User Manual

Ethernet to Wireless Client Adaptor, PC-W

BrainChild

Brainchild Electronic Co., Ltd. **UMPCWA, 06/2009**

Important Announcement

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FCC WARNING

Class A for this product

This product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This product complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This product complies with FCC radiation exposure limits set forth for an uncontrolled environment. This model should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. IEEE 802.11b/g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

UL Notice for Power supplier

All the series of PC-W products are intended to be supplied by a Listed Power Unit marked with “LPS”, “Limited Power Source” or “Class 2” and output rate 9~48VDC, 1.0A minimum. Or, use the recommended power supply in “Optional Accessories”.

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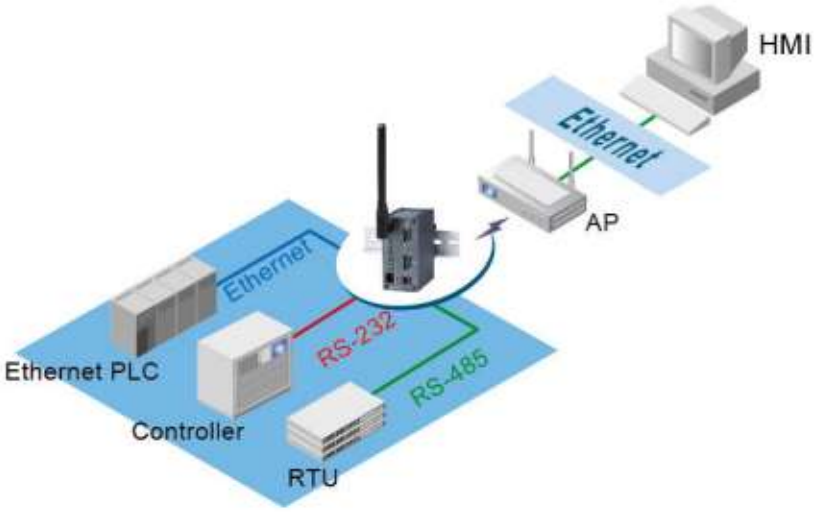
1. Introduction

1.1. Overview

PC-W Wireless Client Adaptor is a bridge between RS-232, RS422, RS-485, Ethernet based devices and wireless LAN. It allows almost any Ethernet and serial devices to be connected to a new or existing wireless network. The information transmitted by Wireless Client Adaptor is transparent to both host computers (IP network over wireless LAN) and devices (Ethernet/RS-232/RS-422/ RS-485). Data from the wireless LAN is transmitted to the designated Ethernet/ RS-232/ RS-422/ RS-485 port and data from Ethernet/ RS-232/ RS-422/ RS-485 port is transmitted to the Wireless (TCP/IP) transparently.



In the computer integration manufacturing or industrial automation area, Wireless Client Adaptor is used for field devices to direct connect to network.

Many control devices provide the ability to communicate with hosts through Ethernet/RS-232/RS-485 however RS-232/RS-485 serial communication has its limitations. For instance, it is hard to transfer data through Wireless or long distance. With PC-W, it is possible to communicate with a remote device in the Intranet environment and thus, increases the communication distance dramatically.

Flexible configuration options enable this unit to be setup remotely over IP network by Web browser, or Window utility. Packed in a rugged DIN Rail mountable case and 9~48V DC power input range, PC-W is ideal for almost any industrial and manufacturing automation.

1.2. Features

Features

- 2 Nos. serial ports
- Selectable RS-232/RS-485/RS-422 serial mode by software
- Transparent between Ethernet to Wireless networking
- Support UDP, TCP server and client protocols for Virtual COM mode and pair connection
- Configurable via built-in web server and Windows-based utilities
- Metal housing and IP50 standard with DIN-Rail mounting.
- 15KV ESD protection for serial ports
- IEEE 802.11g 54Mbps wireless network connectivity
- Standard 2.4GHz High-gain antenna

2. Getting Started

2.1. Packaging Include

- PC-W Wireless Client Adaptor x 1
- 4 dBi Antenna x 1
- Wall mount kits x 2
- PC-W Wireless Client Adaptor quick start guide x 1
- Product CD containing configuration utility x 1

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

2.2. Ordering information

The PC-W can be ordered using the following codes.

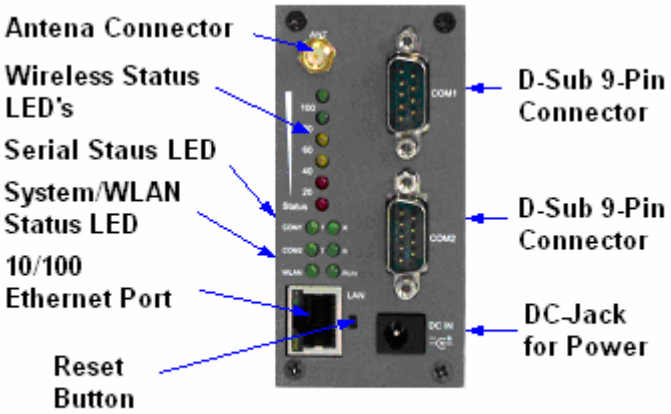
PC-W	Wireless Client Adaptor plus 2-ports with D-Sub 9pin serial connector

Optional Accessories and their ordering codes

AH1812-B	AC100~240V US plug / DC12V DC – Jack, Power adapter
AH1812-E	AC100~240V EU plug / DC12V DC- Jack, Power adapter
1GP-2409	9.0 dBi Omni directional antenna, N female connector (Max. line of sight distance: 800 mtr)
1PG-24001	9.0 dBi directional panel antenna
1CB-0025	External RF Cable, RG58 SMA to N Male 3 m to be used with antenna

2.3. Interfaces

The interfaces of PC-W on the front panel are shown in Fig. 1.



DB Model (9 pin D-Sub Connectors)

Fig. 1. PC-W Front Panel and Interfaces

2.4. Installation Procedures

- Prepare necessary cables, DC power adaptor and RS-232/RS-485 connector.
- Install Serial Manager software in your PC from Product CD
- Place PC-W under the access point signal coverage area. Connect PC-W to your PC via Ethernet using RJ45 connector.
- If you wish to connect serial device to PC-W, connect it. Please make sure the connector and wiring of RS-232 or RS422 or RS-485 is correct. If you just wish to connect Ethernet device to PC-W, then first complete checking of PC-W status from Computer, then connect Ethernet device to PC-W
- Plug in PC-W to DC-9-48V power source (with DC-jack), buzzer will beep and the RUN LED will blink if PC-W functions normally. For LED Status see Appendix D.4

Use **Serial Manager,** configuration utility to check the status of PC-W. If it starts up successfully, users shall find the IP and MAC addresses of PC-W. Users can also change IP address, gateway IP address and subnet mask networking parameters of PC-W according to user networking configurations.

3. Software Setup

Now the PC-W hardware is installed and the power is on, network IP configuration will be set in this section.

3.1. Default Settings

The PC-W has two IP addresses one for Ethernet interface and another one for wireless network interface. These default settings are shown below

Property	Default Value
Wireless Client Adaptor IP	
IP Address	10.0.50.100
Gateway	10.0.0.254
Subnet Mask	255.255.0.0
Security	
User Name	Admin
Password	Null (Leave it blank)
Serial	
COM	9600/None/ 8/1,No flow control, packet delimiter disabled
Link Mode	TCP Server, Listen port 4660/4661,No Filter, Virtual COM disabled
SNMP	
SysName of SNMP	Name
SysLocation of SNMP	Location
SysContact of SNMP	Contact

Table 1. Factory default settings of the PC-W

Reset procedure: Push Reset button for 5 seconds and then release to restart PC-W with the factory default settings.

Warning: Please avoid setting LAN and WLAN IP addresses in the same subnet. This may create unexpected networking problems.

3.2. IP Assignment

3.2.1. Configure IP by Serial Manager Utility

Use **Serial Manager,** configuration utility that comes with Product CD-ROM to configure the network parameters. For more details, please refer to Appendix B1.

Find a new device and IP assignment

- Use **Serial Manager Utility** to find the new device IP address or to get the device's current IP address as shown in Fig. 2.
- If needed, use **Serial Manager Utility** to re-assign a new IP address, Network Mask and Gateway address to the new device.
- Users can also configure User ID, Password and Host Name using **Serial Manager Utility**.

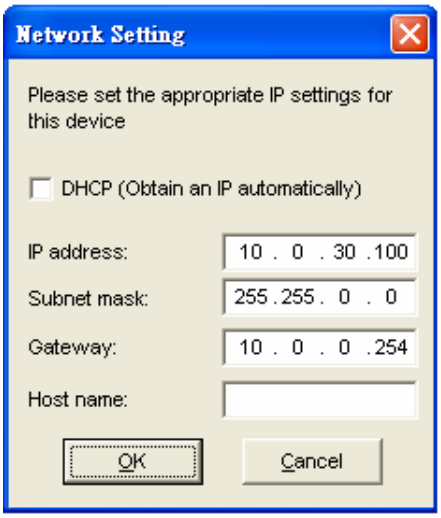


Fig. 2. IP Settings using Serial Manager Utility software

Note: All settings will NOT be changed if User ID or Password was incorrect.

If there is more than one device using the same IP address in the same subnet, users need to correct the mapping between MAC address and IP address using ARP commands as explained in the next section.

3.2.2. Configure IP address using ARP commands

ARP (Address Resolution Protocol) commands can be used to assign a static IP address on PC-W using its hardware MAC (Media Access Control) address. The MAC address "0060E9-xxxxxx" is printed on the rear side of PC-W. The following procedure show how to use ARP commands on MS-DOS Command Prompt Window

Example: Set the IP address 10.0.50.101 to the MAC address 00-60-E9-00-79-F8

C:\> arp –s 10.0.50.101 00-60-E9-00-79-F8

arp –a command shows the current mapping IP and MAC addresses

arp –s "IP address" "MAC address" maps the IP address to a specific MAC address

Note: ARP commands can only be used to set a static IP address of PC-W

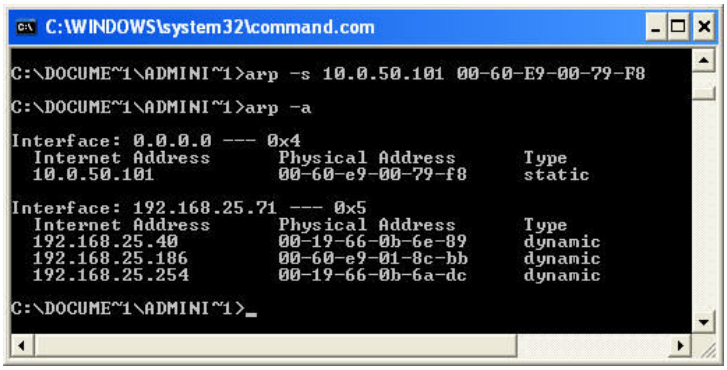


Fig. 3. Mapping IP address to MAC address using ARP Command

3.2.3. Configure IP Using Web Interface

Use common web browsers, e.g. Microsoft Internet Explorer or Mozilla Firefox, to configure the network parameters of PC-W.

- Open a Web browser, type in the **IP address** (default IP: 10.0.50.100) of the PC-W to be configured. The default user name is **admin** and the default password is **null** (leave it blank).
- From the Web **Network links page**, please configure IP address, subnet mask, and gateway address, and then click "**Save Configuration**" to save all settings.
- Click **Restart** button to reboot the device to make the changes effective.

Please refer to contents of Web Configuration section for more details of the settings.

3.2.4. Automatic IP address assignment using DHCP

DHCP server can automatically supply an IP address, gateway address, and subnet mask to PC-W device if its DHCP client function is enabled. By default, the DHCP client function is disabled, users can activate the DHCP function by following these steps

- Execute **Serial Manager Utility**
- Click on the **IP address** of PC-W (This can be the default IP address if it was never set before).
- Click **Config** to pop-up the static IP Dialog Window.
- Check on **Auto IP**
- Click **Config Now**. (The PC-W will restart and obtain an IP from DHCP server automatically)

Note: You need to have a DHCP Server running in your subnet to automatically supply an IP address. Please consult your network administrator if you are not sure.

3.3. TCP/IP Port Number

Default TCP Port numbers of PC-W are **4660** (1st port) and **4661** (2nd Port) that are associated with the Serial port **COM1** and **COM2**, respectively. After the application program connects to the TCP port 4660 (or 4661) on the PC-W, data of user's application program are transparently transmitted to Serial port COM1 (or COM2) of PC-W.

4. Application Connectivity

The PC-W is designed to transmit data between one or more Ethernet/serial devices to/from one or more TCP/IP devices through wireless Ethernet interface. PC-W can enhance the accessibility of the serial device through TCP/IP based Ethernet as well as Wireless Ethernet. The connection distance limit is overcome by PC-W. Examples of these devices are PLC controllers, card readers, display signs, security controls, CNC controller, etc.

4.1. TCP & UDP Protocols

PC-W can operate in two most common transportation protocols, TCP and UDP.

4.1.1. Transmission Control Protocol (TCP)

TCP provides a connection and a byte oriented data stream with control parameters such as flow control, multiple ports option, and order delivery notification. Once the connection is established, data can be transmitted in both directions. TCP guarantees data is transmitted from one node to the other node(s) in orderly. The protocol also distinguishes the transmitted data for different applications (such as a Web server or an Email server) on the same computer.

For redundant or dual-network connectivity purposes, PC-W offers two TCP operation modes so users may choose for their specific application, TCP Server Mode and TCP Client Mode.

4.1.2. User Datagram Protocol (UDP)

UDP is a faster datagram delivery protocol. User can configure PC-W to work in the UDP mode. UDP is connectionless protocol and can transmit multicast data to/from a serial device to one/multiple host computer. Because UDP is the connectionless protocol, UDP does not guarantee the reliability and orderly data streams like TCP protocol. Datagram may arrive out of order or lose without notice. But the advantage of UDP is the speed. UDP is faster and hence more attractive in time-sensitive applications.

4.2. Connectivity Topology

PC-W is also equipped with Tunneling and Virtual COM operation modes. It is designed to transmit data to/from multiple serial devices and from/to multiple TCP/IP devices on Ethernet, so it can enhance the accessibility of the serial devices immensely**.** The example of PC-W connection topology is shown in Fig. 4.
Note: Please do not connect more then one device on Ethernet port

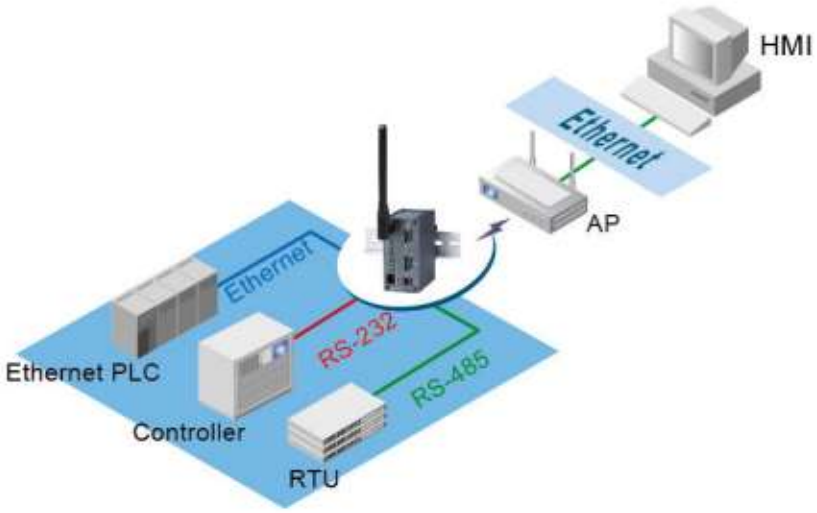


Fig. 4. Typical Topology of PC-W Connection

4.3. Ethernet to WLAN Bridge Function

The PC-W can also work as a network bridge between Ethernet to WLAN. Packets from WLAN to Ethernet or from Ethernet to WLAN are transferred transparently. This will let the Ethernet devices can be accessed from wireless networks over the wireless interface.

4.4. Virtual COM Mode

The **Virtual COM** software emulates a serial port in LAN topology. In the Virtual COM Mode, COM port data is encapsulated with Ethernet data format. By creating a virtual COM port on a PC, the Virtual COM driver redirects communications from the virtual COM port to the destination IP address (and the designated port number) by encapsulating COM data into IP packet format. **Fig. 5** illustrates a Virtual COM connection diagram.

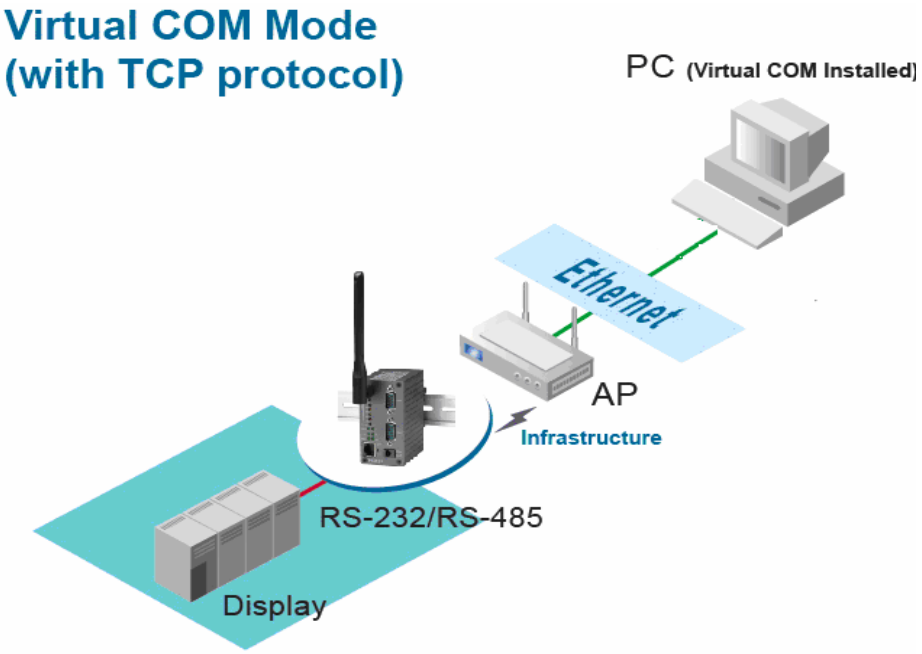


Fig. 5. TCP Connection in Virtual COM Mode

4.4.1. TCP Server in Virtual COM Mode

PC-W can be configured in the TCP server mode (PC acts as a client) with a unique IP and Port number, and PC-W waits passively for the PC to establish a connection. After the connection is established, PC can communicate to serial devices through PC-W.

Configure PC-W to be TCP server

Using one of the two configuration methods, by Web-based and by Windows-based **Serial Manager** utility, Users can configure PC-W to be a TCP Server as follows.

- Disabled the IP filter (default)
- Set the port number (default port is 4660 for COM1, 4661 for COM2).
- If IP filter is enabled, only the assigned source IP is allowed to be connected to PC-W.

4.4.2. TCP Client in Virtual COM Mode

PC-W can also be configured in TCP Client mode (PC as a server) to establish a TCP connection to an application server on PC, or the Remote Control Host. Once the connection is established, PC or Remote Control Host can exchange data with several serial devices at the same time through PC-W as shown in Fig. 6.

Configuring PC-W to be TCP client

User can configure PC-W to be as a TCP client, for example, from Fig. 7, PC, as a server, has IP address 10.0.0.100 and listening on port 1000. Each PC-W, connected with serial device, configured as TCP client mode with destination IP address 10.0.0.100 and the destination port 1000, and the IP filter is disabled (by default).

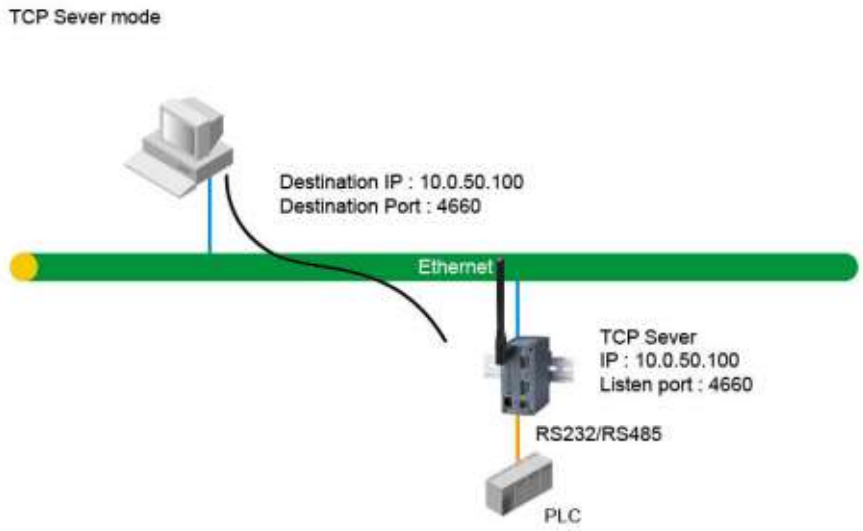


Fig. 6. TCP Server in Virtual COM Mode

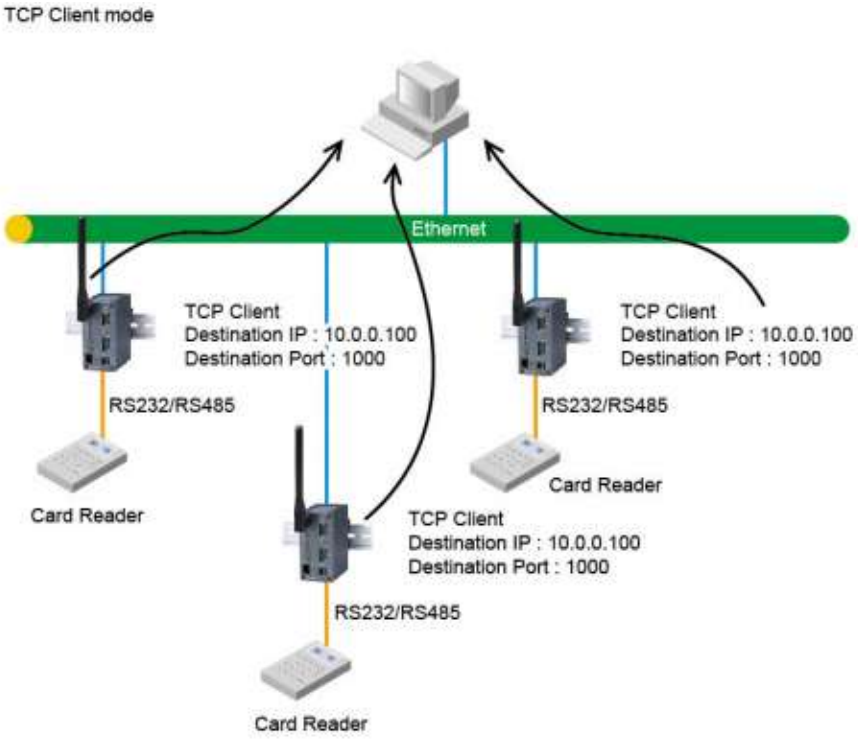


Fig. 7. TCP Client in Virtual COM Mode

4.5. Tunneling Mode

Tunneling Mode is used for multiple serial devices to “talk” among one another through PC-W’s wireless LAN or wired Ethernet interface. This mode is particularly useful when two or more serial devices are far away. This mode can be used to extend the normal RS-232 serial communication distance of 15 m to 100 m or longer as shown in Fig. 8.

One PC-W can be configured to be the TCP Server Mode with serial device connected and also another PC-W is configured as TCP client with serial device connected. After the connection is established, both serial devices can exchange data to each other transparently. For example, users can implement PC-W tunneling mode for Master /Slave mode PLC's or between other serial devices.

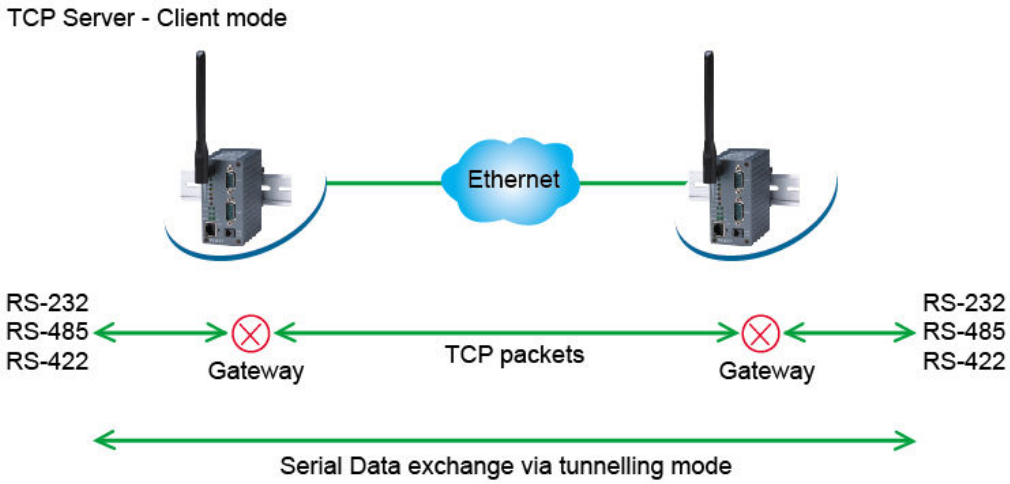


Fig. 8. TCP Link in Tunneling mode

Configuring PC-W to Tunneling Mode

Using one of two configuration methods (Web-based or Windows-based **Serial Manager** utility), users can configure PC-W to TCP Server mode with a desired IP address and port, and with other PC-W is configured as TCP Clients mode with Server IP and port as destination IP and port respectively as shown as an example in Fig. 9.

Note: TCP client has to assign the destination IP and the destination port corresponding to TCP server's IP and listening port (example: TCP 4660 port).

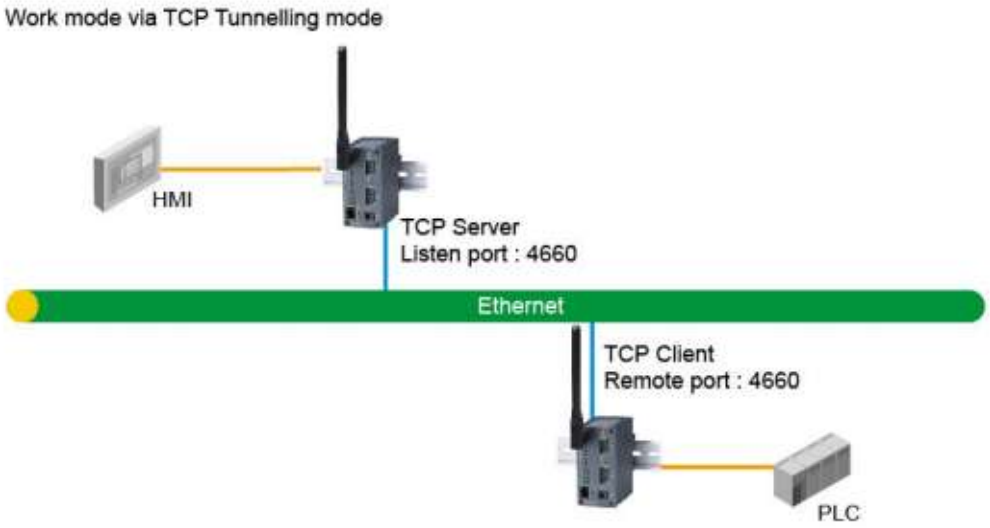


Fig. 9. TCP Tunneling Mode

4.6. UDP mode

In UDP mode, users may exchange Multicast data from one PC-W with multiple PC-W devices as shown in Fig. 10.

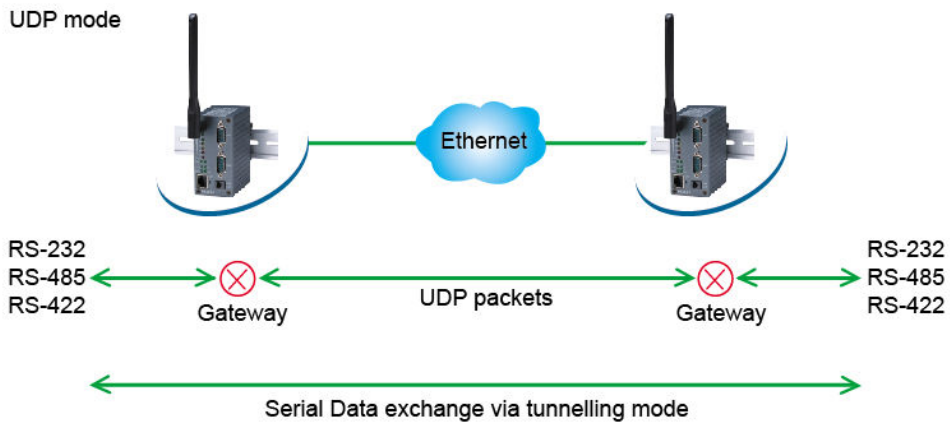


Fig. 10. UDP Link in Tunneling mode

Configure PC-W in UDP Mode

Use one of the two configuration methods (Web-based or Windows-based **Serial Manager** Utility). Users can configure PC-W to UDP mode. In UDP mode, PC-W can be configured to communicate to more than one node (Multicasting). Note that the Multicast IP address is limited by the Class of IP address and subnet mask. As an example, for a network of Class C of subnet 192.168.1.X and a subnet mask of 255.255.255.0, the maximum Multicast IP address to be configured is four destinations IP's.

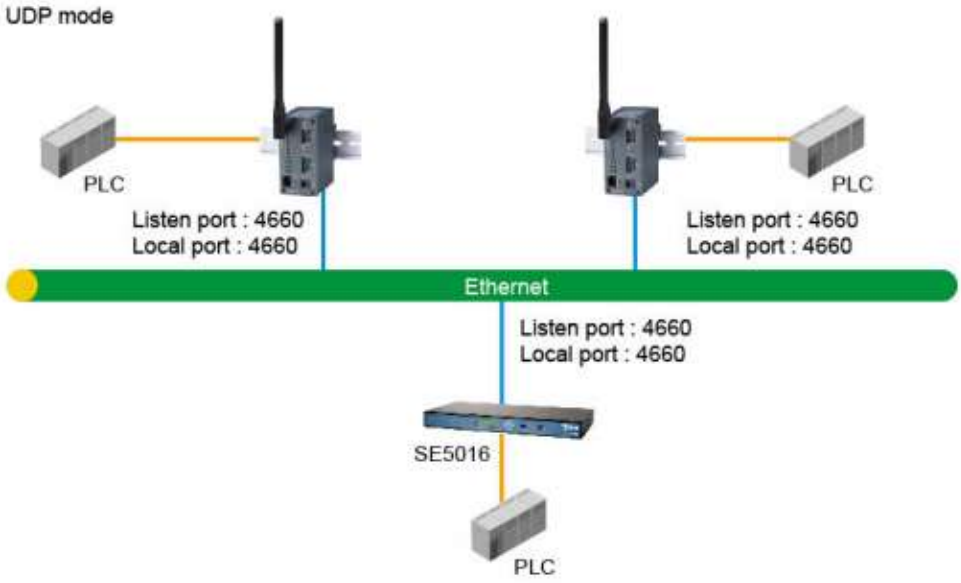


Fig. 11. Multi-UDP Link in Tunneling Mode

5. Configure PC-W by Web Interface

Users need to assign an IP address to PC-W before working on the web configuration operations. Please refer to Section 3.2 for IP address assignment.

5.1. Login to System

Open one of the web browsers, ex. Microsoft IE or Firefox etc. Enter the IP address of PC-W on the URL. Example: http://10.0.50.100 or http://your-device-IP-address.

The following authentication screen shall appear. Enter User Name and Password then click on “OK”. The default user name is **“admin”** and password is **null** (leave it blank).

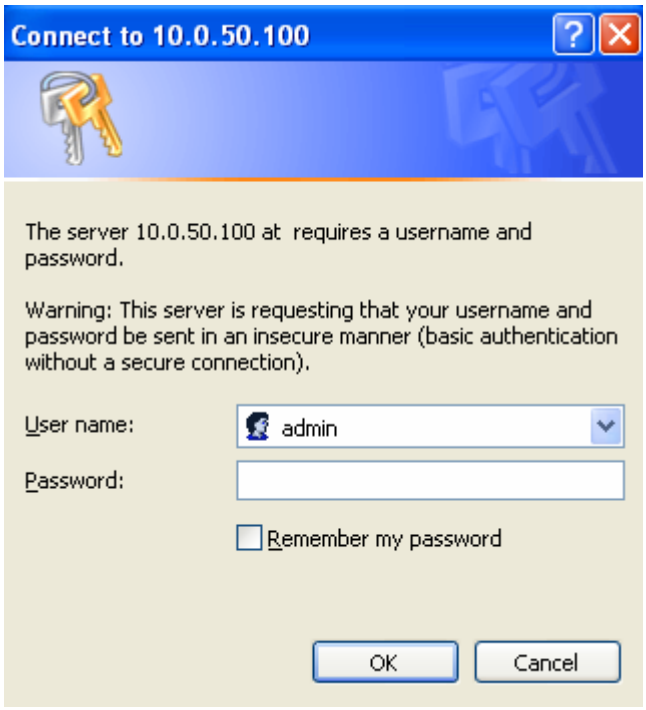


Fig. 12. Authentication request for system security

5.2. General Information

Once the login is successful, an Overview window gives the general information of PC-W, included Network, and Serial information as shown in Fig. 13.

Overview

Device Information	
Model Name	PC-W
Device Name	0060e9035a9e
Kernel Version	1.19
AP Version	1.36

Wireless Client Adaptor Information	
MAC Address	00:60:E9:03:5A:9E
Region	America
IP Address	192.168.1.61
Status	3Com 00:0E:6A:D6:9F:BE 100%

COM 1 Information	
Serial Interface	RS-232
Link Mode	TCP Server
Baud Rate	9600
Parity	None
Data bits	8
Stop bits	1
Flow Control	None
Link Status	SERVER MODE: Listening[0]

COM 2 Information	
Serial Interface	RS-232
Link Mode	TCP Server
Baud Rate	9600
Parity	None
Data bits	8
Stop bits	1
Flow Control	None
Link Status	SERVER MODE: Listening[0]

Link Status: [N] is the session number connected.
It's [0] when the link is connecting or listening.

Fig. 13. Overview of system information on a Web Interface

5.2.1. Device Information

PC-W's system information includes Model Name, Device Name, Kernel Version, and AP version. The information is read only and is attributed from setting page or system status.

Device Information	
Model Name	PC-W
Device Name	0060e9035a9e
Kernel Version	1.19
AP Version	1.36

Fig. 14. Device Information from Overview web page

5.2.2. Wireless Client Adaptor Information

Wireless Client Adaptor Information fields display both LAN & Wireless LAN (WLAN) information. The information provided are LAN MAC address, Region for Regulation, LAN IP address, WLAN MAC address, WLAN IP address, and Link status.

Wireless Client Adaptor Information	
MAC Address	00:1A:4D:3C:6F:AF
Region	America
IP Address	192.168.0.132
Status	3Com 00:0E:6A:D6:9F:BE 100%

Fig. 15. Wireless Client Adaptor Information from Overview web page

5.2.3. Serial Information

PC-W COM1 (COM2) information includes UART mode, link mode, baud rate, parity, data bits, stop bits, flow control and link status. The COM1 (COM2) information is read only and is attributed from Serial settings of COM1 or COM2 Port of PC-W.

COM 1 Information	
Serial Interface	RS-232
Link Mode	TCP Server
Baud Rate	9600
Parity	None
Data bits	8
Stop bits	1
Flow Control	None
Link Status	SERVER MODE: Listening[0]

Fig. 16. Serial Information from Overview web page

5.3. Network Configurations

There are three items allowed to change on Networking page, included Wireless Client Adaptor Settings, DNS Setting and SNMP Settings.

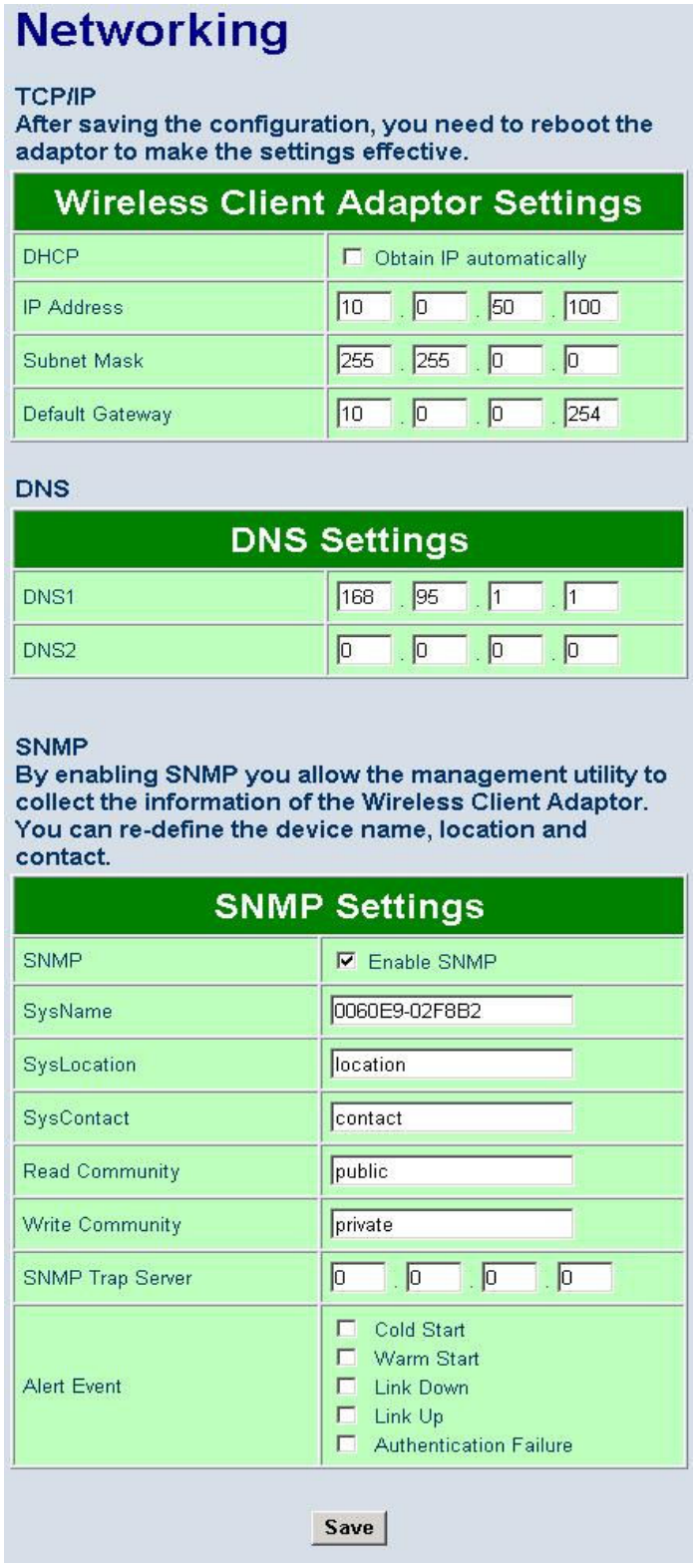


Fig. 17. Network information by Web page

5.3.1. Wireless Client Adaptor Settings

Click on the “Network” link and the following screen shall appear. Fill in network information on WLAN interface including IP Address, Subnet Mask, and Default Gateway. Alternatively, User may activate DHCP client function by checking on “Obtain an IP automatically” field to automatically obtain IP Address, Subnet mask and Default gateway from a DHCP server.

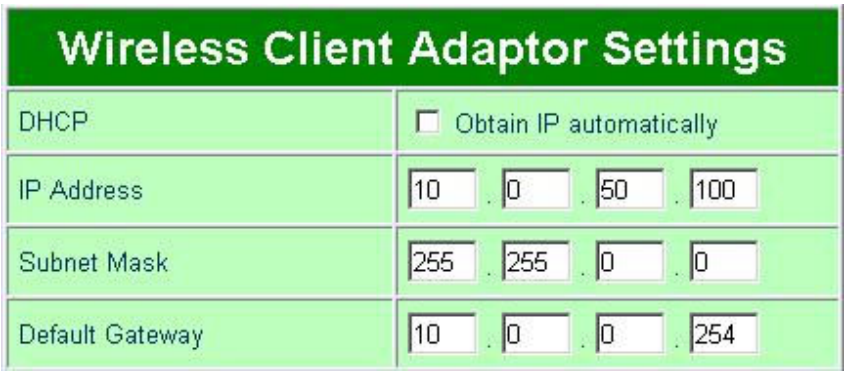


Fig. 18. Wireless Client Adaptor Settings from Network web page

5.3.2. DNS Settings

Click on the “Network” link and the following screen shall appear. Fill in the IP Address of DNS Servers in DNS1 and DNS2 fields. Alternatively, User can configure DNS by checking on “Obtain an IP automatically” field in LAN Settings or WLAN Settings fields to automatically obtain DNS from a DHCP server.

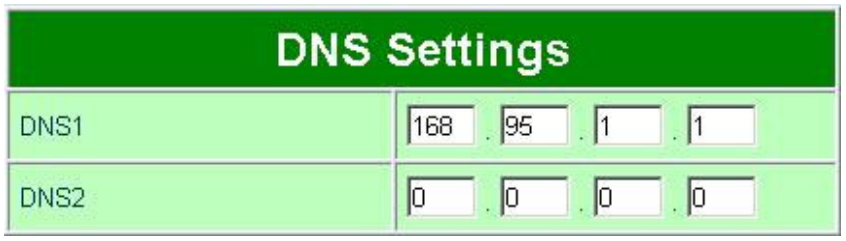


Fig. 19. DNS Settings from Network web page

5.3.3. SNMP Settings

Click on the “Network” link and the following screen shall appear. Check on “Enable SNMP” checkbox to continue the setting. Fill in the desired SysName, SysLocation, SysContact information in the fields. To give permission to read/write SNMP information, fill in the “Read Community” and “Write Community”. To set up a trap, fill in the IP address of a SNMP Trap Server, and then select events on which the trap server will catch. The changes of SNMP Settings will take effect only after the PC-W is restarted.

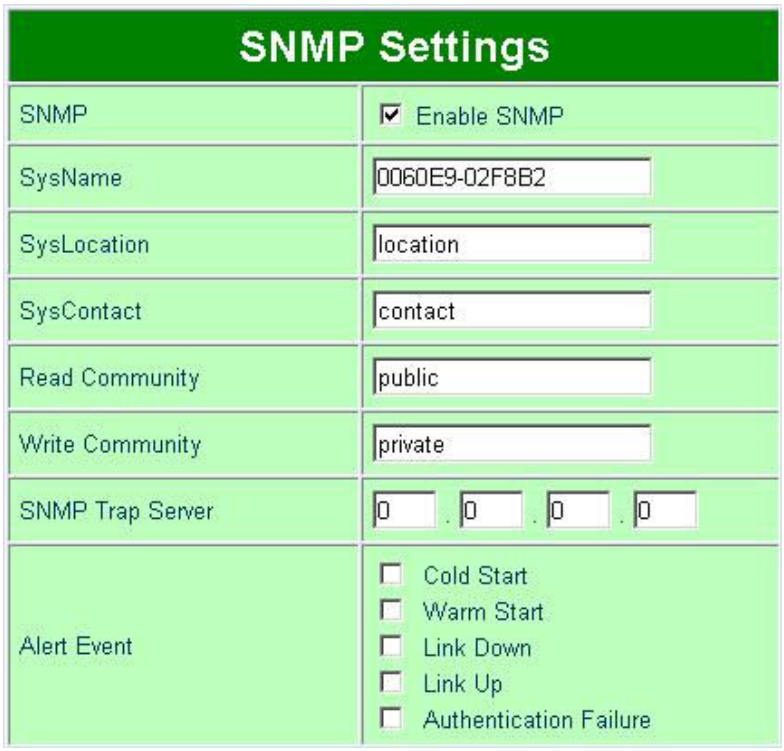


Fig. 20. SNMP Setting from Network web page

5.4. Wireless Configuration

There are three configuration pages for Wireless Configuration which are Default, Current and Site-Survey Information Pages. Click on “Wireless” link and the following screen shall appear.

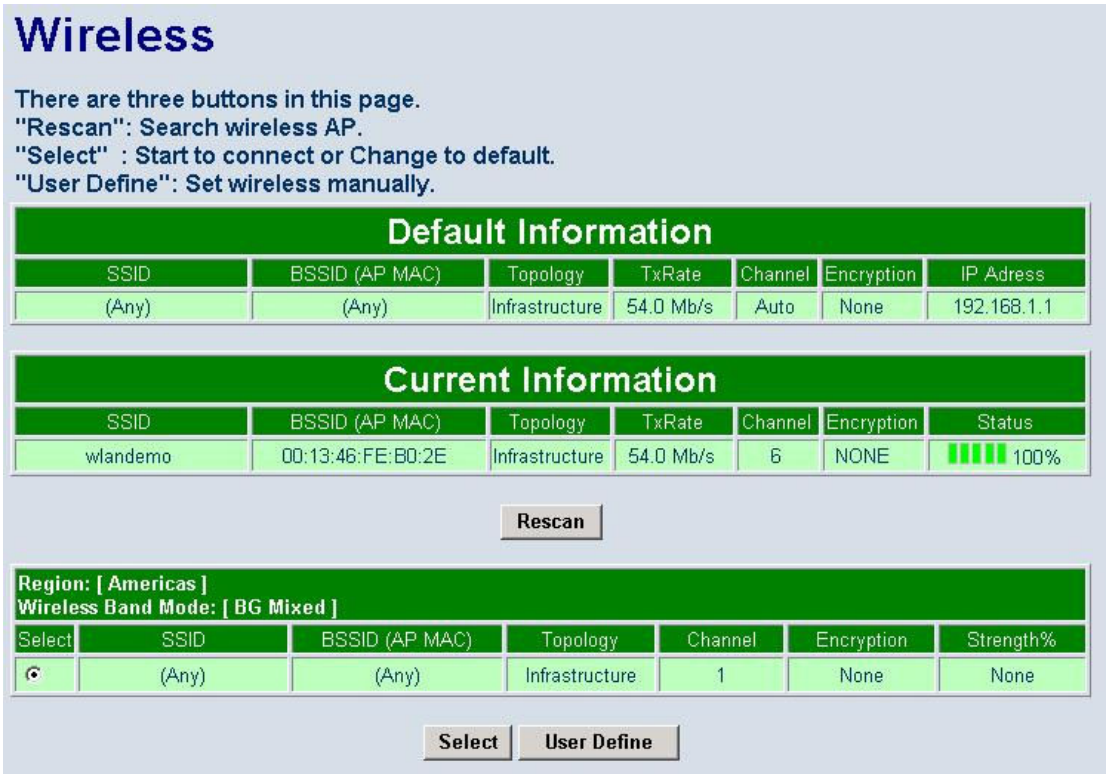


Fig. 21. Wireless Interface Information by Web page

There are 3 buttons can be operated on the Wireless page

- **Rescan:** Click on the "**Rescan**" button, and PC-W will start site-survey procedures, then on the site-survey list will display the access points founded.
- **Select:** On the site-survey list, click on radio button to attach to the access point you wanted.
- **User defined:** Users can also define information of wireless access point to be manually connected.

5.4.1. Wireless Settings

Users can configure wireless LAN parameters through web pages. Pop-up windows page will be shown for advanced wireless settings if "Select" or "User Define" button was clicked. For example, User can configure SSID, BSSID, Topology, Wireless Band Mode, TxRate, Channel, Authentication, and Encryption of the access point that PC-W want to connect to.

The advanced wireless settings also include Roaming Threshold. User can configure roaming signal threshold. PC-W will change to the stronger signal wireless access point, if the original access point's signal strength is less than the roaming threshold.

Fig. 22. Pop-up Windows for Wireless Settings

5.4.2. Sample Wireless Application Cases

Below are some screen shot examples of Wireless Settings for different wireless security schemes.

I. Attach to the access point without authentication

- **Topology**: Infrastructure Mode
- **Channel**: Auto-assignment from Access point
- **Authentication**: Open
- **Encryption**: None

Fig. 23. Open Authorization and no Encryption

II. Attach to the access point with WEP Encryption

- **Topology:** Infrastructure
- **Channel:** Auto-assignment from Access point
- **Authentication:** Shared
- **Encryption:** WEP
- **WEP Key1~4:** Hexadecimal or ASCII, 64 or 128bit, <WEP Key>

Fig. 24. Share Authorization and WEP Encryption

Note1: Enter 5 ASCII value or 10 Hexadecimal digit if select 64-bit encryption.
Note2: Enter 13 ASCII value or 26 Hexadecimal digit if select 128-bit encryption.

III. Attach to the access point with WPA-PSK Encryption

- **Topology:** Infrastructure
- **Channel:** Auto-assignment from Access point

- **Authentication**: WPA-PSK
- **Encryption**: TKIP or AES
- **WPA-PSK:** 8~63 Characters

Fig. 25. WPA-PSK Authorization and TKIP Encryption

5.5. COM Port Configuration

Users can configure Serial parameters including UART mode, baud rate, parity, data bit and type of flow control and the mode of operations, which are TCP Server, TCP Client, and UDP modes. The COM Port Configuration page is shown in Fig. 26.

5.5.1. TCP Server Mode

TCP Server mode is the default Link mode of Serial Settings as shown in Fig. 27. In this mode, the connection waits for a connecting requirement from a remote host PC which is running a “Serial to IP” utility or setting PC-W in tunneling mode. Users need to configure a listening port to allow clients establishing a connection to this server. Default port number of COM1 is 4660.

IP filtering function is a simple ACL (Access Control List) for incoming IP packets. It can be disabled by setting Source IP to “0.0.0.0”. Users can configure one or a group of IP address for Source IP. If IP filter is enabled, only source IP assigned can be connected to PC-W.

Note: Enable Virtual COM mode if the remote site PC’s “Serial to IP” tool is installed

5.5.2. TCP Client Mode

Users may enter a Destination IP and Destination port (default: 4660) to establish a connection of counter-pair (remote) host (for example, another PC-W or PC for data collection) as shown in Fig. 28. PC-W can support up to two destination hosts simultaneously.

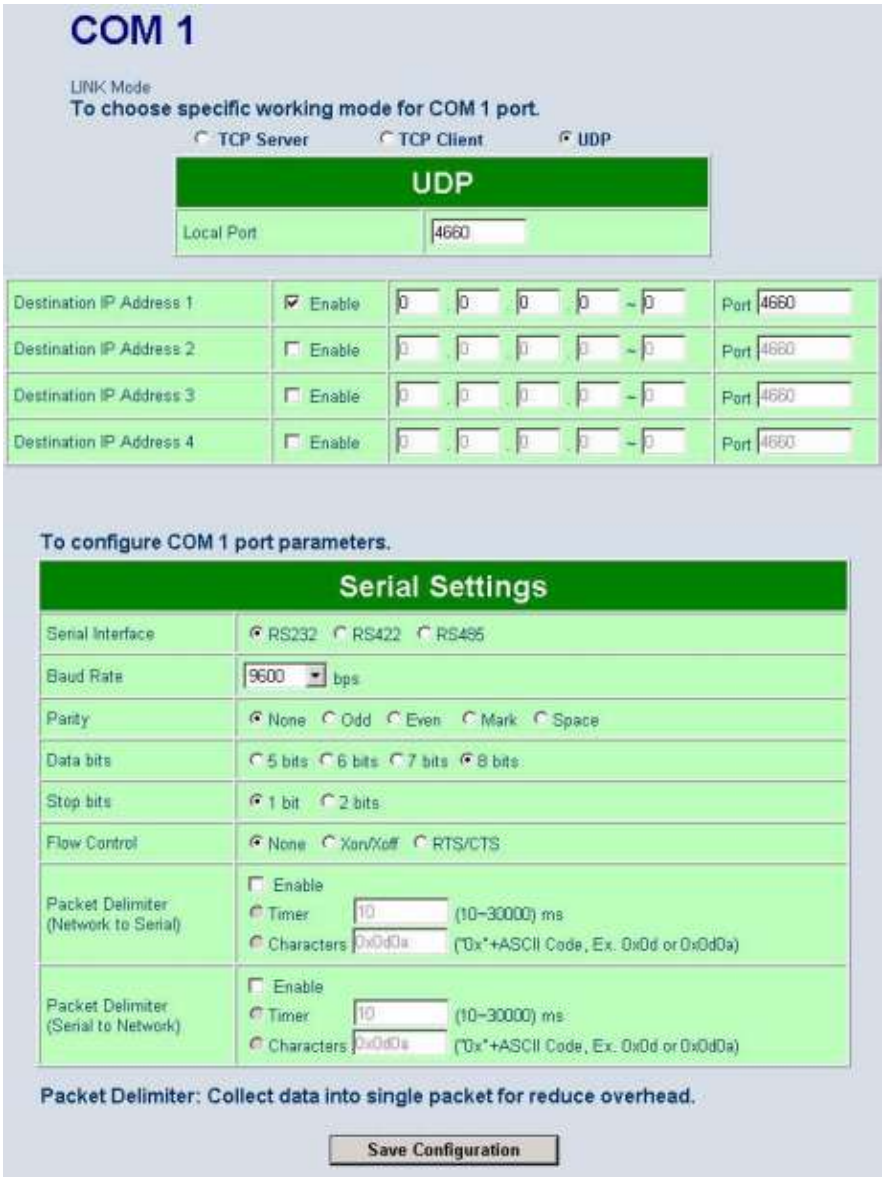


Fig. 26. COM port Information Web Page

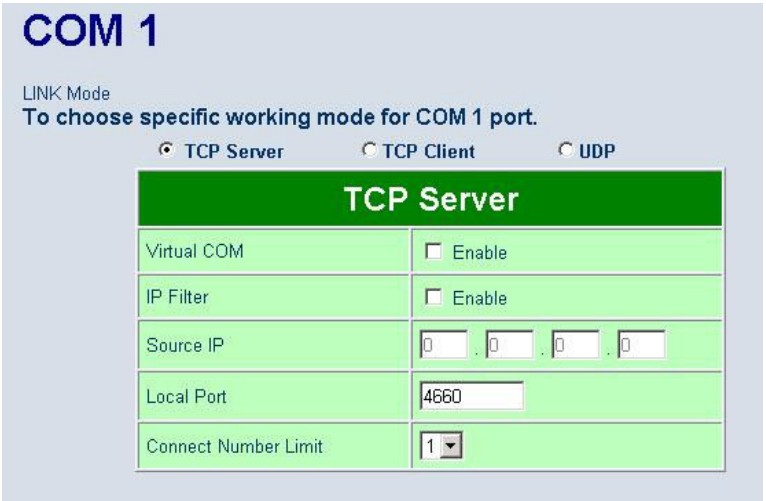


Fig. 27. TCP Server in Link mode

Fig. 28. TCP Client in Link mode

5.5.3. UDP Mode

PC-W can be configured in a UDP mode to establish connection using Unicast or Multicast data from the serial device to one or multiple host computers as shown in Fig. 29. Vice versa is also true. For example, the original RS-422/ RS485 bus can be transferred and extended connection distance by PC-W.

The destination IP is assigned by a single IP or a group of IP addresses. The configuration is limited by the Local Listening Port. For example, the PC-W listening port is 4660 which receives data sending from the host computers. PC-W can support up to 4 group IP addresses for UDP connection, if users needed.

Note: In UDP mode, the device does not support Virtual COM mode.

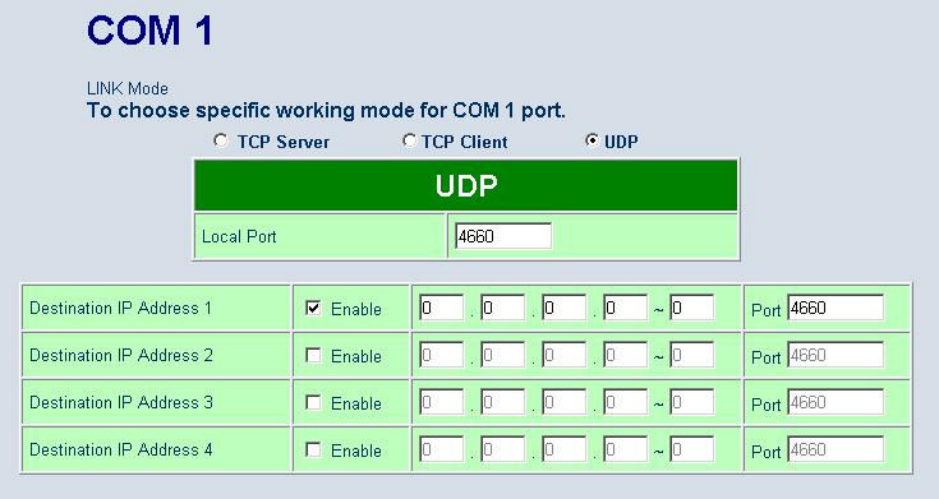


Fig. 29. UDP protocol in Link mode

5.5.4. Serial Settings

The Serial settings of parameters for PC-W are shown in Fig. 30. Users can configure Serial parameters including UART Mode, baud rate, parity, data bit and type of flow control.

- **Configure UART Mode:** RS-232 or RS-485 or RS-422
- **Baud rate (bps):** 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400
- **Parity:** None or Odd or Even or Mark or Space
- **Data bits:** 7 or 8
- **Stop bits:** 1 or 2

- **Flow control:** None or Xon/Xoff or Hardware (RTS/CTS).

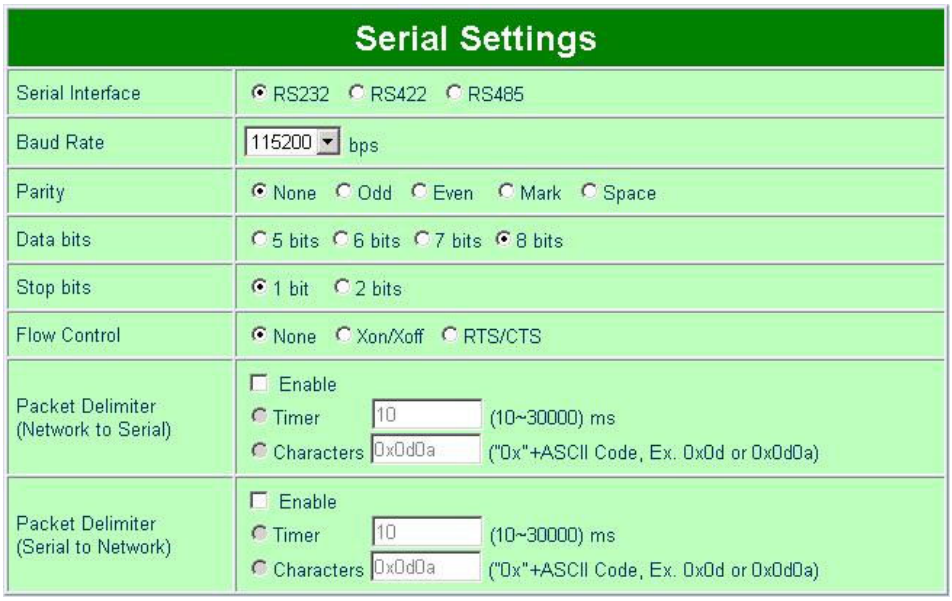


Fig. 30. Serial Communication Settings from Web Page

5.5.5. Packet delimiter

Packet delimiter is a way of controlling the number of packets in a serial communication. It is designed to keep packets in track. PC-W provides two ways in parameter setting: (1) Packet delimiter by timer and (2) packet delimiter by Character pattern. By default, packet delimiter timer is 10 ms. the range of packet delimiter timer is 10 to 30,000 ms. For Character pattern terminator, if a character pattern is selected and a data stream ended with “0x0a04”, then the entire data buffer of the serial device is transmitted.

5.6. Configure System

There are five items for system settings, including Time, WLAN Region, Security, Set to default and Restart.

Fig. 31. Subsystem menu of system settings by Web Interface

5.6.1. Configure Time by NTP Service

User can set date and time manually by enable “Manual Settings” and fill in date and time manually. User can also enable “NTP” to obtain time automatically from a Time Zone and a NTP server.

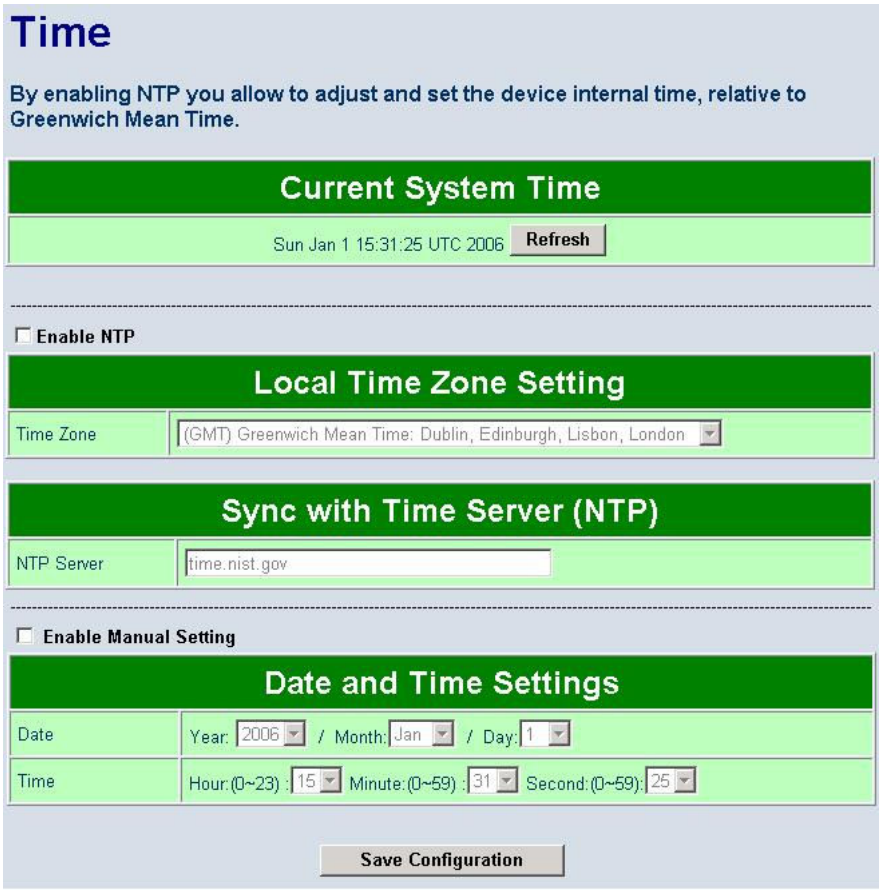


Fig. 32. Time service settings from System web page

5.6.2. WLAN Region

Click on the “WLAN Region” link and the following screen shall appear. Select the country from drop-down list box to the country that user wants to deploy the PC-W. This selection will affect the bands of channels of PC-W wireless mode. For example, the normal system level channel configurations for deployments are channels 1, 6 and 11 for FCC countries and 1, 5, 9 and 13 for European Union countries.

Fig. 33. Time service settings from System web page

5.6.3. Security (Password Change)

Click on the “Security” link and the following screen shall appear. Enter the old password on “Old Password” field then enter the new password on “New Password” and the “Verified Password” fields, and then click on “Save Configuration” to update the password. The maximum number of characters of each field is 8 characters.

Note: User may press the default reset key to reset password to the default value (blank)

Fig. 34. Change password from System Security Page

5.6.4. Restoring Factory Default Configurations

User can click on “Set to default and Restart” button to restore PC-W’s settings to factory default.

Fig. 35. Set all parameters to factory default by Web Interface

5.6.5. Restart System

The changes of networking parameters will take effect only after the PC-W is restarted. User can restart the PC-W manually by click on Restart button on the restart menu web page.

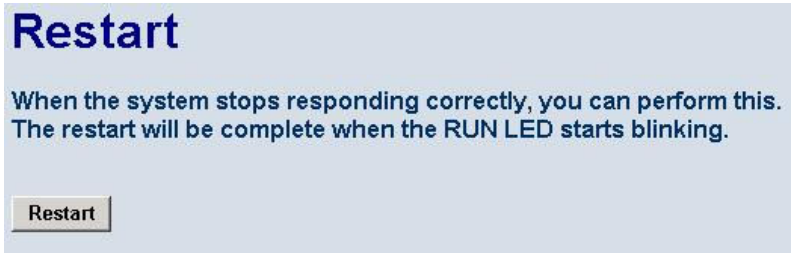


Fig. 36. Restart system by Web

5.7. Applications

5.7.1. Paperless Recorder VR18 (Ethernet port) to Wireless Ethernet

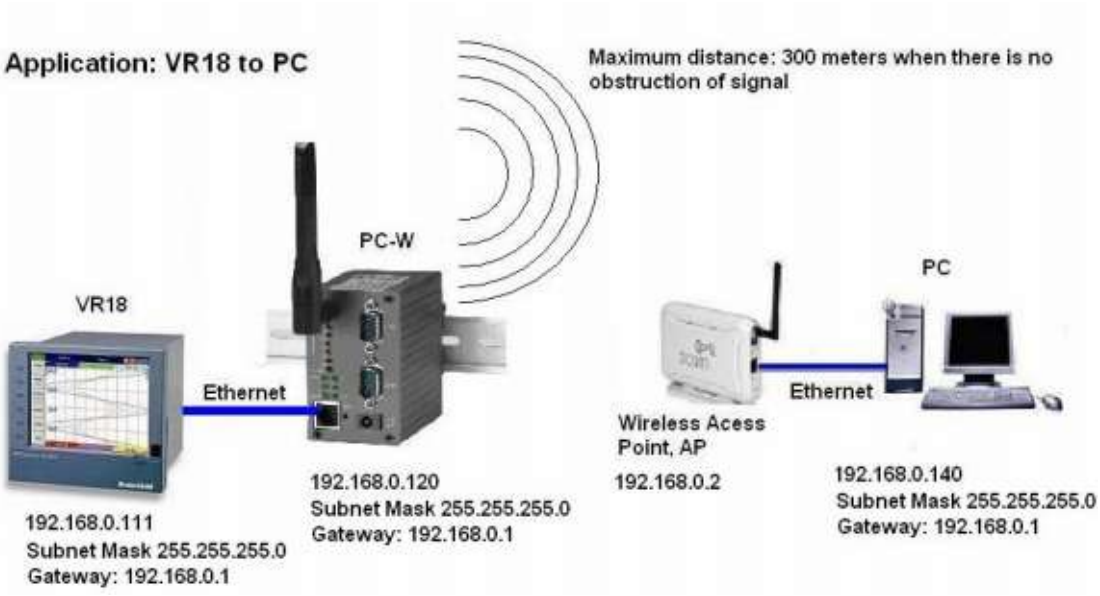
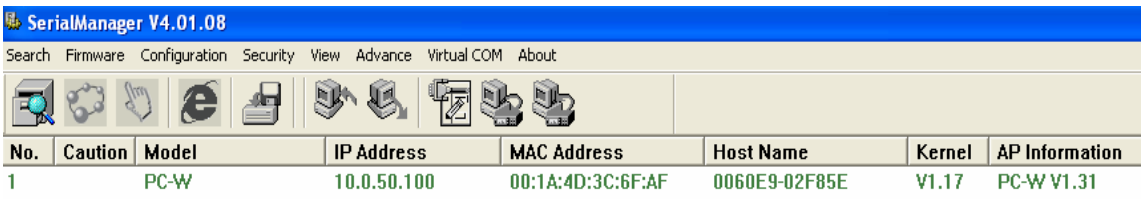


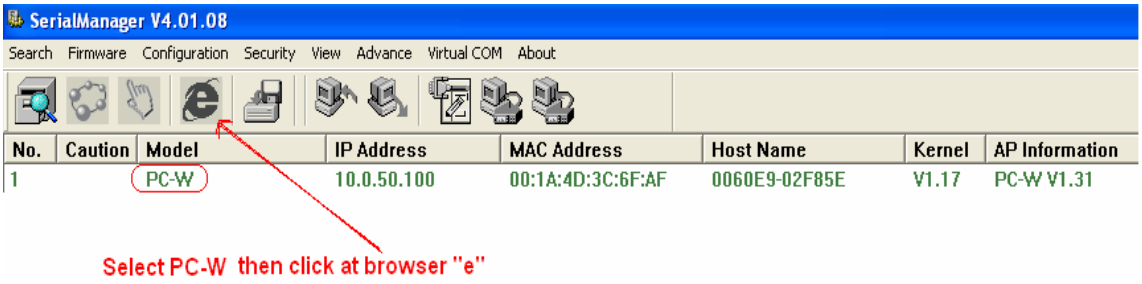
Fig. 37. Application between PC-W and VR18

Procedure as follows..

1. Install Serial Manager in PC
2. PC-W default IP address: 10.0.50.100
3. Set IP address of PC as 10.0.50.110, Subnet Mask 255.255.255.0 & Default Gateway: 10.0.50.1. Since IP address of PC is in same domain as PC-W, now, it is possible to configure PC-W from PC
4. Switch on Power supply to PC-W. Connect PC-W to PC via Cross over Ethernet Cable or LAN cable
5. Open Serial Manager. If step3 and step4 is proper, then PC-W will be detected by Serial manager and it is shown as follows



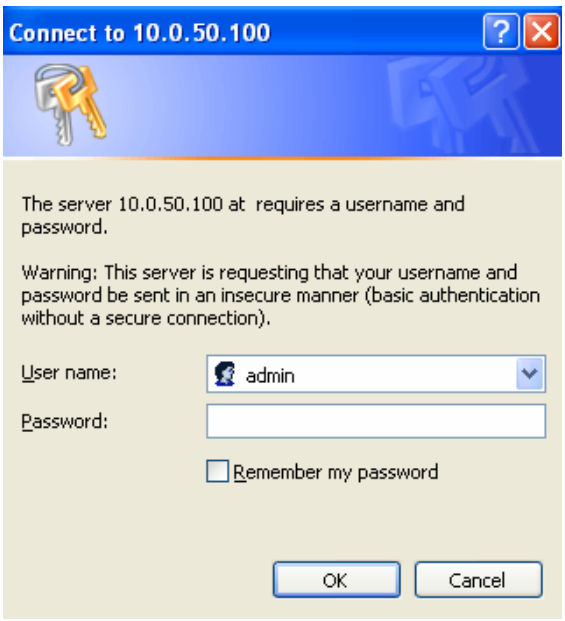
6. Now select PC-W and then click on browser “e” as follows



7. Log in screen appear as follows

User name = admin

Password = just leave it blank

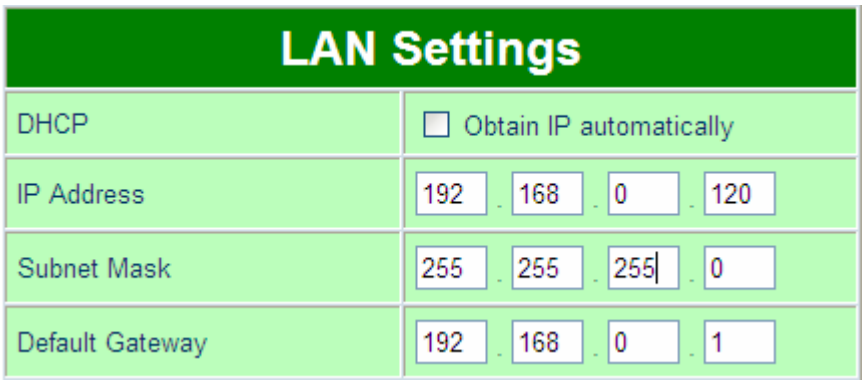


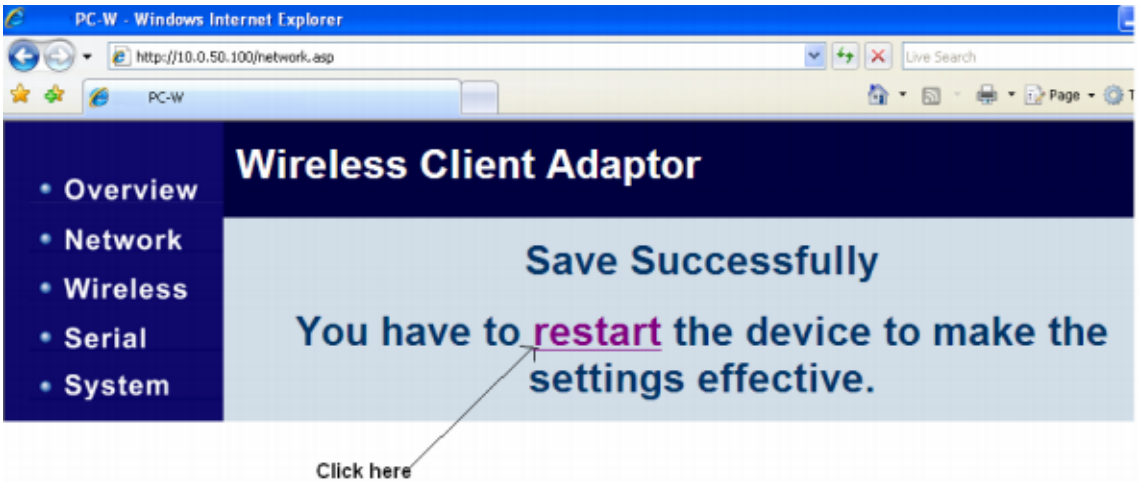
8. Click on “OK”, then Wireless Client Adopter overview screen appear as follows.

9. Now, click on Network on left hand side of the Menu. It shows Networking screen as follows. It is possible to modify IP address of PC-W at this location. We suggest not to select option at "Obtain IP address automatically"

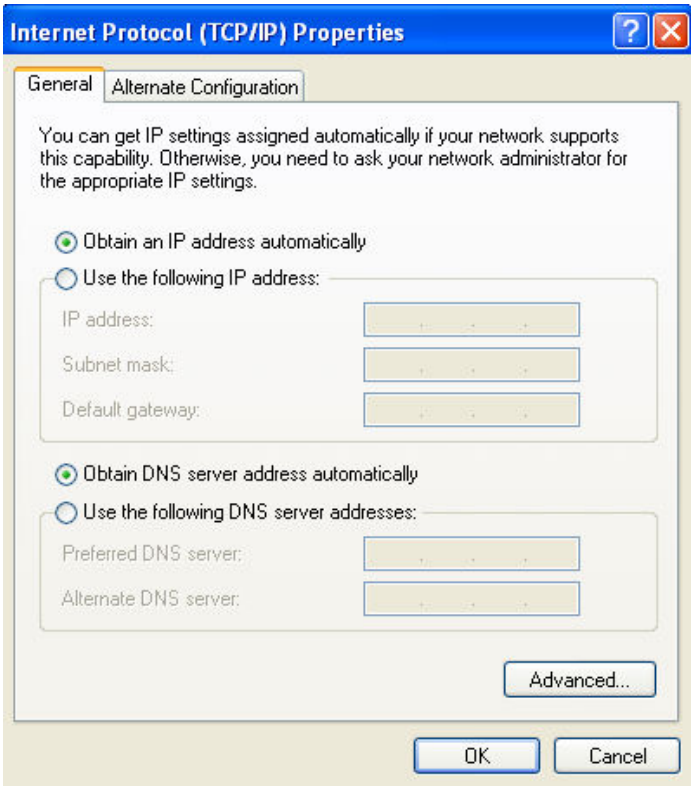
10. Paperless Recorder VR18/VR06 has Ethernet port by Default. Assume Recorder IP address is 192.168.0.111

11. Now, it requires to Set IP address of PC-W to the above domain. So, click on Networking and then do LAN settings properly as follows…, scroll down to bottom and then click on "Save" button. Click on "Restart" when prompted in the screen and PC-W will restart in 60 sec

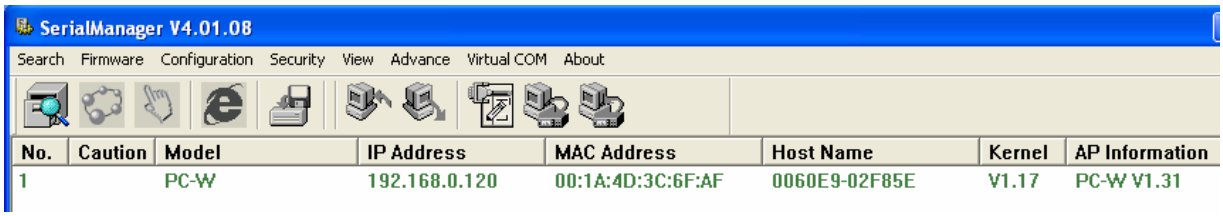




12. Now, change IP address, subnet mask and gateway address in PC in same domain of VR18 and Wireless AP or just set "obtain an IP address automatically" as shown below



13. Now, close the serial manager and open again. Then, it should detect PC-W and shows as follows

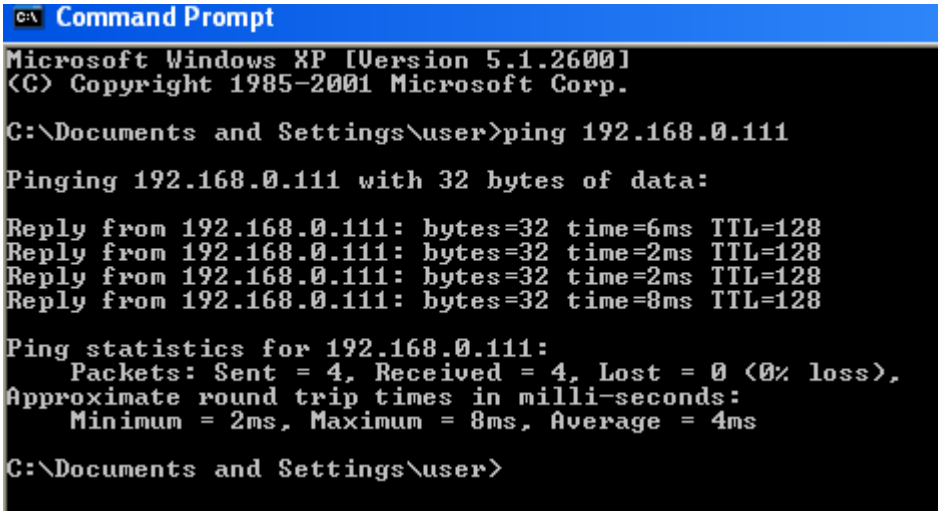


14. If there is good communication between PC-W and Your wireless AP, then green color LED should be flashing slowly at PC-E. If not, then from the serial Manager, it requires to connect your Wireless AP provider properly

Click on Wireless, then click on “Rescan” button, it scans all the available wireless access points. Select the required access point and then “Save settings and Connect”. Then your wireless access point should be selected in Current information and it also shows status

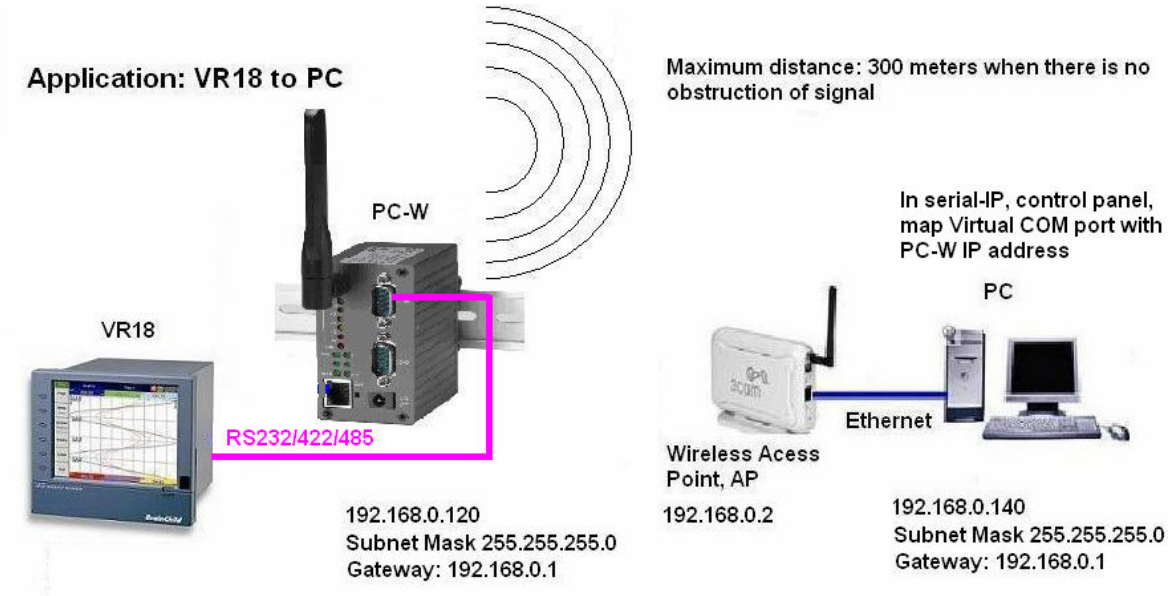
15. Now, close serial Manager and disconnect Ethernet cable between PC-W and PC.

16. Now connect VR18 with PC-W via cross over Ethernet cable or Straight through cable. At this time, VR18 is virtually connected to your wireless access point. If connection is successful, then you can see Green color LED flashing at Ethernet port at PC-W. In Recorder, Green LED will be on continuously and orange LED will be flashing at Ethernet port. You may check VR18 using “Ping” instruction at dos prompt from any PC connected to LAN or Wireless AP. If there is no reply, then it requires to check Ethernet cable, IP address of Recorder, setting of IP address at PC-W and also wireless AP settings



17. Now, in Observer software, create a new project and enter IP address of Recorder. Please note that there is no need to enter IP address of PC-W or Wireless AP device in Observer software.

5.7.2. Paperless Recorder VR18 (Serial port) to Wireless Ethernet



Procedure as follows..

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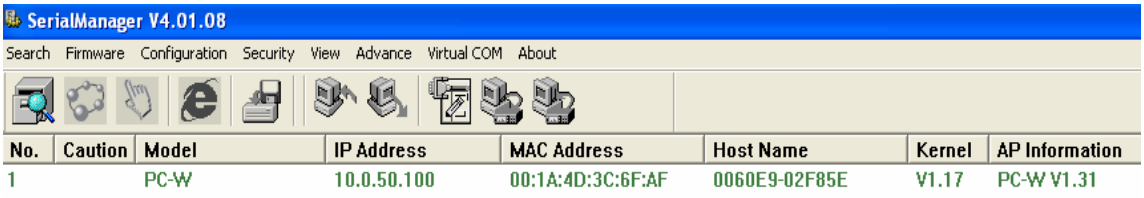
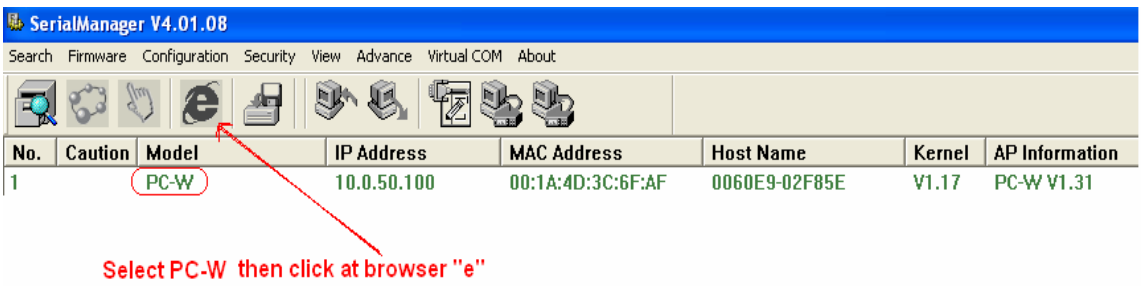
2. PC-W default IP address: 10.0.50.100
3. Set IP address of PC as 10.0.50.110, Subnet Mask 255.255.255.0 & Default Gateway: 10.0.50.1. Since IP address of PC is in same domain as PC-W, now, it is possible to configure PC-W from PC
4. Switch on Power supply to PC-W. Connect PC-W to PC via Cross over Ethernet Cable or LAN cable
5. Open Serial Manager. If step3 and step4 is proper, then PC-W will be detected by Serial manager and it is shown as follows



6. Now select PC-W and then click on browser “e” as follows



7. Log in screen appear as follows

User name = admin

Password = just leave it blank

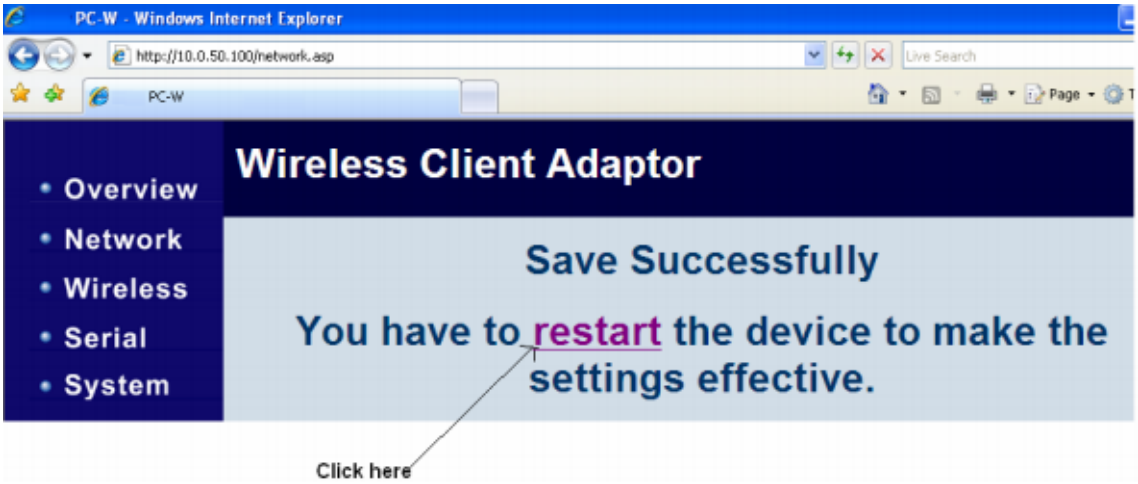
8. Click on “OK”, then Wireless Client Adopter overview screen appear as follows.

9. Now, click on Network on left hand side of the Menu. It shows Networking screen as follows. It is possible to modify IP address of PC-W at this location. We suggest not to select option at “Obtain IP address automatically”

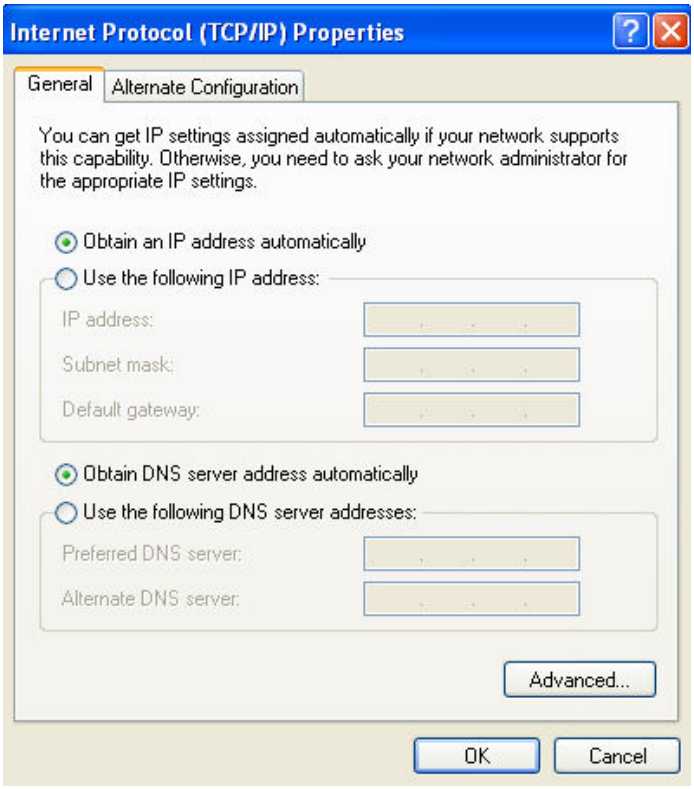
10. Check IP address details of Server or wireless AP

11. Now, it requires to Set IP address of PC-W to the above domain. So, click on Networking and then do LAN settings properly as follows…, scroll down to bottom and then click on “Save” button. Click on “Restart” when prompted in the screen and PC-W will restart in 60 sec

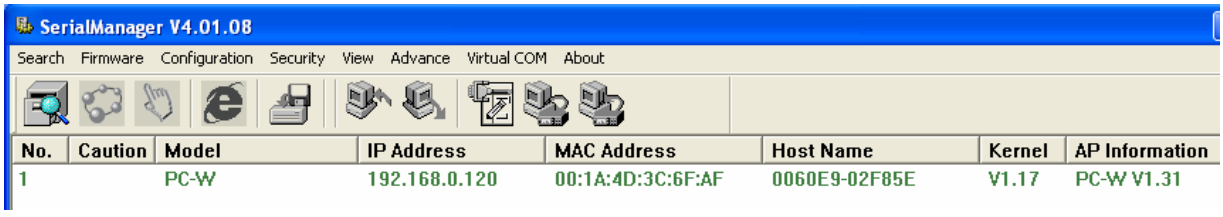
LAN Settings	
DHCP	☐ Obtain IP automatically
IP Address	192 . 168 . 0 . 120
Subnet Mask	255 . 255 . 255 . 0
Default Gateway	192 . 168 . 0 . 1



12. Now, change IP address, subnet mask and gateway address in PC in same domain of Wireless AP or just set “obtain an IP address automatically” as shown below



13. Now, close the serial manager and open again. Then, it should detect PC-W and shows as follows



14. If there is good communication between PC-W and Your wireless AP, then green color LED should be flashing slowly at PC-E. If not, then from the serial Manager, it requires to connect your Wireless AP provider properly

Click on Wireless, then click on “Rescan” button, it scans all the available wireless access points. Select the required access point and then “Save settings and Connect”. Then your wireless access point should be selected in Current information and it also shows status

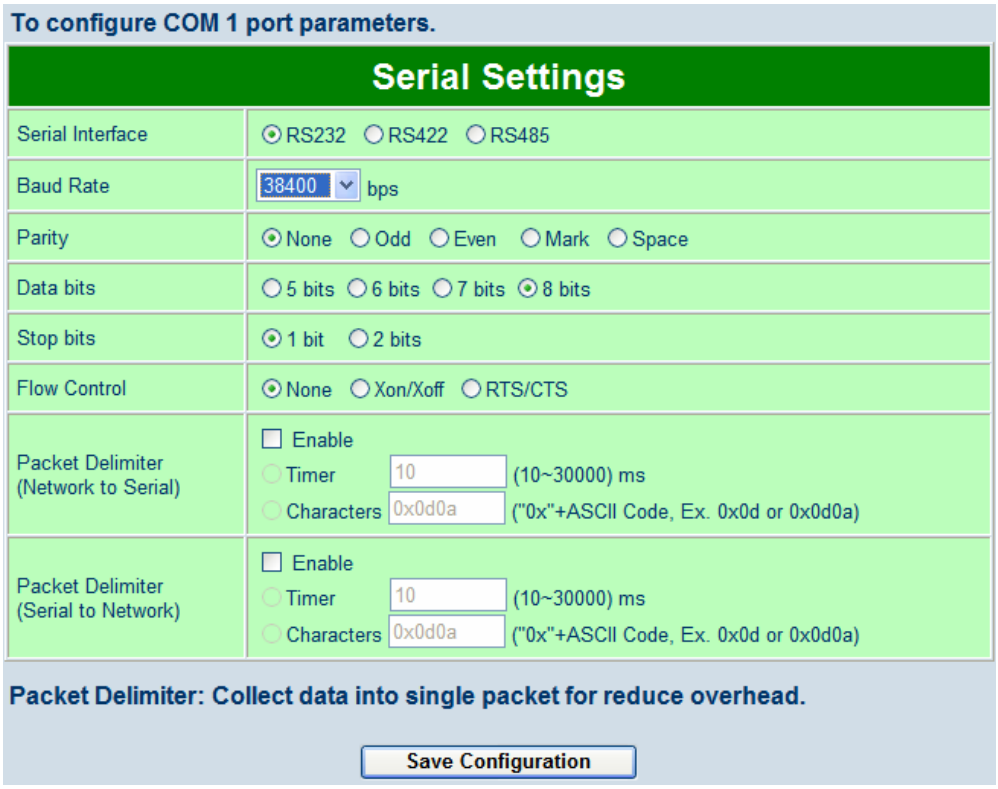
15. Now, close serial Manager and disconnect Ethernet cable between PC-W and PC.

16. Now connect VR18 with PC-W COM1 port via serial cable say RS232. At this time, VR18 is virtually connected to your wireless access point.

17. In VR18, press “Config”, then select “Instrument” and press Enter. Set communication parameters. Ex: PC Transfer = RS232/RS485/RS422, Address = 1, Baud rate = 38400, data format = No, 8, 1

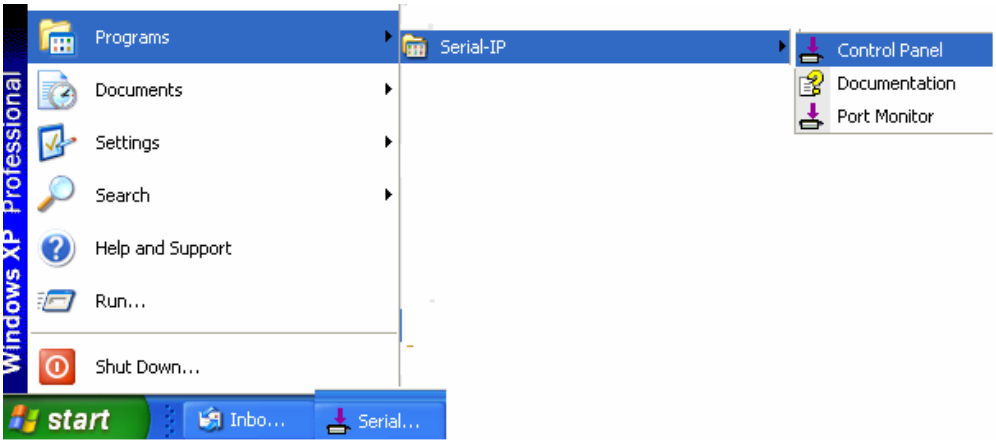
18. In serial manager, click on “Serial” and it shows the following screen. For COM1, select option “TCP Server” and enable Virtual COM enable as shown

Select PC-W COM1 settings same as VR18 COM port settings



19. Click on “Save Configuration” button. Then it appears a message “Save successfully”

20. Now, it requires to create virtual COM port in PC for PC-W device. During installation of serial manager, Serial/IP redirector will be installed in PC. If not, install Serial/IP software from CD



21. Open Serial-IP control panel and select the options as follows

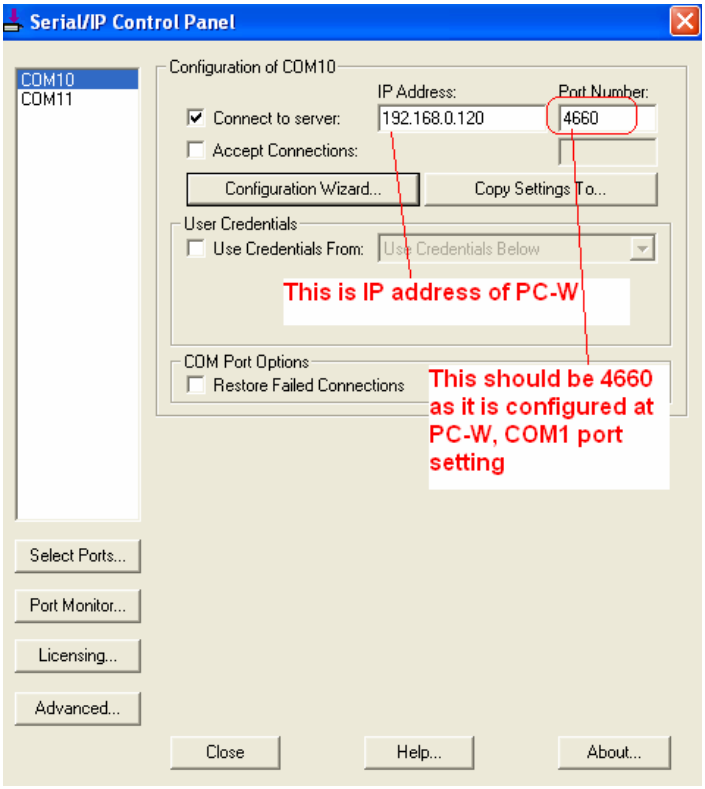
Click at “Select ports” and then select Virtual port number required for VR18 paperless Recorder to use in Observer software

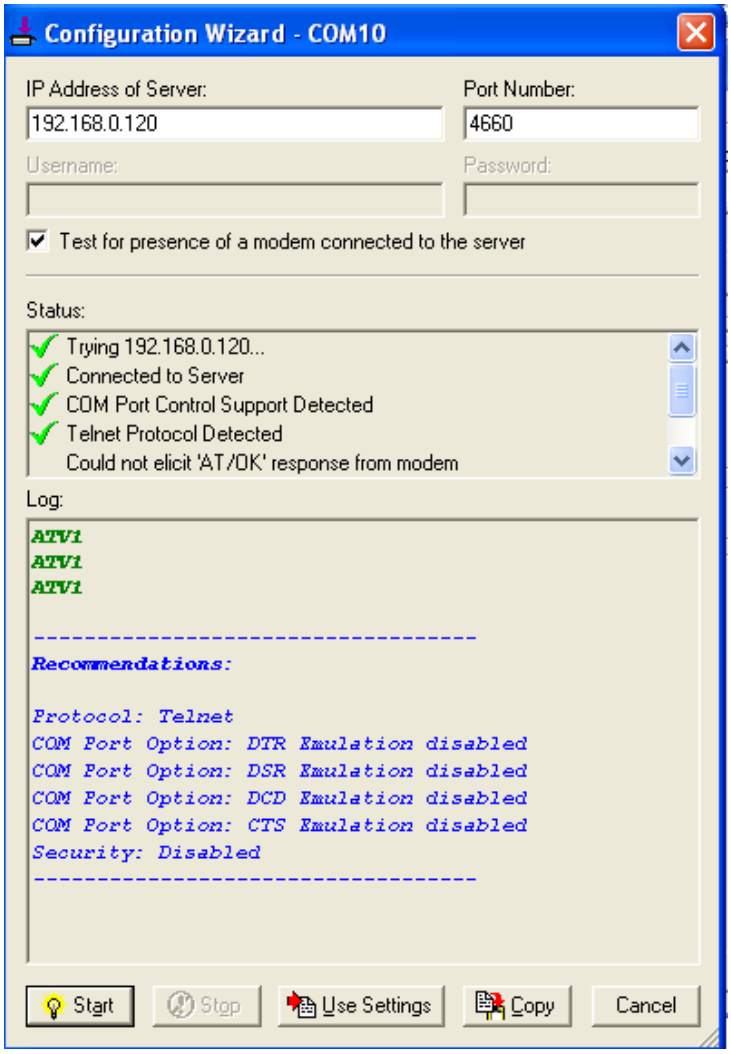
Select “Connect to Server”

Enter IP address of PC-W

Enter port number: 4660 (This is already configured at PC-W, COM1 settings)

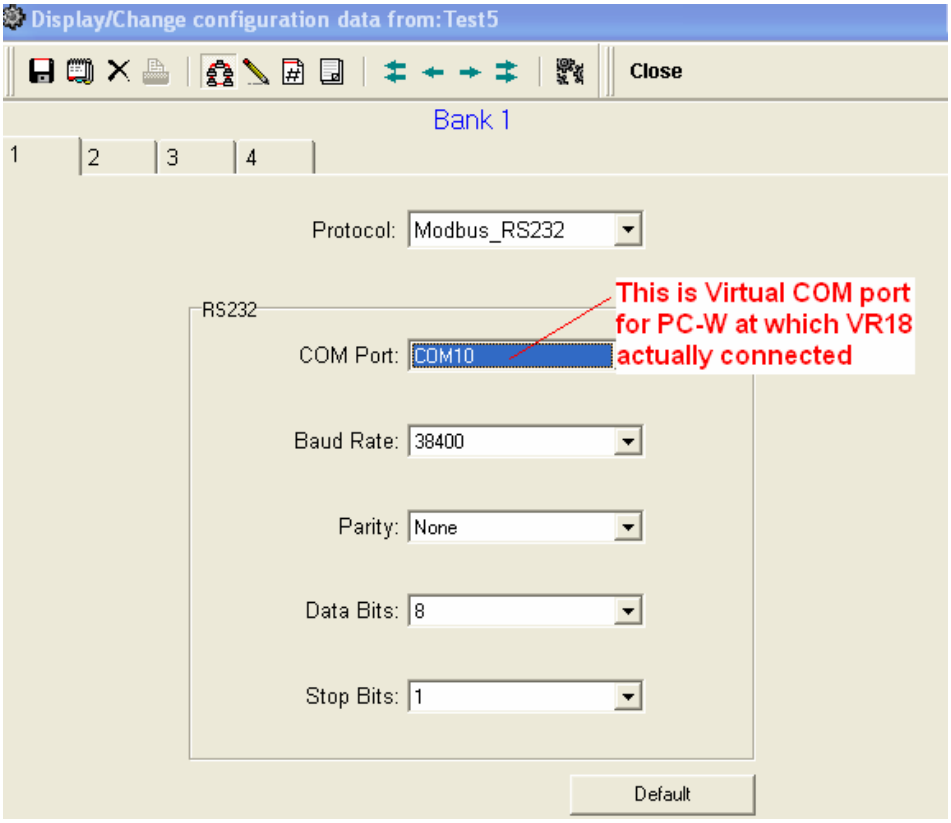
Now Click on “Configuration wizard” to test connection between PC and VR18 via PC-W and Wireless Access Point

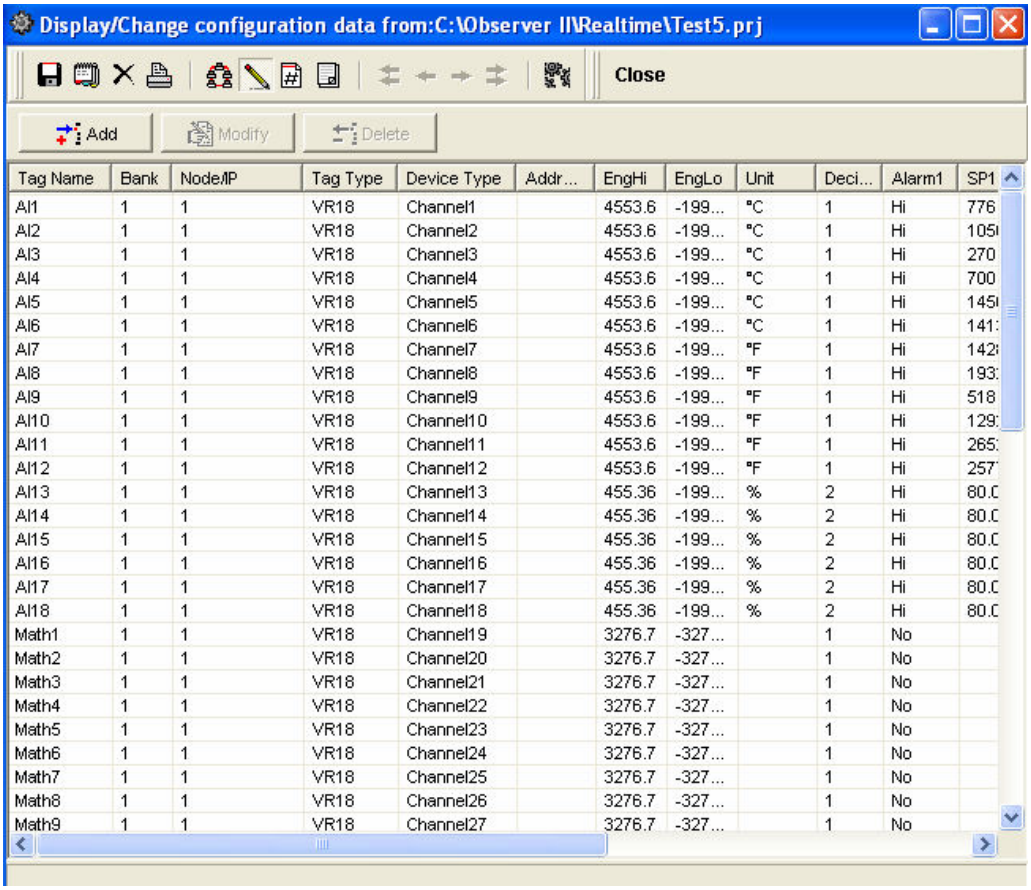




22. The above screen shows successful connection between PC and VR18 via PC-W and Wireless access point and now COM10 is virtual COM port in PC to be used in Observer software

23. Now open Observer software, Real time viewer and create new project. Set bank as shown below





Tag Name	Bank	Node/IP	Tag Type	Device Type	Addr...	EngHi	EngLo	Unit	Deci...	Alarm1	SP1
AI1	1	1	VR18	Channel1		4553.6	-199...	°C	1	Hi	776
AI2	1	1	VR18	Channel2		4553.6	-199...	°C	1	Hi	105
AI3	1	1	VR18	Channel3		4553.6	-199...	°C	1	Hi	270
AI4	1	1	VR18	Channel4		4553.6	-199...	°C	1	Hi	700
AI5	1	1	VR18	Channel5		4553.6	-199...	°C	1	Hi	145
AI6	1	1	VR18	Channel6		4553.6	-199...	°C	1	Hi	141
AI7	1	1	VR18	Channel7		4553.6	-199...	°F	1	Hi	142
AI8	1	1	VR18	Channel8		4553.6	-199...	°F	1	Hi	193
AI9	1	1	VR18	Channel9		4553.6	-199...	°F	1	Hi	518
AI10	1	1	VR18	Channel10		4553.6	-199...	°F	1	Hi	129
AI11	1	1	VR18	Channel11		4553.6	-199...	°F	1	Hi	265
AI12	1	1	VR18	Channel12		4553.6	-199...	°F	1	Hi	257
AI13	1	1	VR18	Channel13		455.36	-199...	%	2	Hi	80.0
AI14	1	1	VR18	Channel14		455.36	-199...	%	2	Hi	80.0
AI15	1	1	VR18	Channel15		455.36	-199...	%	2	Hi	80.0
AI16	1	1	VR18	Channel16		455.36	-199...	%	2	Hi	80.0
AI17	1	1	VR18	Channel17		455.36	-199...	%	2	Hi	80.0
AI18	1	1	VR18	Channel18		455.36	-199...	%	2	Hi	80.0
Math1	1	1	VR18	Channel19		3276.7	-327...		1	No	
Math2	1	1	VR18	Channel20		3276.7	-327...		1	No	
Math3	1	1	VR18	Channel21		3276.7	-327...		1	No	
Math4	1	1	VR18	Channel22		3276.7	-327...		1	No	
Math5	1	1	VR18	Channel23		3276.7	-327...		1	No	
Math6	1	1	VR18	Channel24		3276.7	-327...		1	No	
Math7	1	1	VR18	Channel25		3276.7	-327...		1	No	
Math8	1	1	VR18	Channel26		3276.7	-327...		1	No	
Math9	1	1	VR18	Channel27		3276.7	-327...		1	No	

24. Now, Real time viewer should run in PC. If there is successful communication between PC and VR18 via PC-W and Wireless access point AP, then in PC-W, the LED status will be as follows

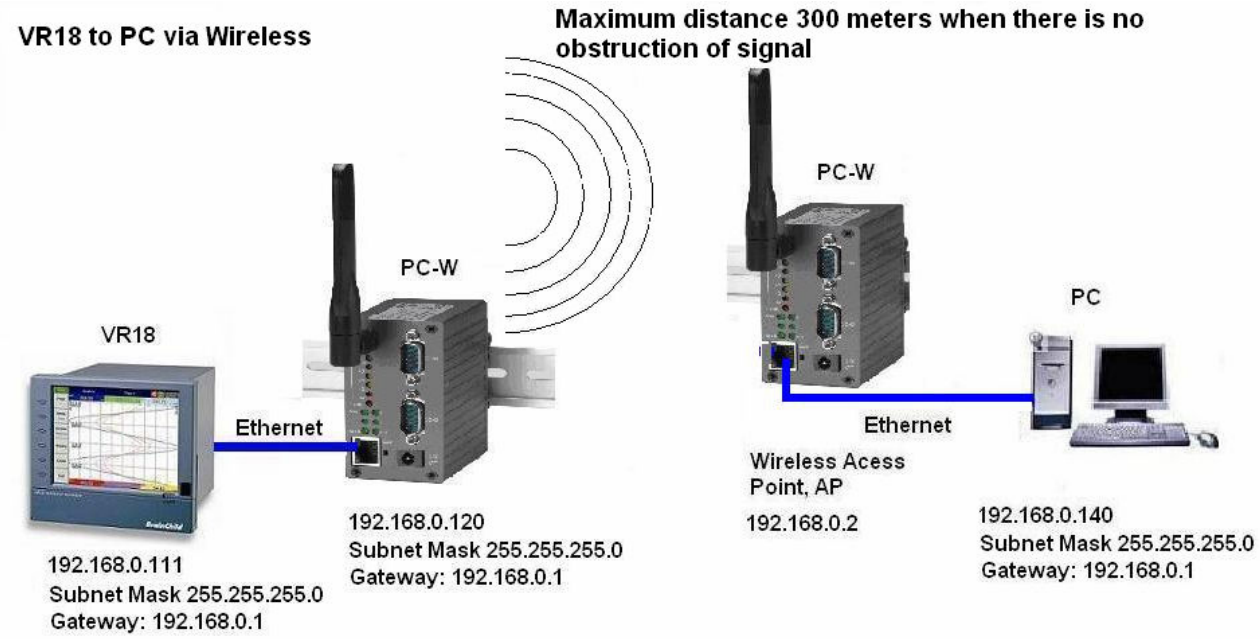
    COM1: T & R – Flashing

    WLAN: Flashing

    RUN: Flash

5.7.3. Paperless Recorder VR18 to PC via Wireless Ethernet (Using 2 PC-W devices)

If existing wireless AP is overloaded with many connected devices, it may affect performance of data transfer between VR18 and PC via wireless Ethernet. In this case, it is suggested to use PC-W as wireless AP also such that you will have dedicated Wireless Ethernet for factory applications and do not mix up with office setup

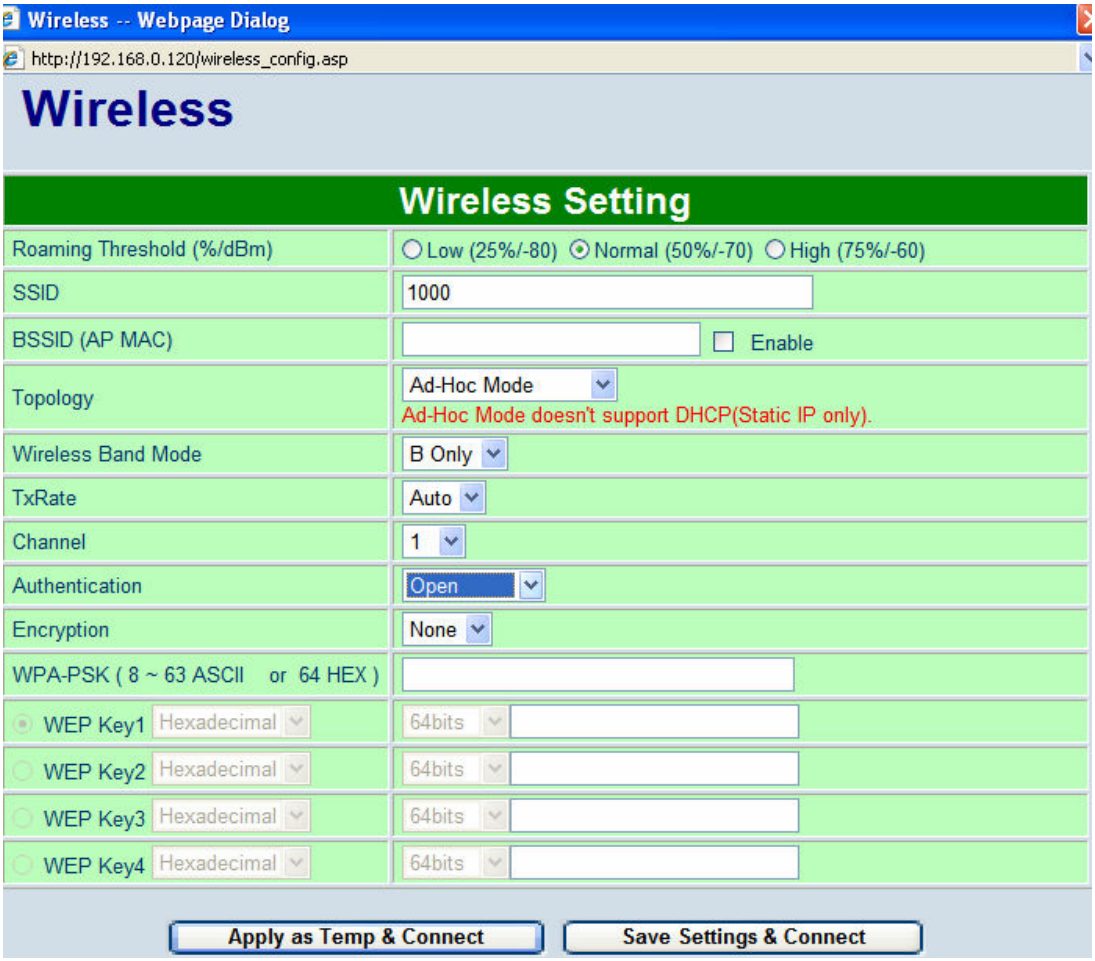


In case of Ethernet connection between VR18 and PC-W, setup is same as procedure explained in section 5.7.1. It requires the additional setup as follows..

SSID should have same ID for both PC-W devices.

Click on “Wireless” and then click on “User define button” as shown attached

Do settings as follows. Please note that these settings should be done at both PC-W devices and settings should be same in both PC-W devices. Ex: SSID number, Topology, Wireless Band, Channel etc.. should be same. Click on “Save settings and Connect” after completing settings



Appendix A. Using Virtual COM

Virtual COM is a software driver for Microsoft Windows operating system to convert the data in COM port format to IP protocol format, and to transfer the data between the COM port on PC-W device and the IP network. As shown in Fig. 38, by creating Virtual COM ports on a PC, the PC can redirect the communications from the Virtual COM ports over a TCP/IP network to a connection port of a PC-W which is also connected to a Serial device. By using Virtual COM ports, the application running on the PC can send and receive data from the Serial device transparently over the TCP/IP network.

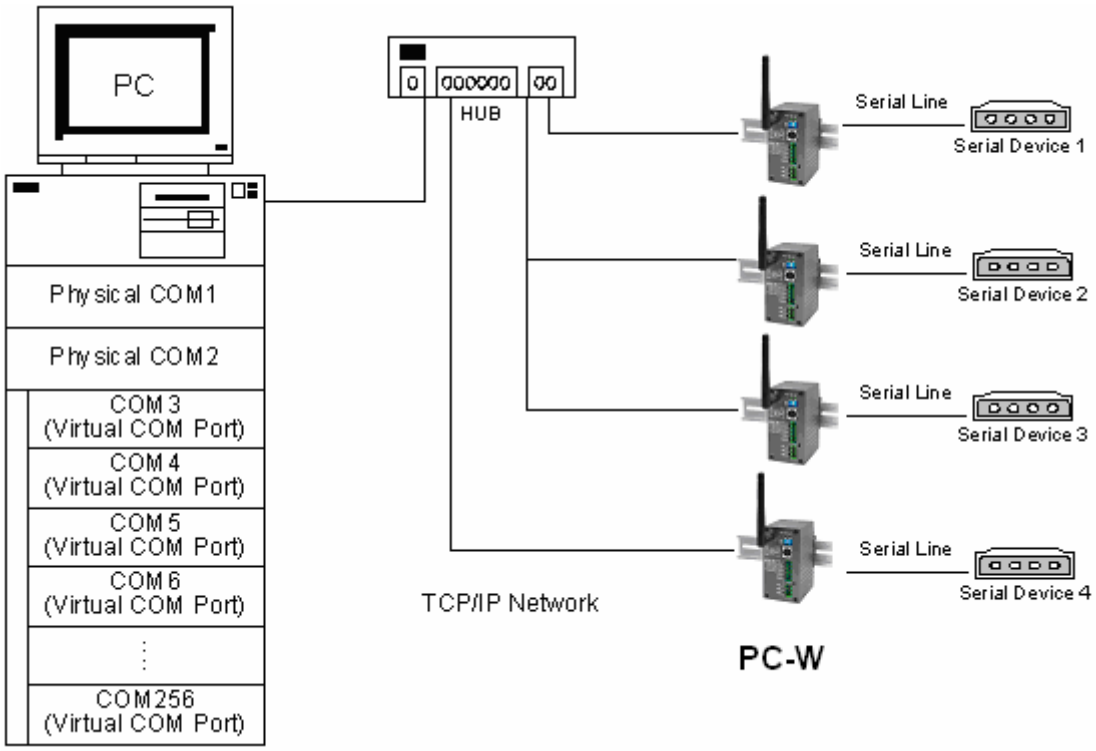


Fig. 38. Setup of a Virtual COM driver

A.1. Pre-installation Requirements

Please check the operating system on your PC complied with the following requirements:

- Processor: Intel-compatible, Pentium class
- Operation system: Windows Server 2003, Window Vista, Windows XP, Windows 2000, Windows NT 4.0 SP5 or later, Windows Me, Windows 98, Windows 95, Microsoft NT/2000 Terminal Server, Citrix Meta Frame
- Windows Installer 2.0
- Network: Microsoft TCP/IP networking software

A.2. Limitation and Installation

Limitation

Virtual COM driver provides users to select up to 256 COM ports as Virtual COM ports using **Serial Manager** Utility software. Users can select them from a list of COM ports, which is from COM1 up to COM256.

Installation

Make sure you have turned off all anti-virus software before beginning the installation. Run **VcomXXX.exe** program included in the Product CD to install Virtual COM for your operating system. At the end of the installation, please select one or two COM ports to become the Virtual COM ports.

Uninstalling

- From Windows Start menu, select Setting\ Control Panel\ Add/Remove Programs.
- Select Virtual COM in the list of installed software.
- Click the Add/Remove button to remove the program, or from Windows Start menu select Programs, Virtual COM, and click Uninstall Virtual COM to remove the program.

A.3. Virtual COM Communication

Enable Virtual COM on PC-W by web interface

To access PC-W device from a web browser, typing its IP address in URL location bar, and then click on "Serial" link to access Serial page. On the top half of the page, click on "TCP Server" and enable Virtual COM by putting a check in front of the "Enable" checkbox. Then, type in the local port number in the "Local Port" field as indicated in Fig. 39.

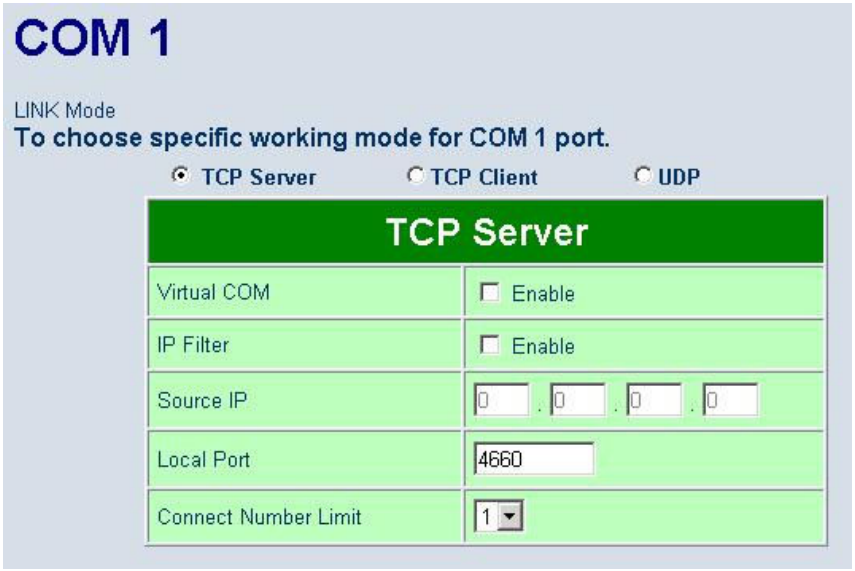


Fig. 39. Enable Virtual COM Mode using Web page

Running Serial to IP for program on PC

On Window Start Menu, go to Program\Serial/IP\Control panel\, The "Serial to IP for Control Panel" window shall appear. Then select the serial port that you want to set up as shown in Fig. 40. On the right of the panel is the sample for COM10 settings. On the left is the list of the COM ports that have been selected for configuration. Change the list by clicking the Select Ports button. Each COM port has its own settings. When clicking on a COM port on the left list, the Control Panel changes to reflect the parameters of the selected port.

Note: The COM port changes become effective immediately.

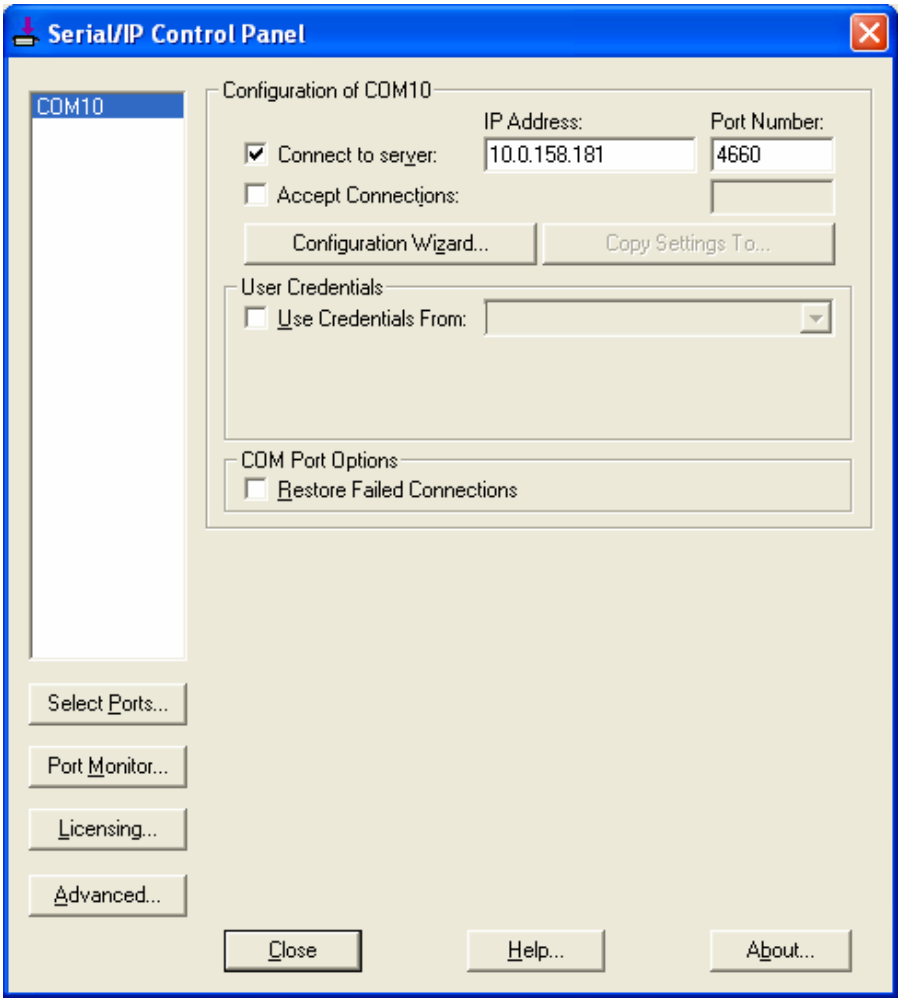


Fig. 40. Detailed Setting of Serial/IP Control Panel

Configure Virtual COM Ports

To configure Virtual COM port as shown in Fig. 40, it can be configured as follows.

- Select a COM port on the list.
- Check “Connected to Server” and enter the PC-W IP address in “IP Address” field.
- In the “Port Number” field, enter the TCP port number of the PC-W. The default port is 4660.
- By default, “User Credentials” is not required. However, if it does require, you will need a username and password to access PC-W device.
- Click “Configuration Wizard” to pop up a dialog to set up a configuration.
- On “Username” and “Password”, the default is no login required. If the PC-W does require the login, you must provide a username and password to access the PC-W device.
- Click the “Start” button that shall appear on the wizard window. This step verifies that the Virtual COM Redirector communicates with the PC-W. If “Log” display does not show any error, click “Use Settings” to apply the settings and return to the Control Panel.
- Settings on the “Connection Protocol” must match the TCP/IP protocol supported by the PC-W. The Configuration Wizard is capable of determining the correct settings.
- On “COM Port Options”, the settings must match the COM port behavior expected by the PC application. The Configuration Wizard will recommend such settings.

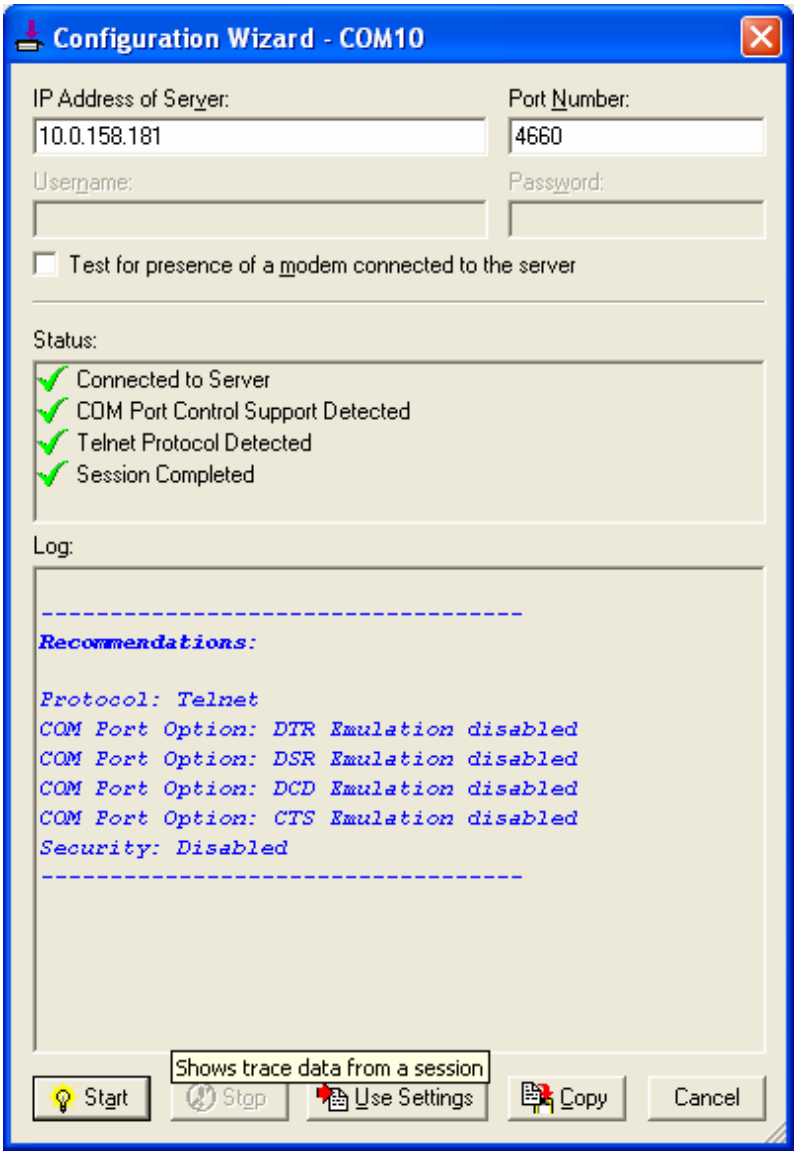


Fig. 41. Configuration Wizard from Serial to IP tool

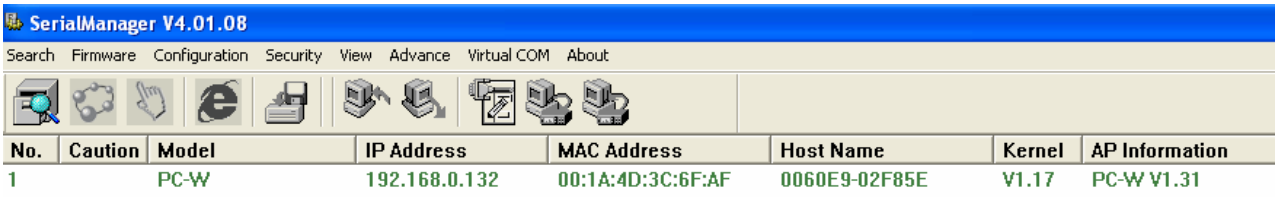
Appendix B. Configuration Utility

B.1. Serial Manager utility Introduction

Serial Manager Utility is a special tool for device management and configuration. It can realize the daily management on PC-W devices for address search, device positioning, parameter configuring, and firmware downloading.

B.2. Interface

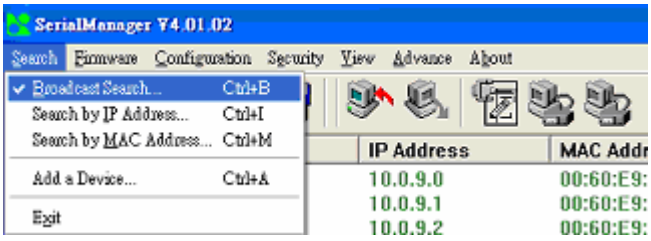
The operating interface of the **Serial Manager Utility** is shown below:



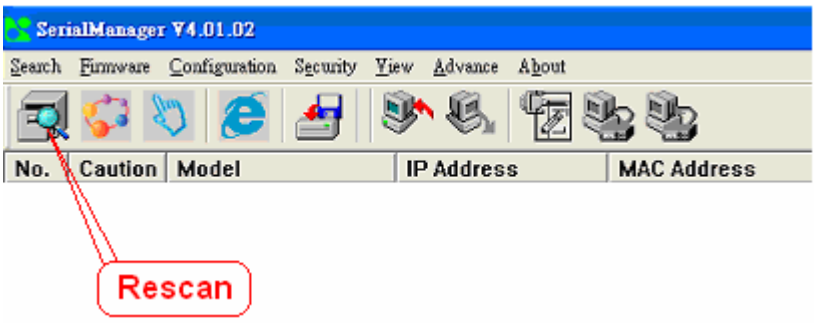
B.3. Functions

B.3.1. Device Search

This function is applied to search devices in the network. There are four methods to search devices, Search by Broadcast, Search by IP addresses, Search by MAC addresses and Rescanning devices by using the current search way. To select the search methods, users click the “Search” on the main menu which is shown below.



Alternatively, users can select by clicking a button on the toolbar as below.

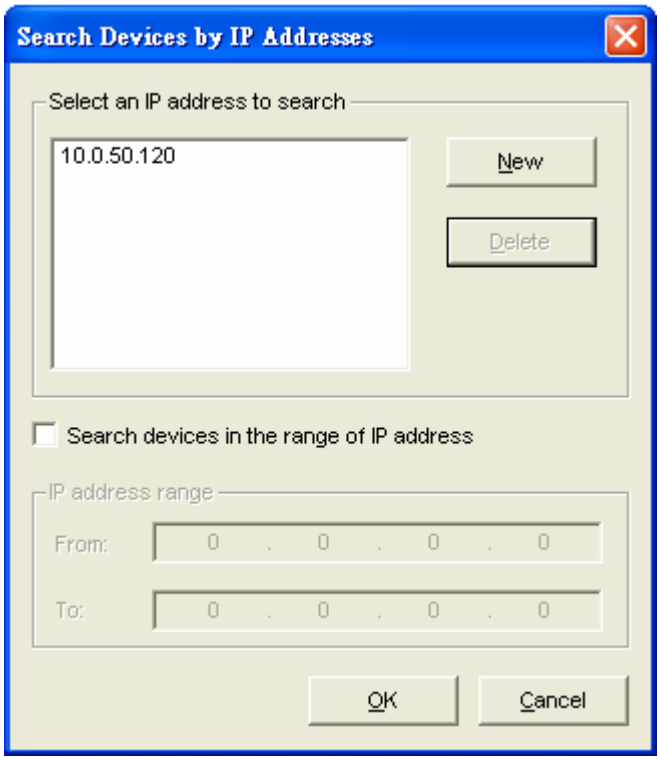


Broadcast Search

Once “Broadcast Search” is selected, a box will pop up as below. The user may type in or select different broadcast address based on requirement.

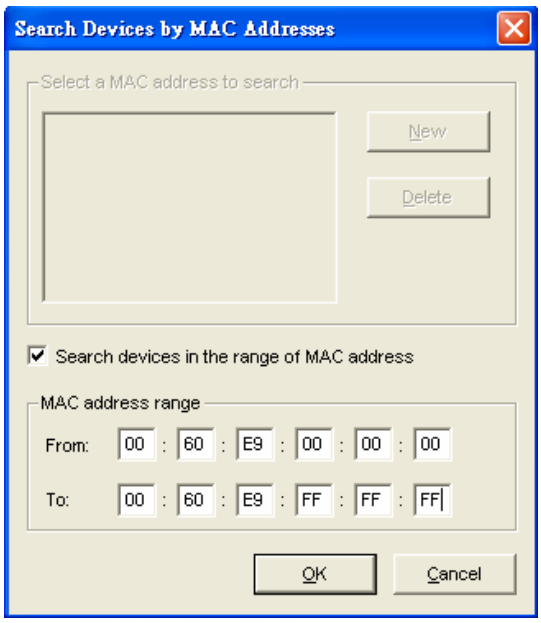
Search by IP address

Once “Search by IP Address” is selected, an interface will pop up as below. Here user may have two options: Select an IP address to search or Search device in the range of IP address.



Search by MAC Address

If “Search by MAC Address” is selected, another box will pop up as below. Here the user may search in two ways: “Search a MAC address to search” or “Search devices in the range of MAC address”

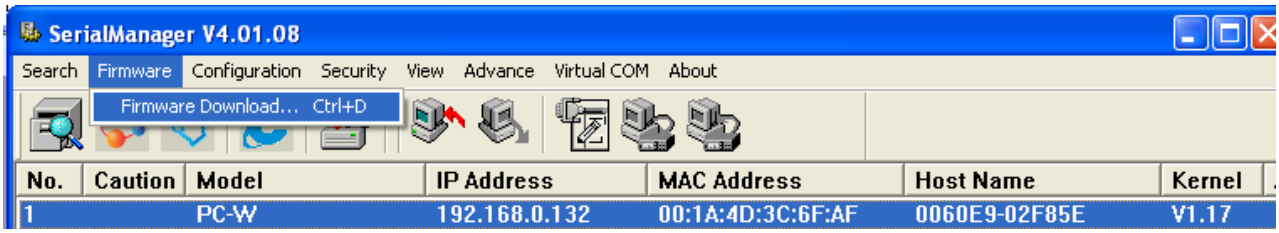


Rescan

Once the user click the “Rescan” button on the toolbar, the Serial Manager utility shall re-search devices by using the current search way.

B.3.2. Firmware

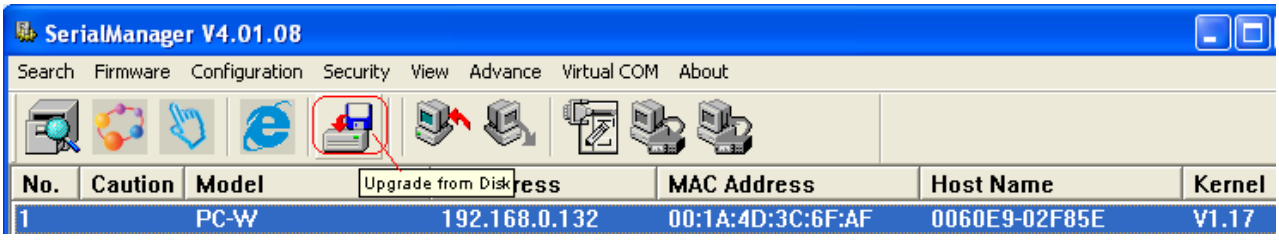
This function is applied to downloading a firmware into the selected device. The user can enter the window for downloading by firstly clicking a designated network device, and then selecting the submenu option “Firmware Download” in the main menu option “Firmware”, or directly clicking the button **Upgrade from disk**.

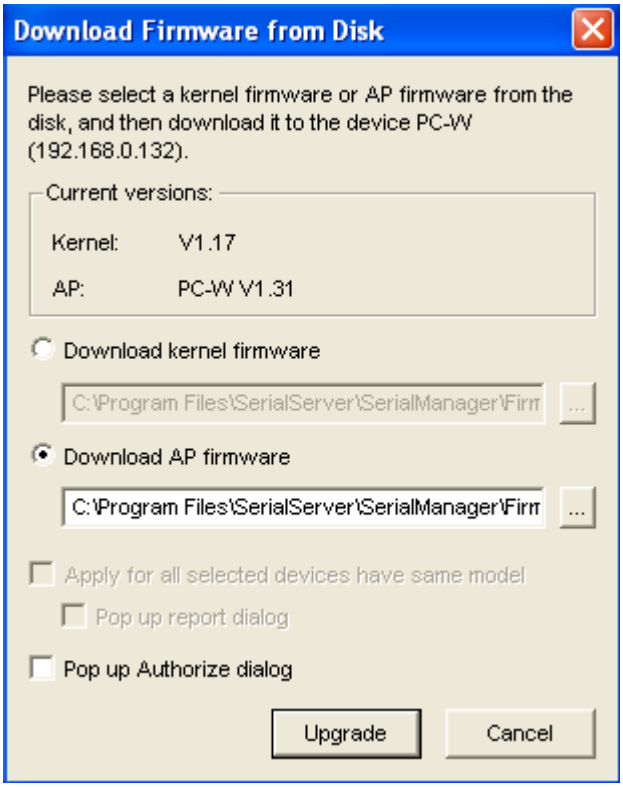


And then the user can select and download the required firmware from the disk, as shown in the figure below. The user can also select several same devices at one time, and realize the firmware updating for them by selecting **Apply for all selected devices have same model**.

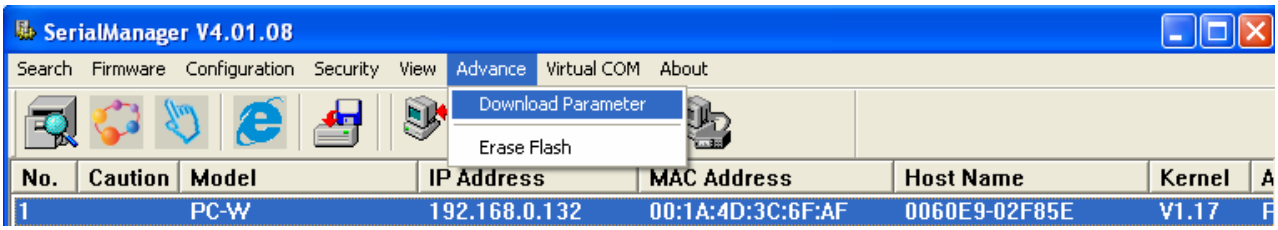
Operation Step:

1. Select device (Holding the [Ctrl] key for multiple selection]
2. Click the [Upgrade from disk] icon
3. Click [Upgrade] to apply for all of selected devices

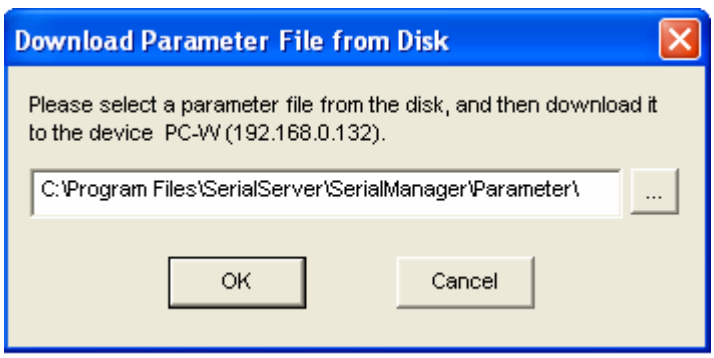




You may want to save device's parameters before upgrading a firmware, and then it can be downloaded to the device after upgrading. Alternatively, you can configure one device and save device's parameters to be downloaded to other devices of the same model. In some devices with JFFS2 file system supported, the user can download the values of related parameters into the device that supports the JFFS2 file system through a submenu **Download Parameter**. See details as the figure below.

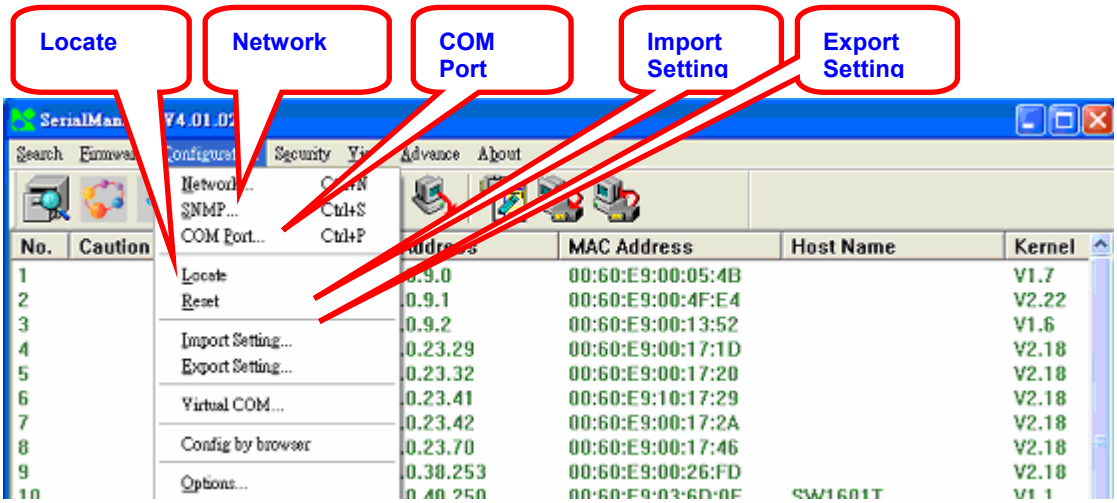


A Dialog is opened and prompted for users to browse and to select a parameter file to be downloaded to devices as shown below.



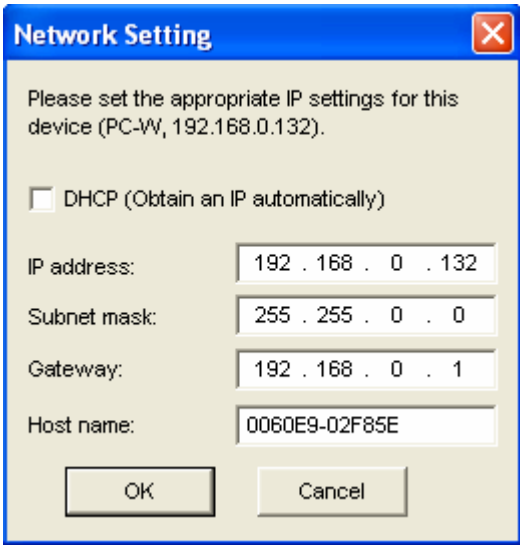
B.3.3. Configuration

This function is for device configuration to set up parameters, to import and to export the parameters, and to set up some options. Here is the list of configurations: “Network”, “SNMP”, “COM Port”, “Locate”, “Reset”, “Import Setting”, “Export Setting”, “Virtual COM”, “Config by browser” and “Options.” Users can carry out a configuration operating through menu or by clicking the corresponded button on the toolbar, shown as the figure below:



Network

The user can modify the IP address of any selected device, shown as the figure below. You can statically assign IP address, Subnet mask, and Gateway. Optionally, you can set up the device with a host name. You can select DHCP option to obtain an IP address automatically.



The user can also select several devices at one time, and save the parameter information of these selected devices into a designated parameter file by selecting "Save all the selected devices".

Configure by Browser

Some devices are supplied with build-in Web servers, which will be used to configure similar to Serial Manager software. Users can carry out any parameter setting directly through the submenu option “Config by Browser”, and a Web browser is shown in the figure below.

Option

The option is mainly applied to setting some common working rules of Serial Manager utility, such as the device search time interval or whether to display any device information tip. The dialog is shown in the figure below.

B.3.4. Security

This function is applied to the security protection for the network devices, so as to supply some necessary protection to a device for configuration modifying, configuration leading-in and leading-out, and some other important functions. Here three functions are mainly supplied, including: **Login**, **Logout** and **Change Password**, shown in the figure below.

Login

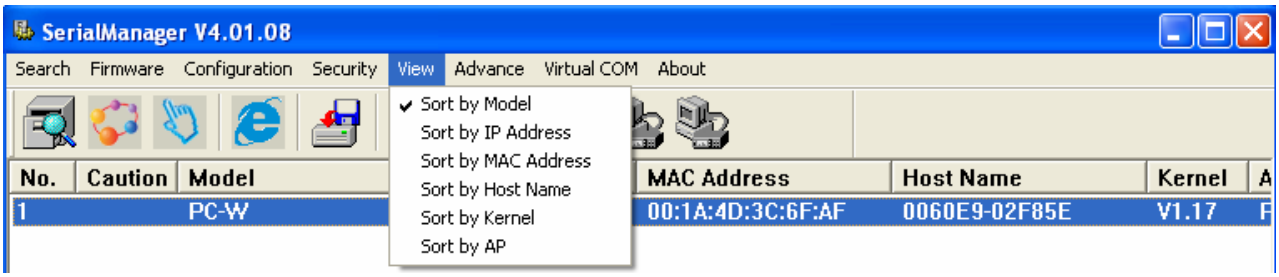
This function is applied to the login to any network device, as some important devices can only be operated after a successful login, shown in the figure below. The user can also select several devices at one time, and log into them at the same time by selecting “Apply for all selected devices.”

Logout

This function is applied to the logout from any network device, as the user should always carry out a logout after he/she has finished the operating action to any important device, shown in the figure below. The user can also select several devices at one time, and log out them at the same time by selecting “Apply for all selected devices.”

B.3.5. View

The user can select a display mode of the network device according to his/her own requirement through the menu option "View", such as: display in sequence of device module name, or display in sequence of IP address and so on, shown in the figure below.



B.3.6. About

This function is mainly applied to displaying information of the **Serial Manager** utility

Appendix C. Upgrading System Software

For updated version of a device firmware, please contact your supplier. You may use serial Manager software to upgrade a firmware. Please refer to Serial Manager Firmware Download sectionCritical Issues in Upgrading Process

If the upgrading is successful, PC-W shall re-program the flash memory, and the buzzer will beep before restarting. It takes around 5 seconds to complete the re-programming. **If any error occurs during the process, PC-W will clear the corresponding memories, and the system will remain the same as the one before the upgrading process**.

Appendix D. Specifications

D.1. Hardware Specifications

System	
CPU	150 MHz RISC Processor with MMU support
Memory	Flash: 8 MB, 2 MB for Bootloader
	SDRAM: 16 MB
Interface	Mini-PCI Slot (for Wireless Module)
Watchdog	Hardware Watchdog Reset
Debug Port	CPU Build in COM port
Wireless LAN	
Hardware	Compliance to IEEE 802.11b/g Standard
	Modulation Type: CCK, DQPSK, DBPSK, OFDM (11g)
Topologies	Infrastructure and Ad-Hoc
Security	WEP 64-bit/128-bit data encryption
	WPA Compatible (TKIP/AES Encryption)
	WPA2-PSK
RF Performance	Tx Power: 14 dBm for 802.11b and 13 dBm for 802.11g
	Rx Sensitivity: -66 dBm @ 54 Mbps, -80 dBm @ 11Mbps
	Transmission Rate: 54 Mbps (max.) with auto fallback
	Transmission distance: Up to 300 meters @12 Mbps, in open areas
	Mobile for Fast Roaming
Interfaces	Reverse SMA connector for an external antenna
Network	
Hardware	10/100M Auto-Negotiation Fast Ethernet
Interface	RJ-45 Connector with 2 LEDs
	Protection: Built-in 1.5 KV magnetic isolation
Configuration	Using Web-based or a Serial Manager program
Serial	
Protocol	Support RS-232/ RS-485/ RS-422 and Software Selection
Interface	D-Sub 9-pin Connector –DB Model (with 12KV ESD)
Parameters	Baud Rate: 1200 bps ~ 921 kbps
	Parity Check: None, Odd, Even, Mark, Space
	Data Length: 7/8 Bit
	Stop Bit: 1/2
	Flow Control: None, Software: Xon/Xoff, Hardware: RTS/CTS
Power	
Input	DC 9V-48V
Consumption	4.5 W max @ Tx Mode
Mechanical	
Dimensions	H x W x D: 90mm x 45mm x 75mm

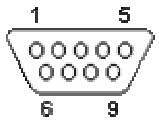
Casing	Metal Housing for IP50 Standard
Environmental	
Operating Temperature	0 to 65°C (32 to 140°F), 5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F), 5 to 95%RH
Regulatory Approvals	
EMC	FCC/CE
Safety	UL
Warranty	5 Years

D.2. Software Specifications

Software	
Protocol	ICMP, IP, TCP, UDP, DHCP Client, Telnet, DNS, SNMP, HTTP, SMTP, SNTP
Utility	Virtual COM Utilities for Windows 98/2000/XP/2003/Vista
	Configure Utilities: Supported for Windows 98/2000/NT/XP/2003/Vista
Configuration	Web browser
	Windows utility software
Buffer Size	TCP receiving buffer size = 8K bytes
	TCP transmitting buffer size = 16K bytes
	RS-232/RS-485 receiving buffer size = 4K bytes
	RS-232/RS-485 transmitting buffer size = 4K bytes

D.3. Pin Assignments

D.3.1. DB9 male connector pin assignments for Serial port

DB9				
	**Pin#**	**RS-232**	**RS-485**	**RS-422**
	1	DCD		
	2	RXD		T+
	3	TXD	Data+	R+
	4	DTR		
	5	SG (Signal Ground)		
	6	DSR		
	7	RTS	Data-	R-
	8	CTS		T-
	9	RI		

D.4. Beep & LED Status

D.4.1. Startup status

Message	Description
^==^========^^^ (5sec)	Startup OK and application firmware is enabled

Note: Buzzer indication: "^" : Beep twice "=" : Beep off

D.4.2. Wireless Signal Strength status

The Access Point link quality can be detected by LED indicator on PC-W. In a running mode, once press a default key and then release, one of the specified actions below shall be performed depending on the released time after you heard how many beeps. The Access Point radio link quality is indicated by the number of LEDs lid on as shown in the table below.

Radio Link Quality LED Message

○ Off ● On ☼ Blinking

Operations		Status*	LED1	LED2	LED3	LED4	LED5
Connecting	Search AP (sequentially blinking)	☼	☼	☼	☼	☼	☼
	Connected AP/ Get assigned IP	☼	☼	☼	☼	☼	☼
	Not matched SSID	☼					
	Not available IP	☼	☼				
Connected	Signal Strength is less 20%	●					
	Bad Signal Strength (20%)	●	●				
	Poor Signal Strength (40%)	●	●	●			
	Fair Signal Strength (60%)	●	●	●	●		
	Good Signal Strength (80%)	●	●	●	●	●	
	Excellent Signal Strength (100%)	●	●	●	●	●	●

Note: The lowest LED is indicated for STATUS on the PC-W's front plate.

D.4.3. WLAN LED Message

Message	Description
LED Off	No data is transmitting on Ethernet
LED Blinking	Data is transmitting on Ethernet

D.4.4. COM Port LED Message

Message	Description
LED off	No data is transmitting on COM port
LED Blinking	Data is transmitting on COM port

D.4.5. RUN LED Message

Message	Description
LED Blinking (0.5 sec interval)	AP firmware is running