

Operation Manual of EX9486C-W-MTCP

Wi-Fi to Modbus Gateway (Modbus RTU/ASCII to Wi-Fi)



Version 1.0

22th April 2016

Introduction

Modbus RTU/ASCII to Wi-Fi(Modbus TCP)converter is provided new ways of connecting serial devices to a Wireless LAN(Wi-Fi 802.11 b/g). Serial(Modbus RTU/ASCII) to Wi-Fi(Modbus TCP) Converter is designed to operate serial ports through wireless (Wi-Fi 802.11 b/g) over 10/100Mbps Ethernet networks. The data is transmitted via TCP/IP protocol. Therefore control is available via Ethernet, Intranet and Internet. Serial (Modbus RTU/ASCII) to Wi-Fi(Modbus TCP) Converter is packaged in a case well suited for industrial environments. All serial ports operate in common RS-232 mode, industrial RS-422 and RS-485 modes configuration.

With the maturity of Wi-Fi technology of 802.11b/g, delivering cost effective becomes increasingly important. Model EX9486C-W-MTCP of Modbus RTU/ASCII to Wi-Fi (Modbus TCP) converter product is a more competitive price by careful selecting high quality with competitive prices components in the world, the product design is ARM single-chip, made network connectivity possible with affordable cost for virtually all kinds of devices. This user manual will guide you step by step for setting the various functions of model EX9486C-W-MTCP product.

The following topics are:

- ❑ Overview
- ❑ Package Checklist
- ❑ Product Features
- ❑ Product Specifications
- ❑ Wiring architecture

Overview

Modbus RTU/ASCII to Wi-Fi(Modbus TCP) Converter is provided a perfect solution to make your industrial serial devices Internet ready instantly via wireless LAN. Model EX9486C-W-MTCP with ARM chipset, Modbus RTU/ASCII to Wi-Fi(Modbus TCP) Converter makes them the ideal choice for connecting your RS-232 or RS-422/485 serial devices such as PLCs, meters, and sensors—to an IP-based Wi-Fi/Ethernet LAN, making it possible for your software to access serial devices anywhere and anytime over a wireless local LAN or the Internet.

Modbus RTU/ASCII to Wi-Fi(Modbus TCP) Converter support manual configuration via the handy web browser console and many protocols including DHCP, HTTP, Modbus RTU/ASCII Slave to Modbus TCP Master Modbus TCP Slave to Modbus RTU/ASCII Master. They are the best solution to network your serial devices.

Package Check List

Serial to Wi-Fi(Modbus TCP) Converter product is shipped with the following items:

- ❑ 1 unit of Serial to Wi-Fi Converter
- ❑ 1 unit of dipole antenna(2.0dBi)
- ❑ 1 unit CD(Operation Manual & Utility)
- ❑ Din Rail Mounting Kit & Power Adaptor :Optional

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

Product Features

Data Conversion between RS-232/422/485 and Wireless Lan

Convert serial device (RS-232, RS-422, RS-485) data/signal into the TCP/IP package data/signal and send them out with the Ethernet DataStream via Wi-Fi wireless; or convert the TCP/IP package data/signal into serial device data/signal.

Wi-Fi Wireless LAN(802.11 b/g)

It based on the latest industry standard Wi-Fi Certified IEEE 802.11b / g specification; it offers maximum channel speeds of up to 54 Mbps. The Wi-Fi function maintains interoperability within the 2.3 2.5 GHz frequency band, offering full compatibility with 802.11b / g networks. This integrated wireless solution of Serial to Ethernet Converter is widely deployed in business environments and is the standard for wireless access in public places. It also supports key security features like Wi-Fi Protected Access (WPA), WEP and 802.1x.

Dynamic IP Configuration

Support DHCP client mode, simplifying network address configuration and management.

Dual LAN Speed

Support 10/100 Mbps Ethernet, auto-detected.

Server / Client Dual Modes

Series can be configured as network server or network client. In the client mode, it can be installed in network which is protected by NAT router or firewall, without the need of a real IP address.

Web-based Setup

Parameters setup is based on HTTPS protocol by using standard browsers (IE and Netscape). No special software would be required. To use https to enter Web-Server of converter
(For example https : //192.168.0.115)

Built-in Security Control

It is protected by both setup password and access password to prevent intruders.

Remote updated

Firmware can be reprogrammed directly via Ethernet network to keep up with latest network standards.

Product Specifications

Hardware specification

WLAN

Standard Compliance : IEEE 802.11 b / g

Spread Spectrum Technology: DSSS, OFDM

Tx Power 11b: Maximum 19 dBm

Tx Power 11g/n: Maximum 16 dBm

Rx Sensitivity: -73 dBm @ 54Mbps, -86dBm @ 11Mbps

Transmission Rate: 54 Mbps (max.) with auto fallback (54,48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps)

Transmission distance: Up to 100 meters (@12 Mbps, in open areas)

Security: WEP 64-bit/128-bit data encryption, AES, WPA2, WPS2.0, WAPI

Antenna Connector: Reverse SMA, 2 dbi Antenna

Network Mode: Infrastructure, Ad-Hoc, Soft AP(Setup)

Setup: HTTP Browser Setup(IE, Chrome, Firefox)

Security: Login Password

Serial Communication Parameters

No. of ports : 1 * RS-232/422/485 port, Male DB9/ 4-pin Terminal Block, S/W selectable

RS-232 Signals : TxD, RxD and GND only

RS-422 Signal : Tx+ , Tx- , Rx+ , Rx -

RS-485 Signal : Data+ , Data-

Serial Line Protection : 15 KV ESD for all signals

Parity: None, Even, Odd, Space, Mark

Data bits: 5, 6, 7, 8

Stop bits: 1, 1.5, 2

Flow control: XON/XOFF

Speed: 110 bps to 115.2+ Kbps

Built-in: RTC(Real Time Clock)

Power Requirements

Power input : 9~24V, 200mA@12 VDC



note: pin assignment of Power Supply if you select the Terminal Block

Environmental

Operating Temperature : -10 to 65°C , 10 to 95% RH

Storage Temperature : -20 to 70°C (-4 to 185°F), 5 to 95%RH

Regulatory Approvals

RoHS

FCC, CE

Software Features

Protocols : DHCP, HTTP, Modbus RTU/ASCII Slave to Modbus TCP Master

Modbus TCP Slave to Modbus RTU/ASCII Master

Mode : Modbus TCP Master/ Slave

Support 8 TCP Masters simultaneously

Support serial Master access to 8 TCP Slaves

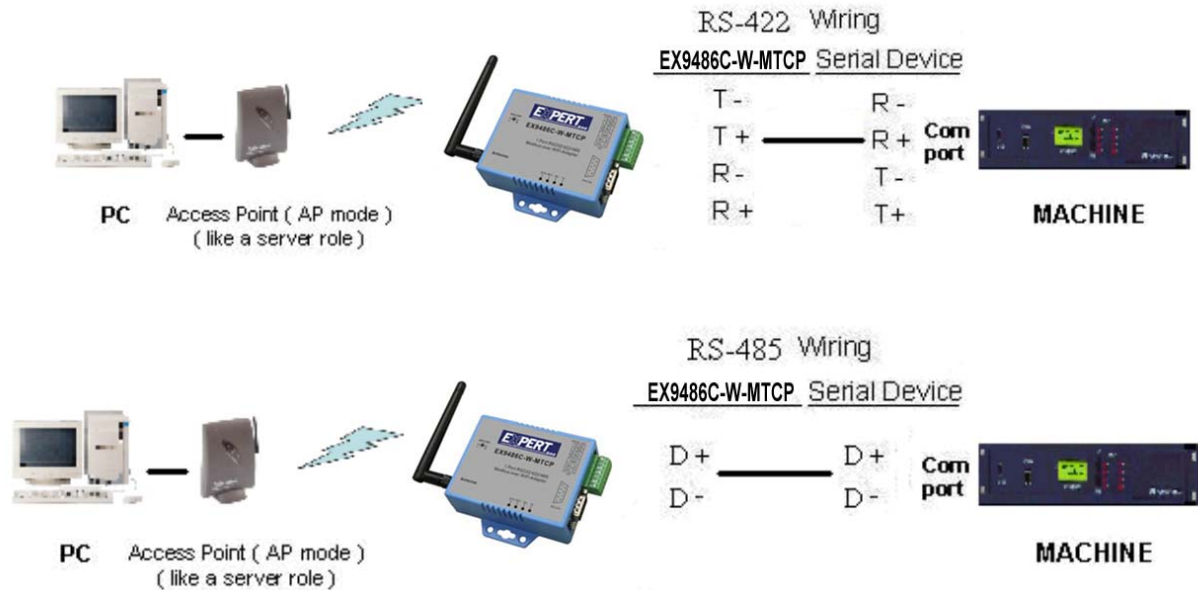
Utilities : Windows 2000/2003/VISTA/WIN 7/WIN 8

Wiring Architecture

RS-232 Wiring Architecture



RS-422/RS-485 Wiring Architecture



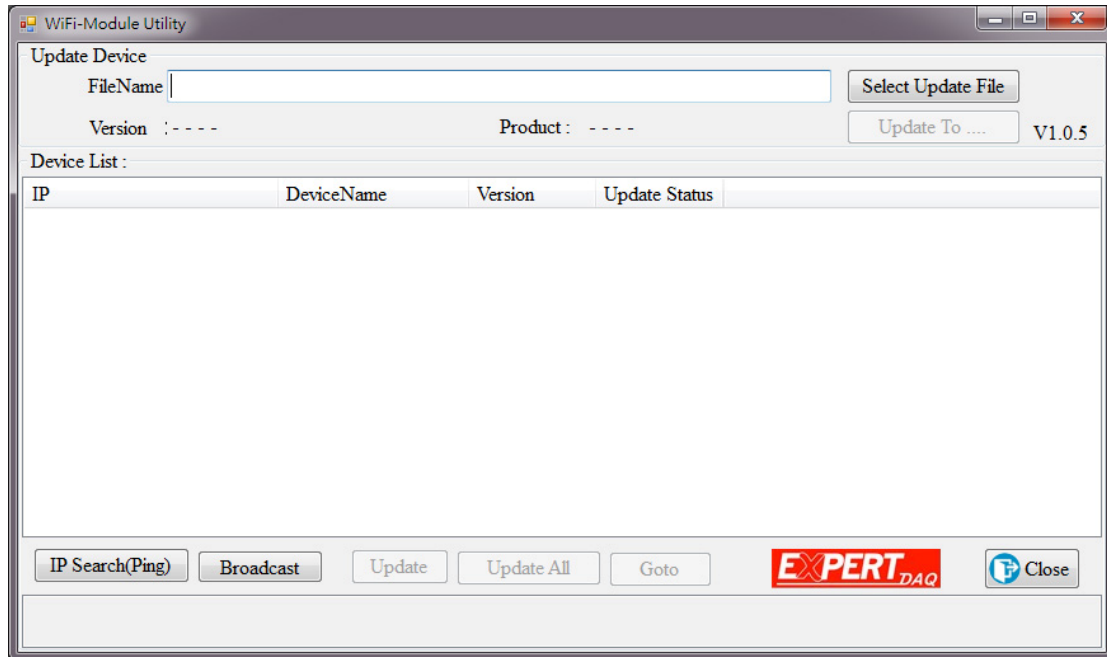
When you finish the steps mentioned above and the LED indicators are as shown, the converter is installed correctly. You can use the Utility Setup CD to setup the IP Address.

To proceed the advanced parameter setup, please use a web browser (IE or Netscape) to continue the detailed settings.

EX9486C-W-MTCP Wi-Fi Converter Configuration

Installation of IP Search Tool

1. Please copy EX9486C-W-MTCP.exe to your PC. You can find the file in the CD ROM.
2. Double click EX9486C-W-MTCP.exe. The program will be extracted and installed in PC.
3. After successful installation, the shortcut of WiFi-Module Utility.exe will be on the desktop



Connection and Configuration

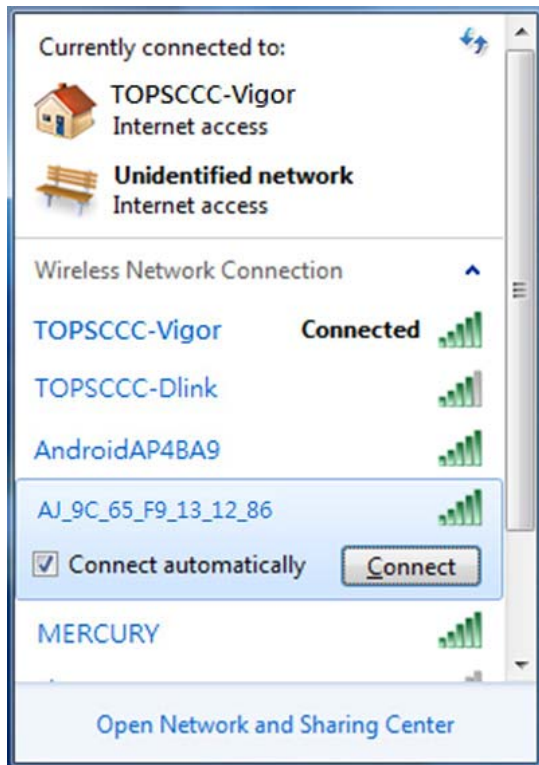
Please prepare a PC/NB with Wireless adapter, a Wireless Access Point and EX9486C-W-MTCP.

1. Connecting EX9486C-W-MTCP Gateway

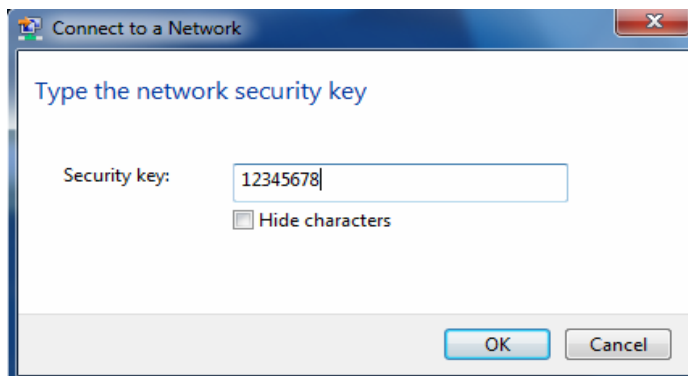
Note: EX9486C-W-MTCP has no Ethernet port and is default as a Soft AP.

1-1. EX9486C-W-MTCP Gateway is default as a "Soft AP" when first connected to power. Its broadcast SSID is AJ+MAC address

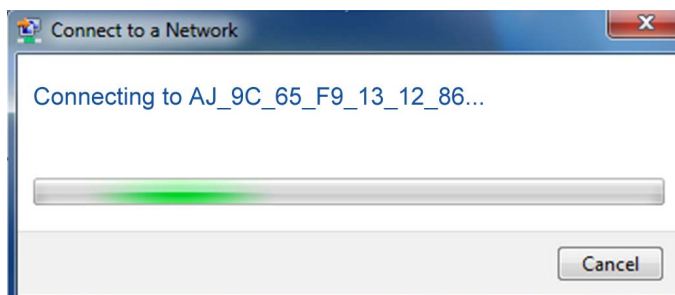
1.2. Please use PC/NB (with Wi-Fi adapter) to conduct SSID site survey. Looking for a SSID shown as MAC address. (ie. AJ:XX:XX:XX:XX:XX) Then Click Connect

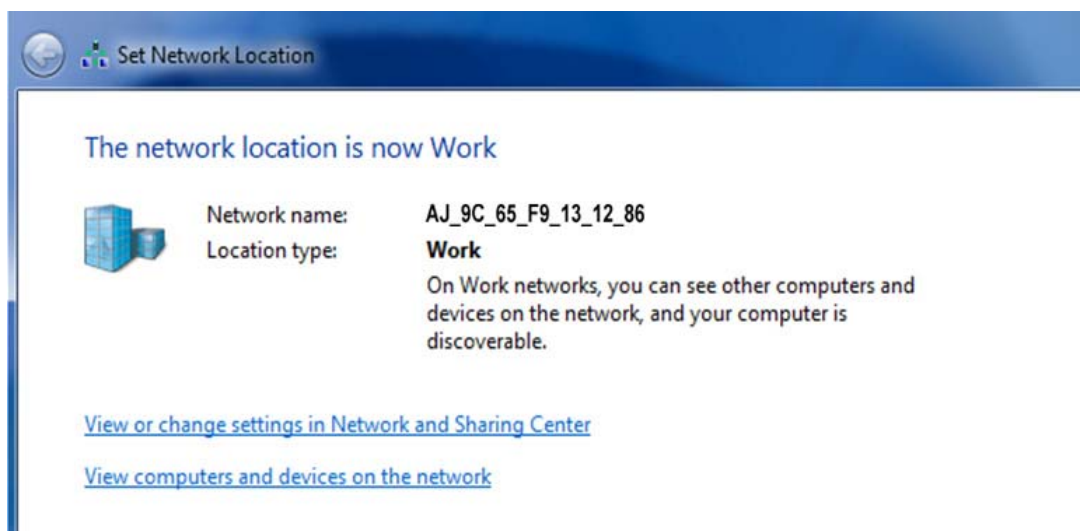
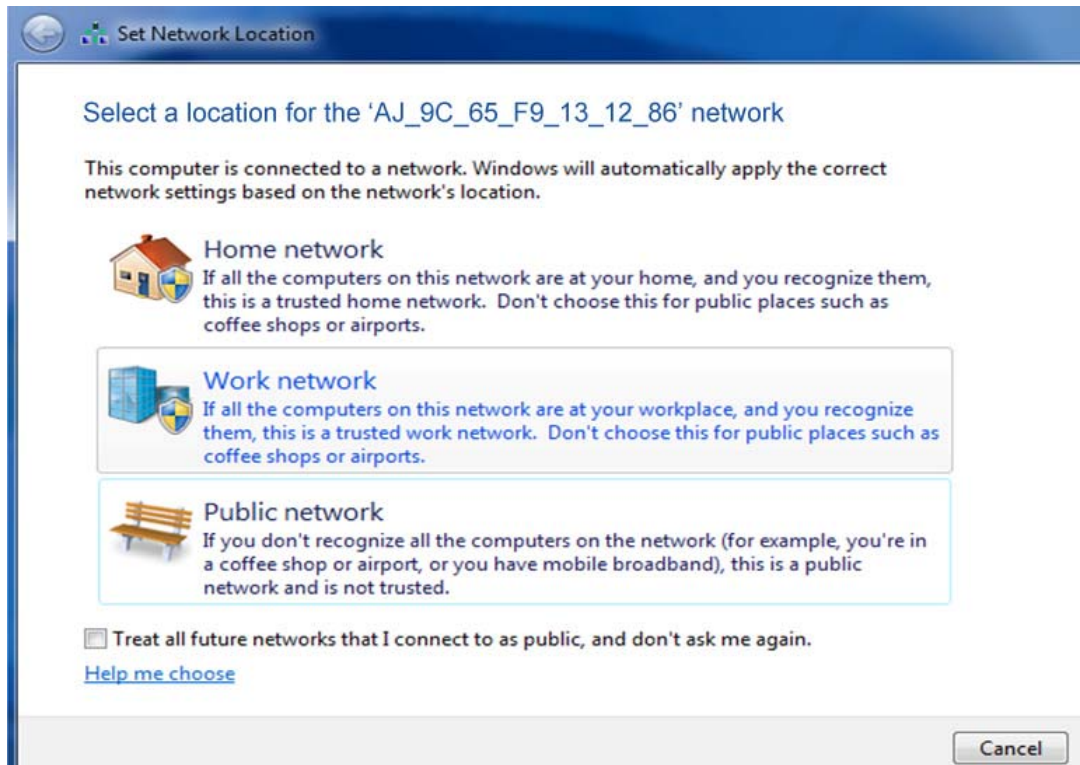


1-3. Key in Soft AP password. Default is 12345678



1-4. Connecting to EX9486C-W-MTCP Gateway





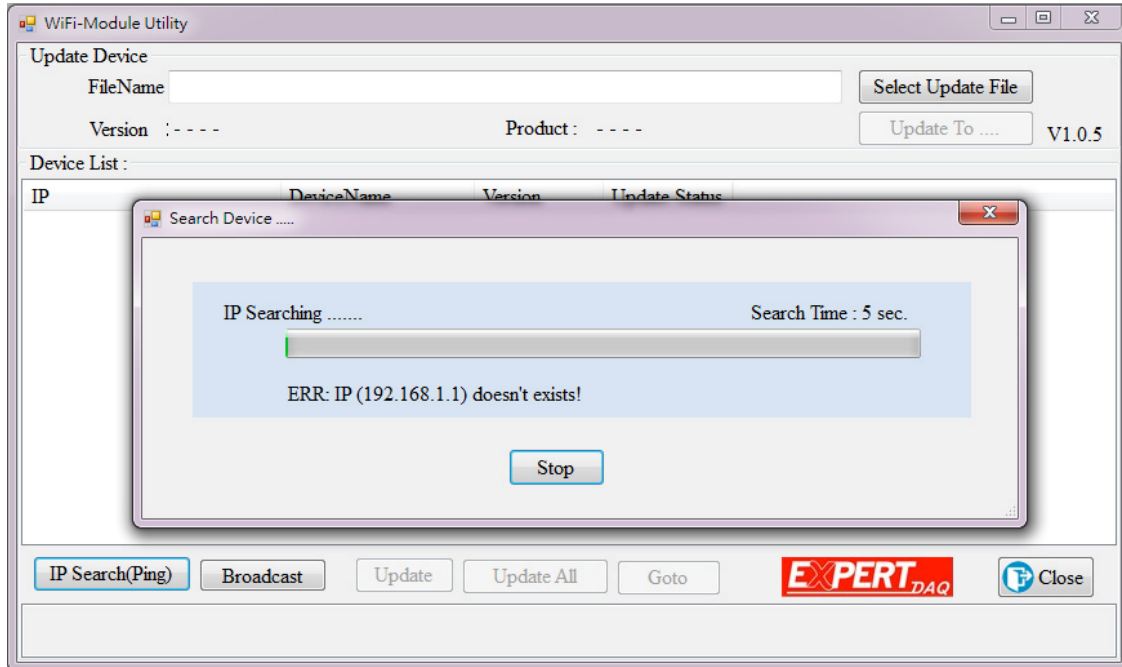
Now you have successfully connect to EX9486C-W-MTCP

2. Searching & Configuring EX9486C-W-MTCP Gateway

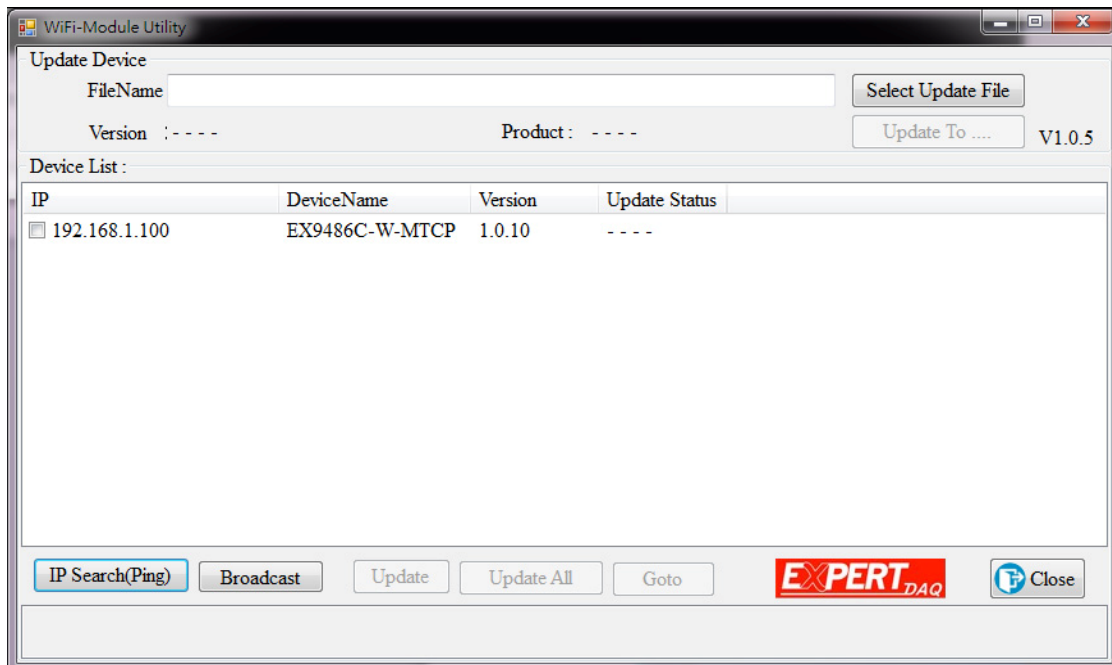
2-1. IP Searching

2-1-1. ☐ WiFi-Module Utility.exe Double Click on to execute IP search tool

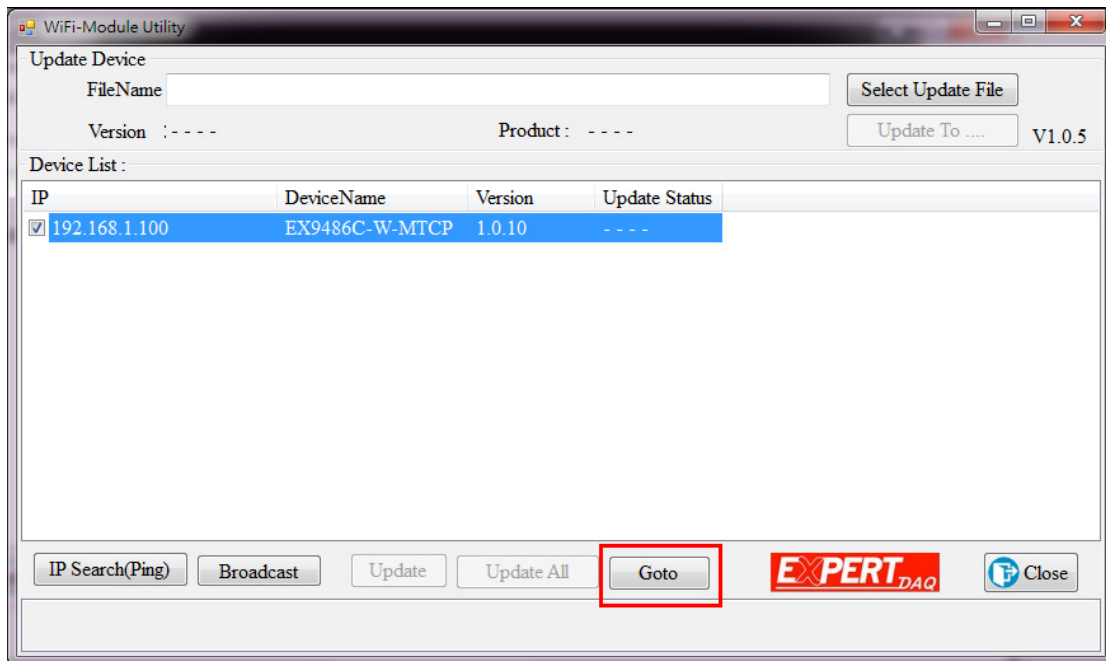
2-1-2. Click on "IP Search" or "Broadcast". WiFi-Module Utility will start to scan the network.



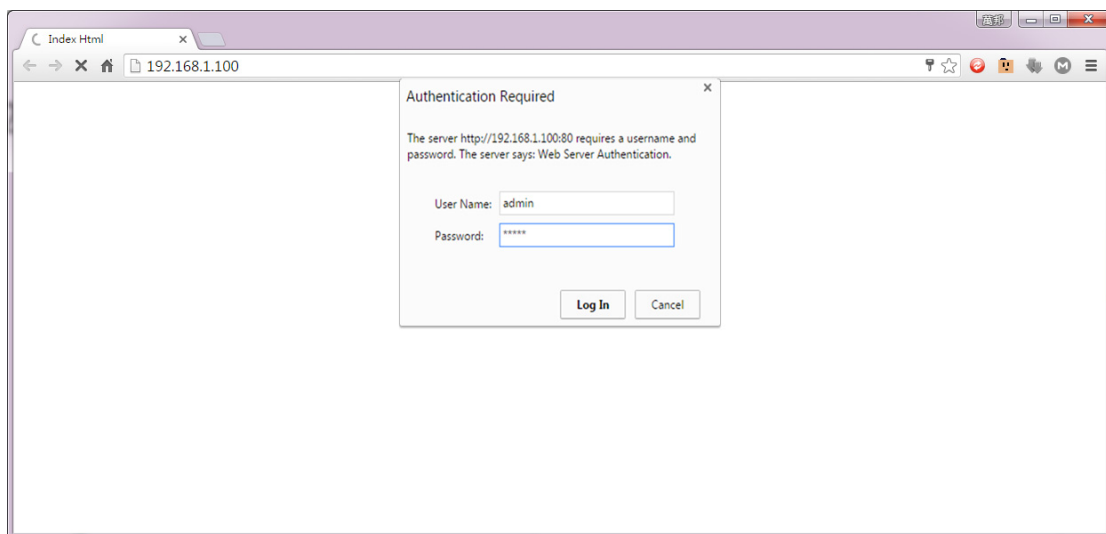
2-1-3. Device found



2-1-4. Single click on device IP address. Then click “Goto” to open browser.



2-1-5. Login page is shown. Please input ID and Password. (default ID: admin; password: admin).



Now you have successfully searched the device

2-2. Configuring

2-2-1. Modbus Gateway Index Page

The screenshot shows a web browser window with the address bar displaying "192.168.1.100/sys/system.html". The page title is "Modbus Gateway" and the version is "ver: 1.0.10". The interface has three tabs: "System", "Network", and "GateWay". The "System" tab is active, showing the following fields:

- Admin. Password : [password field]
- Password Confirm: [password field]
- Auto reset(Hours) : 0
- MAC : 9C:65:F9:13:12:86
- Device Name : EX9486C-W-MTCP
- Description : [text field]

Below the System section is the "NTP" section with the following fields:

- Enabled: Enabled (dropdown menu)
- NTP Server : clock.stdtime.gov.tw
- Time Offset : UTC+8:00 (dropdown menu)

Below the NTP section is the "Serial" section with the following fields:

- Baud Rate: 9600 (dropdown menu)
- Parity : None (dropdown menu)
- Data Bits : 8 (dropdown menu)
- Stop Bits : 1 (dropdown menu)

At the bottom of the page, there are three buttons: "Save", "Save and Reboot", and "Reply to factory settings".

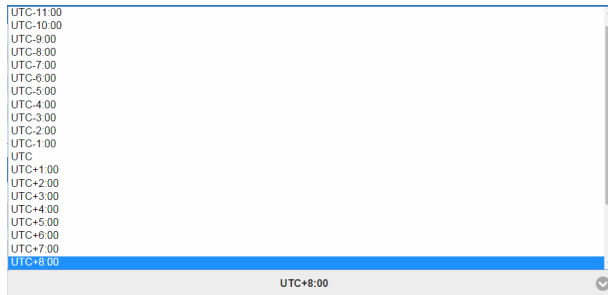
2-2-2. System Setup Page

2-2-2-1. System

Where you can change Password and set up reset time period.

2-2-2-2. NTP

Enable/Disable NTP function; setup NTP server and choose Time zone.



2-2-2-3. Serial

Setup Serial device parameters - Baud Rate, Parity, Data Bits and Stop Bits. Then click “ Save” to save the Settings.

Serial	
Baud Rate:	9600
Parity :	None
Data Bits :	8
Stop Bits :	1

2-2-3. Network Setup Page

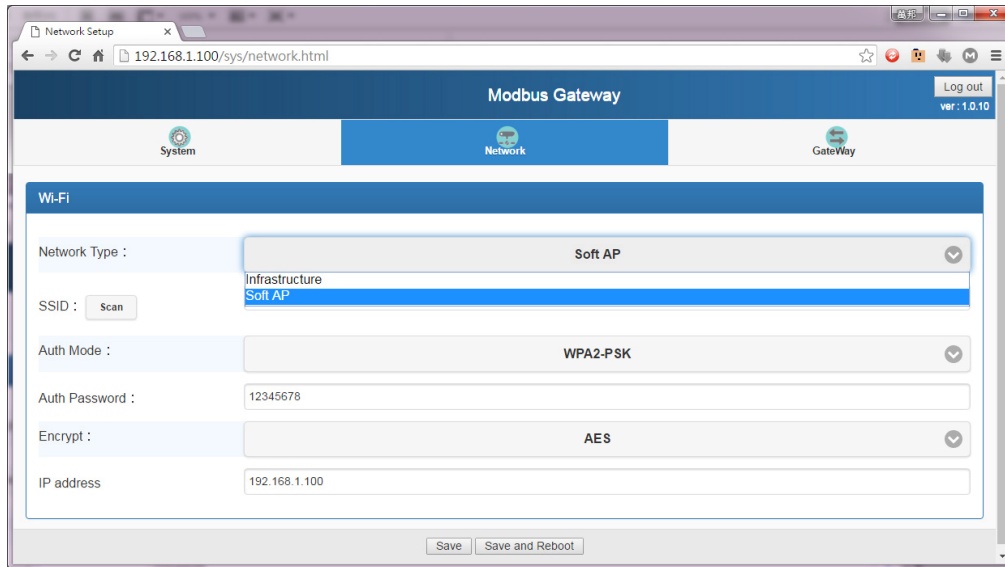
There is Network Type configuration

A screenshot of a web browser displaying the 'Network Setup' page for a 'Modbus Gateway'. The page has a navigation bar with 'System', 'Network' (selected), and 'GateWay' tabs. The 'Wi-Fi' section is active, showing configuration fields: 'Network Type' (Soft AP), 'SSID' (AJ_9C_65_F9_13_12_86), 'Auth Mode' (WPA2-PSK), 'Auth Password' (12345678), 'Encrypt' (AES), and 'IP address' (192.168.1.100). At the bottom, there are 'Save' and 'Save and Reboot' buttons. The browser's address bar shows '192.168.1.100/sys/network.html'.

WiFi Configuration

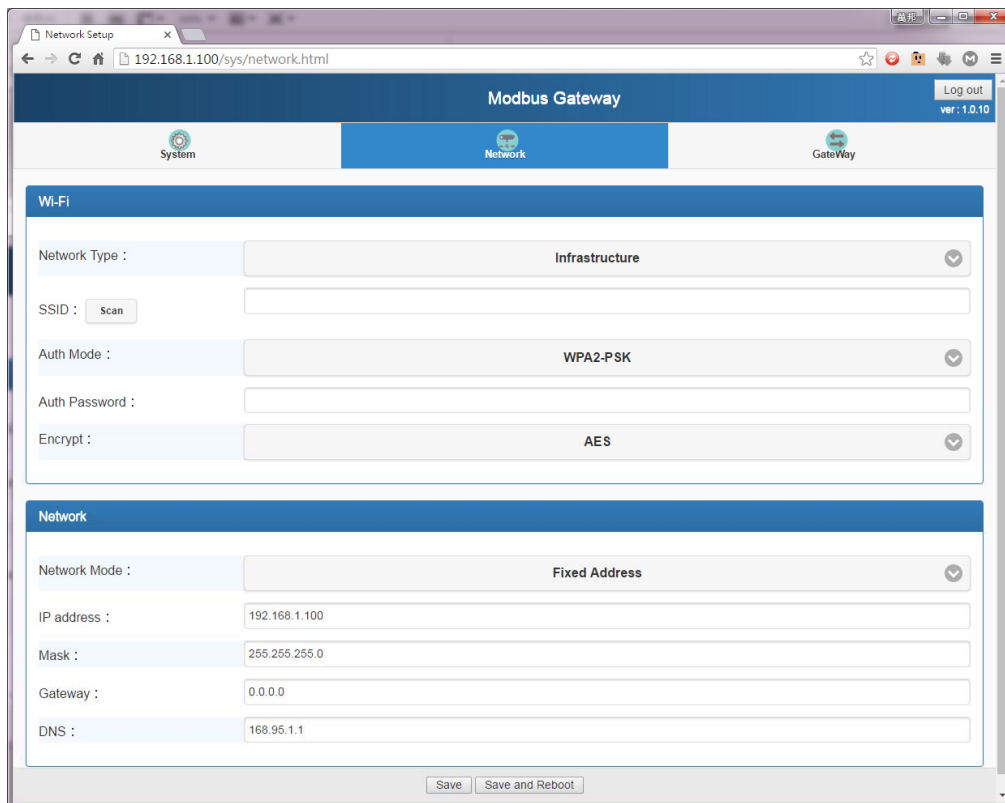
2-2-3-1.Network Type

There are 2 network types: Infrastructure / Soft AP.



A. "Soft AP" mode – This is factory default mode. Device acts as an Access Point which is allow to be connected by various PC /NB /Smart Phone/ PAD. Support DHCP server function. Soft AP broadcasts its SSID "AJ_XX_XX_XX_XX_XX_XX". PC /NB /Smart Phone is requested to connect to this SSID for device setup.

B. "Infrastructure" mode –Choose this mode for connecting to other Access Point.



2-2-3-2. SSID Scan

Click “Scan” for existing Access Point site survey. Choose a suitable SSID, Authentication and Encryption. Then key in password for AP

The screenshot shows the 'Modbus Gateway' web interface. The 'Network' tab is selected. Under the 'Wi-Fi' section, the following fields are visible:

- Network Type : Infrastructure
- SSID : [Empty field] with a 'Scan' button next to it.
- Auth Mode : WPA2-PSK
- Auth Password : [Empty field]
- Encrypt : AES

A 'Data Query' button is located between the 'Auth Password' and 'Encrypt' fields. Below the Wi-Fi section is the 'Network' section with the following fields:

- Network Mode : Fixed Address
- IP address : 192.168.1.100
- Mask : 255.255.255.0
- Gateway : 0.0.0.0
- DNS : 168.95.1.1

At the bottom of the page are 'Save' and 'Save and Reboot' buttons.

This screenshot is similar to the previous one, but with the 'Wi-Fi List' dialog box open over the 'Auth Mode' field. The dialog box contains the following list of detected networks:

- TOPSCCC-Dlink (WPA2PSK)
- INT (WPA2PSK)
- King (WPA2PSK)
- protal_tp (WPA2PSK)
- WONWONNPR (WPA2PSK)
- MERCURY (OPEN)
- ATTW-OFFICE (WPA2PSK)
- TOPSCCC-Vigor (WPA2PSK)
- Smartech (WPA2PSK)

The background interface shows the same configuration fields as the first screenshot, with the 'Auth Mode' field now displaying 'WPA2-PSK'.

2-2-3-3. Authentication

There are 4 authentication Modes

Auth Mode : WPA2-PSK
Auth Password :
Encrypt : AES

2-2-3-4. Encryption

Choose suitable cipher suite

Encrypt : AES
Network: WEP, TKIP, AES

2-2-3-5. Password

Key in password for selected AP

Auth Password : topscceexpert
Encrypt : AES

2-2-3-6. IP Address Mode

Configure IP Address Mode – Suggest choosing “DHCP” – Let AP to assign IP address to Modbus Gateway. You can also choose “Fixed Address” to input fixed IP address, Subnet Mask, Gateway address.

Network Mode: Fixed Address
IP address: DHCP

Fixed Address parameters setting

Network Mode: Fixed Address
IP address: 192.168.1.100
Mask: 255.255.255.0
Gateway: 192.168.1.1
Save Save and back Home

Now, Network Setup is successfully configured.

Please click "Save" to keep the settings in memory.

System Message

Data saved, All settings will be 【Reboot】 after applying!

Close

DHCP Mode

Modbus Gateway Log out ver: 1.0.2

System

Network

GateWay

Wi-Fi

Network Type: Infrastructure

SSID:

Auth Mode: WPA2-PSK

Auth Password:

Encrypt: AES

Network

Network Mode: DHCP

2-2-4. Gateway Setup

There are 4 Modbus modes for selection.

TCP to RTU Slave; RTU to TCP Slave

TCP to ASCII Slave; ASCII to TCP Slave

Modbus Gateway SetUp x 192.168.1.100/sys/gateway.html

Modbus Gateway Log out ver: 1.0.10

System

Network

GateWay

Gateway

Mode : TCP to RTU Slave

Message Timeouts(ms) :

RTU To TCP Slave
ASCII To TCP Slave
TCP to RTU Slave
TCP To ASCII Slave

TCP Properties

Port :

Save

Save and Reboot

2-2-4-1. TCP to RTU Slave

Configure TCP server port number and message time out period

The screenshot shows the 'Modbus Gateway Setup' web interface in a browser window. The address bar displays '192.168.1.100/sys/gateway.html'. The page has a dark blue header with the title 'Modbus Gateway' and a 'Log out' button. Below the header is a navigation bar with three tabs: 'System', 'Network', and 'GateWay'. The 'GateWay' tab is selected. The main content area is divided into two sections: 'Gateway' and 'TCP Properties'. In the 'Gateway' section, the 'Mode' is set to 'TCP to RTU Slave' (indicated by a dropdown arrow) and the 'Message Timeouts(ms)' is set to '500'. In the 'TCP Properties' section, the 'Port' is set to '502'. At the bottom of the page, there are two buttons: 'Save' and 'Save and Reboot'.

2-2-4-2. TCP to ASCII Slave

The screenshot shows the 'Modbus Gateway Setup' web interface in a browser window, similar to the previous one. The address bar displays '192.168.1.100/sys/gateway.html'. The page has a dark blue header with the title 'Modbus Gateway' and a 'Log out' button. Below the header is a navigation bar with three tabs: 'System', 'Network', and 'GateWay'. The 'GateWay' tab is selected. The main content area is divided into two sections: 'Gateway' and 'TCP Properties'. In the 'Gateway' section, the 'Mode' is set to 'TCP To ASCII Slave' (indicated by a dropdown arrow) and the 'Message Timeouts(ms)' is set to '500'. In the 'TCP Properties' section, the 'Port' is set to '502'. At the bottom of the page, there are two buttons: 'Save' and 'Save and Reboot'.

2-2-4-3. RTU to TCP Slave

Configure TCP slave IP address, port number and message time out period

The screenshot shows the 'Modbus Gateway Setup' web interface. The 'Gateway' tab is selected. Under 'Gateway', the 'Mode' is set to 'RTU To TCP Slave' and 'Message Timeouts(ms)' is 500. Under 'TCP Properties', the 'Port' is 502. The 'TCP SLAVE MAP' table is as follows:

No.	ID Start	ID End	IP[:Port]
1	1	32	
2	33	64	
3	65	96	
4	97	128	
5	129	160	
6	161	192	

Buttons at the bottom: Save, Save and Reboot.

2-2-4-4. ASCII to TCP Slave

The screenshot shows the 'Modbus Gateway Setup' web interface. The 'Gateway' tab is selected. Under 'Gateway', the 'Mode' is set to 'ASCII To TCP Slave' and 'Message Timeouts(ms)' is 500. Under 'TCP Properties', the 'Port' is 502. The 'TCP SLAVE MAP' table is as follows:

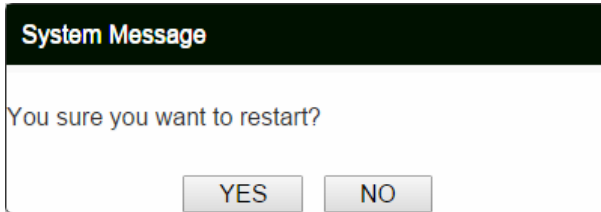
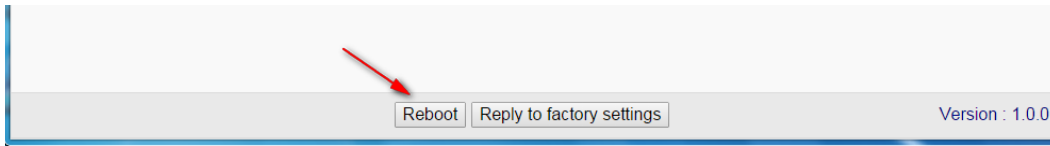
No.	ID Start	ID End	IP[:Port]
1	1	32	
2	33	64	
3	65	96	
4	97	128	
5	129	160	
6	161	192	

Buttons at the bottom: Save, Save and Reboot.

Now, Gateway Setup is successfully configured.

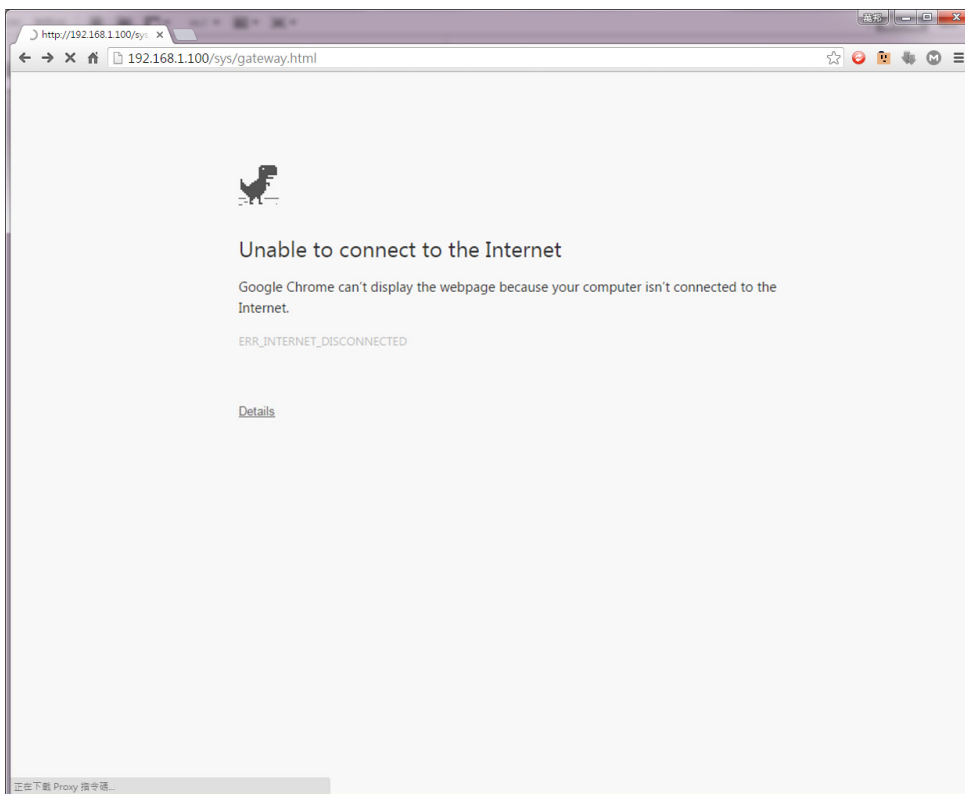
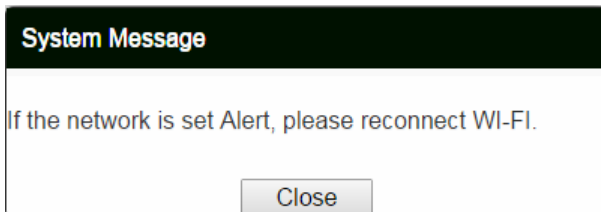
Please click "Save" to keep the settings in memory.

2-2-5. Click “Home”. Go to home page. Then click “Reboot” to re-start Modbus Gateway.



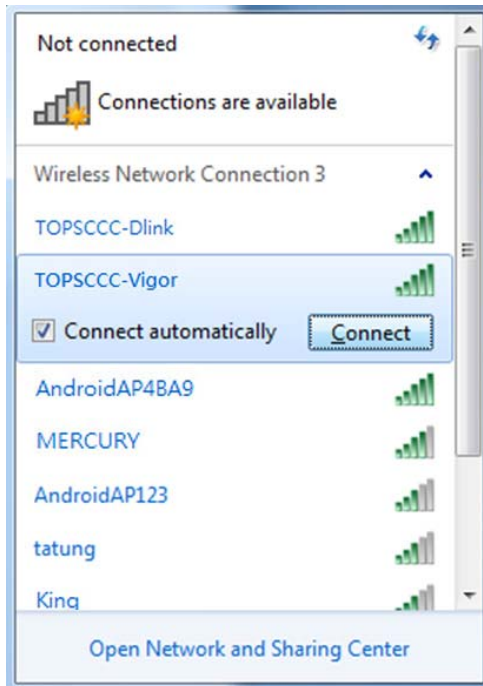
Click yes to reboot system

2-2-6. After device reboot, the original wireless connection will be disconnect.



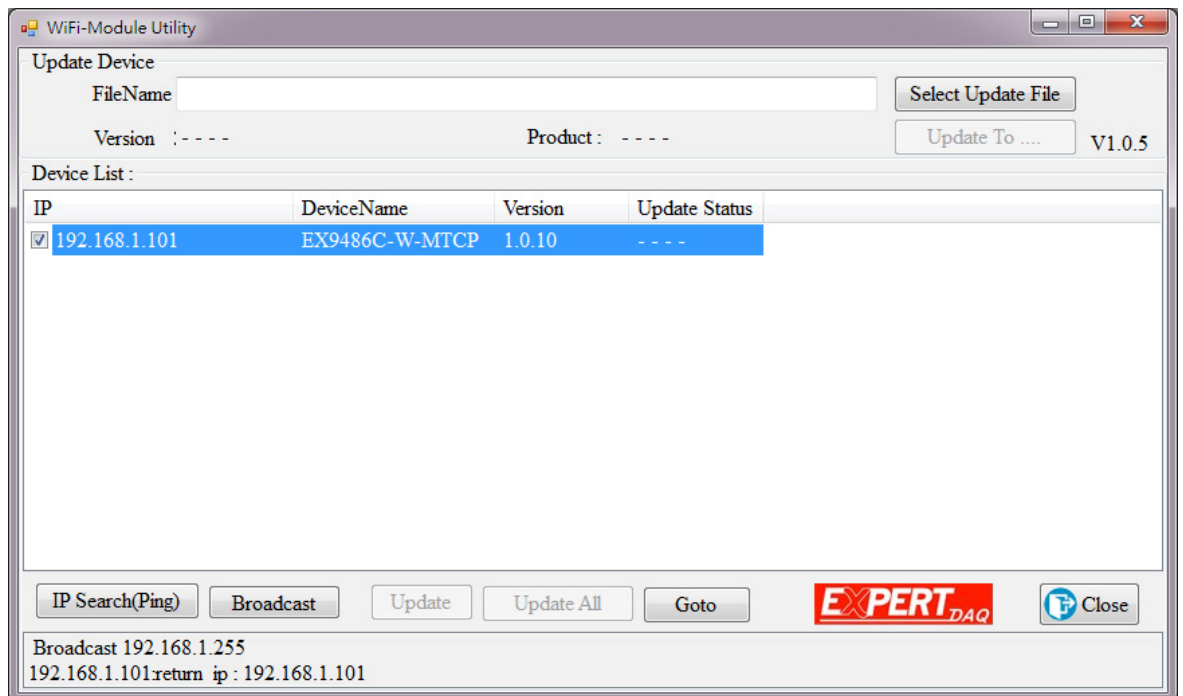
2-3. Reconnect to EX9486C-W-MTCP Gateway

2-3-1. Search the selected AP which EX9486C-W-MTCP connect with

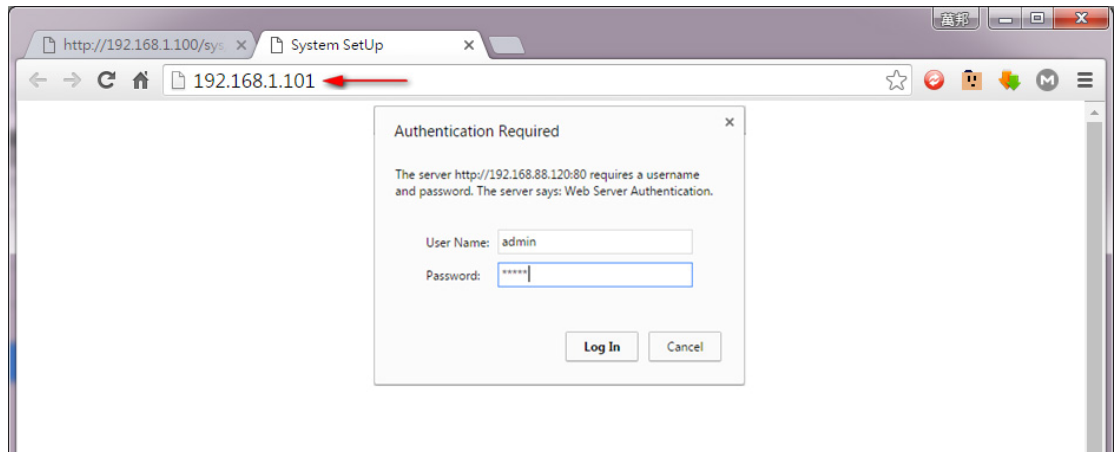


2-3-2. Key in password

2-3-3. Execute WiFi-Module Utility to search device



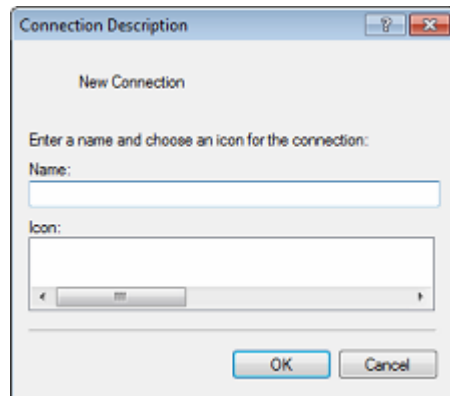
2-3-4. Single click device IP address then click “Goto” Device login page will be shown



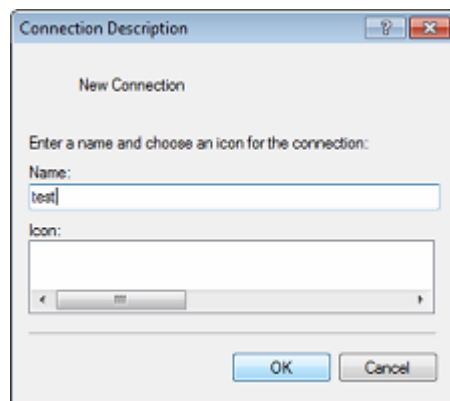
You have successfully re-connected to EX9486C-W-MTCP Gateway

Testing procedure of data transmission

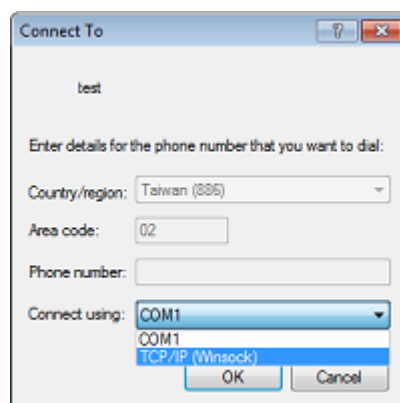
1. Open the Hyper Terminal



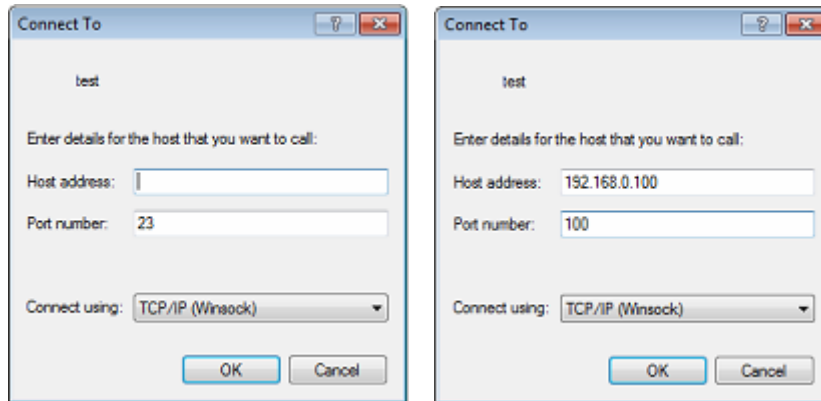
2. Key in a name for connection (ex. test) and then press OK



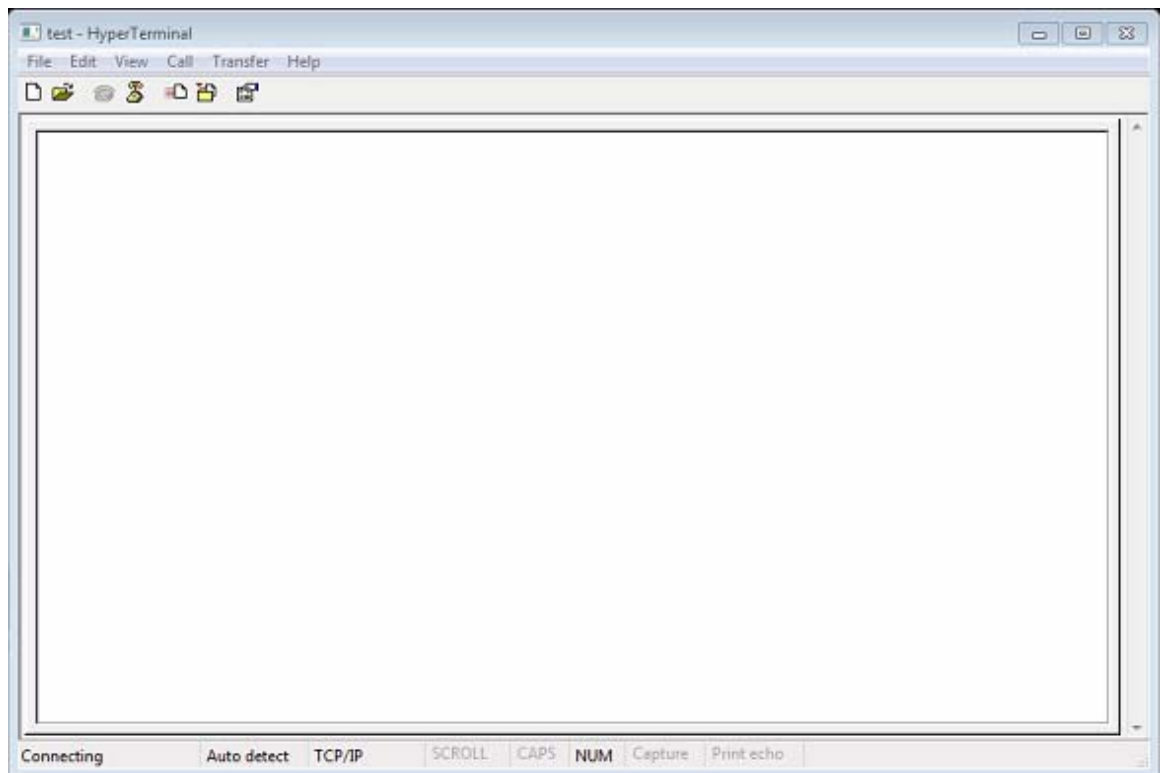
3. You will see following page. Choose TCP/IP, then press OK



4. Key in the Converter IP address and Socket port and then press OK



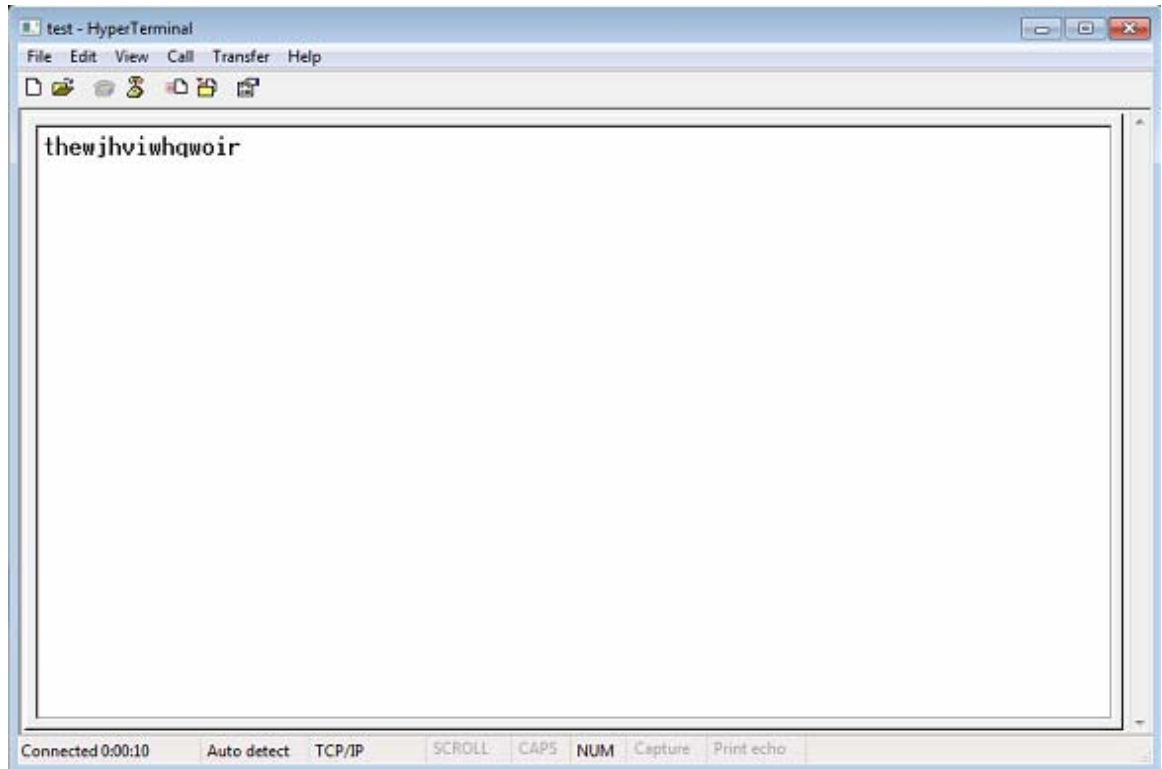
5. You will see HyperTerminal window



5-1. Echo Loop Test

Please short DB9 NO. 2 pin and NO.3 pin circuit, (in green Terminal Block - T+ connect to R+, T- connect to R- or TX connect to RX.)

5-2. Key in characters. the converter will echo back of the characters and shown on the screen

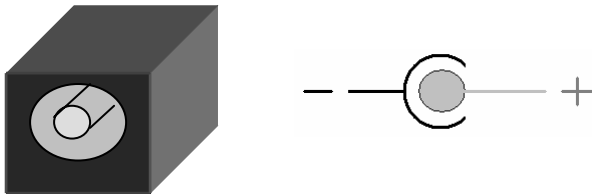


Congratulation. You had successfully set up the converter and start to use it

Appendix A

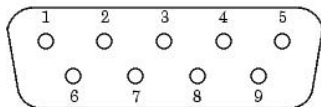
Pin outs and Cable Wiring

□ 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 : X
 PIN 5 : GND PIN 6 : X PIN 7 : X PIN 8 : X
 PIN 9 : X (DC+5V Power Output- For Option)

□ RS-422 Pin Assignment

The pin assignment scheme for a 4-pin RS-422 is given below.

PIN 1 : R- PIN 2 : R+ PIN 3 : T- PIN 4 : T+

□ RS-485 Pin Assignment

The pin assignment scheme for a 4-pin RS-485 is given below.

PIN 1 : X PIN 2 : X PIN 3 : D- PIN 4 : D+

□ RS-422 Wiring Diagram

Serial Device	EX9486C-W-MTCP Converter
R-	3 T-
R+	4 T+
T-	1 R-
T+	2 R+

□ RS-485 Wiring Diagram

Serial Device	EX9486C-W-MTCP Converter
D-	1 D-
D+	2 D+

