EX-6011
8-line Digital I/O to Ethernet Adapter, w/ DIN RAIL Mounting Kit

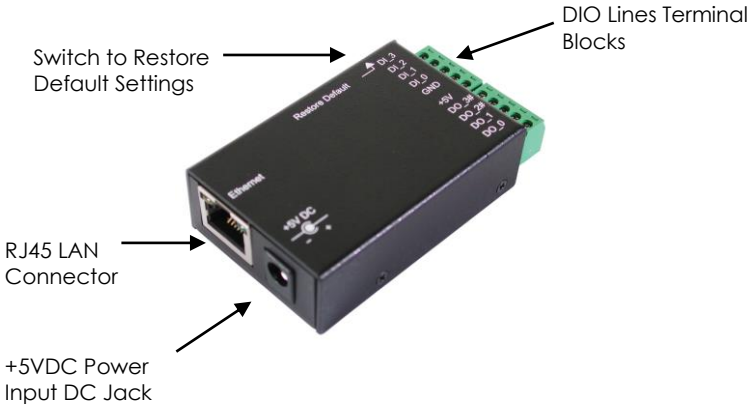
1. Introduction

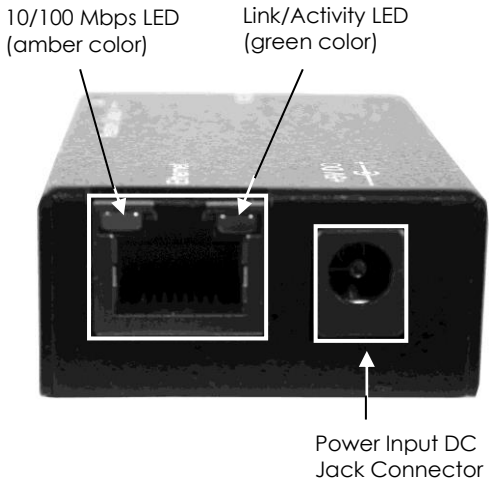
Thank you for purchasing this 8-line Digital I/O to Ethernet Adapter (hereinafter referred to as **"Adapter"**). It is designed to adopt your digital I/O lines remotely on your Ethernet (Internet). It delivers simple, reliable and cost-effective network connectivity for your digital I/O applications such as home or industrial factory automation, digital I/O control from any networked PC, alarm and power monitoring by network or Internet, PC controlled machines, distributed machine I/O, remote lighting and power control etc.

Features:

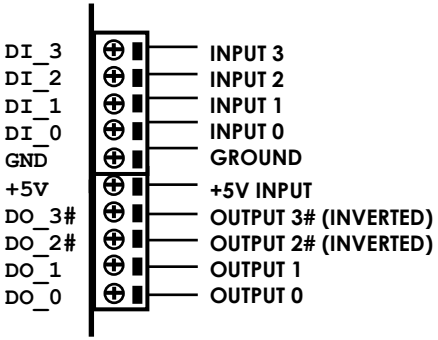
- ✓ 4 Digital Input and 4 Output Lines over a 10-pin Terminal Blocks
- ✓ 2 Non-inverted and 2 Inverted Output Lines
- ✓ Provides ESD and Surge Protection for all I/O Lines
- ✓ I/O Line Voltage is Compatible with CMOS/TTL
- ✓ Provides one 10/100Mbps, RJ45 LAN Port
- ✓ Provides TCP Server, TCP Client, and I/O Extender Modes
- ✓ Powered +5VDC by DC Jack or Terminal Blocks
- ✓ Provides both Wall Mounting and DIN RAIL Kits
- ✓ Supports Virtual COM Port Drivers

2. Connector Layout





- **10-pin Terminal Blocks:** This pluggable terminal blocks integrates 4 digital input and 4 digital output I/O lines (CMOS/TTL Level). Its pin assignment as the following table. The +5V pin functions as either INPUT or OUTPUT, if DC Jack is powered, it simply copies the +5V from the DC jack and works as +5V OUTPUT. If the DC Jack is unconnected, it can be powered by this pin with +5V input power.



- **Switch to Restore Default Settings:** This switch can be used to reset the product to its factory default settings. Press the switch by either a pen or similar tool will restore the default settings immediately.
- **DC Jack Power Connector:** A 5V/2A AC adapter is supplied with this product.
- **RJ45 Ethernet Connector:** 10/100Mbps Ethernet port. It supports auto cross-over feature. You can use the same cable to connect to either a Hub/Switch or a host computer.
- **LED Indicators:** There are 2 LAN LEDs on the rear panel. They are described as the following table:

LED Name	Color	LED Function
Link/Activity	Green	**Steady on:** Linked. **Blinking:** Transferring data
10/100Mbps	Amber	**Steady on:** Linked in 100Mbps mode. **Off:** Linked in 10Mbps mode.

3. Hardware Installation

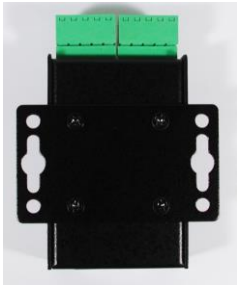
1. **Use static electricity discharge precautions.**
   Remove possible static discharge potential from any objects that the **Adapter** may come in contact with before installation. This can be accomplished by touching a bare metal chassis rail after you have turned off the power.

2. **Attached the power adapter. +5V DC power needs to be connected to either the DC jack or the Terminal Blocks, but not simultaneously. Once the power is connected to the DC jack, the +5V power will output to the 10-pin Terminal Blocks immediately. So it is not allowed to connect any power to the Terminal Blocks if the DC jack is connected to a 5V AC power adapter.**

3. **Connecting LAN cable:** Use a standard straight-through Ethernet cable to connect to a Hub or Switch. If you connect the **Adapter** to your computer's Ethernet port instead, you don't need to change to a cross-over type cable since the **Adapter** provides auto cross-over feature.

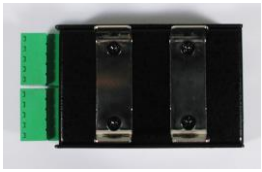
4. **Connect the Adapter's DI and DO pins to your devices.**

5. **Use the Wall or DIN RAIL mounting Kit (optional) if you want to place the product on the industrial DIN RAIL.**



Wall Mount

DIN RAIL Mount
(Vertical)



DIN RAIL Mount
(Horizontal)

4. Configuring the Adapter

Setting IP Address

Please consult your Network Administrator to determine the appropriate IP address for the **Adapter**. The IP address can be set in any of the following ways:

- Automatically from a DHCP Server
- Web Browser
- Ethernet Managing utility (Em.exe supplied by this product)

This **Adapter** comes with a factory installed static fixed IP address **192.168.1.254**. It is unable to accept a new IP address from a DHCP Server by factory default (with DCHP client set to Disable). If your network has a DHCP server and you want it to assign IP address to this **Adapter**, you need to enable this **Adapter**'s DCHP client setting (refer to the following sections). After that, the **Adapter** will send a DHCP request to the DHCP server, which will assign a dynamic IP address, net mask, and gateway to the **Adapter** the first time it is connected and powered up.

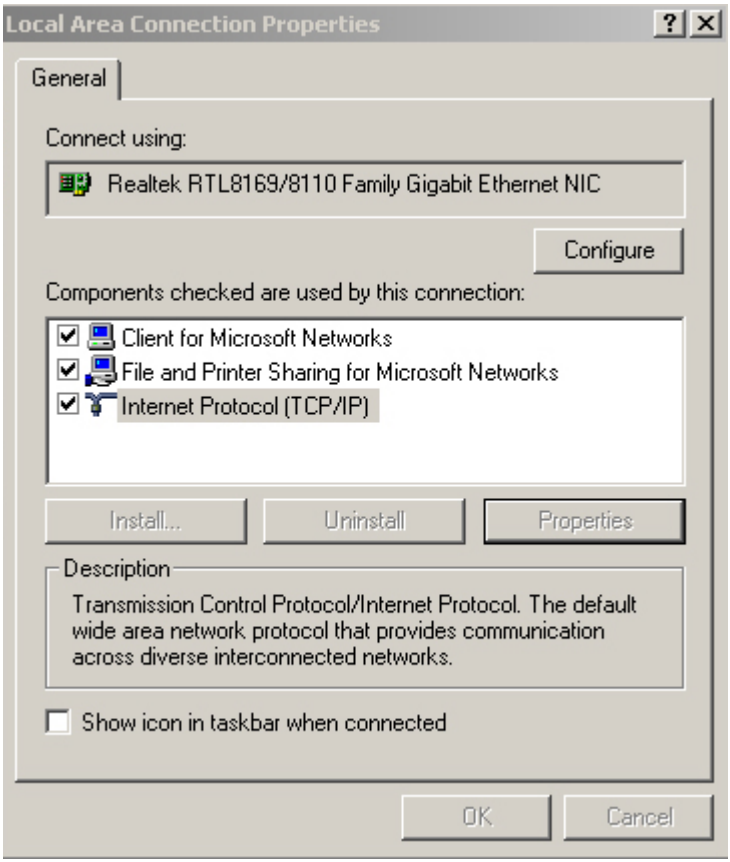
1. Setting the IP address from a DHCP Server

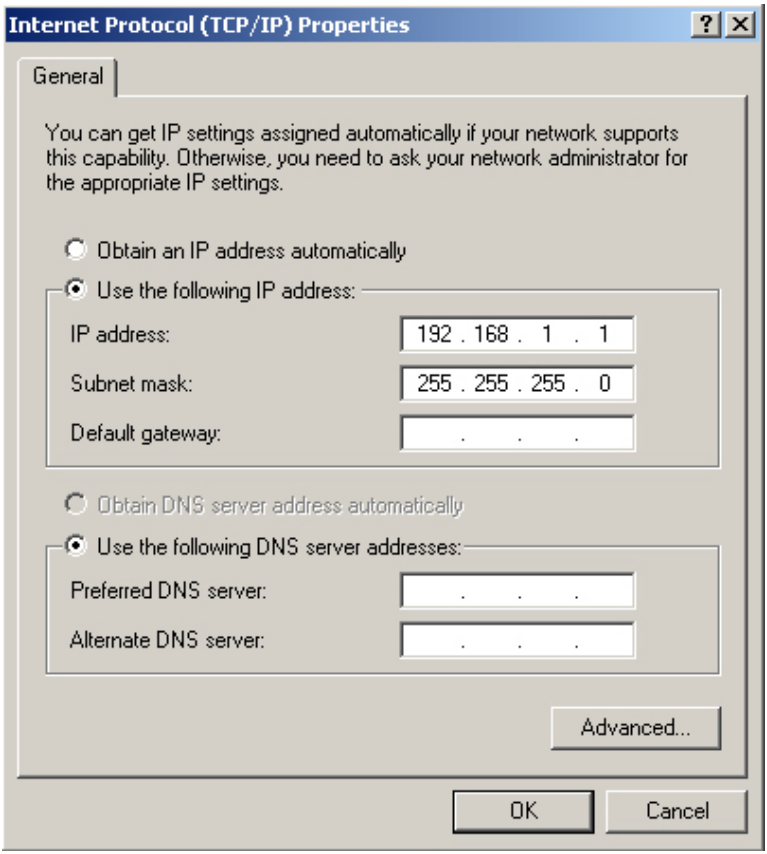
A DHCP server will automatically assign an IP address (dynamic address) as well as Subnet Mask and Gateway to this **Adapter**. If you power up the **Adapter** without a fixed (static) IP address, the DHCP server will be able to assign an IP address (Note: the default setting is **Disable** DHCP, if you want to support DCHP, please Enable it first.).

If you want to set the IP address using another method, the address becomes static. This was done when you **Disable** the DHCP setting (default) in the Setup Menu of the **Adapter**.

2. Setting the IP address using Web Browser

Please make sure your PC's IP address is set at the same subnet of the **Adapter**. If not, you usually need to change your PC's IP address from **"Local Area Connection Properties"**, here is an example to show you how to change your PC's IP address:


Local Area Connection Properties
General
Connect using:
Realtek RTL8169/8110 Family Gigabit Ethernet NIC
Configure
Components checked are used by this connection:
Client for Microsoft Networks
File and Printer Sharing for Microsoft Networks
Internet Protocol (TCP/IP)
Install...
Uninstall
Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
Show icon in taskbar when connected
OK
Cancel

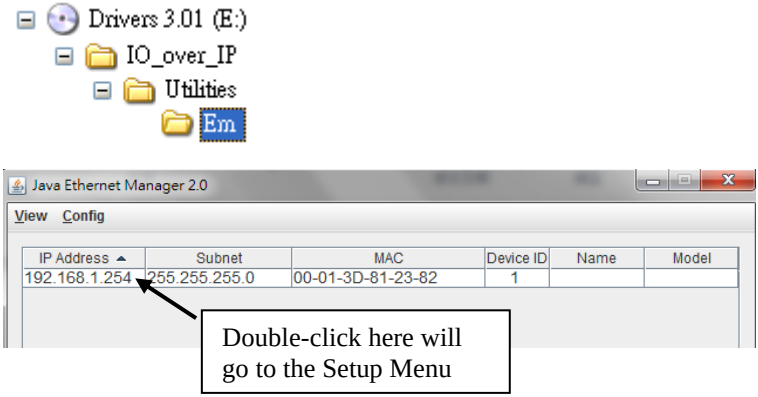


Run your browser and access the **Adapter** by entering the default (**192.168.1.254**) or current IP address into your browser's address window. Enter the password (default has no password). Then go to change your IP address as well other parameters if required.

3. Setting the IP address using Em.exe Utility

The Em.exe is a Microsoft Windows based utility to find all the **Adapters** connected on the same subnet and network segment. To run the Em.exe utility, please insert the driver CD supplied with the **Adapter**. Open (double click) the program at the following location (assume the CD-ROM drive is at E):

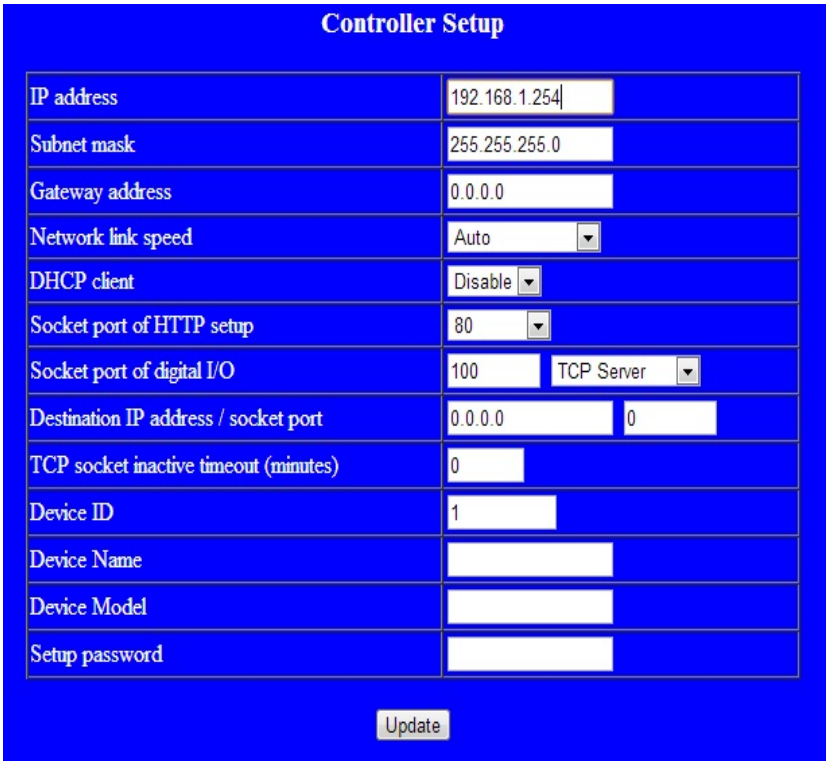
E:\IO_over_IP\Utilities\Em\Em.exe



Note: If the Setup Menu does not appear after double-clicked the listed item on the above screen, you may need to disable your firewall or the anti-virus software then try again.

4. The Adapter Settings

When you entered Setup Menu of the **Adapter**, the following page will be available for your access. Please click Update button after you changing any settings. Remember and record your password for the future use. You need it to enter this Setup Menu next time.



Item	Description
IP address	4 numbers separated by dots, it can be assigned by the DHCP server if "DHCP client" is enabled.
Subnet mask	4 numbers separated by dots, can be assigned by the DCHP server if "DHCP client" is enabled.
Gateway address	4 numbers separated by dots, can be assigned by the DCHP server if "DHCP client" is enabled.
DHCP client	If disable, then IP address、Subnet mask and Gateway address must be assigned manually.
Socket port of HTTP setup	Port number for HTTP Setup Menu, default is 80.
Socket port of digital I/O	**Port Number：** any number between 1 and 65536,except 80 and 81（which have been designated as the web pages） **Socket Type：** **TCP Server**, uses TCP protocol, passively waits for Client. **TCP Client**, uses TCP protocol, actively connects to Server. **UDP**, uses UDP protocol, exchanges packets with Server without connection.

	IO Extender Master, uses Master Server protocol, passively waits for IO Extender Slave **IO Extender Slave**, uses Slave Client protocol, actively connects to IO Extender Master
Destination IP address/ socket port	Only valid for TCP client, UDP, IO Extender Slave modes: Enter the Server IP address and port number when set in TCP client or UDP client mode. Enter IO Extender Master's IP address and port number when set in IO Extender Slave mode.
TCP socket inactive timeout (minutes)	# of minutes the socket port has been idle to terminate the connection. **0:** Never terminate the connection (default) **1-99:** Terminate the connection if the socket port is idle for this time period (minutes).
Device ID	User assigned device ID number, acceptable range is 0 to 65535.
Device Name	16 characters maximum, to describe the application facility.
Device Model	16 characters maximum, to indicate the application device model number for management.
Setup password	The login password can be empty or 1 to 15 characters long. If the password is empty then no password is required for login.

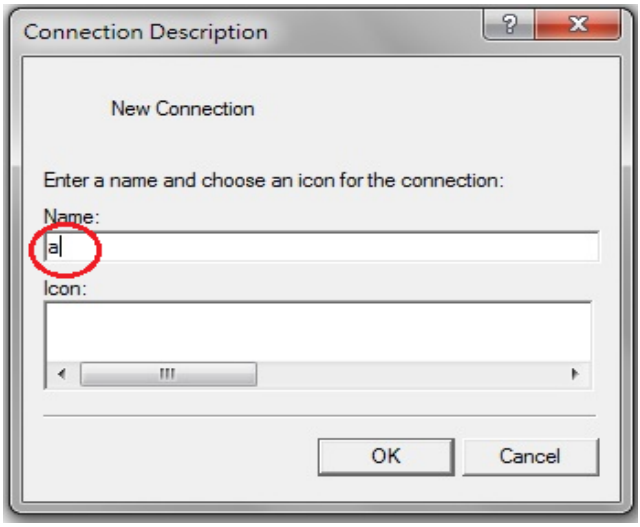
5. Examples for Controlling DIO Lines

This section will introduce some examples to control the DIO lines of this **Adapter**. We are using a Terminal Emulation Program (such as HyperTerm or TeraTerm) to send control strings over the TCP/IP socket port.

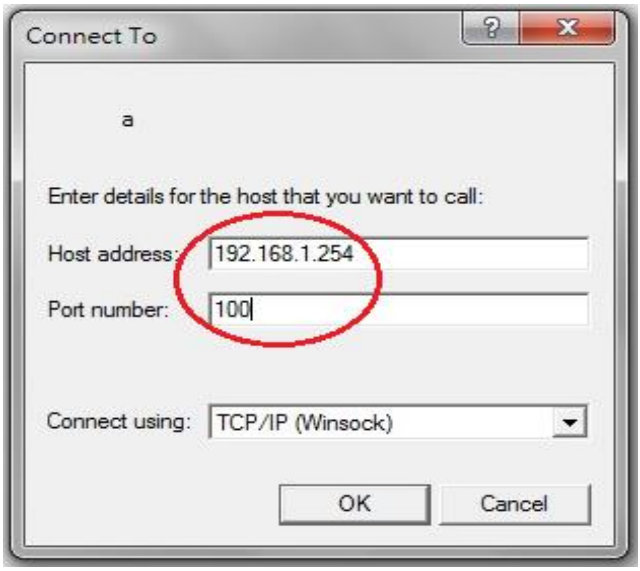
HyperTerm is a Windows based utility for Windows XP or earlier version. However, it is not bundled in Vista or later Windows version.

As shown in the HyperTerm examples, the application software can read or write the string (in ASCII code format) on the TCP/IP socket port to check or change the **Adapter**'s state.

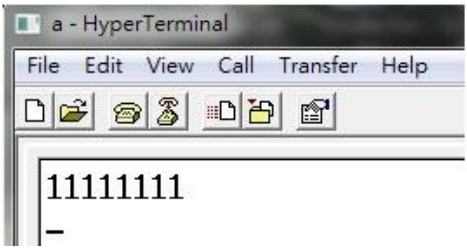
1. Launch the HyperTerm utility, it will create a new connection, please type the connection name (type "a" in this case).



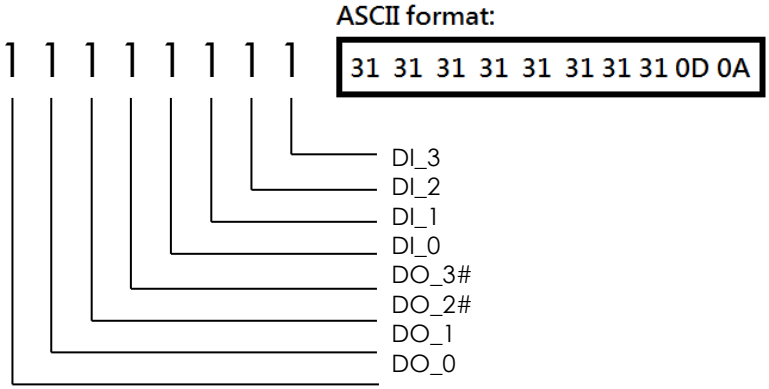
2. Enter the **Adapter**'s IP address and port number:



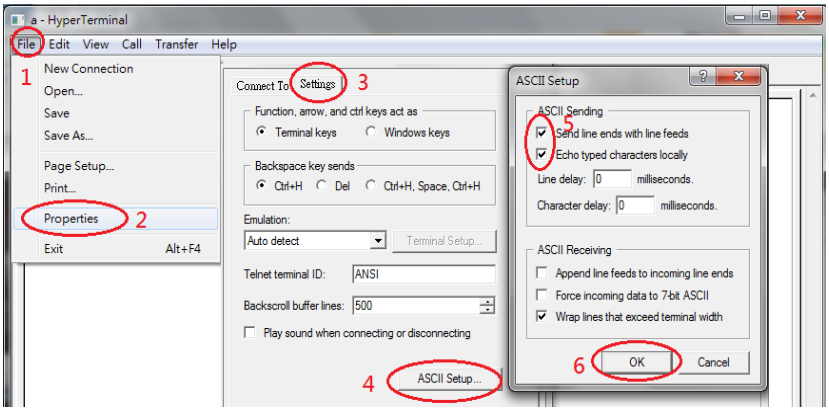
3. Once the connection is built up successfully, the HyperTerm will receive a 10-byte (ASCII) string (8 characters plus a carriage-return and a line-feed) indicating the current state of all 8 DIO lines, "11111111" for example.



The string is formatted as the following table:



4. In HyperTerm, click **File**, **Properties**, **Settings**, **ASCII Setup**, enable both **Send line ends with line feeds** and **Echo typed characters locally** options to make the test screen more readable.



5. At this point you may key in command strings to change the digital output line state or read their current state. For example:

nnm 

where

nn = Output pin number, there are four legal values: 01, 02, 03 and 04

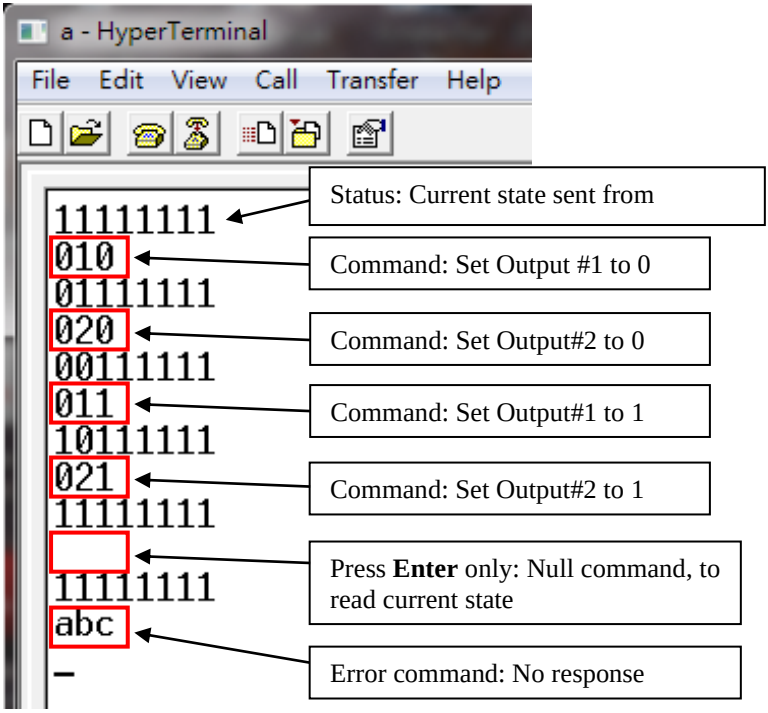
m = 0 or 1, 0 means to drive the I/O pin to LOW state, 1 means to set the I/O pin to HIGH state.

= Stands for 2 characters, a Carriage-return and a Line-feed (0x0D and 0x0A)

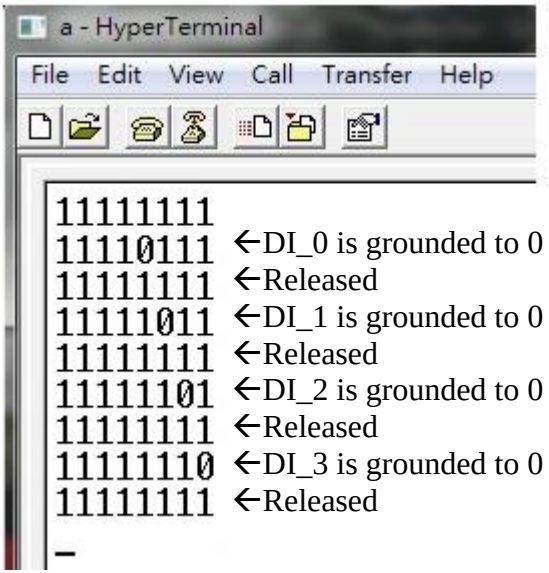
e.g.

010 →change output #1 to low, DO_0 = 0
020 → change output #2 to low, DO_1 = 0
011 → change output #1 to high, DO_0 = 1
021 → change output #2 to high, DO_1 = 1

The following screen shot showed some command practices:



6. The 4 digital input pins are always monitored and de-bounced by the firmware. Once their state is changed, the firmware will send the current state string automatically. Please refer to the following screen shot, it was actually tested with a short wire to ground the DI_0, DI_1, DI_2, then DI_3 pins sequentially. You will see it detected 0 (when grounded) then 1 (when released) sequentially.



6. Using Virtual COM Port Drivers

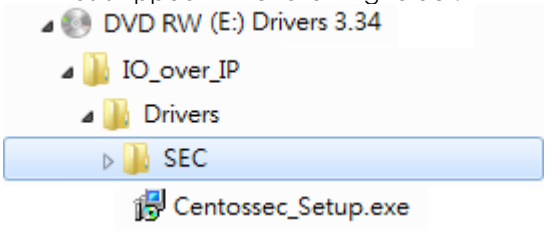
This digital I/O **Adapter** can work in ether Straight IP mode or Virtual COM Port mode. The Straight IP mode will be accessed through its TCP/IP socket port directly. The Virtual COM Port mode allows it treated as a COM port by installing the CentosSEC Virtual COM Port driver.

The **Virtual COM Port** software, CentosSEC, is an advanced software to map your serial port devices (COM ports) to Ethernet so they could be accessed from anywhere in the world (via Internet or LAN) as if it is attached directly to the remote PC. When the attached serial port device (or digital I/O **Adapter**) sends communication data it is actually transmitted over TCP/IP network and back from the network to your device.

After installed, the driver allows Windows platform software, using standard API calls, to be used in an Ethernet application.

Installing CentosSEC

1. Run the Centos_Setup.exe setup program on the supplied CD, it was shipped in the following folder:

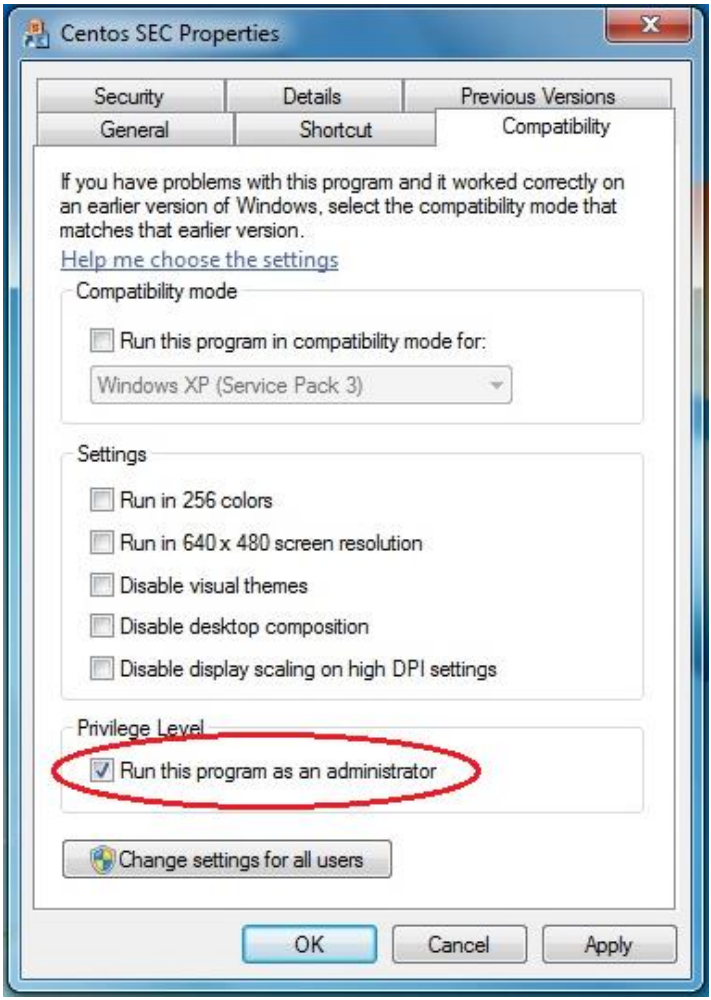


2. While installing the driver, please enter the password:

3. Follow the on-screen instructions to complete the Installation, you are ready to launch the software utility to enter the hardware settings to function properly.

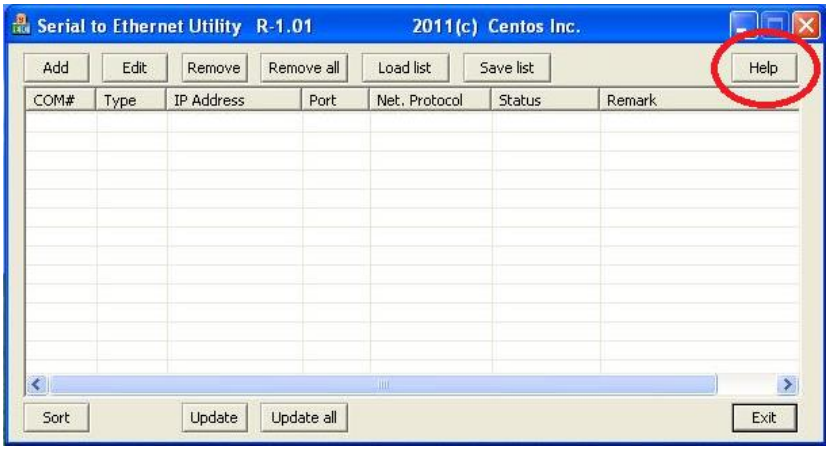
Launch CentosSEC

After installed the CentosSEC, you will need to navigate either to the Start Menu and locate the launcher in Programs submenu or double-click the shortcut created on the desktop. Please note that CentosSEC should be run as an administrator, for some Windows such as 2008, Vista and 7, their UAC (User Account Control) will limit the CentosSEC from working properly if you have only standard user privileges. In this case, please right-click the CentosSEC shortcut on the desktop, choose "**Properties**", click "**Compatibility**" tab, enable the "**Run this program as an administrator**" option of the privilege level then click **OK**. Please see the following screen shot:

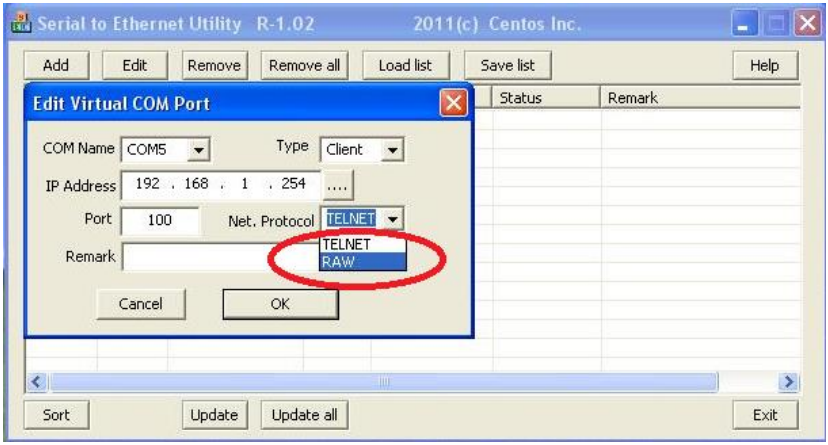


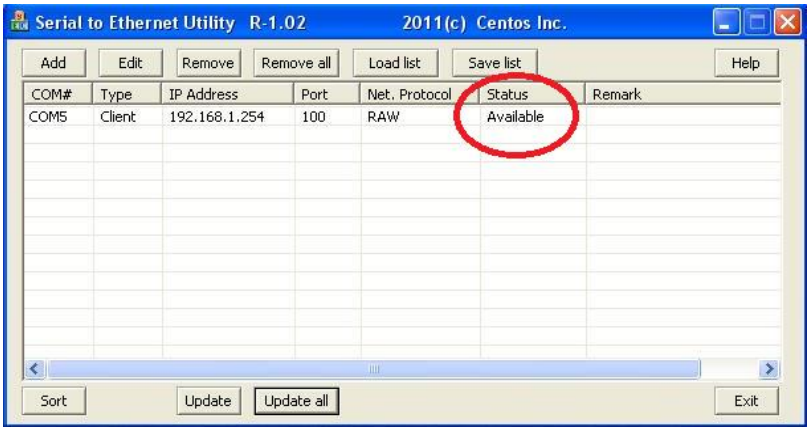
Configuring CentosSEC

1. Running the CentoSEC, the following screen will appear, click the **Help** button will list the supported operations and details. You may need to click **Add** to create a new COM port then click **Update All** to save the settings. You don't need to reboot the system after you pressing **Update All** button for any COM port changes.



2. It is important to set the Net. Protocol to RAW instead of TELNET for this digital I/O **Adapter**. After clicked Update All button, the status field should become "Available". If it is "Registered", it won't work properly. You need to review the problem. Usually it because you did not run as an Administrator.



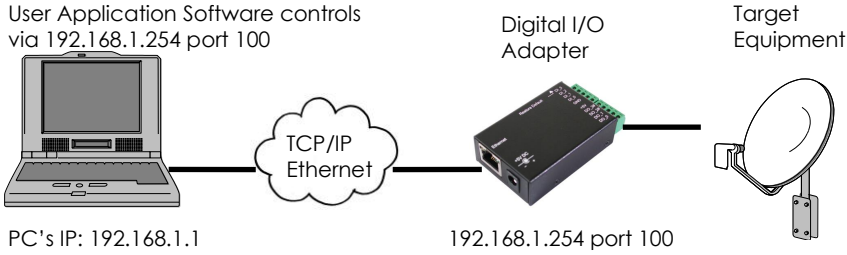


7. Operation Modes

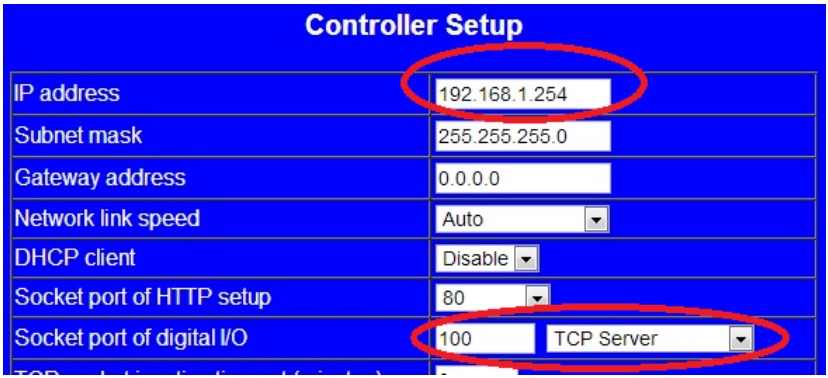
The **Adapter** can function as a server or client for TCP and UDP connections. The application scenarios include TCP Server mode, TCP Client mode, UDP mode, IO Extender Master/Slave (Paired) mode. When in IO Extender Master/Salve Paired mode, one **Adapter** must be set as IO Extender Master and the other as IO Extender Slave mode, the paired mode extends the digital IO lines remotely without any extra software or drivers.

TCP Server mode:

The TCP Server mode provides the service at the TCP/IP socket port. The default setting of this **Adapter** is set at 192.168.1.254 port 100. The application software works as a client to this **Adapter**. It can control via straight IP address directly or via a Virtual COM Port driver.

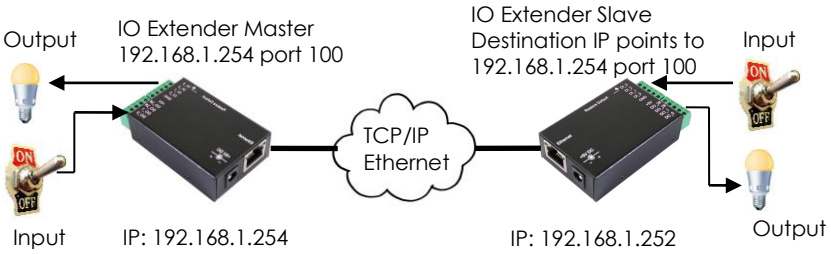


The configuration settings for TCP Server as follows:



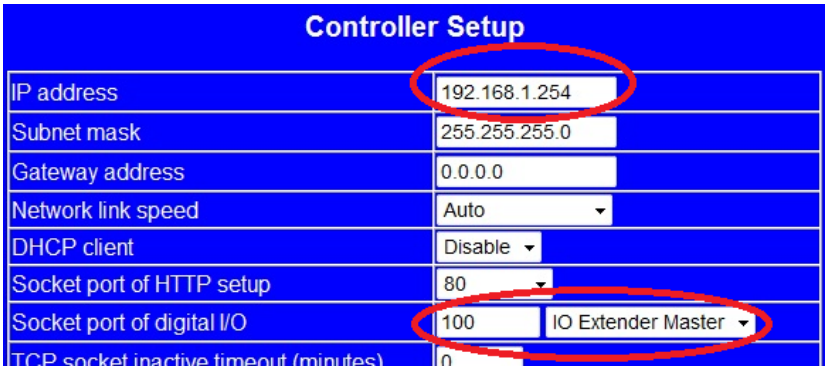
IO Extender Master/Salve (Paired) mode:

The IO Extender mode is designed for 2 digital IO **Adapters** to be connected in back-to-back via Ethernet (Internet). The 4 digital inputs of one unit will be driven by the 4 digital outputs of the other unit. Please refer to the following diagram. The Master unit will provide a service at 192.168.1.254 port 100, the Slave unit should set its Destination IP to match the Master's service port (192.168.1.254 port 100). In this mode, the IO pins are remotely connected without any software support. It's very simple and straightforward.



IO Extender Master Configuration:

The Master unit settings included its IP address (192.168.1.254), socket port (100) and its mode (IO Extender Master).



IO Extender Slave Configuration:

The Slave unit settings included its IP address (192.168.1.252, must be different from the Master unit), mode (IO Extender Slave) and Destination IP/port (Master unit's IP/port, 192.168.1.254 port 100) to request for the service connection.

6. Product Specifications

Type	Specifications
LAN	10/100Mbps Ethernet
Connector	RJ45
Speed	10/100Mbps
Digital I/Os	
No. of Digital Inputs	4 TTL/CMOS Input Lines (DI_0 to DI_3)
No. of Digital Outputs	4 TTL/CMOS Output Lines: (DO_0, DO_1, DO_2#, DO_3#)
Connector	10-pin Terminal Blocks
Surge Protection	350W surge protection for all I/O lines
Watch Dog Timer	Built-in
Power Requirements	
Power Input	5V DC (via DC Jack or TB)
Power Consumption	250mA @ 5V DC
Mechanical	
Specifications	
Material	Metal
Gross Weight	9065g (0.20lb)
Environmental	
Operating Temperature	0 to 558C (32 to 1318F)
Storage Temperature	-20 to 858C (-4 to 1858F)
Operating Humidity	5 to 95% RH

Electrical Characteristics

Parameters	Values
Input: DI_0, DI_1, DI_2, DI_3	
Low	< 0.8V
High	> 2.0V
Output: DO_0, DO_1, DO_2#, DO_3#	
Low	< 0.55V
High	> 2.4V