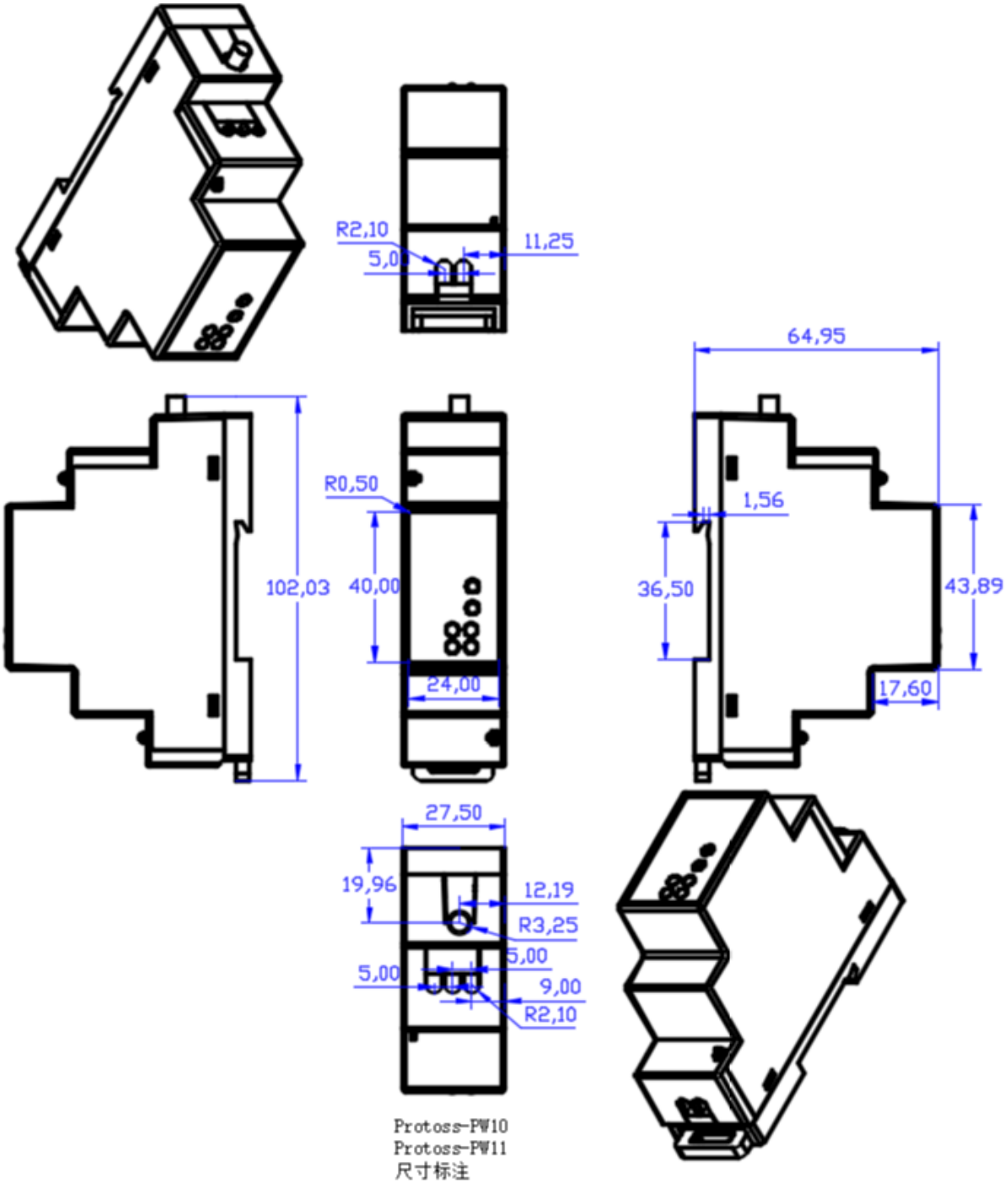



Figure 3. Protoss-PW11 Mechanical Dimension

## 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:

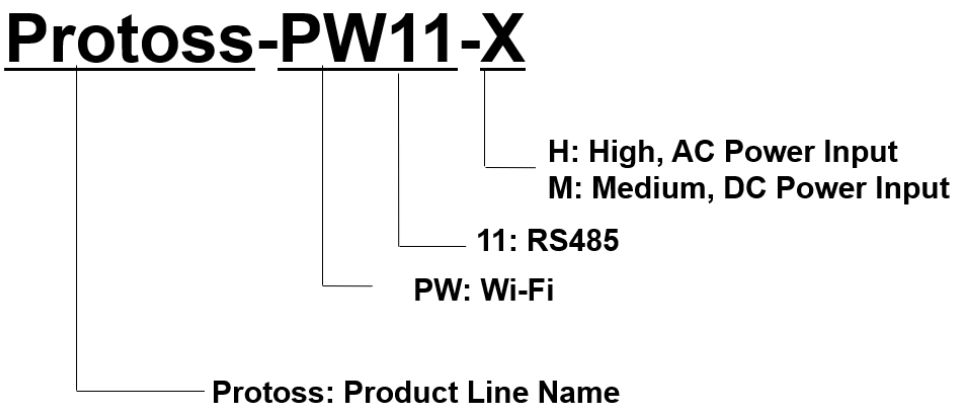



Figure 5. Protoss-PW11 Product Order Information

# 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.

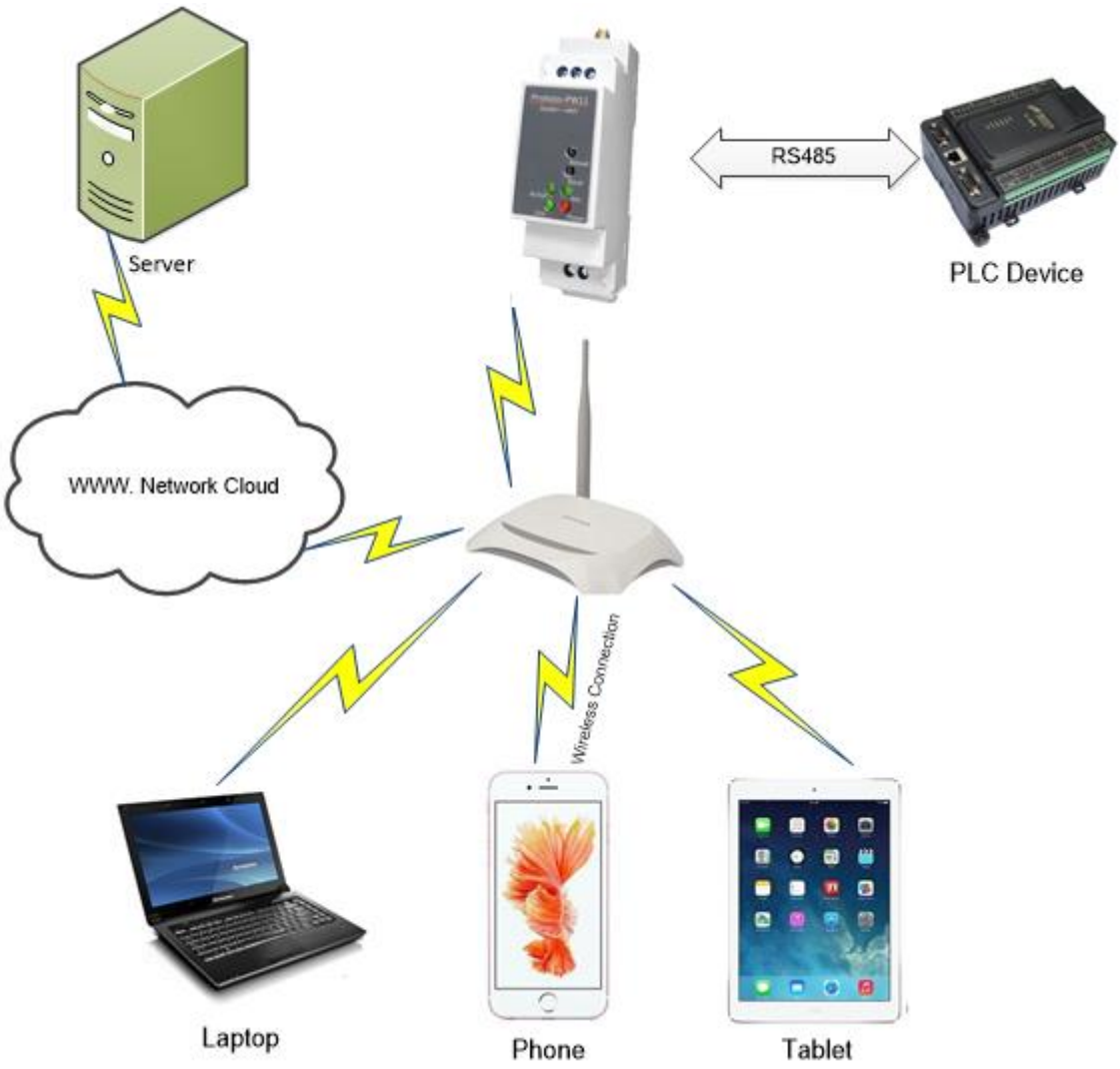



Figure 7. STA Application

### 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:

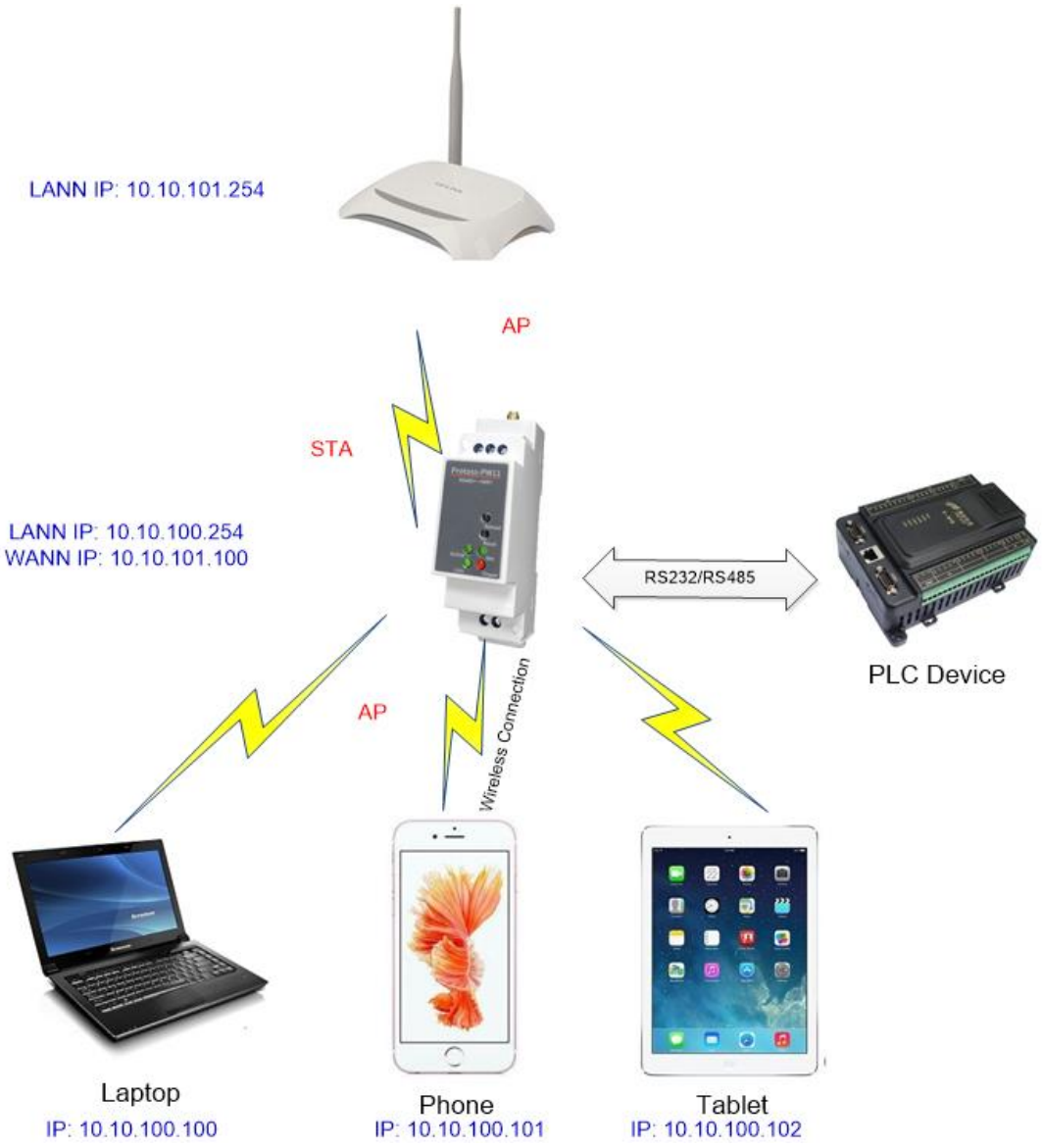



Figure 8. AP+STA Wireless Network

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.

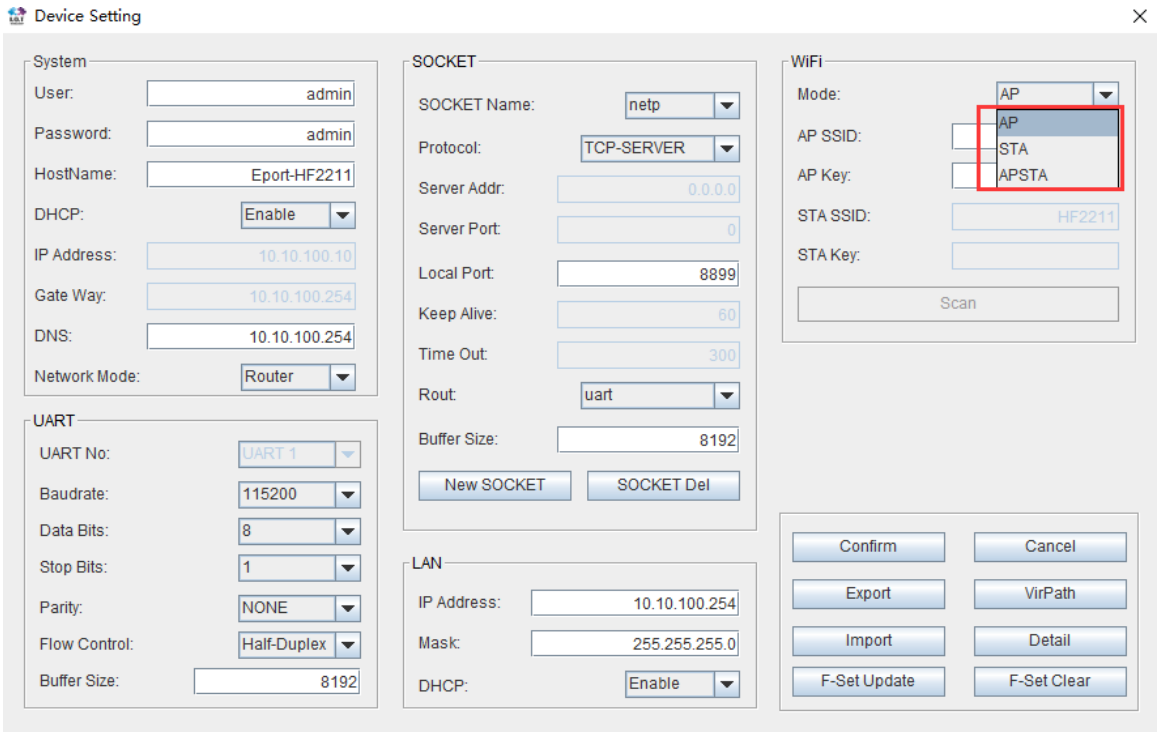
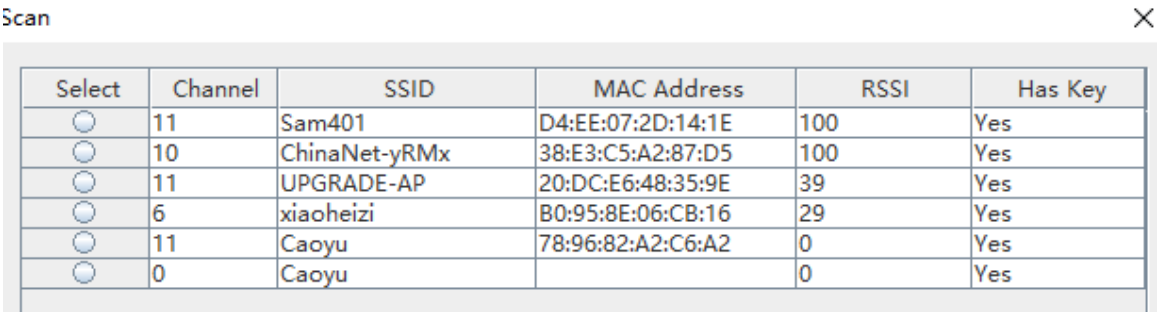



Figure 9. Config Wi-Fi Parameter




| 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.

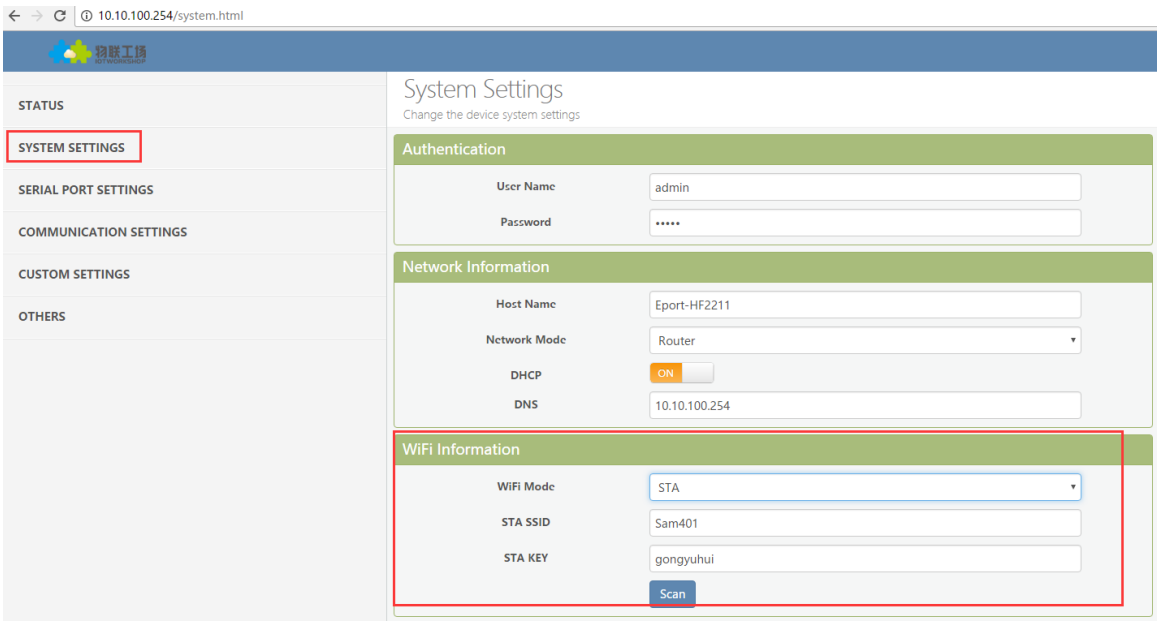
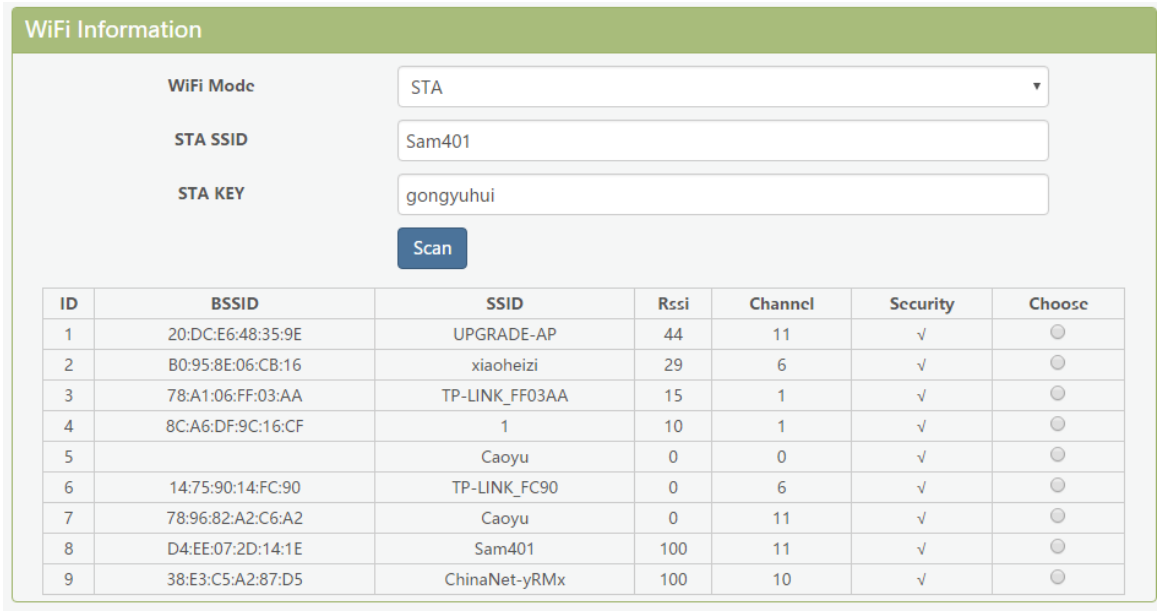



Figure 11. Configure the Wi-Fi Parameter




| 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

---

**Address:** Room 1002,Building 1,No.3000,Longdong Avenue,Pudong New Area,Shanghai,China,201203
**Web:** www.iotworkshop.com or www.hi-flying.com
**Contact:**
Sales: sales@iotworkshop.com
Support: support@iotworkshop.com
Service: service@iotworkshop.com
Business: business@iotworkshop.com

---

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

## <END OF DOCUMENT>