CTC Union Technologies Co., Ltd.

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User Manual

GW211W-MB

Modbus RTU to Modbus TCP Gateway

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Introduction

GW211W-MB RTU/ASCII to TCP Gateway provides the easy way of connecting Modbus Serial devices to Wireless and Ethernet LAN in Modbus TCP and RTU/ASCII networks at the same time. The wireless supports 802.11 b/g/n in AP/Station mode with WEP/WPA/WPA2 encryption for data transmission security. Ethernet support 10/100 Mbps auto-detecting communication speeds. This Gateway is designed to operate 2 Serial ports (RS-232 and RS-422/485 respectively) over wireless and Ethernet network. It allows users to integrate Modbus/RTU and Modbus/ASCII Serial devices to the TCP/IP network-based devices from host to remote site with 8 TCP Masters simultaneously and 32 requests simultaneous per Master.

GW211W-MB 2-Port Modbus RTU/ASCII To Modbus TCP Gateway is a high performance design consisting of carefully selected and qualified components from reliable and certified sources. This operation manual will guide you to configure functions step by step.

The following topics are covered in this chapter:

- **Overview**
- **Package Checklist**
- **Product Features**
- **Hardware Specifications**
- **Web Browser Configurations**

Overview

GW211W-MB 2-Port Modbus RTU/ASCII To Modbus TCP Gateway provides a perfect solution to enable your industrial Serial devices to connect to Internet instantly via Wireless and Ethernet LAN.

GW211W-MB embedded with powerful chipset is the ideal device for transmitting the data from your RS-232 or RS-422/485 Serial interface devices, such as PLCs, various Meters and/or Sensors to an IP-based Wi-Fi LAN, and makes it possible to access Serial interface devices anywhere and anytime via your software.

GW211W-MB provides TCP Server Mode, TCP Client Mode, and UDP Mode for selection. It supports manual configuration via web browser and support various protocols including TCP, IP, UDP, HTTP, DHCP, ICMP, and ARP. These are the best solution to coordinate your Serial interface devices.

Package Checklist

- 1 unit of GW211W-MB Gateway
- 1 unit of Power Adaptor (12V DC, 1A)
- 1 unit of dipole antenna (2.0dBi)

NOTE: Inform your sales representative if any of the above items is missing or damaged.

Product Specifications

System

- ✧ CPU: MT7688AN MIPS CPU, 580 MHz
- ✧ RAM: 128M Bytes DDR2 RAM
- ✧ ROM: 32M Bytes Flash ROM
- ✧ OS: OpenWrt Linux OS
- ✧ TCP to RTU support 8 simultaneous TCP Master, 32 simultaneous requests per Master.
- ✧ RTU to TCP support 8 TCP Slaves on each port.

Ethernet

- ✧ Port Type: RJ-45 Connector
- ✧ Speed: 10 /100 M bps (Auto Detecting)
- ✧ Protocol: ARP, IP, ICMP, UDP, TCP, HTTP, DHCP
- ✧ Protocol: NTP, FTP
- ✧ Mode: TCP Server / TCP Client / UDP
- ✧ Setup: HTTP Browser Setup (IE, Chrome, Firefox)
- ✧ Security: Setup Password
- ✧ Protection: Built-in 1.5KV Magnetic Isolation

WiFi port

- ✧ Support AP / Station
- ✧ Standard: 2.4G IEEE 802.11b/g/n
- ✧ Data Rate: 11/54/72.2 Mbps @ 20Mhz Band Width
- ✧ Modulation: DSSS; OFDM
- ✧ Frequency: 2.4GHz
- ✧ Tx Power 11b: Max. 22dBm
- ✧ Tx Power 11g/n: Max. 19dBm
- ✧ Rx Sensitivity: -76dBm @ 54Mbps; -89.5dBm @ 11Mbps
- ✧ Tx Rate: Max. 54Mbps with auto fallback
- ✧ Tx Distance: Up to 100m
- ✧ Security: WEP 64-bit / 128-bit data encryption, WPA / WPA2 personal
- ✧ Antenna: 2 dBi ; RP-SMA connector
- ✧ Network Mode: Infrastructure; Soft AP (for Setup)
- ✧ Mode: TCP Server / TCP Client / UDP / Virtual Com / Pairing
- ✧ Setup: HTTP Browser Setup (IE, Chrome, Firefox)
- ✧ Security: Login Password

Serial Ports *2

- ✧ Port: RS-232 *1 (RS-232 with RX/TX/GND only)
- ✧ Port: RS-422 / 485 *1 (Surge Protection)
- ✧ Speed: 300 bps ~ 921.6 K bps
- ✧ Parity: None, Odd, Even, Mark, Space
- ✧ Data Bit: 5, 6, 7, 8
- ✧ Stop Bit: 1, 2
- ✧ RS-232 Pins: Rx, Tx, GND
- ✧ RS-422: Rx+, Rx-, Tx+, Tx- (Surge Protection)
- ✧ RS-485: Data+, Data- (Surge Protection)
- ✧ 15KV ESD for all signals

Power

- ✧ DC 9~32 V, 1000mA@12V
- ✧ Support DC Jack & Terminal Block Input
- ✧ Power Consumption: 2W

Mechanical and Environment

- ✧ Operating Temperature: -20°C~70°C
- ✧ Storage Temperature: -25°C~80°C
- ✧ Dimensions: 110mm (W) * 90mm (D) * 26 mm (H)
- ✧ Weight : 110 ± 5gm
- ✧ Housing: plastic

Other Features

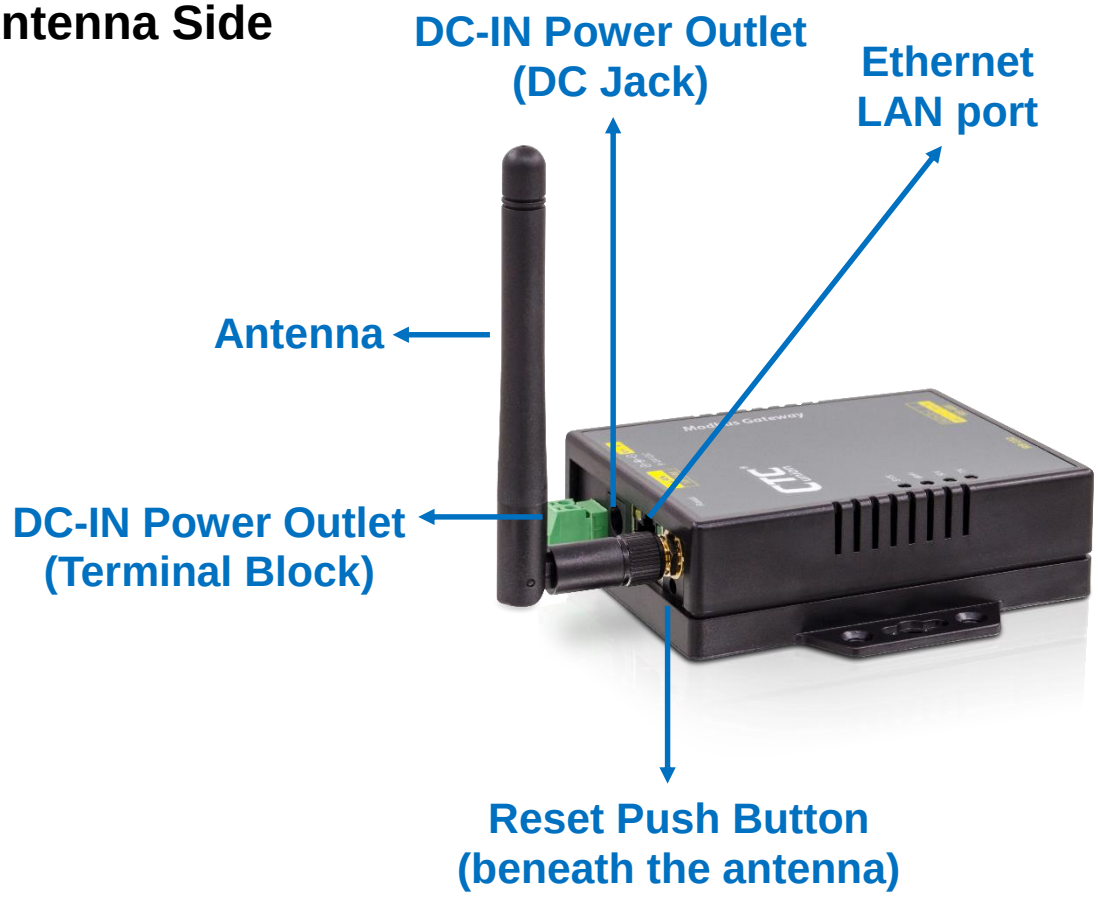
- ✧ LED Indicators: SYS, WiFi, RX, TX, LAN
- ✧ RTC: Real Time Clock
- ✧ Watch Dog Function
- ✧ Software: TCP TO RTU Slave, RTU Master TO TCP Slave, TCP TO ASCII Slave, ASCII Master TO TCP Slave

MTBF (MIL-HDBK-217)

- ✧ 60,000 Hours

Product Panel Views

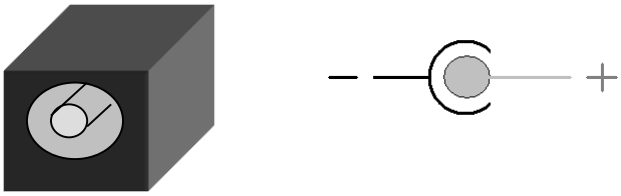
Antenna Side



DC-IN Power Outlet

The Serial to Ethernet+WiFi Converter is powered by a single 12V DC (Inner positive, outer negative) power supply and 1A Current. Connect the power adaptor to the AC power socket and put the DC Jack plug into the outlet of device. The “SYS” green color LED will be ON when power is properly supplied. Terminal Block 2 wires power supply is an option.

DC Power outlet



Reset Button

(1) Press reset key after 5 seconds until SYS LED flash then release the key will reset network default IP and gateway IP back to default. The other parameters keep same as last confirmation.

(2) Press reset key after 5 seconds until both SYS LED and WiFi LED flash then release the key will make all parameters back to factory default.

(3) Press reset key within 5 seconds without LED flash will reboot the equipment. Last configuration no change.

Antenna Connector

The connector for antenna is a standard reverse SMA jack. Simply connect it to a 2.0dBi dipole antenna (Standard Rubber Duck). It is 50 Ohms impedance and can support 2.4GHz frequency.

Ethernet Port

The connector for network is the usual RJ45. Simply connect it to your network switch or Hub. When the connection is made, the green color LED of Ethernet port will blink. When data traffic (Rx/Tx) occurs on the network, yellow color LED will blink during data transferring.

DC-IN Power Outlet

The Device is powered by a 12V DC (Inner positive, outer negative), 1.0A power supply. Plugging the power adaptor to the AC power socket and put the DC Jack plug into the outlet of the Device. The “SYS” green color LED will be ON when power is properly supplied. Terminal Block 2 wires power supply is an option.

Serial Interface Side

Serial Port of RS-232/RS-422/RS-485

Connect the Serial data cable between the device and the Serial interface device. Follow the procedure of web page configuration to set up parameters.

LED Indicators

SYS (Green):
Power indicator. When the power is on, the LED will be on and blink per second.

WiFi (Red):
WiFi indicator. When the WiFi is working, this LED will be blinking.

Tx (Green):
Data sending indicator. When data sends to the device from LAN or WiFi, this LED will blink.

Rx (Red):
Data received indicator. When data sends to the device from Serial ports, this LED will blink.

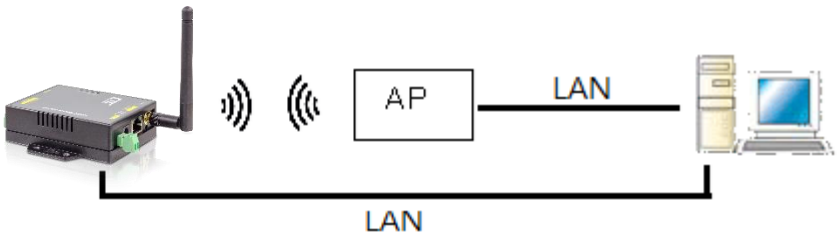
Wiring Architecture

1. RS-232

RS-232 Wiring

Serial Device

DB 9 —————— DB 9



2. RS-422/RS-485

RS-422 Wiring

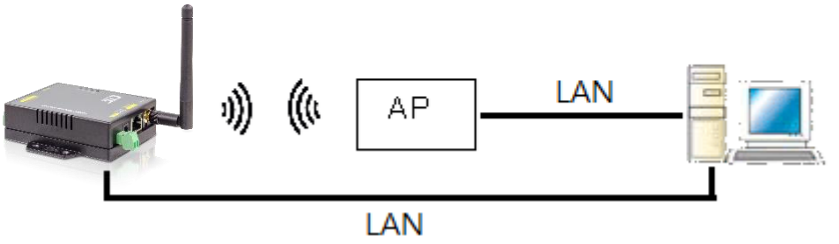
Serial Device

T - —————— R -

T + —————— R +

R - —————— T -

R + —————— T+

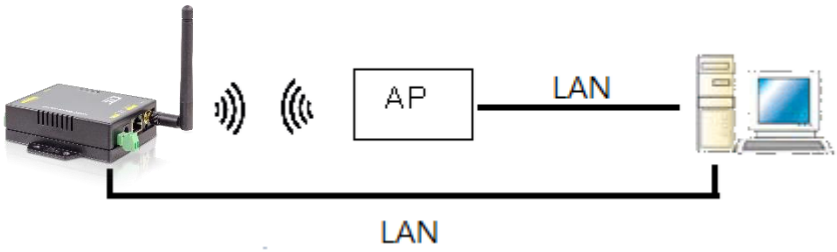


RS-485 Wiring

Serial Device

D + —————— D +

D - —————— D -



When you complete the steps mentioned above, the LED indicators will be lit. This means that the converter is connected and installed correctly. To proceed with the parameters setup, please use a web browser (IE or Chrome) to configure the detailed settings.

Configuration

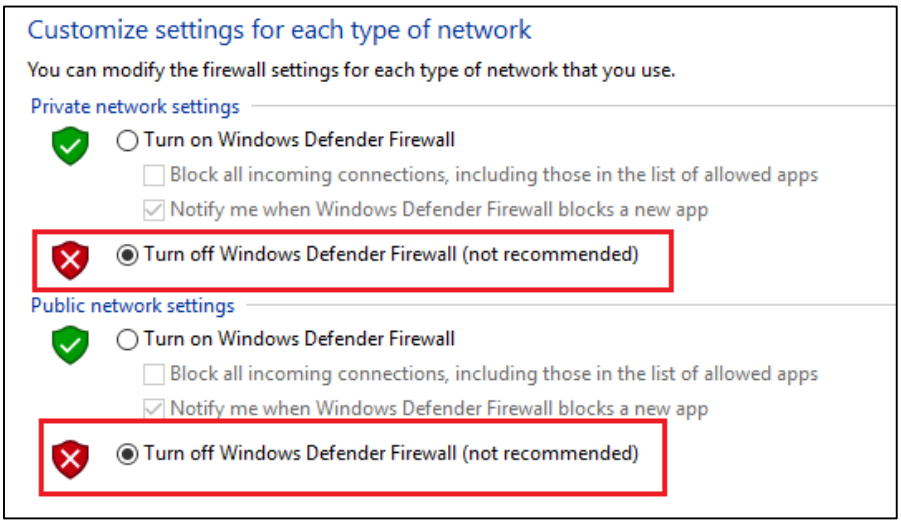
When setting up your Gateway for the first time, the first thing you should do is to configure the IP address. You can use IP Device Search tool to find the IP or simply use the default IP to login to the device.

The following topics are covered in this chapter:

- **IP Search Utility Setup**
- **Web Browser Configuration**

IP Search Utility Setup

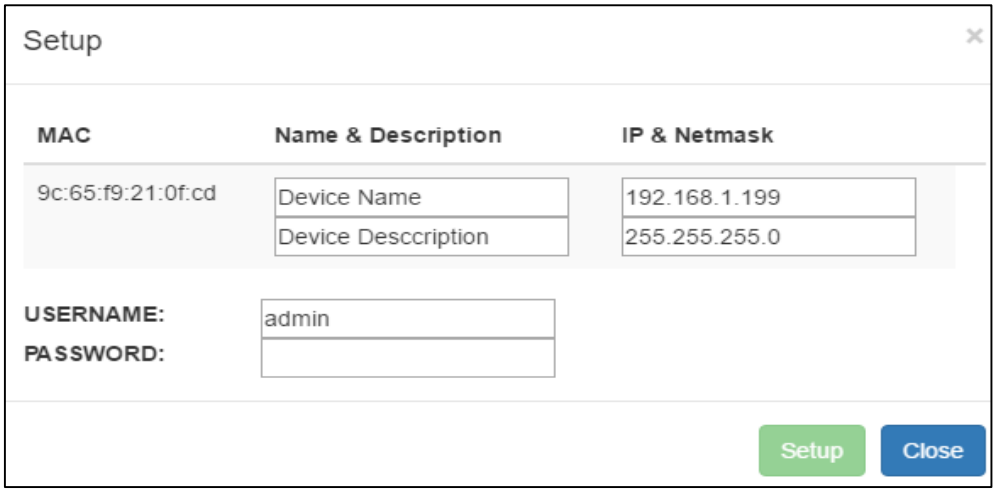
1. Copy  “Device Search Setup” to your host computer.
2. “Device Search” is a self-extract-install program. Double click it to install this Wi-Fi IP Searching tool into host computer.
3. Upon running  IP search tool (Device Search), if a firewall warning pops up, please click to accept the program pass through firewall.



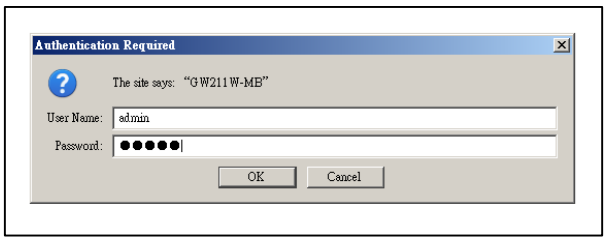
4. “Device Search” will pop up on the screen after installation or you may double click the icon on desk top of host computer to open this tool.

5. Click on “**Find**” button. It will scan the network and show up the IP of Gateway.

6. Click “Setup” button will pop up a window. You may change Name, Description, IP, Netmask of device. Click “Setup” to save setup. The device’s IP must be same subnet with host PC/NB enable to use web browser open configuration page.

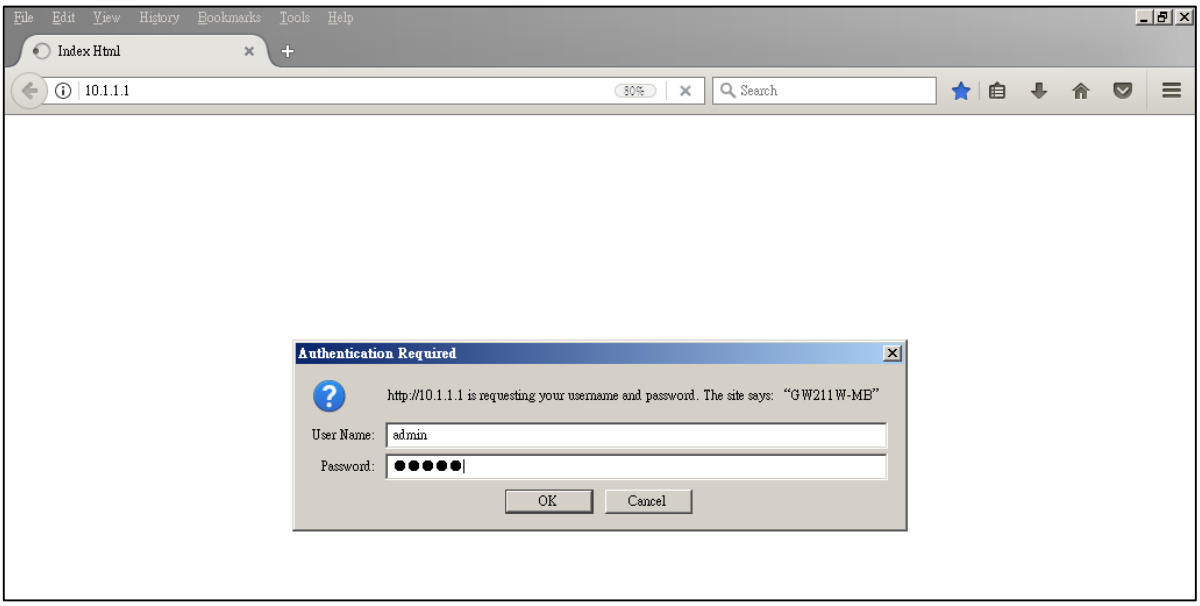


7. Click “Goto” button will open a web page of configuration. (Default Username: **admin**; Default Password: **admin**).

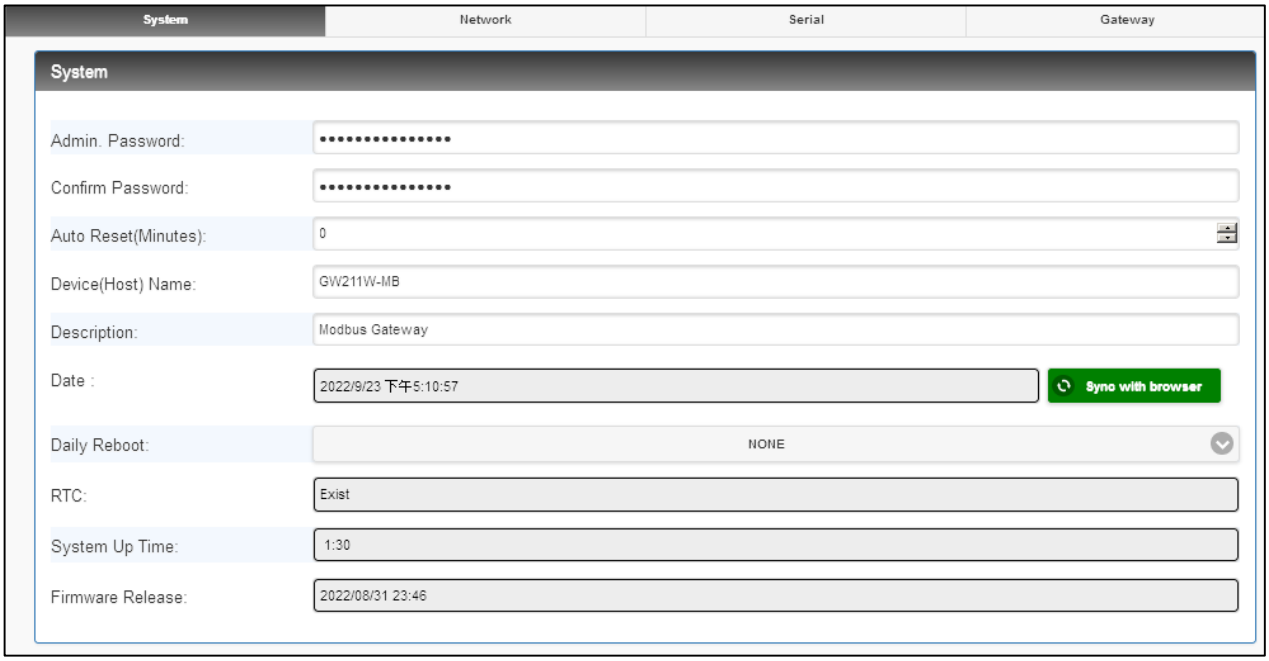


8. You can also use the default IP address (**10.1.1.1**) to login to the configuration webpage with the default Username: **admin** and Password: **admin.**

Note: *The default Ethernet IP address is **10.1.1.1/24**; while, the default WiFi IP address is **10.0.0.1/24**.*

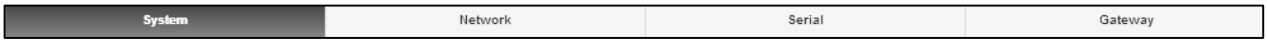


9. When you successfully login to the device, the following main screen will pop up.



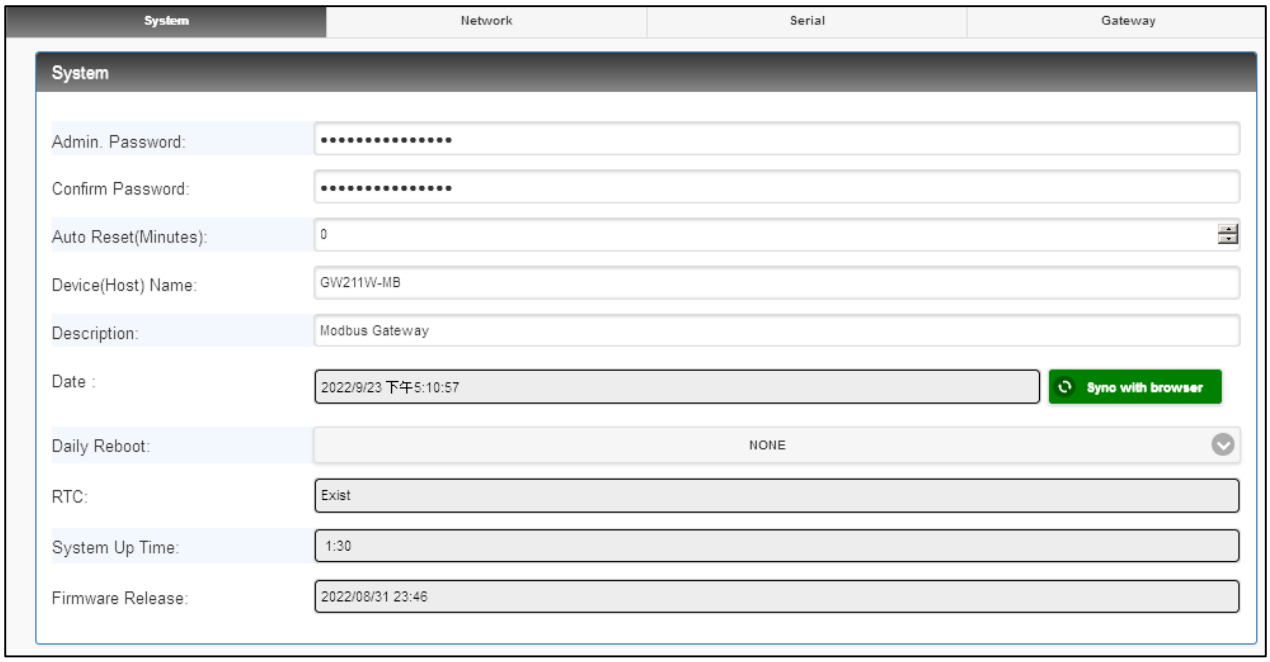
Web Browser Configuration

There are 4 setup pages as “System”, “Network”, “Serial” and “Gateway”.

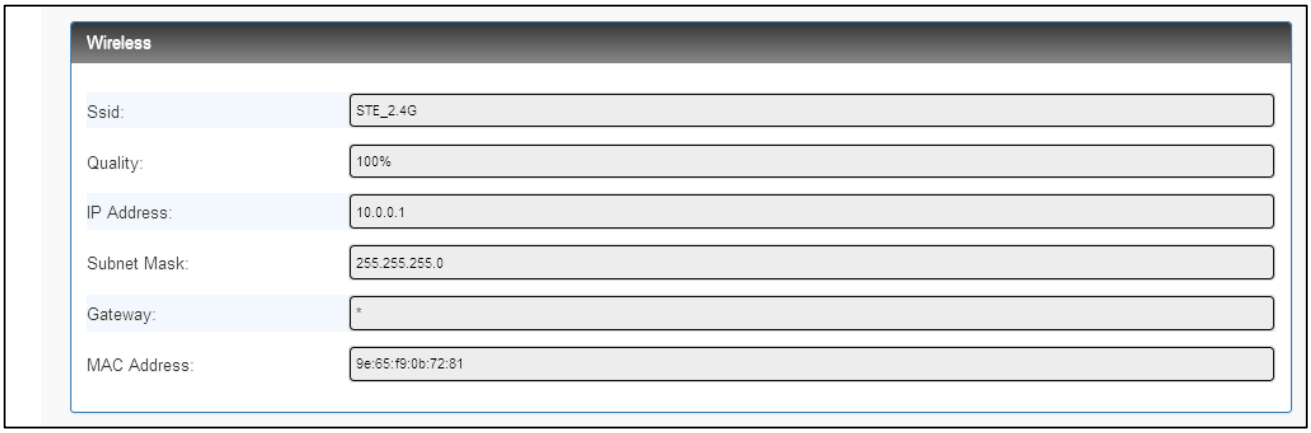


System Setup

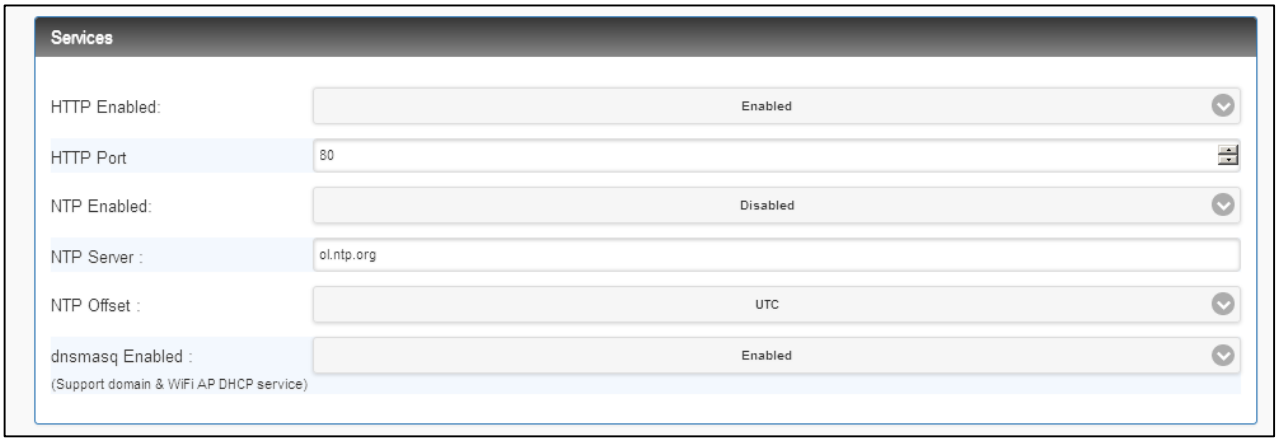
1. System: where you can change Password, set up Auto Reset time and modify Device Name, Description of device.



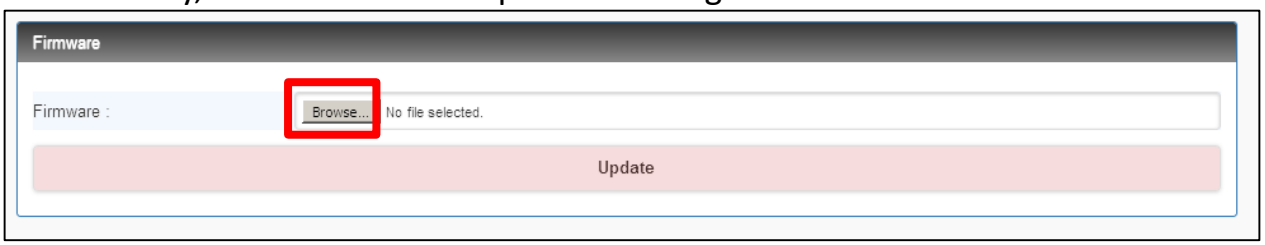
2. Appearance of Wireless and Ethernet setup. Please note that the default WiFi IP address is **10.0.0.1/24** and the default Ethernet IP address is **10.1.1.1/24**.



3. NTP: Enable / Disable NTP function; Set up NTP server and Time Zone.

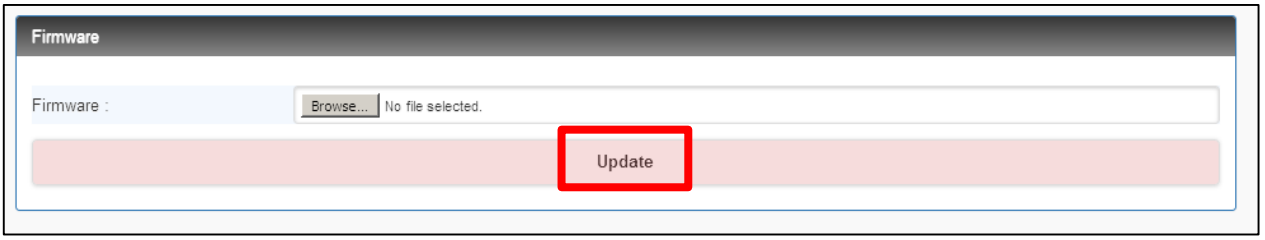


4. Firmware update:
   If necessary, click “Browse” to open file manager.

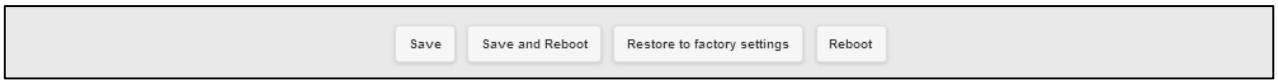


Then, select the file with specified version and click “open” button.

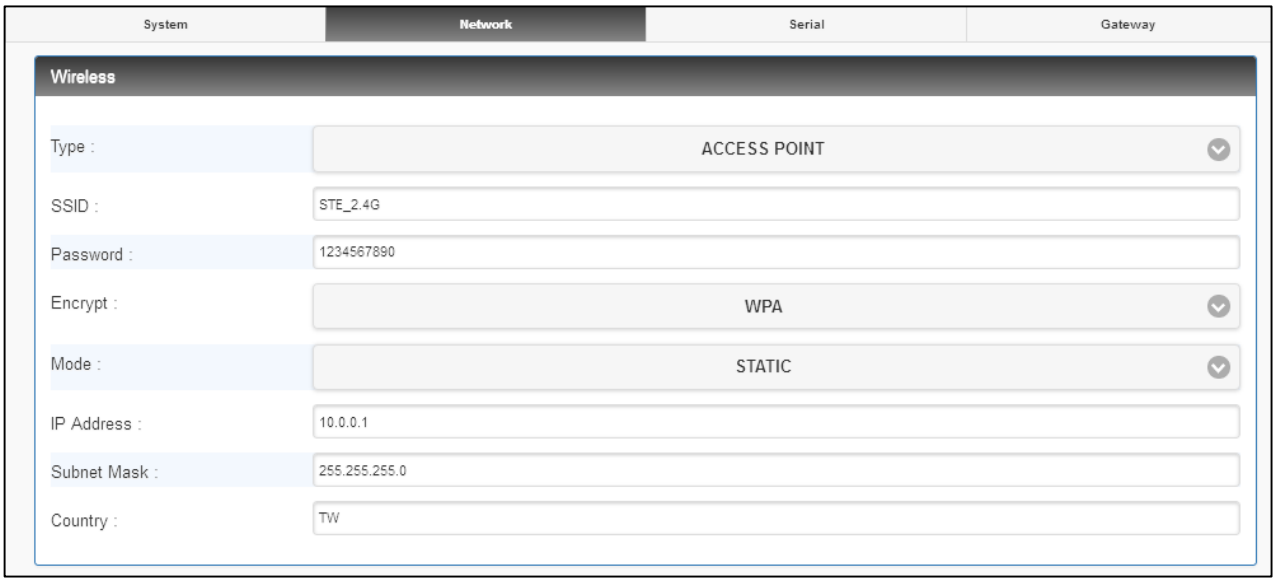
When the selected file name appears on the input column, click “Update” button.



5. Up to now, Setup is successfully configured. Please click “Save” and go to other pages for configuration or click “Save and Restart” to run new configuration.

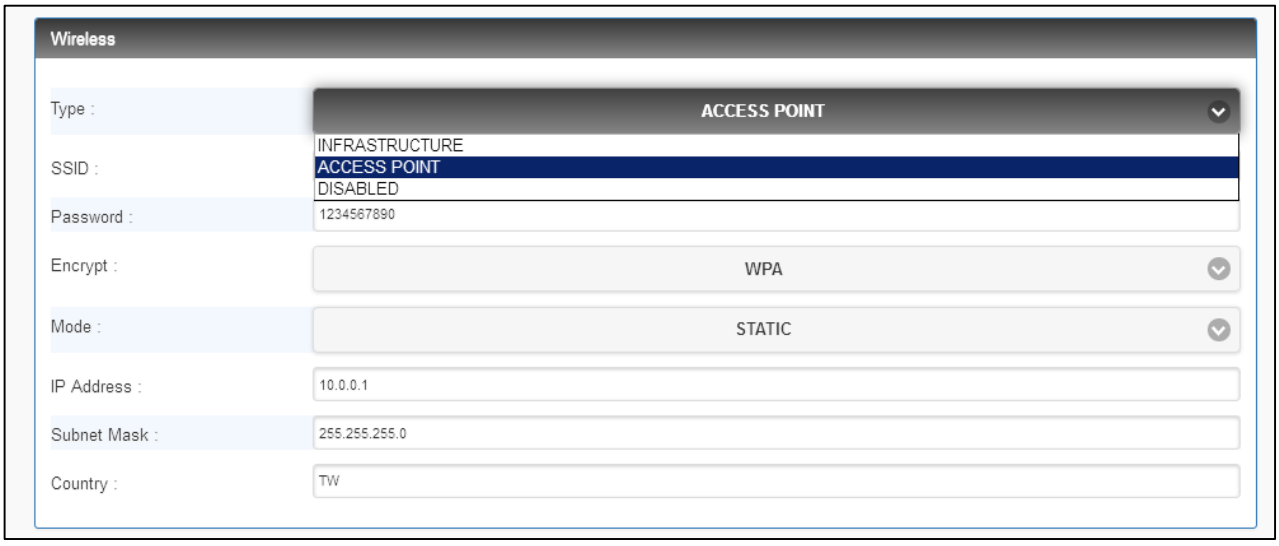


Network Setup

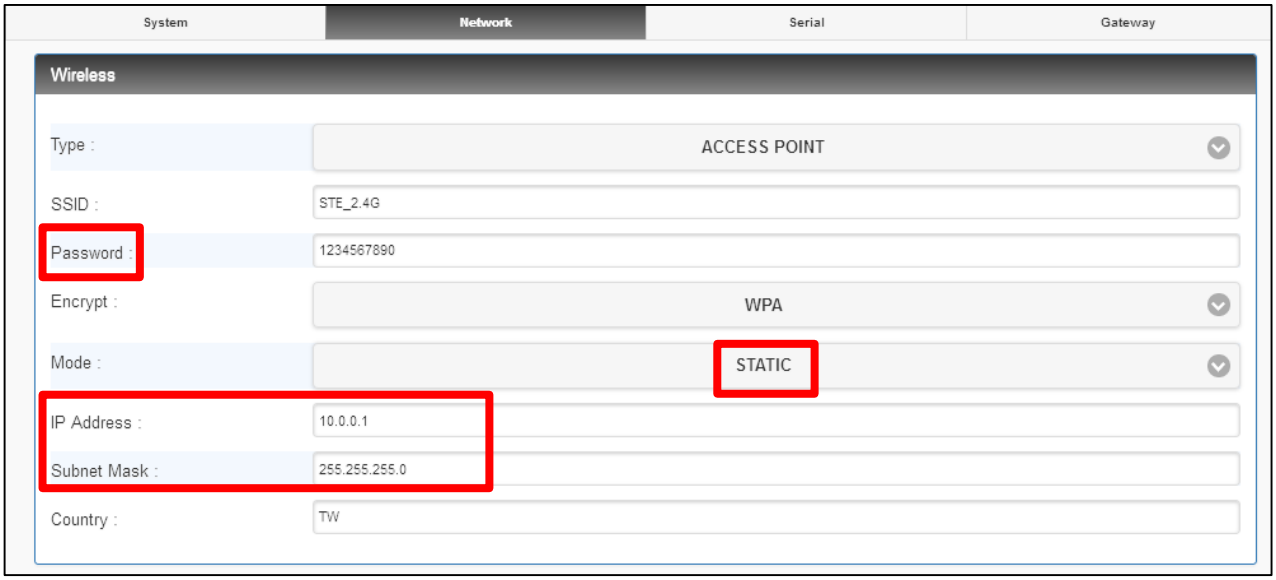


1. Wireless section:

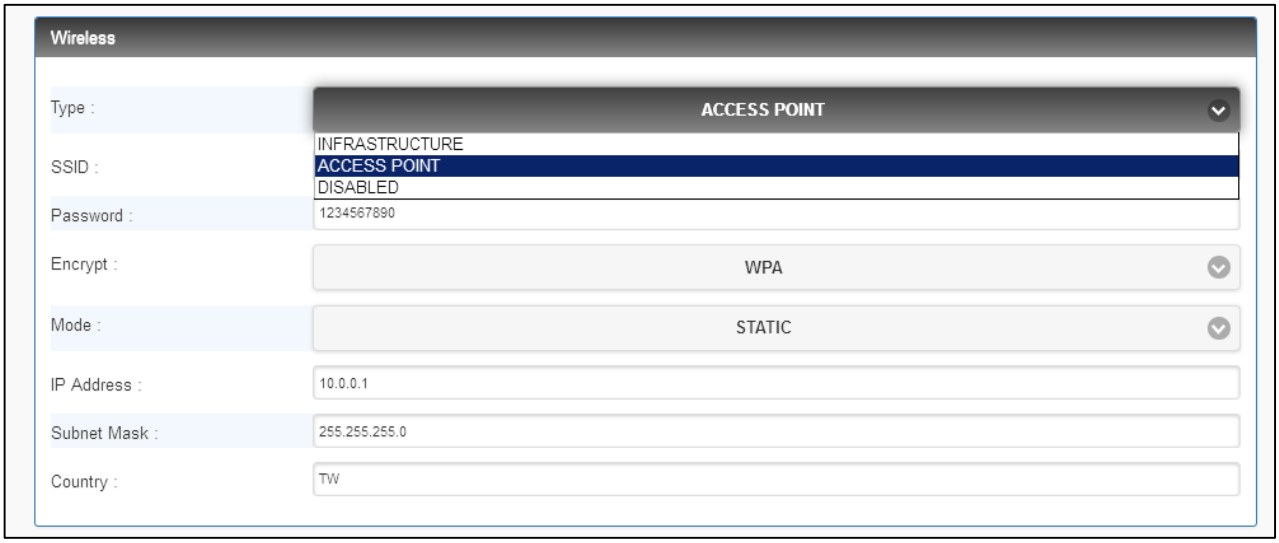
1.1 Type: Click to select “Access Point” or “Infrastructure”. “Infrastructure” is for connecting to a local Router.



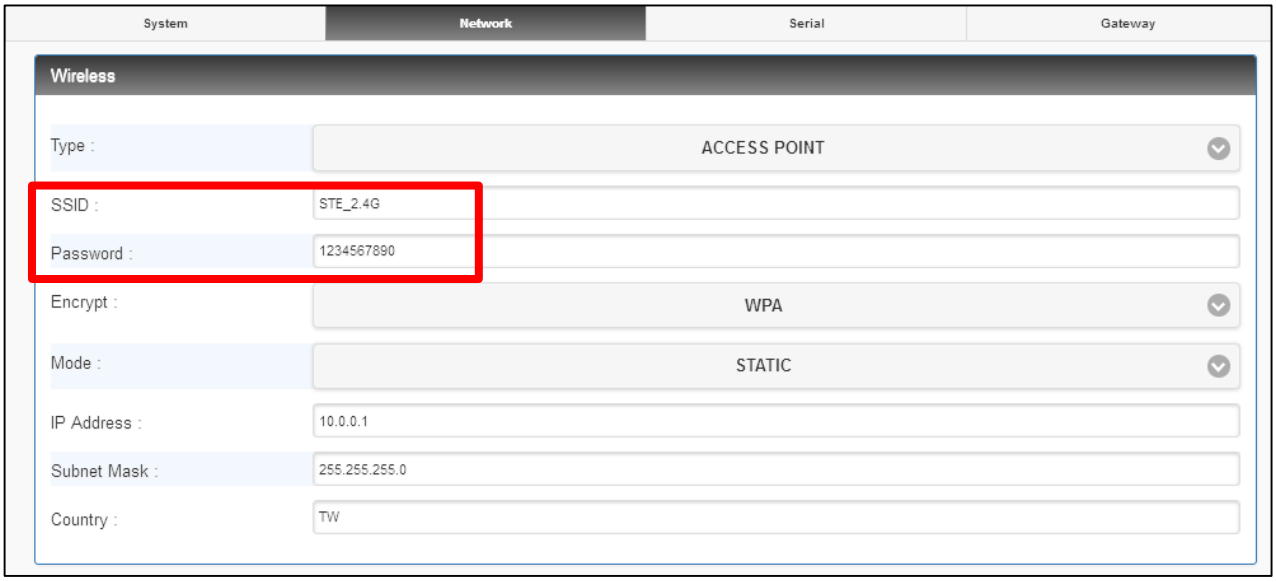
1.2 If “ACCESS POINT” is selected, input password (1234567890) for the AP and assign IP address with “DHCP” or “STATIC”.



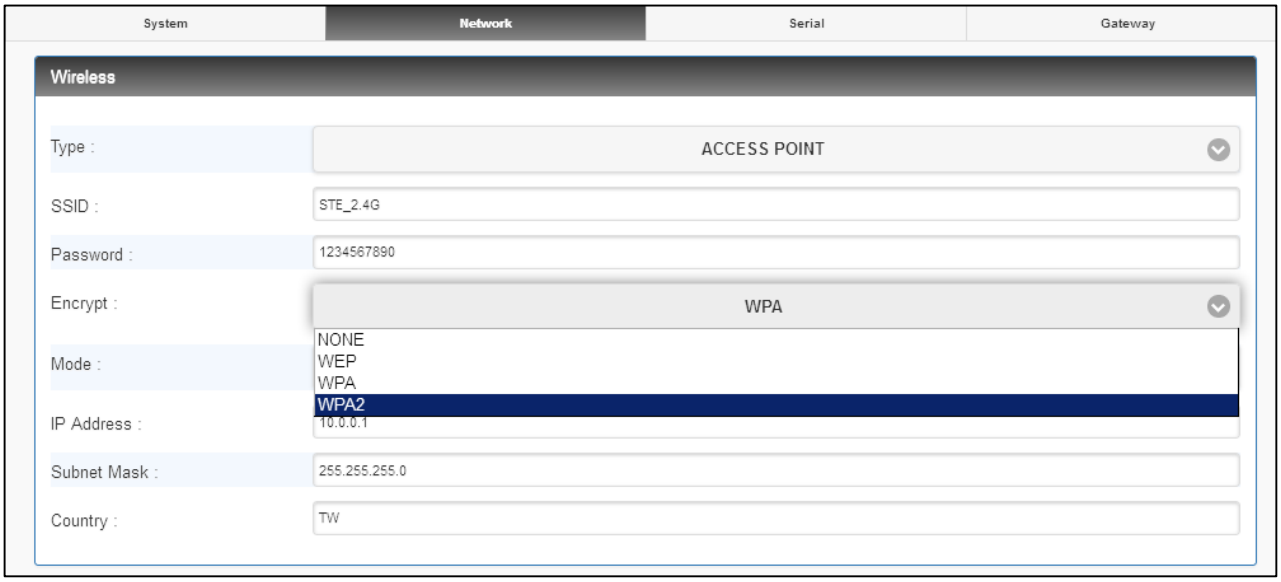
1.3 When “ACCESS POINT” is selected, this Device acts as an Access Point which is allowed to be connected by PC /NB /Smart Phone/ PAD. It supports DHCP server function. Soft AP broadcasts its SSID “STE_2.4G”. PC /NB /Smart Phone/PAD should connect to this SSID and then able to open web browser with default IP of this Device.



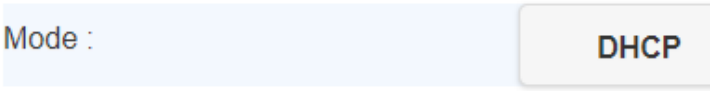
1.4 Password: Key in password for the selected AP.



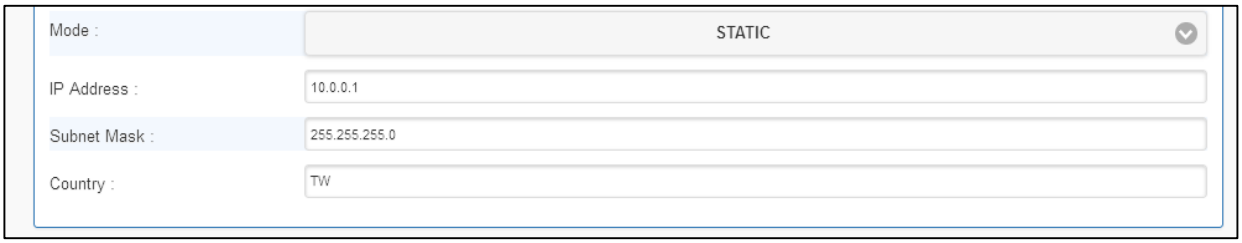
1.5 Encrypt



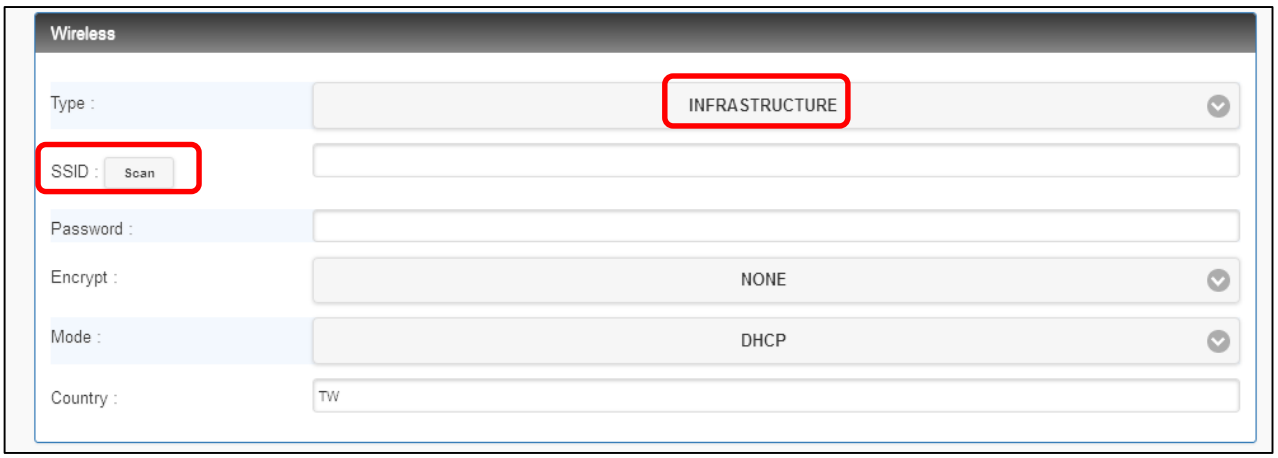
1.6 Mode: select “DHCP” to let AP assign IP address to itself,



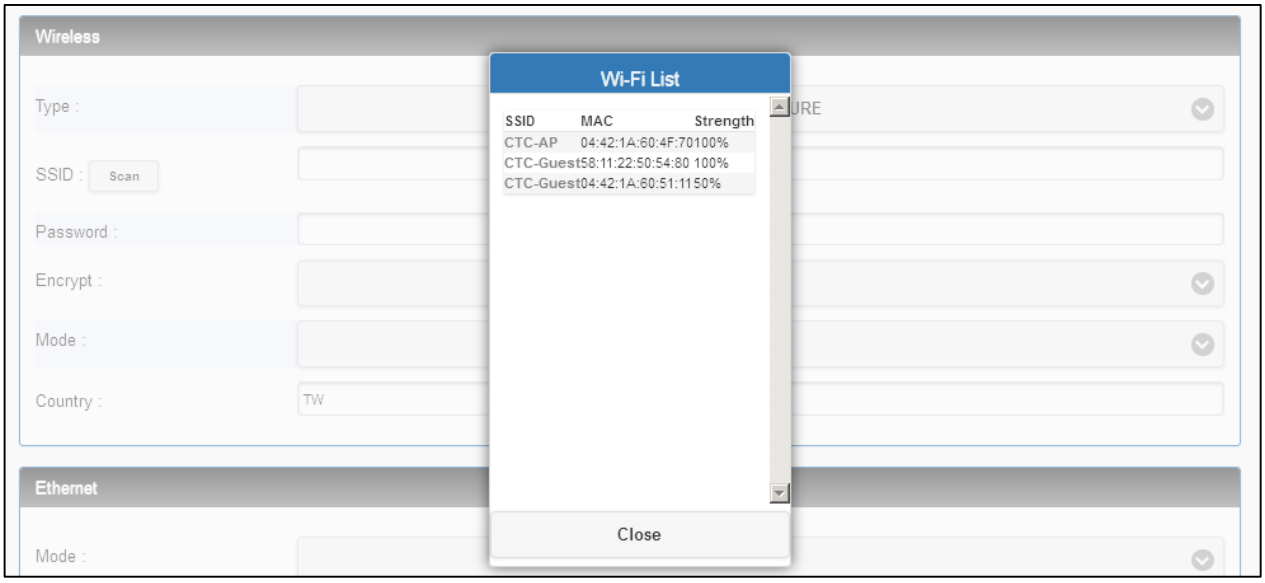
or select “STATIC” to input assigned IP address, Subnet Mask manually.



1.7 If “Infrastructure” type is selected, set SSID of Router and the other inputs.

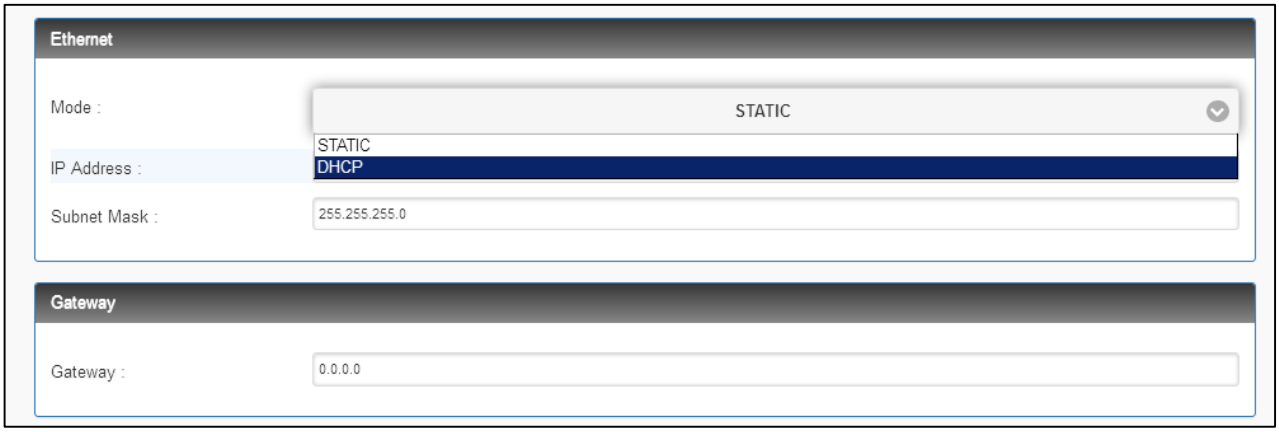


1.8 Go to item SSID, click “Scan” will get list of available SSID of Access Points, select the one in your network to link. For example:

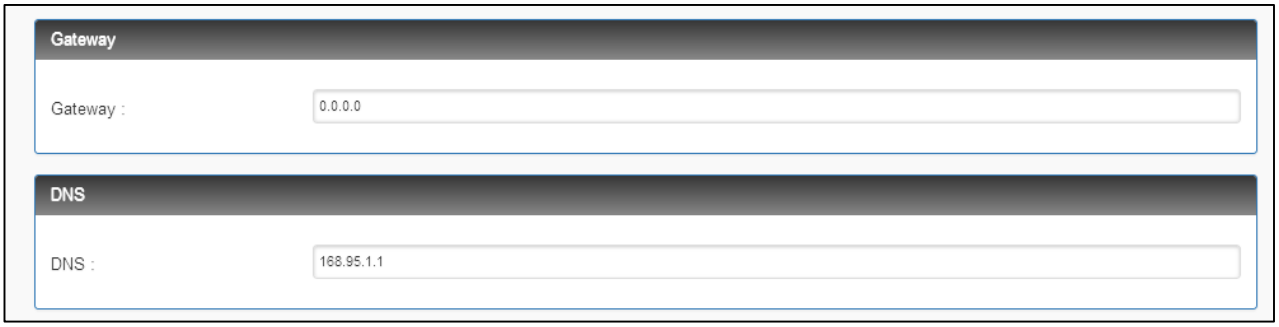


1.9 On the NB/PC, choose same SSID to link. NB/PC must disconnect Ethernet in advance otherwise the data transmission would not work.

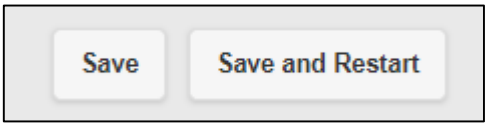
2. Ethernet section: Select “STATIC” or “DHCP” to assign IP address.



3. Gateway and DNS section: check with MIS for right IP address of Ethernet or Wi-Fi. The Gateway must be set with the correct IP enable to connect with other devices.

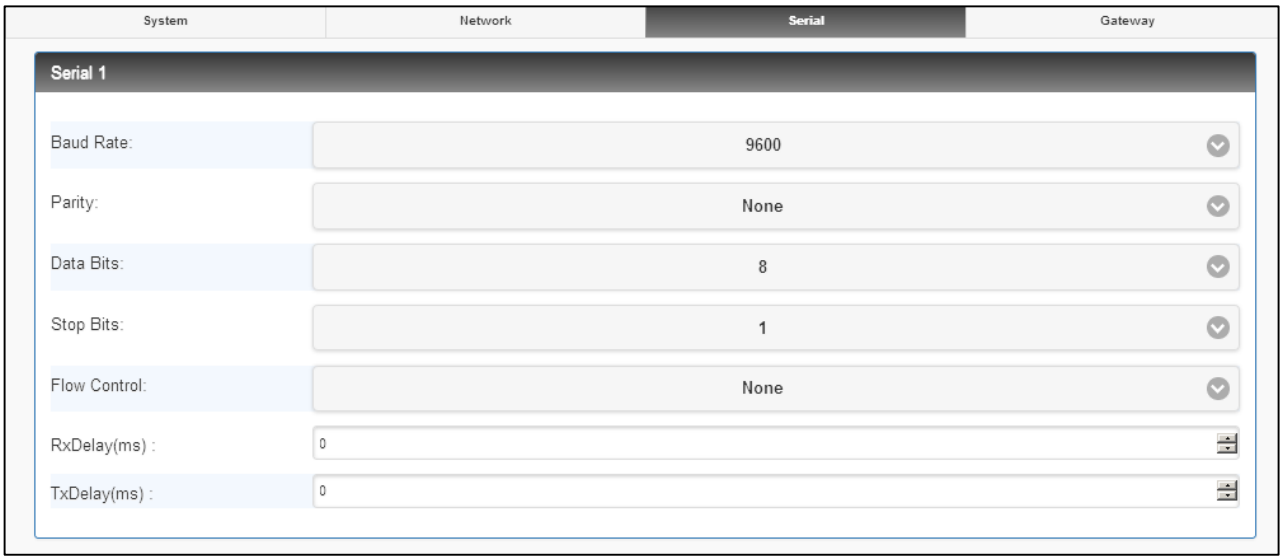


4. Up to now, Setup is successfully configured. Please click “Save” for this page temporarily and go to other pages for configuration or click “Save and Restart” to run this Device with new settings.



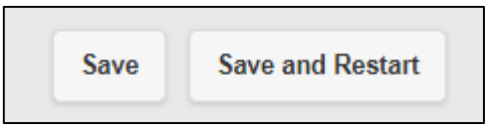
Serial Port Setup

Please clearly set each parameters from Serial 1 to Serial 2 (Default 9600, n, 8, 1).



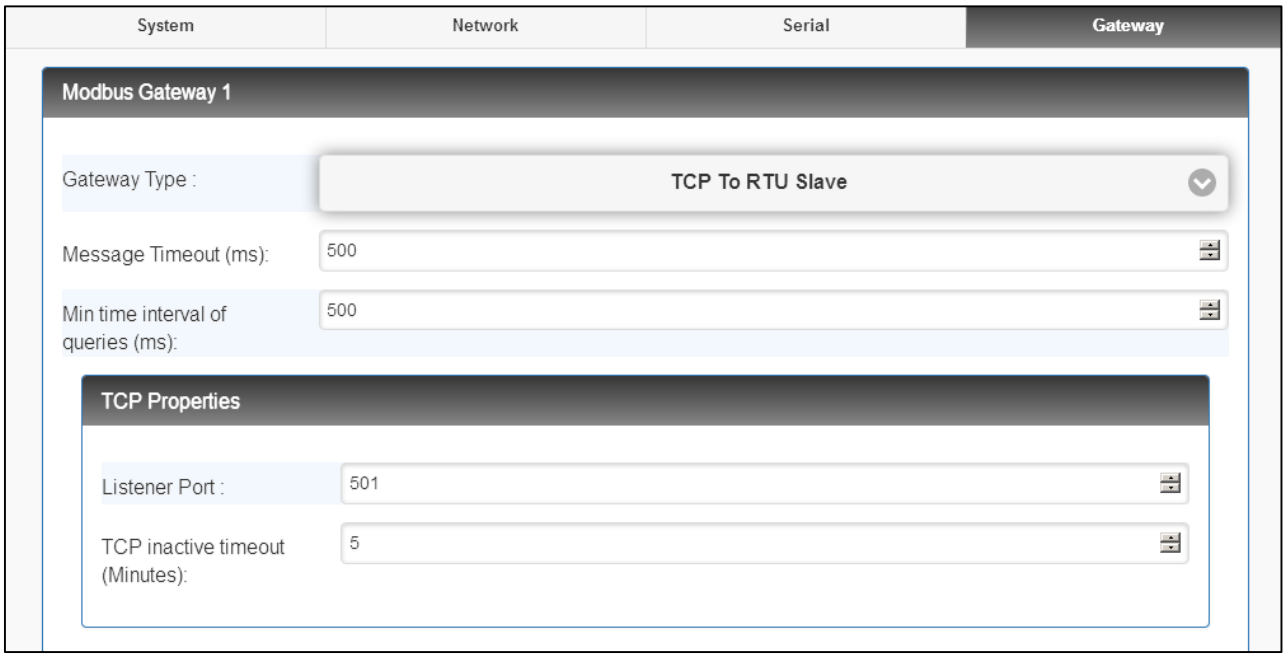
Baud Rate: 300 bps to 921.6K bps
Parity: None, Even, Odd
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 2
Flow Control: None, XON/XOFF
RxDelay(ms)
TxDelay(ms)

Up to now, Setup is successfully configured. Please click “Save” for this page temporarily and go to other pages for configuration or click “Save and Restart” to run this Device with new settings.

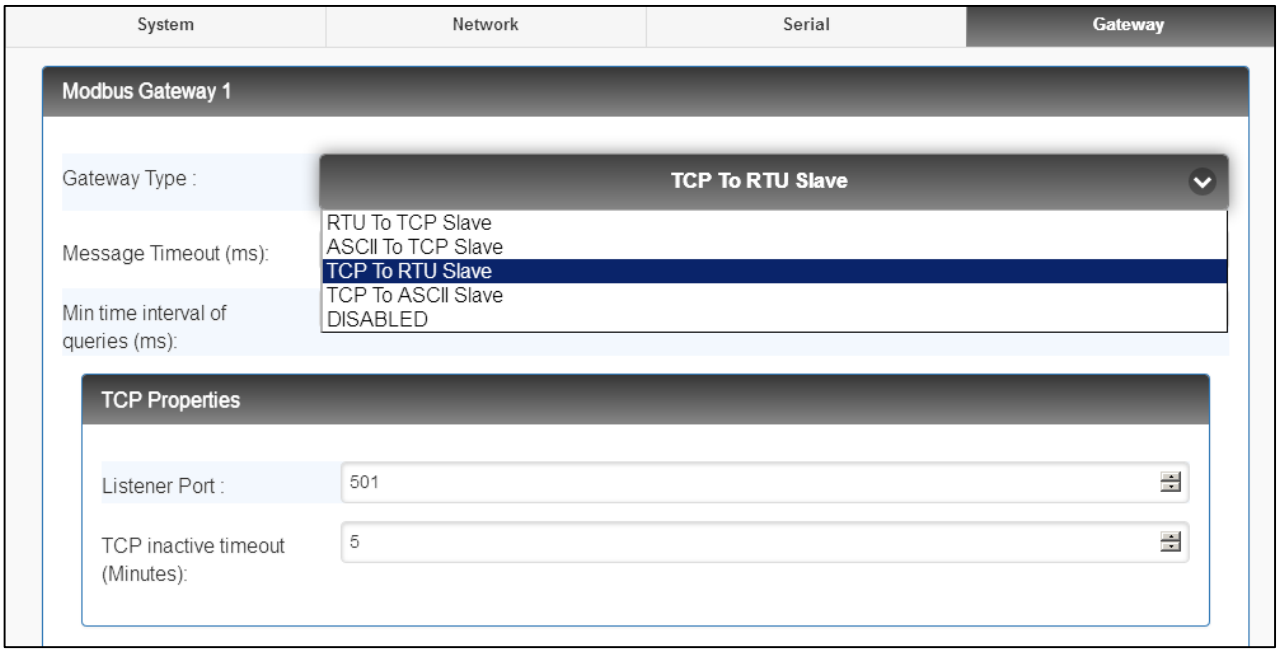


Gateway Setup

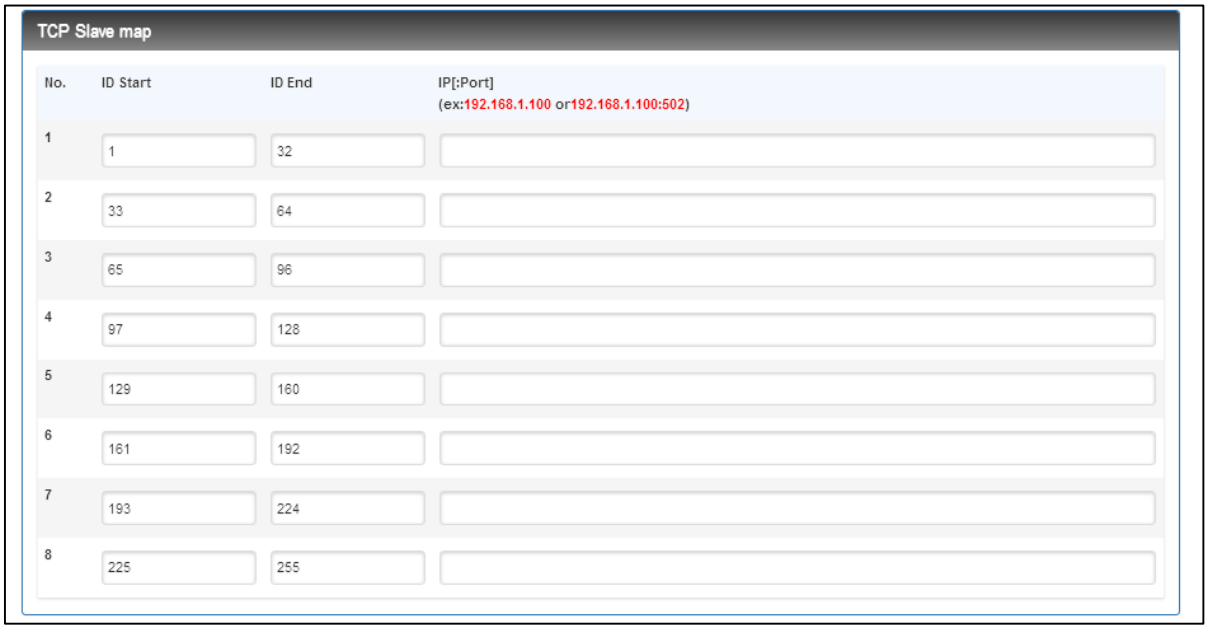
1. There are Modbus Serial" #1 and #2 over TCP/IP.



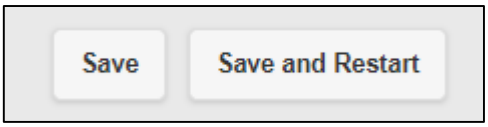
2. Gateway Type: 4 types for selection or to disable this function.



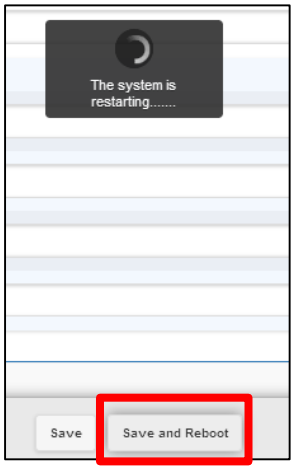
3. For TCP Client, users can set up to 8 clients.



4. Up to now, Setup is successfully configured. Please click “Save” and go to other pages for configuration or click “Save and Restart” to run new configuration.



5. After configuring all parameters, click “Save and Restart” to reboot system.



Testing Verification

After completing the wiring and parameter setting, we should verify if the setting is correct. This chapter will introduce how to use a single computer to test whether the converter work well.

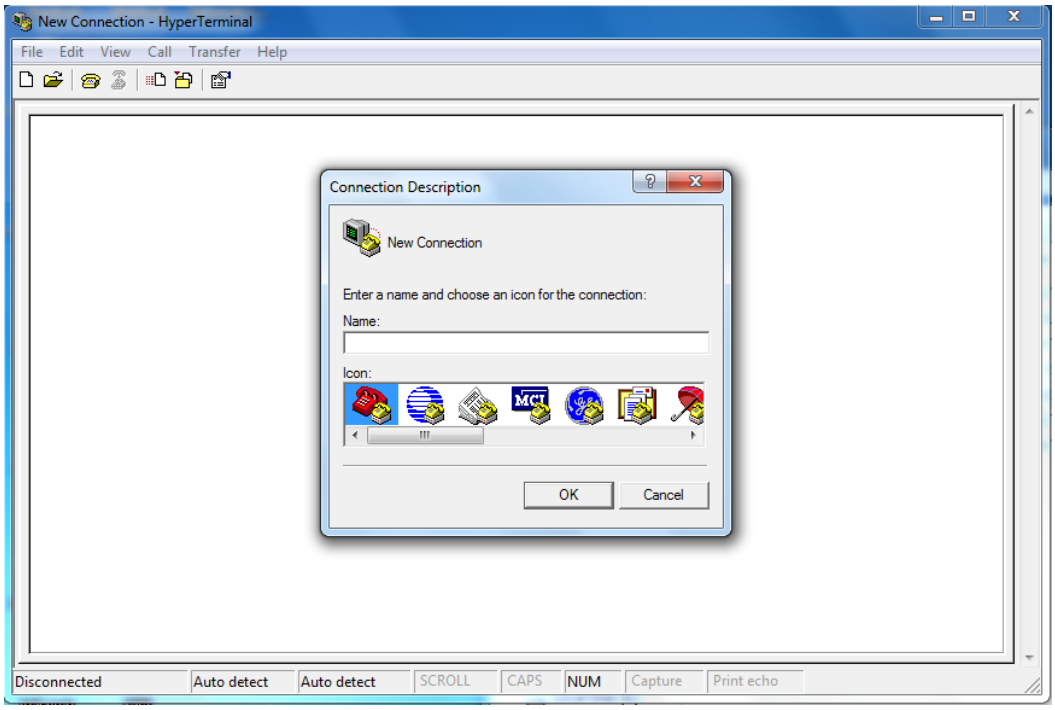
The operating system can be Window 7/8/10. The “Hyper Terminal” utility should be installed on host PC/NB.

The following topics are covered in this chapter:

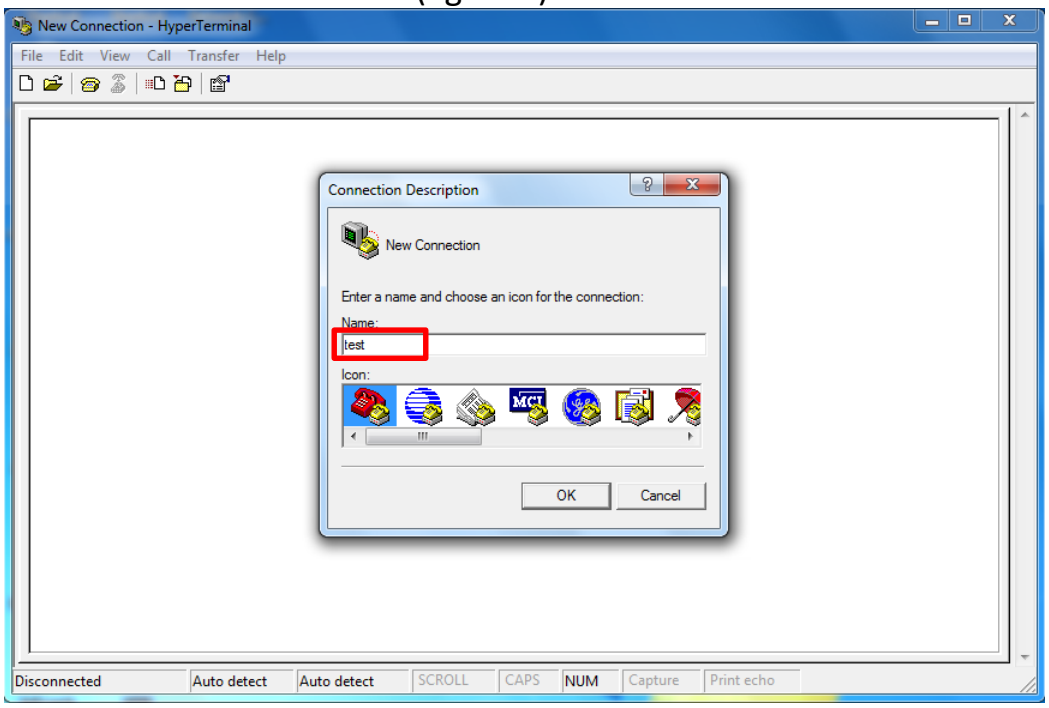
- **Hyper Terminal for TCP/IP**
- **Hyper Terminal for COM Port**
- **Data Transmission**

Hyper Terminal for TCP/IP

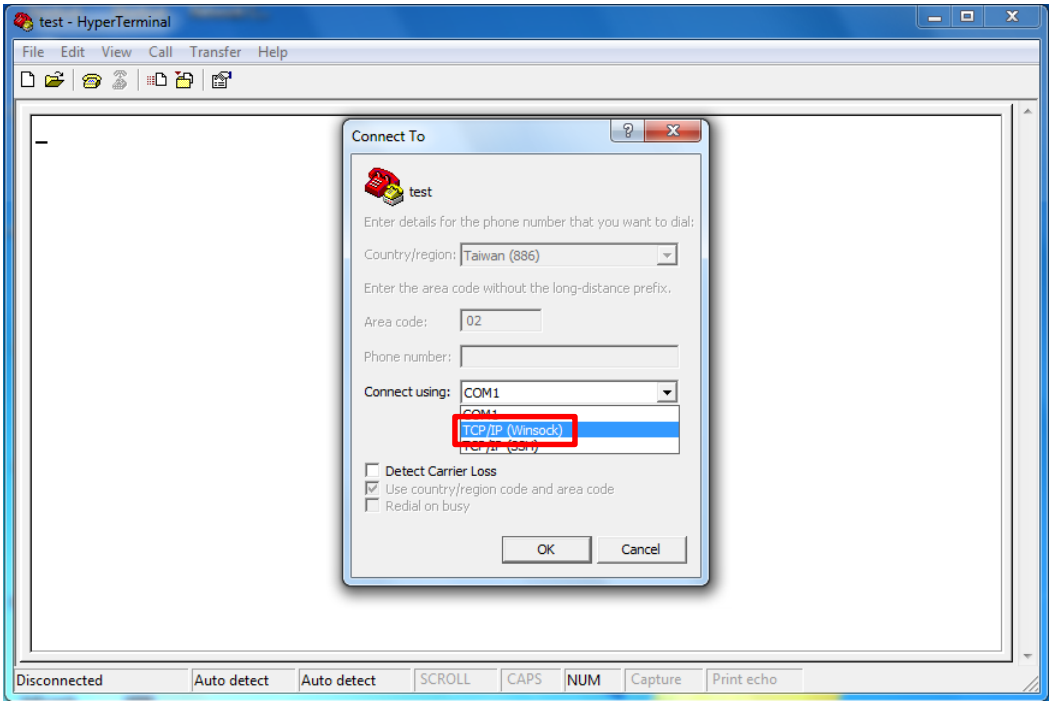
1. Open the Hyper Terminal 



2. Key in a file name of connection (eg. test) and then click “OK”.



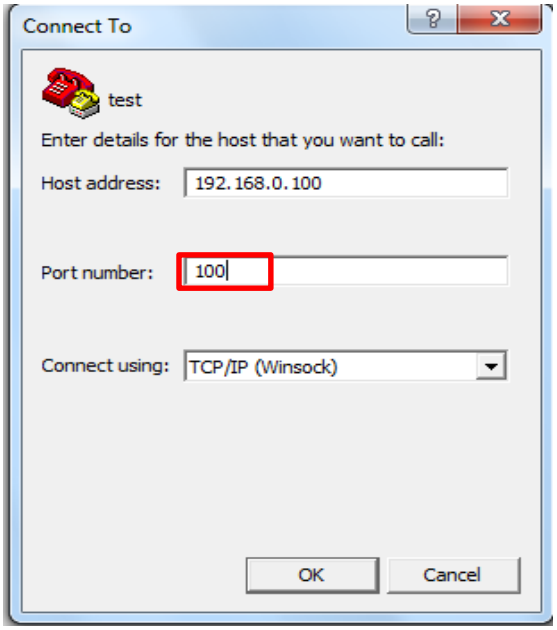
3. Choose TCP/IP, then click “OK”.

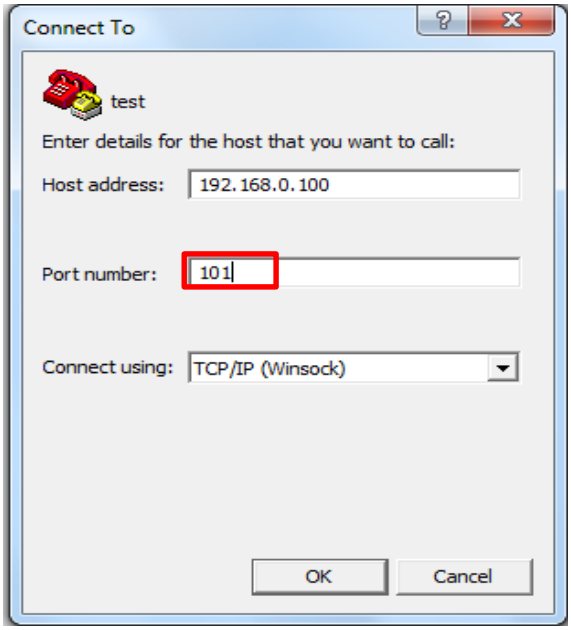


4. Key in the Converter’s IP address and Socket port then click “OK”.

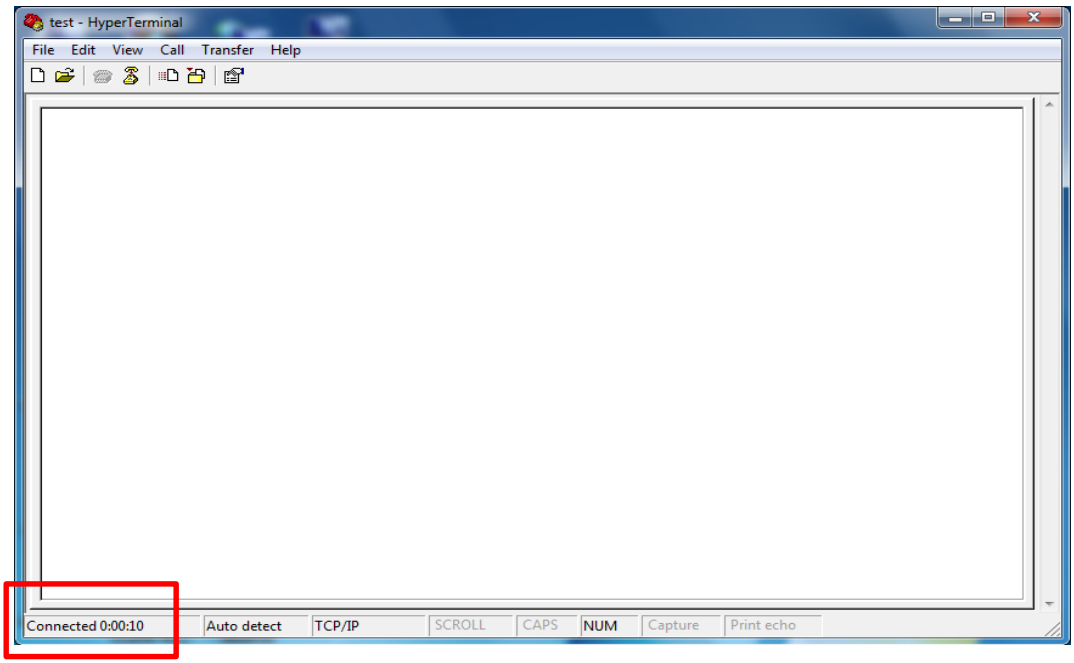
*for testing RS-232: default Port Number is 100

*for testing RS-422/485: default Port number is 101



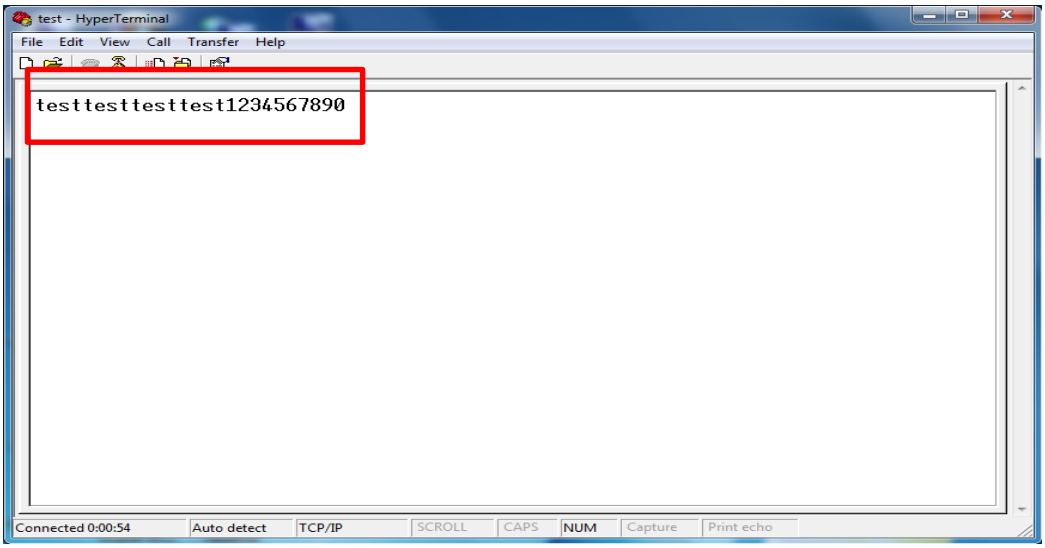


5. A HyperTerminal window will show up. The time counter start at the down left corner if connect is correct.



6. Echo Loop Test

- For RS-232 testing: Short DB9 connector #2 pin and #3 pin as circuit.
- For RS-422 testing: Short the green Terminal Block T+ to R+ and T- to R- or TX to RX. In RS-422/485 setup page: choose RS422 firstly.
- Key in any characters. If those characters show on the screen means the loop test is successful.



7. If you are not able to type or character are not shown in the window, please check every step from the beginning of this procedure.

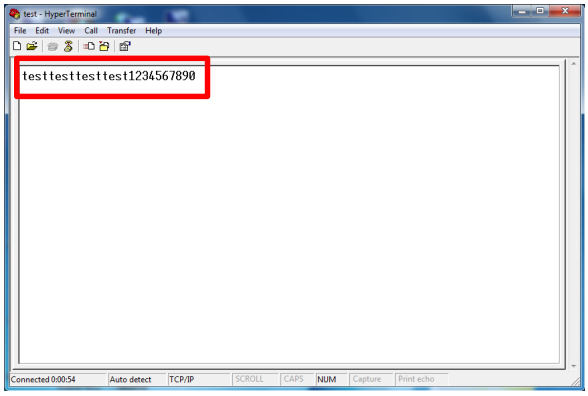
Hyper Terminal for COM Port

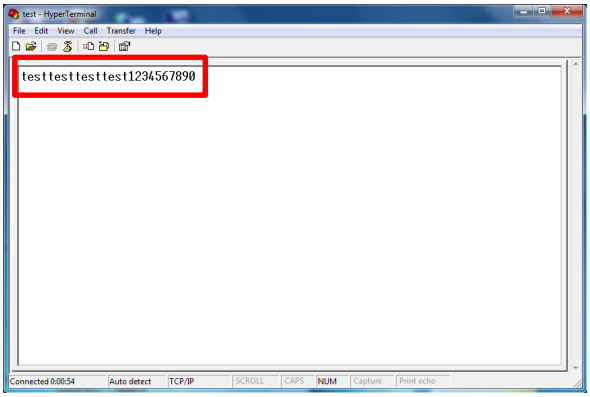
1. For RS-485 testing:

It needs two devices to connect the Terminal Block D+ to D+ and D- to D-.
In RS-422/485 setup page: choose RS485.

2. Socket ports must be different between two devices.

3. Run HyperTerminal as per RS-232 or RS-422 for two socket ports. Key in characters. If characters are shown on the screen of another socket port, it means the loop test is successful.



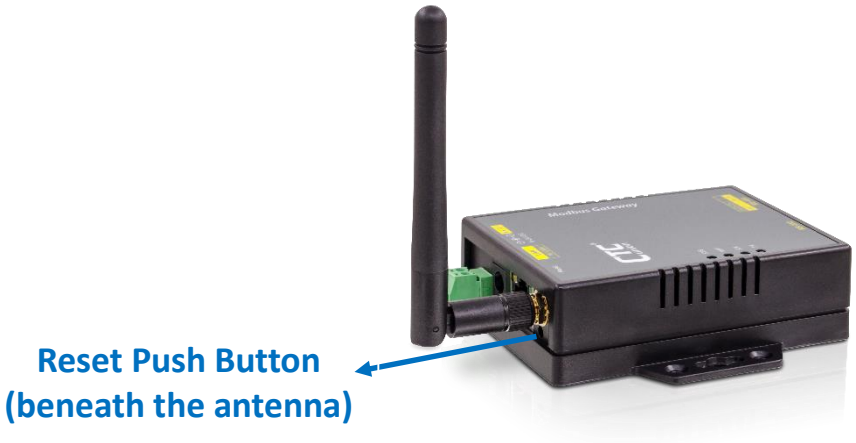


Reset Push Button

(1) Press reset key for 5 seconds or longer until SYS LED flash. Then, releasing the reset key will reset network default IP and gateway IP back to default settings. The other parameters remain the same as the last confirmation.

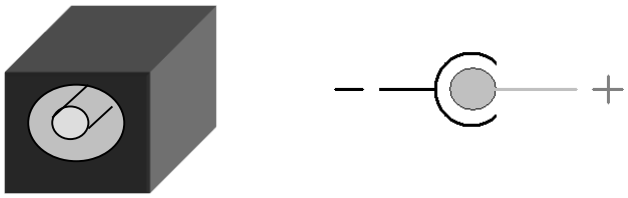
(2) Press reset key for 5 seconds or longer until both SYS LED and WiFi LED flash. Then, releasing the key will make all parameters back to factory default settings.

(3) Press reset key within 5 seconds without LED flash will reboot the equipment. Changed settings of the last confirmation will have no change.



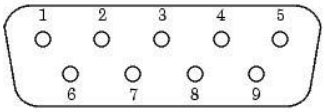
Pin Assignment

DC Power outlet



RS-232 Pin Assignment

The pin assignment scheme for a 9-pin male connector on a DTE is given below.



PIN 1 : DCD PIN 2 : RXD PIN 3 : TXD PIN 4 : DTR
PIN 5 : GND PIN 6 : DSR PIN 7 : RTS PIN 8 : CTS
PIN 9 : X

RS-422 Wiring Diagram

Serial Device	Converter
R-	**T-**
R+	**T+**
T-	**R-**
T+	**R+**

RS-485 Wiring Diagram

Serial Device	Converter
D+	**D+**
D-	**D-**