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# PD9W

# CONVERTER OF RS-485 TO WI-FI/ETHERNET INTERFACE

**SUBJECT TO CHANGE WITHOUT NOTICE**
This datasheet superseded all previous versions – please keep for future reference

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# Features

Support WIFI@2.4GHz 802.11b/g/n wireless standards.
Support TCP Server/TCP Client/UDP Server/UDP Client/HTTP Client mode.
Support AP, STA, AP+STA.
Support RS232 and RS485 serial ports.
Support electrostatic protection.
Support identity packet function.
Support heartbeat packet function.
Support Websocket function.
Support timeout reset function, timing reset function.
Support Web Server, setup software.
Support hardware reset.

# 1.Get Start

## 1.1.Application Diagram




**Figure 1 Application diagram**

## 1.2.Hardware

### 1.2.1.LED




| LED | Description |
|---|---|
| Power | Power LED will light after powering the module successfully |
| Work | Work LED will blink every two seconds if module works normally. |
| Link | Link LED will light after module establishing WIFI connection |
| TXD | TXD LED will blink when module sends data from serial side |
| RXD | RXD LED will blink when module's serial side receives data |

**Figure 2 LED**

## 1.2.2.Interface

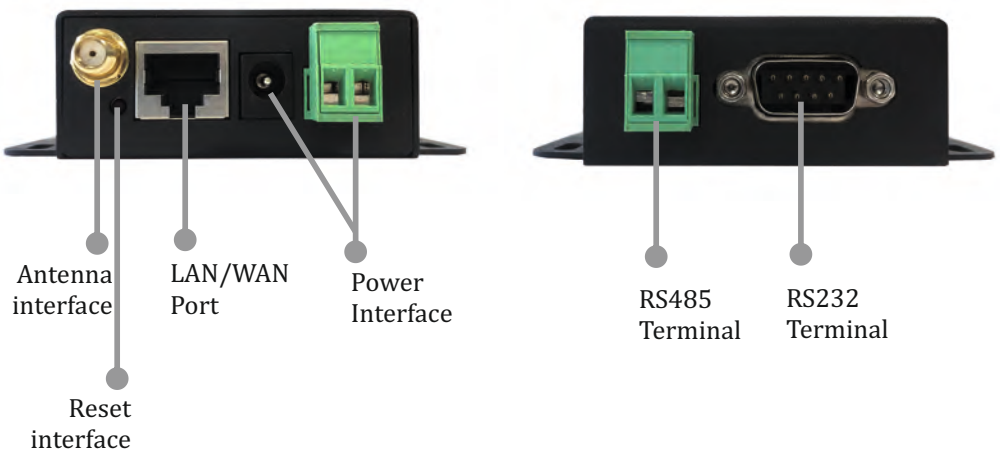



**Figure 3 Interface**

## 1.2.3.Dimension

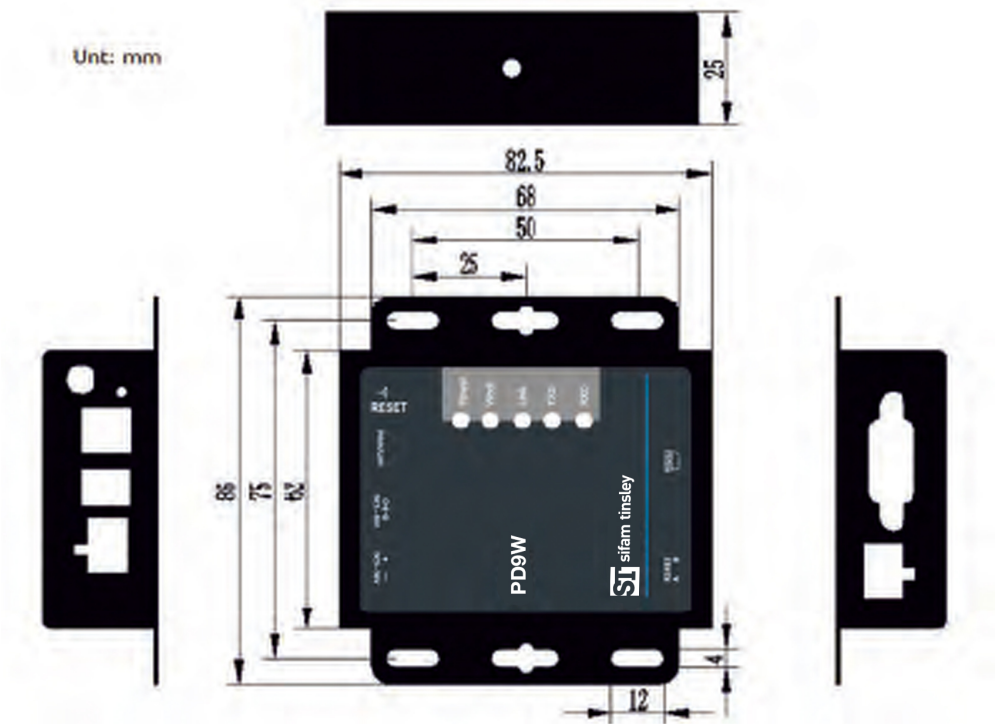



**Figure 4 Dimension**

# 2.Networking application

PD9W supports two wireless interface: one STA interface and one AP interface. And PD9W also supports one 100M Ethernet interface.

AP: Access point, central node of a wireless network. In general, wireless router is an AP and other wireless terminal can connect to each others through AP.

STA: Station, terminal of a wireless network. Such as PDA, mobile phone.

## 2.1.Wireless networking

When PD9W works in STA mode, PD9W will adjust own channel to be same as AP's channel which PD9W want to connect to. And when PD9W works in AP mode, user can configure PD9W to automatically choose channel and PD9W will choose a channel according to surrounding environment.

### 2.1.1.AP mode

User can connect own devices as STA devices such as PC/PAD/phone to PD9W works in AP mode directly to realize data transmission. After establishing connection successfully, user can enter PD9W Web Server to configure the PD9W. User can also connect serial devices to PD9W through RS232 or RS485 interface.

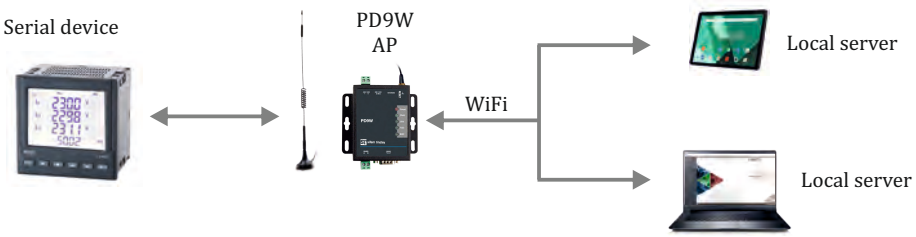



**Figure 5 AP mode**

### 2.1.2.STA mode

PD9W works in STA mode can connect to an AP to realize communication with other devices which connect to same AP. And if this AP has connected to internet, PD9W can also access internet.

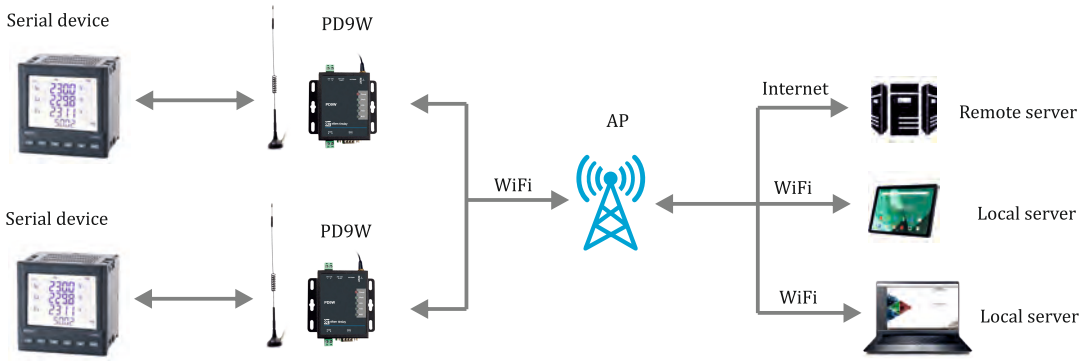



**Figure 6 STA mode**

### 2.1.3.AP+STA mode

PD9W supports AP+STA mode which can enable an AP interface and a STA interface simultaneously. PD9W's STA interface can connect to an AP and AP interface can be connected by STA devices.

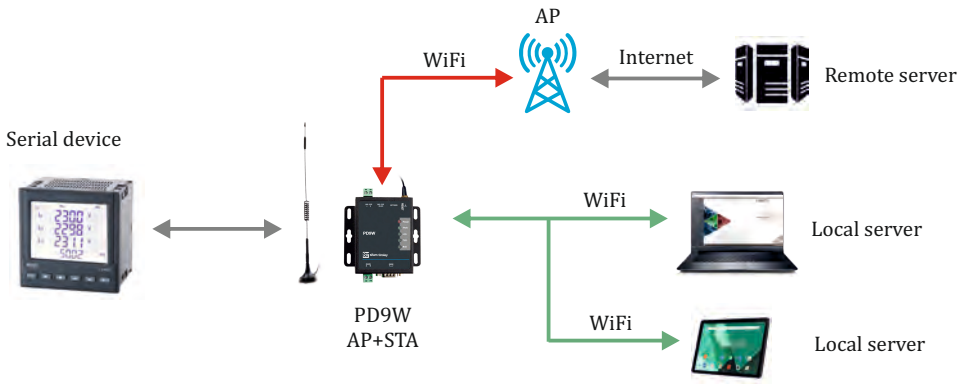



**Figure 7 AP+STA mode**

## 2.1.4.AP, STA application

User can configure two PD9W one as AP and another as STA, then connect PD9W in STA mode to PD9W in AP mode to realize AP, STA application.

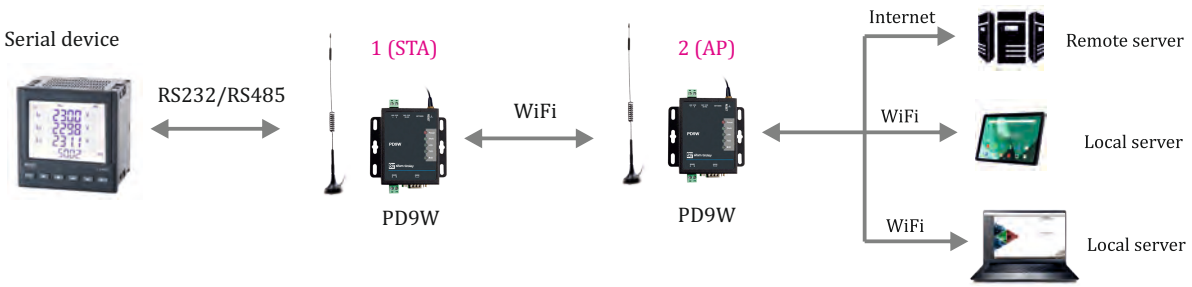



**Figure 8 AP, STA application**

## 2.1.5.Encryption mode

Encryption can make sure secure data transmission and improve communication security. PD9W supports various encryption mode including:

WPA-PSK/TKIP
WPA-PSK/AES
WPA2-PSK/TKIP
WPA2-PSK/AES
WEP

**Note**: When module adopts WEP encryption mode, HEX format is 10 bytes or 26 bytes password and ASCII format is 5 bytes or 13 bytes password; when module adopts WPA-PSK and WPA2-PSK encryption mode, password is at least 8 bytes.

## 2.2.Wired networking

## 2.2.1.AP+LAN

When PD9W works in AP mode, other STA devices can connect to PD9W through RJ45 or WIFI. In this network,

all devices will be distributed a IP in same network segment with PD9W. Application diagram as follow:

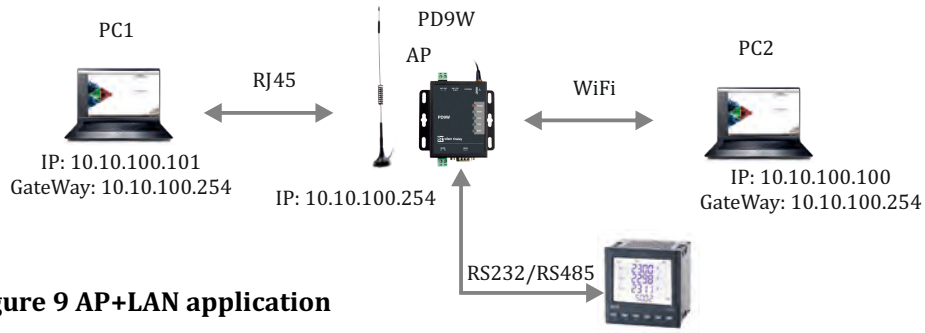



**Figure 9 AP+LAN application**

## 2.2.2.AP+WAN

User can configure PD9W in AP mode and Ethernet interface in WAN interface(enable DHCP) to connect to internet. In this mode, PD9W can work as second grade router and other STA device can connect to PD9W AP interface to access internet.

After PD9W connecting to first grade AP, PD9W can get IP address from first grade AP. And PD9W will distribute IP address to STA devices which connect to PD9W AP interface. Application diagram as follow:

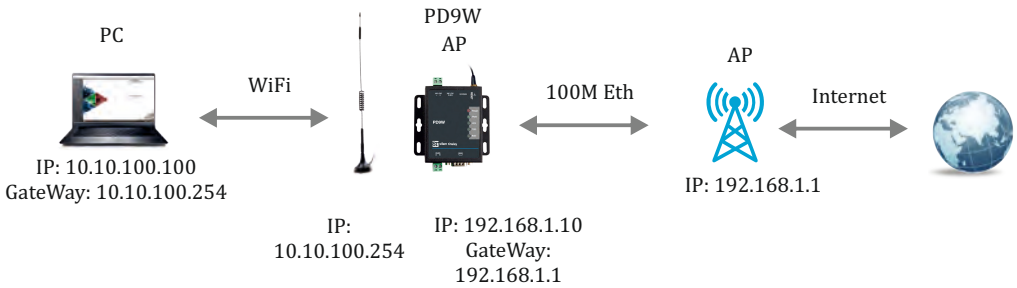



**Figure 10 AP+WAN application**

## 2.2.3.Route mode

PD9W can work in STA mode with N-Ver version to apply route mode. PD9W can get IP address from AP and distribute IP address to device which connect to PD9W through Ethernet interface. Application diagram as follow:

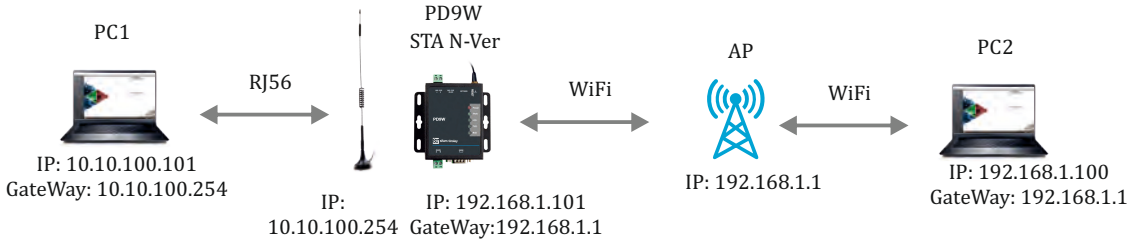
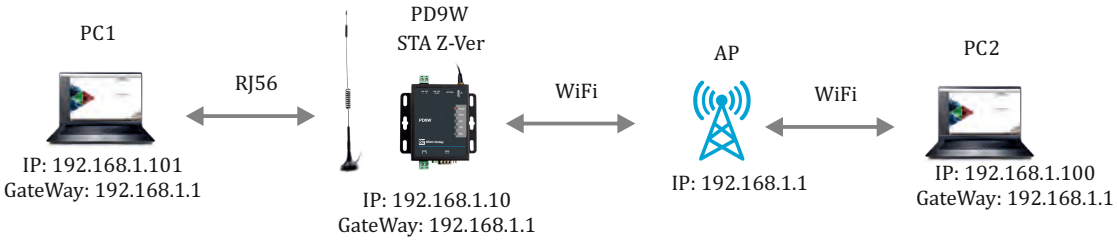



**Figure 11 Route mode**

Note: In above application diagram, PC1 can initiate a connection to PC2 but PC2 can't initiate a connection to PC1.

## 2.2.4.Bridge mode

PD9W can work in STA mode with Z-Ver version to apply bridge mode. After connecting to AP, device which connect to PD9W through Ethernet interface can get IP address from AP. In this whole network, PC1 and PC2 can communicate to each other without limitation. If user want to achieve communicate between PD9W to other devices, user need set LAN interface IP address of PD9W into same network segment as AP. Application diagram as follow:



# 3.Product Functions

## 3.1.Work mode

PD9W supports five work modes: transparent transmission mode, serial port command mode, HTTP Client mode, Modbus TCP<=>Modbus RTU mode and AT command mode. Default work mode of module is transparent transmission mode. User can switch module between transparent transmission mode, serial port command mode, HTTP Client mode and Modbus TCP<=>Modbus RTU mode by Web Server.

### 3.1.1.Transparent transmission mode

In this work mode, PD9W can make a bidirectional connection between serial side and network side. This connection is transparent transmission. Data from serial device can be received in network, and network data can also be sent to serial device. This mode mainly used to realize data transmission between user serial device and fixed server through socket.

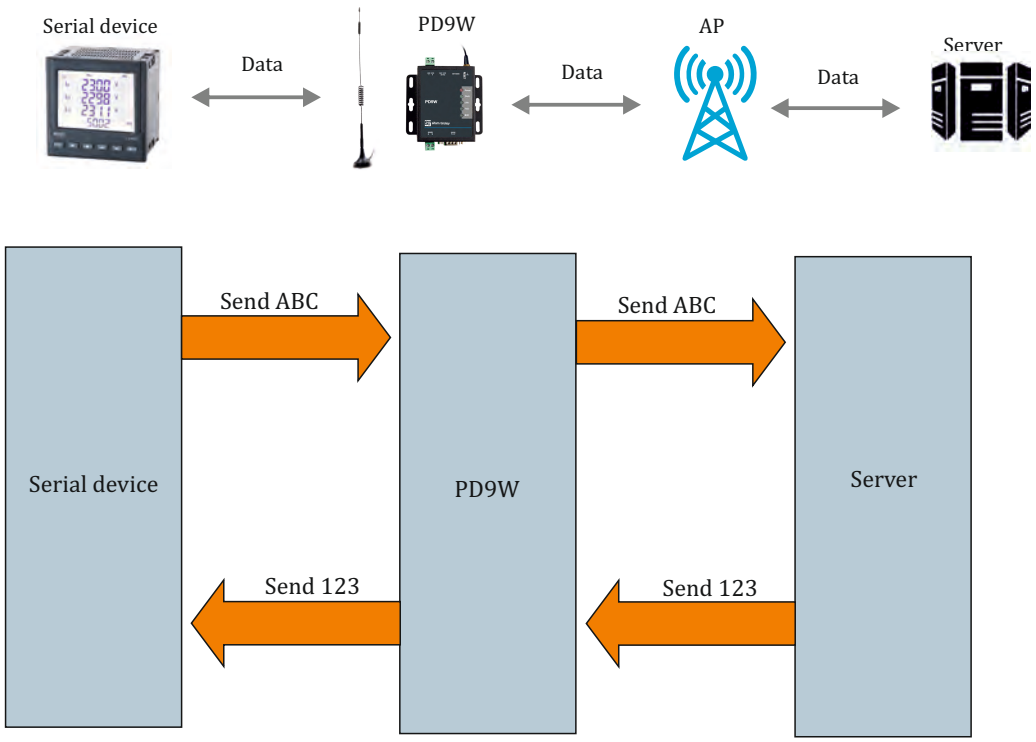



**Figure 12 Transparent transmission mode**

Note:

Socket A supports: TCP Server, TCP Client, UDP Server, UDP Client. Socket A works in TCP Server mode supports at most 24 TCP Client connections.

Socket B supports: TCP Client, UDP Client.

## 3.1.2.Serial port command mode

In this mode, PD9W should works in UDP Client mode or TCP Client mode and user can send data in specified protocol format to different server without resetting.

If user send serial data in specified protocol format from serial device to PD9W, PD9W will parse the data and send data after parsing to appointed server if data format is correct; if data isn't in correct format, PD9W won't send to server side.

Note: serial port command mode is one of transparent transmission mode.

## 3.1.3.HTTP Client mode

In this work mode, user should configure the HTTP URL, HTTP header data, HTTP server address and HTTP server port firstly. Serial data can be packaged into HTTP format and sent to HTTP server through PD9W, HTTP server will also return data to PD9W.

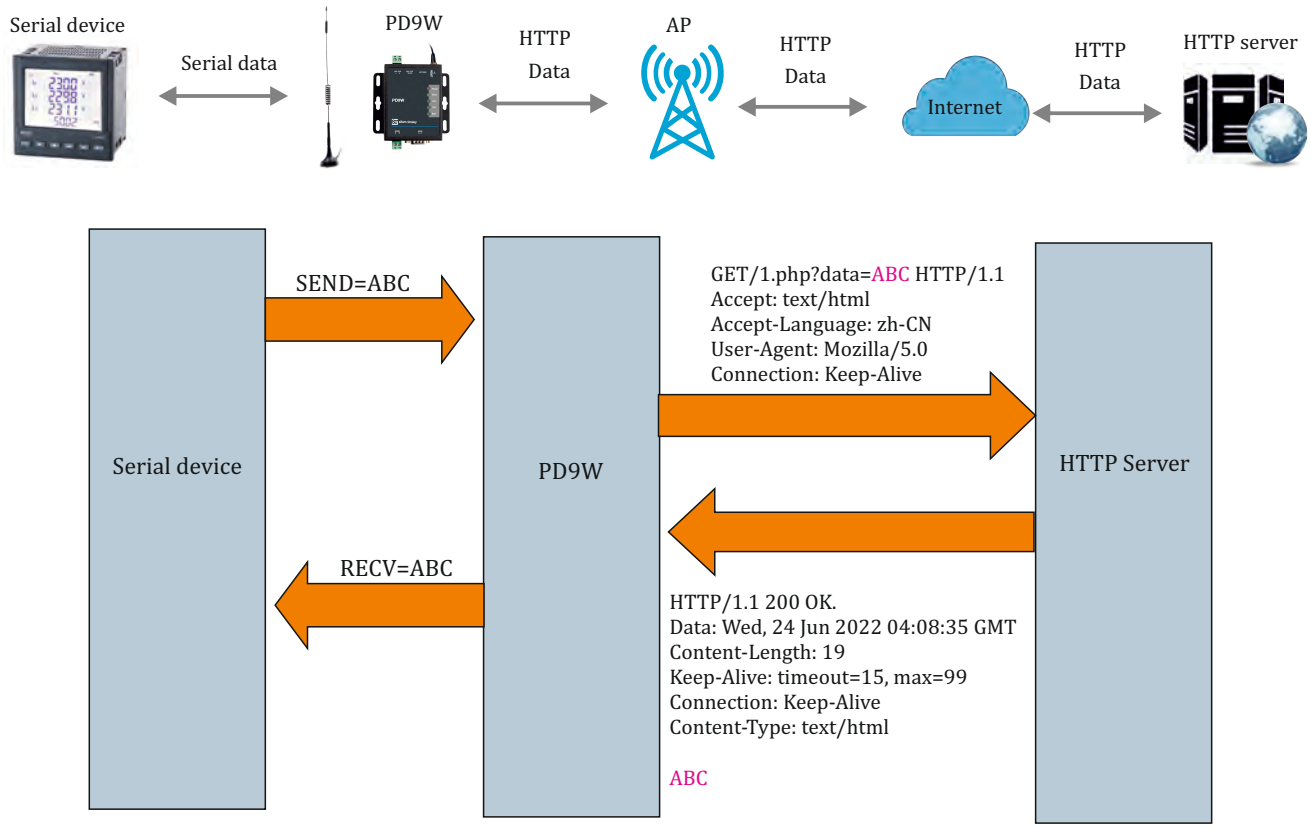



**Figure 13 HTTP Client mode**

## 3.1.4.Modbus TCP<=>Modbus RTU mode

PD9W supports Modbus TCP<=>Modbus RTU mode(doesn't support Modbus ASCII). User just needs to configure PD9W work mode to Modbus TCP<=>Modbus RTU mode and change related parameters(port, remote IP and some other parameters) to correct settings when user wants to use this mode.

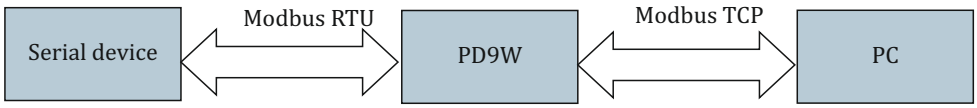



**Figure 14 Modbus TCP<=>Modbus RTU mode**

## 3.2.Serial port

### 3.2.1.Serial port basic parameters

| Parameters | Range | Default |
|---|---|---|
| **Baud Rate** | 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 345600, 460800 | 9600 |
| **Data Bits** | 5, 6, 7, 8 | 8 |
| **Stop Bits** | 1, 2 | 2 |
| **Parity Bits** | None, Odd, Even | None |
| **Flow Control** | NFC: No flow control<br>FC: Hardware flow control | NFC |

**Figure 15 Serial port basic parameters**

### 3.2.2.Serial Free-Frame mode

PD9W will continually check the interval between two adjacent bytes when PD9W receives the data from serial side. If this interval > serial Free-Frame triggering time(Default is 50ms), it will be considered as end of a package and PD9W will send received data as a TCP package data to network. Otherwise PD9W will receive data to 4K bytes and send these 4K bytes as a TCP package data to network.

Suppose n ms is serial package triggering time, if T1>n, T2<n, T3<n, T4<n, T5<n, T6>n, Byte1-Byte5 will be a package.

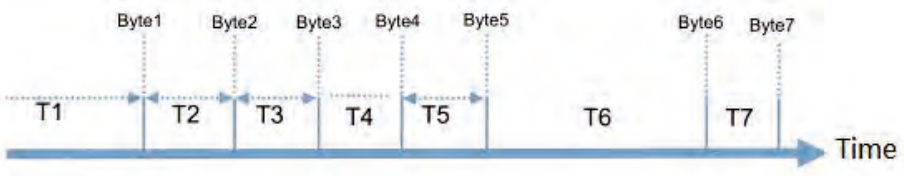



**Figure 16 Serial Free-Frame mode**

### 3.2.3.Serial package method

PD9W supports serial package method(include Time Trigger Mode and Length Trigger Mode) and PD9W will send received data as TCP package data to network if serial data arrive triggering time or triggering length.

### 3.2.4.Baud rate synchronization function

When module works with Lumel software, serial parameters will change dynamically according to network protocol. User can modify serial parameters by sending data conformed to specific protocol via network. It is temporary, after resetting module, the parameters will back to original parameters.

## 3.3.Features

### 3.3.1.Keep-Alive function

PD9W supports Keep-Alive function of TCP connection. PD9W will disconnect to network when network connection exceptions occur and will also reconnect to server after network connection restoring.

### 3.3.2.Heartbeat packet function

Heartbeat packet: In transparent transmission mode, module can output heartbeat packet to serial side or network side periodic. User can configure the heartbeat packet data(less than 40 bytes and in HEX format) and sending interval(1~65535s).

Serial heartbeat packet can be used for polling Modbus data or other querying commands.

Network heartbeat packet can be used for showing connection status and keeping the connection (only take effect in TCP/UDP Client mode). When connection exceptions happen, PD9W can't send heartbeat packet to network server successfully and will reconnect to server after sending unsuccessfully over three times.

### 3.3.3.Websocket function

PD9W supports Websocket server function which can realize real-time communication between serial side and web page and user can use this function in PD9W Web Server(Websocket function occupies PD9W port 8000). Websocket server supports at most 8 client connections simultaneously.

### 3.3.4.Timeout reset function

After enabling timeout reset function in transparent transmission mode, if PD9W has no WIFI connection or has WIFI connection but no data transmission and these two situations last over a setting time, PD9W will reset. This time is range from 60~65535s and default is 3600s.

communicate to each other without limitation. If user want to achieve communicate between PD9W to other devices, user need set LAN interface IP address of PD9W into same network segment as AP. Application diagram as follow:

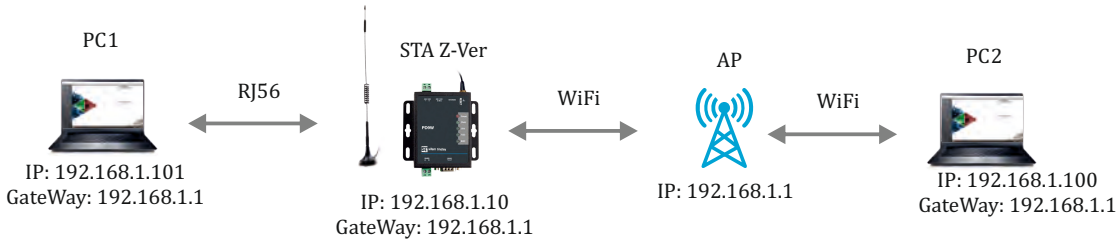



**Figure 17 Bridge mode**

# 4.Parameter configuration

There is one way to configure PD9W via Web Server.

## 4.1.Web Server

User can connect PC to PD9W through AP interface and enter Web Server to configure.

Web Server default parameters as follows:

| Parameter | Default settings |
|---|---|
| SSID | Lumel_PD9W_xxxx (4 bytes MAC address) |
| Web Server IP address | 10.10.100.254 |
| Username | admin |
| Password | admin |

**Figure 18 Web server default parameters**

After firstly connecting PC to PD9W, user can open browser and enter default IP 10.10.100.254 into address bar, then log in username and password, user will enter Web Server.

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