Moxa EtherDevice Server

User's Manual

Sixth Edition, June 2008

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Moxa EtherDevice Server (EDS)
User's Manual

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1
Introduction

Welcome to Moxa EtherDevice Server™, the world's first intelligent Ethernet Device Server specially designed for connecting Ethernet-enabled devices in industrial field applications.

The following topics are covered in this chapter:

- **Inside the Future of Industrial Ethernet Technology**
- **Moxa EtherDevice Server™**
- **Package Checklist**
- **Features**
- **Specifications**

Inside the Future of Industrial Ethernet Technology

The trend in industrial communications and automation applications

As the world's network and information technology becomes more mature, the trend is to use Ethernet as the major communications interface in many industrial communications and automation applications. In fact, a whole new industry has sprung up to provide Ethernet products that comply with the requirements of demanding industrial applications.

Industrial vs. Commercial

Users have found that when moving Ethernet from the comfortable office environment to the harsh and less predictable industrial environment, the commercial Ethernet equipment available in today's market simply cannot meet the high reliability requirements demanded by industrial applications. This means that a more robust type of network equipment, commonly referred to as *industrial* Ethernet equipment, is required for these applications.

Informative vs. Passive

Since industrial Ethernet devices are often located at the endpoints of a system, such devices cannot always know what's happening elsewhere on the network. This means that industrial Ethernet communication equipment that connects these devices must take responsibility for providing system maintainers with real-time alarm messages.

Moxa EtherDevice Server™

Moxa EtherDevice Server comes with a suite of useful maintenance and monitoring functions, and is designed to provide smooth and reliable operation in harsh industrial environments. You will find that Moxa EtherDevice Server establishes a new industrial Ethernet benchmark. It is excellent for keeping automation systems running continuously, is ideal for sending status reports to help prevent system damages and losses, is a great tool for mastering your industrial Ethernet networks, and is well-suited for use with industrial device control networks.

Moxa EtherDevice Server has a wide operating temperature range, from -40 to 75°C, and is designed to withstand a high degree of vibration and shock. The rugged hardware design makes Moxa EtherDevice Server perfect for ensuring that your Ethernet equipment can withstand critical industrial applications, such as in hazardous locations (Class 1 Division 2/ Zone 2), and complies with FCC, TÜV, UL, and CE Standards.

NOTE *Throughout this User's Manual, we often use **EDS** as an abbreviation for Moxa EtherDevice Server:*

EDS = Moxa EtherDevice Server

Package Checklist

Moxa EtherDevice Server is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

- ❑ Moxa EtherDevice Server
- ❑ User's Manual
- ❑ Moxa Product Warranty booklet
- ❑ Panel mounting kit
- ❑ Console port cable (RJ45 to DB9)
- ❑ Protective caps for unused ports

Features

Excellent for keeping automation systems running continuously

- Line-Swap fast recovery (patent pending)
- Redundant Ethernet Ring capability
- Redundant power inputs
- Hardened design for harsh environments
  - Operating temperature ranges from 0 to 60°C, or extended operting temperature from –40 to 75°C for (-T) models
  - IP 30, rugged high-strength case
  - Fanless design
  - DIN-Rail or panel mounting ability
- Watch-dog self-saver™

Dynamically know the status of networked industrial devices

- Automatically sends warning e-mail when an exception is detected
- Automatically sends warning e-mail when Ethernet traffic builds up
- Signals the system administrator via a Digital Output (DO) line when a malfunction occurs

Key management functions let you easily master your industrial Ethernet network

- Set up a mirror port for better online data monitoring
- Assign IP addresses to connected devices
- Send ping commands to identify network segment integrity
- Easily test cable wiring

Specifications

Interface

RJ45 Ports	10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection
Fiber Ports	100BaseFX ports (SC connector)
LED Indicators	Power, Faults, ACT, LNK, 10/100
Alarm Contact	One relay output, current carrying capacity of 1A @ 24 VDC

Technology

Standards	IEEE802.3, 802.3u, 802.3x, 802.1D
Forward and Filtering Rate	148810 pps
Packet Buffer Memory	256 KB
Processing Type	Store and Forward, with IEEE802.3x full duplex, non-blocking flow control
Address Table Size	4K uni-cast addresses
Management	SNMP V1.2c, MIB-II, Ethernet-like MIB, EDS-SNMP OPC Server (Optional)

Optical Fiber

Distance	Single mode fiber for 15 km, Multi mode fiber for 2 km
Wavelength	1310 nm
Min. TX Output	-15 dBm (Single), -19 dBm (Multi)
Max. TX Output	-8 dBm (Single), -14 dBm (Multi)
Sensitivity	-36.4 dBm (Single), -35.2 dBm (Multi)

Power

Input Voltage	Dual redundant inputs 9 to 32 VDC previous Rev. 12 to 48 VDC, Rev. 2.0 & 2.1 or later
Input Current (@24V)	0.35A (ED6008) 0.45A (ED6008-M-SC, ED6008-S-SC) 0.55A (ED6008-MM-SC, ED6008-SS-SC)
Connection	Removable Terminal Block (maximum cable diameter = 1.5 mm)
Overload Current Protection	Present, can withstand 3.75A
Reverse Polarity Protection	Present

Mechanical

Casing	IP30 protection, aluminum case
Dimensions	51.8 × 136.7 × 101.2 mm (W × H × D)
Weight	0.57 kg
Installation	DIN-Rail, Wall Mounting

Environment

Operating Temperature	0°C to 60°C (32°F to 140°F) -40°C to 75°C (-40°F to 167°F) -T
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Ambient Relative Humidity	5% to 95% (non-condensing)

Before connecting ED6008 to 12 to 48 VDC power inputs, verify the ED6008 Rev. is **2.0 & 2.1** or later on the side label..

Regulatory Approvals

Safety	UL60950, UL 508, CSA C22.2 No. 60950, EN60950
Hazardous Location	UL/cUL Class I, Division 2, Groups A, B, C and D ATEX Class I, Zone 2, EEx nC IIC
EMI	FCC Part 15, CISPR (EN55022) class A
EMS	EN61000-4-2 (ESD), Level 3 EN61000-4-3 (RS), Level 3 EN61000-4-4 (EFT), Level 3 EN61000-4-5 (Surge), Level 3 EN61000-4-6 (CS), Level 3
Laser Protection	Class 1, complies with EN60825
Shock	IEC 60068-2-27
Free Fall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	230,000 hours
WARRANTY	5 years

2

How To Use Moxa EtherDevice Server

In this chapter, we give the reader some general tips about how to use Moxa EtherDevice Server. Some users will simply want to plug in the power, connect the switch to their Ethernet-enabled devices, and then go to work right away. Other users will want to utilize Moxa EtherDevice Server's basic device management functions, whereas some will want to make full use of Moxa EtherDevice Server's advanced device management functions.

The following topics are covered in this chapter:

- **Basic Switching Function**
- **Redundant Ethernet Ring Quick Setup**
- **Basic Device Management**
- **Advanced Device Management**
  - DHCP Server Configuration

Basic Switching Function

The most basic function of Moxa EtherDevice Server is as an Ethernet switch. To just make use of EDS's fast Ethernet switching capability, we suggest using Model ED6008, which has 8 10/100BaseTX ports. In fact, after taking EDS out of the box, you can immediately attach it to a power source, plug Ethernet devices into the 10/100BaseTX ports, and then go to work. EDS will provide the same reliable, fast Ethernet switching ability provided by other high level switches.

EDS's fast Ethernet switching ability can be exploited in two basic ways:

ED6008 as a standalone switch

This type of setup allows you to provide up to 8 Ethernet-enabled devices with the ability to communicate on their own isolated, private network. In this case, you must set up the attached devices' network parameters so that they all belong to the same subnetwork. For example, you could configure the devices' IP addresses and netmasks as follows:

Port	IP Address	Netmask
1	192.168.127.1	255.255.0.0
2	192.168.127.2	255.255.0.0
…	…	…
8	192.168.127.8	255.255.0.0

ED6008 for connecting Ethernet-enabled devices to a LAN

This type of setup allows you to provide up to 7 Ethernet-enabled devices with the ability to communicate with other Ethernet devices connected to the same LAN. In this case, one of EDS's ports must be reserved for connecting to a Hub or switch that itself connects to the LAN. You will also need to check with the network administrator to determine what IP address and netmask to use for each of the devices connected to EDS's ports. As an example, assume the LAN does not use a DHCP Server, and is set up as a Class C network with IP addresses of the form 192.168.100.xxx. Assuming that EDS's port 8 is used to connect to the LAN, you could configure the devices' IP addresses and netmasks as follows, provided IP addresses 192.168.100.1 to 192.168.100.7 are not in use by other devices on the LAN:

Port	IP Address	Netmask
1	192.168.100.1	255.255.255.0
2	192.168.100.2	255.255.255.0
…	…	…
7	192.168.100.7	255.255.255.0
8	---	---

NOTE *If you are connecting Moxa EtherDevice Server to a public network, but do not intend to use its management functions over the network, then we suggest disabling both* ***Telnet Console*** *and* ***Web Configuration*** *from the RS-232 Console's* ***Advanced Settings → Server*** *page. See the "Advanced Settings" section from Chapter 3 of the User's Manual for details.*

Redundant Ethernet Ring Setup

Moxa EtherDevice Server supports two redundancy protocols for Redundant Ring Setup. You can choose which protocol is best suited for your own network's topology. For Spanning Tree Protocol (IEEE 801.1D) we highly recommended establishing ports 7 and 8 as portals for communicating with other devices on the network.

When Spanning Tree Protocol (IEEE 801.1D) is enabled, you should connect ports 7 and 8 to the network (instead of to a device). That is, these ports should connect to a HUB, switch, or another Moxa EtherDevice Server, provided the opposing device is connected to the rest of the network.

NOTE *We suggest not enabling Spanning Tree Protocol for a port once the port is connected to a device (PLC, RTU, etc.) as opposed to network equipment. The reason is that it will cause unnecessary negotiation.*

For Turbo Ring, you can only connect port 8 of one EDS to port 7 of another EDS for fast redundant recovery time.

See the Communication Redundancy section from Chapter 3 of the User's Manual for more information about EDS's Redundant Ring feature.

Basic Device Management

In addition to using Moxa EtherDevice Server's fast Ethernet switching ability, as described in the previous section, some users will also want to take advantage of some of EDS's basic management and monitoring functions. EDS functions that can be accessed over the LAN, after setting up EDS's IP address, or that can be accessed via EDS's Console port, include:

- Monitor
- Line-Swap fast recovery
- Set device IP
- Mirror port
- Network segment integrity
- Cable tester
- Port/Server setup

To be able to access EDS's functions over the network (by Telnet or Web Browser) from a PC host that is connected to the same LAN as EDS, you need to make sure that the PC host and EDS are on the same logical subnetwork. To do this, check your PC host's IP address and netmask. By default, EDS's IP address is 192.168.127.253 and EDS's netmask is 255.255.0.0 (for a Class B network). If you do not change these values, and your PC host's netmask is 255.255.0.0, then its IP address must have the form 192.168.xxx.xxx. On the other hand, if your PC host's netmask is 255.255.255.0, then its IP address must have the form 192.168.127.xxx.

NOTE *To use EDS's management and monitoring functions from a PC host connected to the same LAN as EDS, you must make sure that the PC host and EDS are on the same logical subnetwork.*

Advanced Device Management

Some users will want to use Moxa EtherDevice Server's full range of management and monitoring functions. This not only includes such functions as Monitor, Auto Warning, Mirror Port, and Segment Integrity, mentioned in the previous section, but also Advanced EDS functions that allow you to configure EDS's own network parameters, and functions that let you assign IP addresses to connected devices, such as:

- Auto warning (by e-mail or by relay output)
- DHCP
- Communication Redundancy
- SNMP

All of EDS's management and monitoring functions are discussed in detail in Chapter 3 of the User's Manual.

To be able to access EDS's functions over the network (by Telnet or Web Browser) from a PC host that is connected to the same LAN as EDS, you need to make sure that the PC host and EDS are on the same logical subnetwork. To do this, check your PC host's IP address and netmask. By default, EDS's IP address is 192.168.127.253 and EDS's netmask is 255.255.0.0 (for a Class B network). If you do not change these values, and your PC host's netmask is 255.255.0.0, then its IP address must have the form 192.168.xxx.xxx. On the other hand, if your PC host's netmask is 255.255.255.0, then its IP address must have the form 192.168.127.xxx. If your LAN connects to a WAN or the Internet by a router, then check with your network administrator to determine the IP address you should enter for EDS's Gateway setting.

NOTE *To use EDS's management and monitoring functions from a PC host connected to the same LAN as EDS, you must make sure that the PC host and EDS are on the same logical subnetwork.*

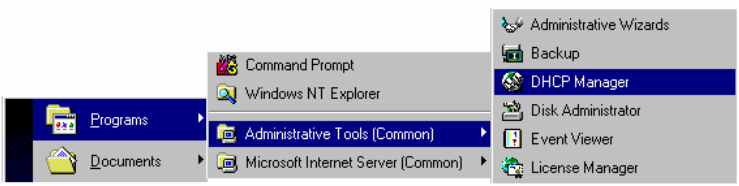
Another point to consider is whether or not EDS is connected to a DHCP network. In the next section, we explain how to configure your DHCP host to reserve a specific IP address for Moxa EtherDevice Server. By reserving a specific IP address, you will always be able to locate EDS by Telnet or Web Browser.

DHCP Server Configuration

This section applies if your Moxa EtherDevice Server is connected to a LAN that uses a DHCP Server to assign IP addresses to connected hosts. A DHCP server is set up to assign IP addresses to hosts as they log onto the network, so that if EDS is enabled as a DHCP client, then its IP address could change each time it is powered up. If you will need to access EDS's configuration and management functions over the network (by Telnet or web browser), it will be more convenient for you to assign EDS a fixed IP address. What we describe in this section is how to configure your DHCP Server to reserve an IP address for exclusive use by EDS. The configuration procedure requires knowing EDS's MAC address, which can be found on its product label.

STEP 1

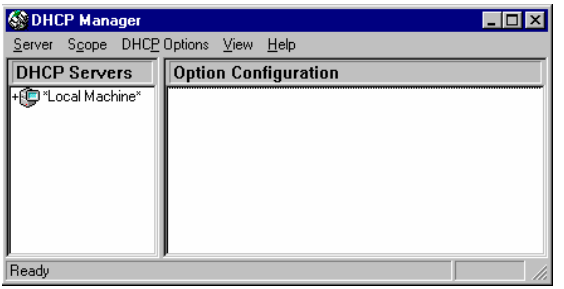
Access **DHCP Manager** from the Windows NT desktop by clicking on **Start → Programs → Administrative Tools → DHCP Manager**.



STEP 2

The left info box of the DHCP Manager window will show a list of DHCP hosts currently hooked up to the network.

Note that before you can make changes to the host's parameters, there must be a minus sign (–) located to the left of the server name (Local Machine in the example shown below.) If, as shown, there is a plus sign (+) to the left of the server name, use the left mouse button to click on the name of the host until the minus sign appears.



STEP 3

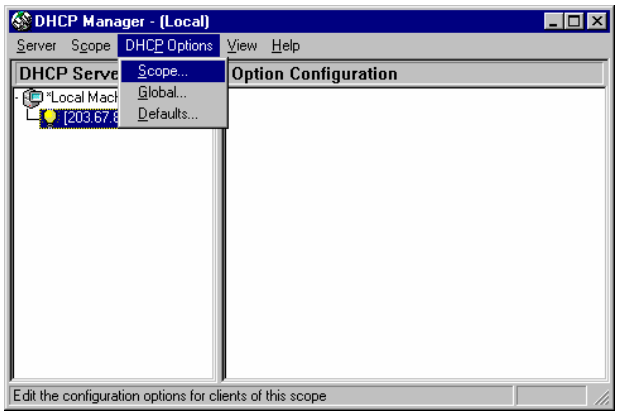
You must now define the DHCP server "scope."

A scope is a range of IP addresses that the server can choose from to assign to hosts as they log onto the network. Since the assignment is dynamic, the IP address assigned to a particular host can change each time the host logs in. What we will do is use DHCP Manager to set aside a specific IP address that will always be assigned to your Moxa EtherDevice Server when it is connected to the network. When EDS is not connected to the network, the reserved IP address is not used.

If you have already defined a scope, continue with STEP 10 below.

STEP 4

To get started, click on **DHCP Options** and then chose **Scope** from the pull down menu.



STEP 5

Once the **Create Scope (Local)** window opens (see below), you will be required to input a range of IP addresses in the IP Address Pool.

There is also an **Exclusion Range** used to prevent the DHCP Server from issuing addresses to existing devices that have already been assigned IP addresses from this range. By using the **Add** and **Remove** buttons, several different ranges can be excluded, and later included.

STEP 6

Another item that must be attended to is the **Subnet Mask**. This is a number that is combined with a device's IP address to determine which subnet the device belongs to. For a Class C address you

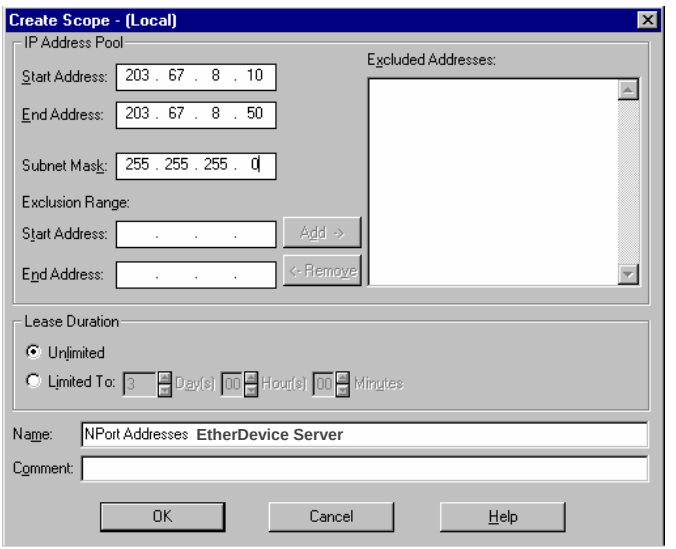
should input 255.255.255.0, and for Class B addresses use 255.255.0.0.

STEP 7

Make sure the **Unlimited** option under **Lease Duration** is checked. This prevents the system from automatically disconnecting devices that are using IP addresses in the specified range.

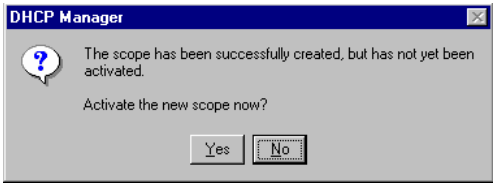
STEP 8

Assign a name to the scope, and if you like, include a comment. Click **OK** to accept the values.



STEP 9

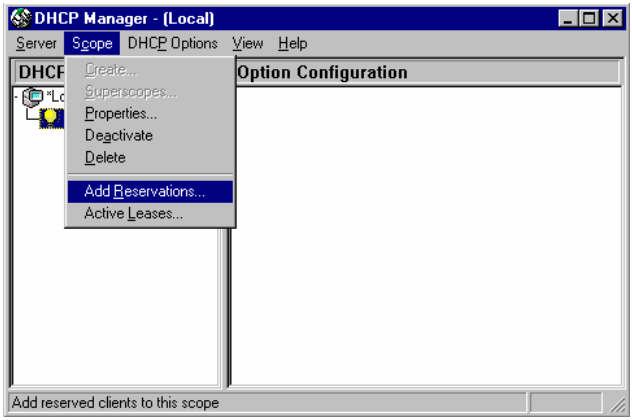
A window opens with the question: **Activate the new scope now?** Click on **Yes** to activate.



At this point we explain how to input a unique IP address reserved exclusively for use by your Moxa EtherDevice Server.

STEP 10

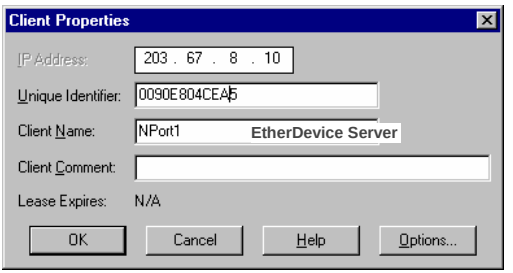
From the **DHCP Manager – (Local)** menu bar, click on **Scope**, and then select **Add Reservations**.



STEP 11

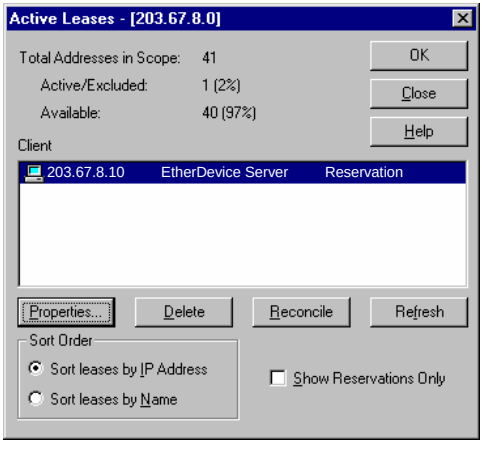
The **Client Properties** window that opens contains text input boxes for **IP address**, **Unique Identifier**, **Client Name**, and **Client Comment**. First enter the selected IP address, and then locate and enter your EDS's MAC address in the Unique Identifier field. (The MAC address is located on EDS's product label.)

Be sure to enter the same **Client Name** that was entered in the **Name** field of the **Create Scope - (Local)** window (see step 8 above). The **Client Comment** is optional. At this point you should double-check the MAC address and IP address, and then click **OK** to accept the values.



STEP 12

To check that the numbers just entered are correct, return to the DHCP Manager main window, click on **Scope**, and then choose **Active Leases** from the pull down menu. The IP address reserved for your Moxa EtherDevice Server will be displayed in the window that opens. Check to make sure that it is accurate.



3
Featured Functions

This chapter explains how to access Moxa EtherDevice Server's various configuration, monitoring, and administration functions. There are three ways to access these functions: serial console, Telnet console, and web browser. The serial console connection method, which requires using a short serial cable to connect Moxa EtherDevice Server to a PC's COM port, can be used if you do not know Moxa EtherDevice Server's IP address. The Telnet console and web browser connection methods can be used to access Moxa EtherDevice Server over an Ethernet LAN, or over the Internet.

The following topics are covered in this chapter:

- **Startup Procedure**
  - RS-232 Console (115200, None, 8, 1, VT100)
  - Telnet Console
  - Web Configuration
- **Monitor**
  - Console Monitor
  - Web Browser Monitor
- **Auto Warning**
  - Email Warning
  - Relay Warning

(Chapter contents continued on following page)

- **Line-Swap Fast Recovery**
- **Communication Redundancy**
  - Spanning Tree Protocol
  - Moxa Turbo Ring
- **Assigning IP Addresses to Connected Devices**
- **Mirror Port**
- **Segment Integrity**
- **Cable Tester**
- **Advanced Settings**
  - Server
  - Port
  - Network
  - Factory Default
  - Upgrade Firmware by Console
  - Activate Settings

Startup Procedure

In this section, we explain how to access Moxa EtherDevice Server's RS-232 Console, Telnet Console, and Web Browser interfaces.

NOTE **Connection Note!**

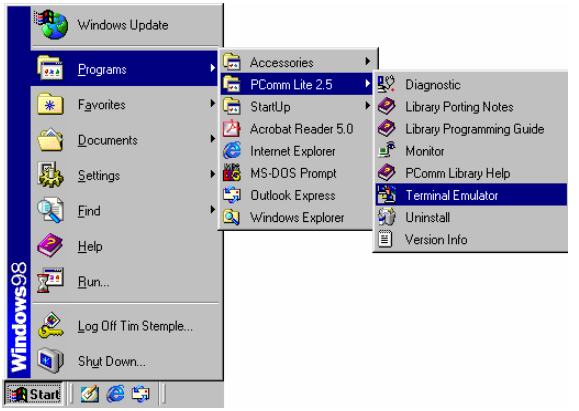
1. *You **cannot** connect to EDS simultaneously through the serial console and via Telnet.*
2. *You **can** connect to EDS simultaneously by web browser and serial console, or by web browser and via Telnet.*
3. *However, we recommend that when connecting to EDS by web browser, you do not simultaneously connect by either serial console or via Telnet.*
   By following this advice, you can maintain better control over how your Moxa EtherDevice Server is managed.

RS-232 Console (115200, None, 8, 1, VT100)

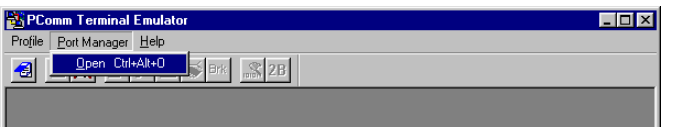
We recommend using Moxa PComm Terminal Emulator, which can be downloaded free of charge from Moxa's website. After installing PComm Terminal Emulator, take the following steps to access the RS-232 Console utility.

NOTE *Before running PComm Terminal Emulator, use an RJ45 to DB9-F (or RJ45 to DB25-F) cable to connect Moxa EtherDevice Server's RS-232 Console port to your PC's COM port (generally COM1 or COM2, depending on how your system is set up).*

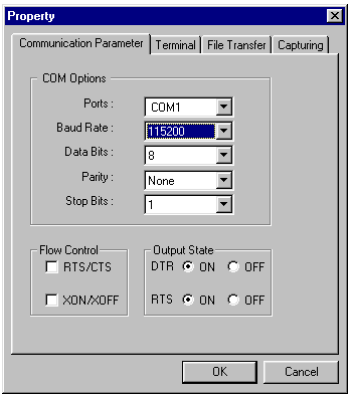
1. From the Windows desktop, click on **Start → Programs → PCommLite2.5 → Terminal Emulator**.



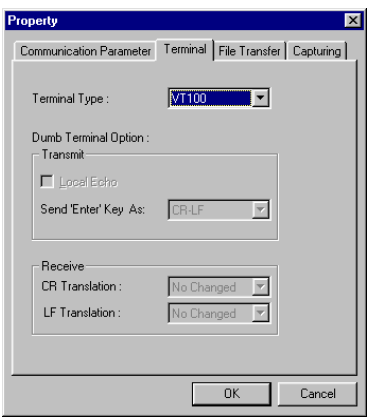
2. Select **Open** under **Port Manager** to open a new connection.



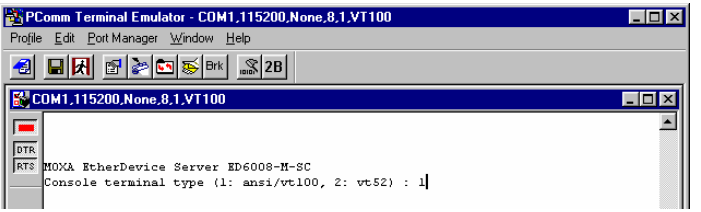
3. The **Communication Parameter** page of the **Property** window opens. Select the appropriate COM port for **Console Connection**, **115200** for **Baud Rate**, **8** for **Data Bits**, **None** for **Parity**, and **1** for **Stop Bits**.



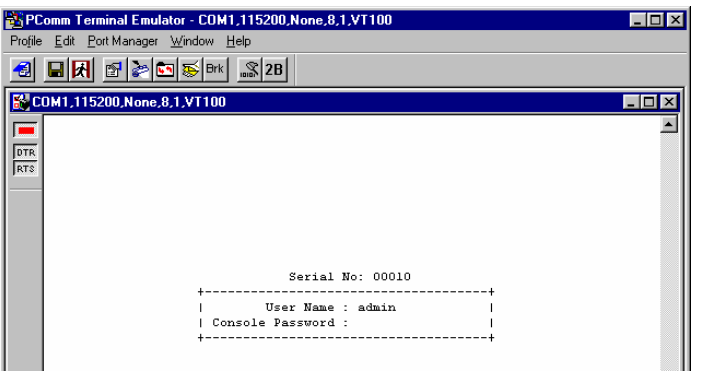
4. Click on the **Terminal** tab, and select **VT100** for **Terminal Type**. Click **OK** to confirm.



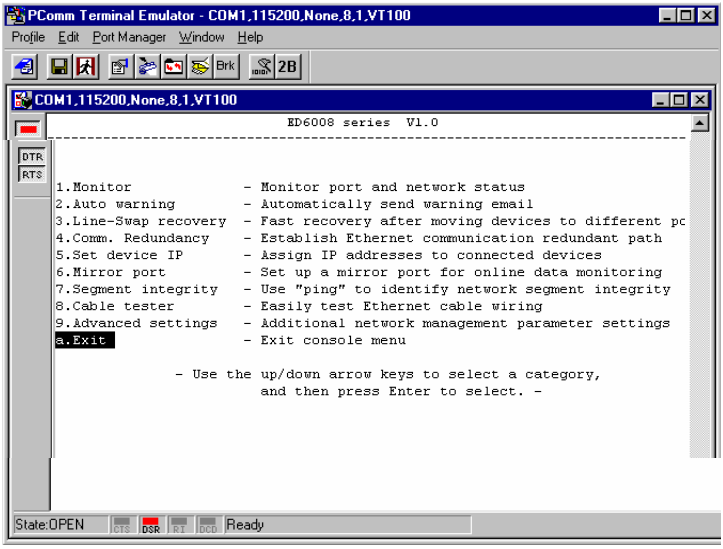
5. Type **1** to select **ansi/VT100** terminal type, and then press **Enter**.



6. If a password has been set for this device, the Console login screen will appear. Enter the **User Name** and **Console Password** (this is the same as the Web Browser password), and then press **Enter**.



7. Moxa EtherDevice Server's **Main Menu** will be displayed. (To modify the appearance of the PComm Terminal Emulator window, select **Font…** under the **Edit** menu, and then choose the desired formatting options.)



8. After entering the **Main Menu**, use the following keys to move the cursor, and to select options.

Key	Function
Up/Down/Left/Right arrows, or Tab	Move the onscreen cursor
Enter	Display & select options
Space	Toggle options
Esc	Previous Menu

Telnet Console

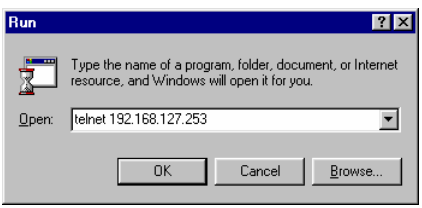
You may use Telnet to access Moxa EtherDevice Server's console utility over a network.

NOTE *Before accessing the console utility via Telnet, first connect one of Moxa EtherDevice Server's RJ45 Ethernet ports to your Ethernet LAN, or directly to your PC's Ethernet NIC. You should be able to establish a connection by using either a straight-through or cross-over Ethernet cable. However, if you experience connection difficulties, refer to the* Auto MDI/MDI-X Connection *section from* Chapter 4 of the Hardware Installation Guide *for more information about the different types of Ethernet cables and ports.*

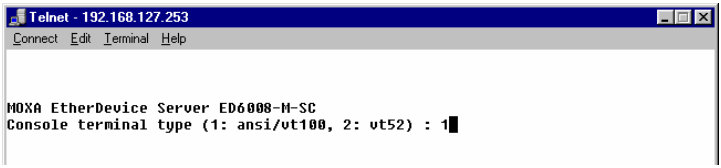
NOTE *Moxa EtherDevice Server's default IP is:* 192.168.127.253

Use the following procedure to access the console utility via Telnet.

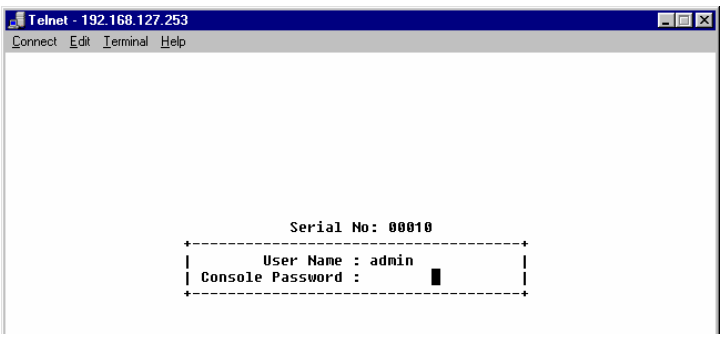
1. Telnet to Moxa EtherDevice Server's IP address from Window's **Run** window (or from the MS-DOS prompt).



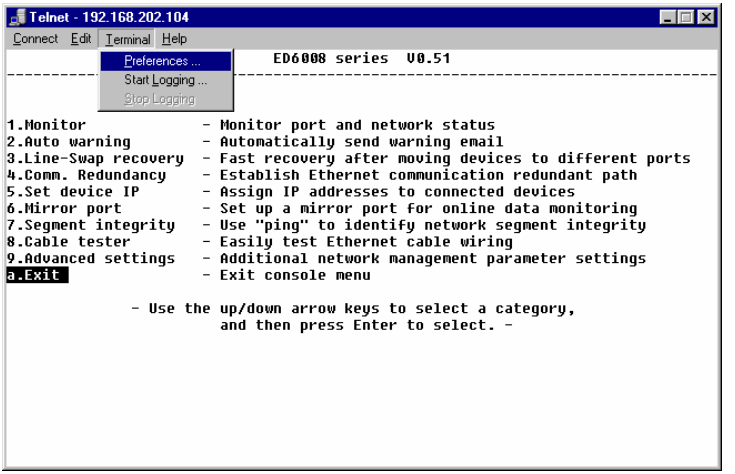
2. Type 1 to choose ansi/vt100, and then press Enter.



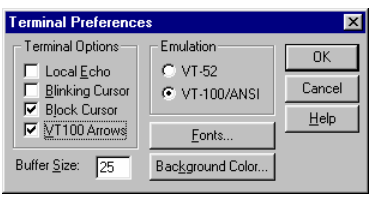
3. If a password has been set for this device, the Console login screen will appear. Enter the User Name and Console Password (this is the same as the Web Browser password), and then press Enter.



4. When Moxa EtherDevice Server's Main Menu opens, first select Preferences… under the Terminal menu.



5. When the Terminal Preferences window opens, check to make sure that the VT100 Arrows box is check-marked.



NOTE *The Telnet Console looks and operates in precisely the same manner as the RS-232 Console.*

Web Configuration

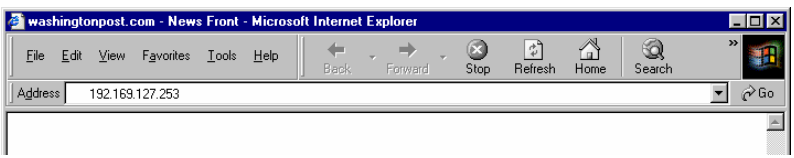
Moxa EtherDevice Server's web browser interface provides a convenient way to make modifications to its configuration, and to access the built-in monitoring and network administration functions. You may use either Internet Explorer or Netscape to access EDS.

NOTE *Before accessing Moxa EtherDevice Server's web browser interface, first connect one of Moxa EtherDevice Server's RJ45 Ethernet ports to your Ethernet LAN, or directly to your PC's Ethernet NIC. You should be able to establish a connection by using either a straight-through or cross-over Ethernet cable. However, if you experience difficulties, refer to the* Auto MDI/MDI-X Connection *section from* Chapter 4 of the Hardware Installation Guide *for more information.*

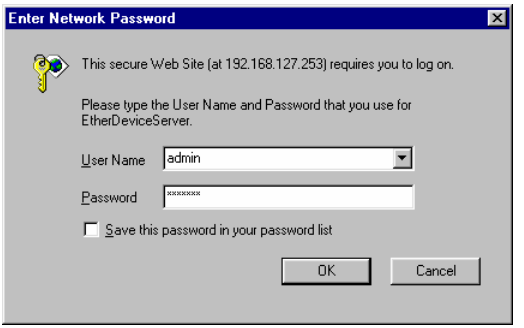
NOTE *Moxa EtherDevice Server's default IP is:* 192.168.127.253

Use the following procedure to access Moxa EtherDevice Server's web browser interface.

1. Start Internet Explorer, and then type Moxa EtherDevice Server's IP address in the Address field. Press Enter to establish the connection.

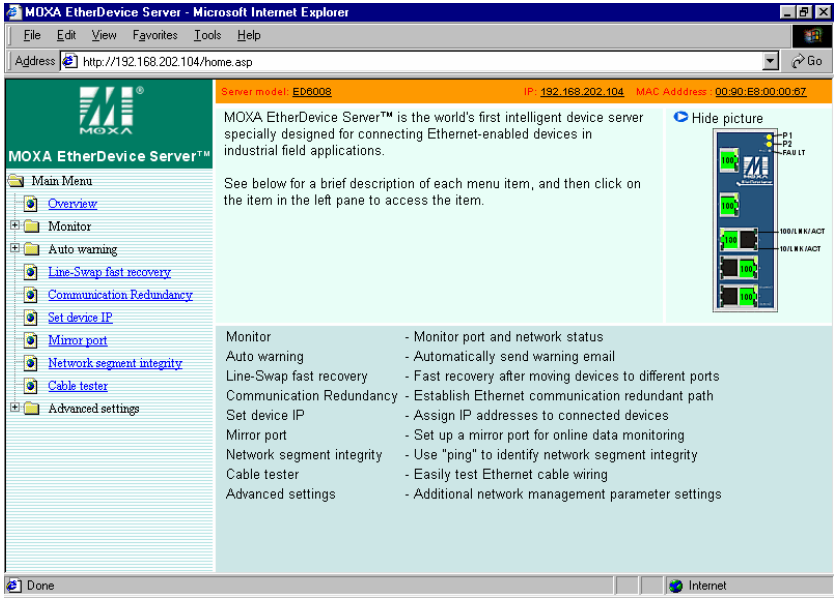


2. If a password has been set for this device, the Enter Network Password screen will appear. Enter the User Name and Password (this is the same as the Console password), and then click OK.

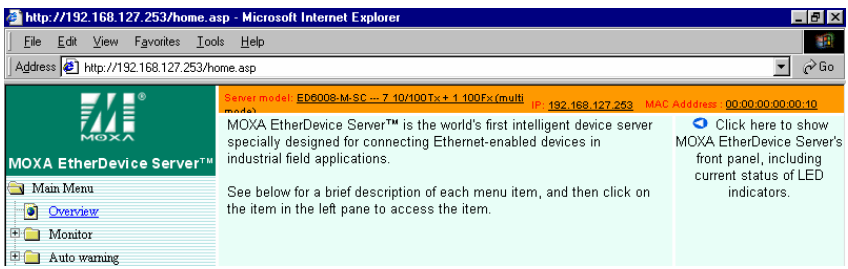


NOTE *Moxa EtherDevice Server's default User Name is:* admin, *and by default, the Password is not set (i.e., is* blank*).*

You may need to wait a few moments while the web page is downloaded to your computer. Note that by default, a *real-time* image of Moxa EtherDevice Server's front panel, including active LEDs, is displayed in the upper right corner of the web page. To hide the image, and speed up the transmission of management and configuration commands, click on **Hide picture**, located just above the image.



3. The web page will appear as follows after reloading. To re-show the image of Moxa EtherDevice Server, click on Click here to show….

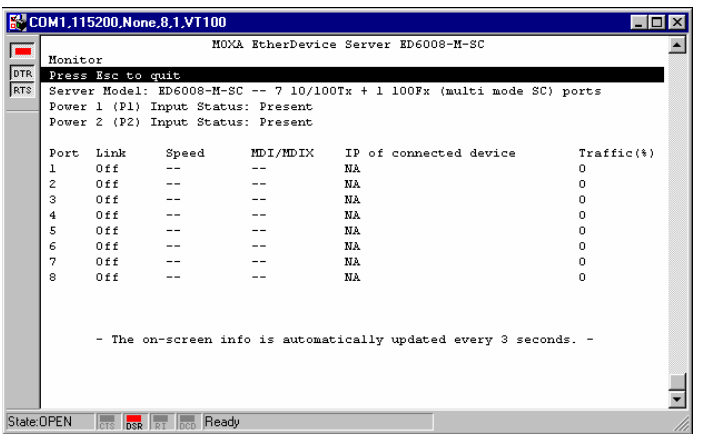


Monitor

The Console Monitor and Web Browser Monitor functions are somewhat different, so we describe them separately. In general, both functions allow you to view real-time data transmission activity, giving you the ability to analyze and monitor network activity.

Console Monitor

The Console Monitor function is accessed from either the RS-232 Console or Telnet Console. As you can see from the figure of the Console Monitor window shown below, important information about the status and activity of each port is displayed neatly in tabular form.



Towards the top of the window, you can view the Server Model name, and basic information about the number and types of ports for that model. In addition, the following information is given for each of the ports:

Item	Description
Link	**On** means the port is connected to another active device. **Off** means that the port is disconnected.
Speed	Current data transmission speed
MDI/MDIX	Indicates whether the port is set up as an MDI or MDIX port
IP of connected device	IP address of the connected device (if applicable)
Traffic (%)	Percentage of the port's bandwidth currently being used by that port (e.g., if the port is set at 100 Mbps, and 15 Mb are transmitted during a particular second, then the Traffic=15%).

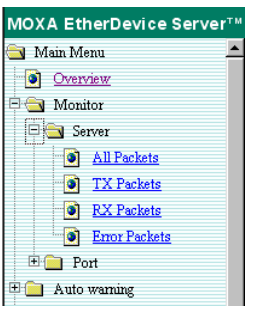
Note that the on-screen information is automatically updated every 3 seconds, giving you the ability to analyze data transmission flow through each port.

Web Browser Monitor

The Web Browser Monitor function is accessed by expanding the **Monitor** folder located in the web page's left pane. There are two options, **Server** and **Port**, discussed separately below.

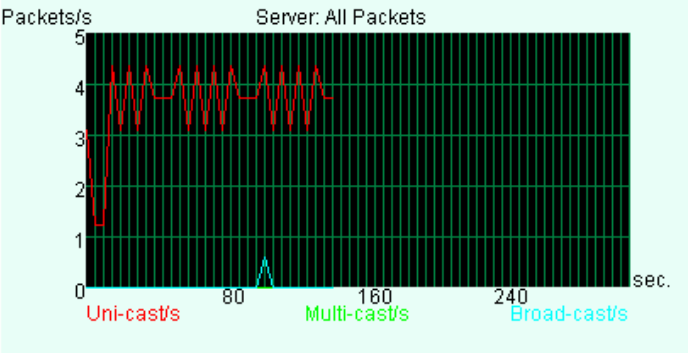
Monitor by Server

Access the Monitor by Server function by expanding the **Server** folder, as shown to the right. Monitor by Server allows the user to view a graph that shows the combined data transmission activity of all of Moxa EtherDevice Server's 8 ports. Click on one of the four options, **All Packets**, **TX Packets**, **RX Packets**, or **Error Packets**, to view transmission activity of specific types of packets.



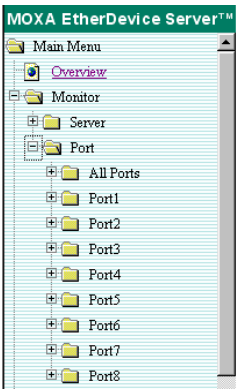
Recall that TX Packets are packets sent out from Moxa EtherDevice Server, RX Packets are packets received from connected devices, and Error Packets are packets that did not pass TCP/IP's error checking algorithm. The All Packets option displays a graph that combines TX, RX, and Error Packet activity.

The four graphs (All Packets, TX Packets, RX Packets, and Error Packets) have the same form, so we show here only the All Packets graph. The graph displays data transmission activity by showing **Packets/s** (i.e., packets per second, or pps) versus **sec.** (seconds). In fact, three curves are displayed on the same graph: **Uni-cast** packets (in red color), **Multi-cast** packets (in green color), and **Broad-cast** packets (in blue color). The graph is updated every few seconds, allowing the user to analyze data transmission activity in real-time.



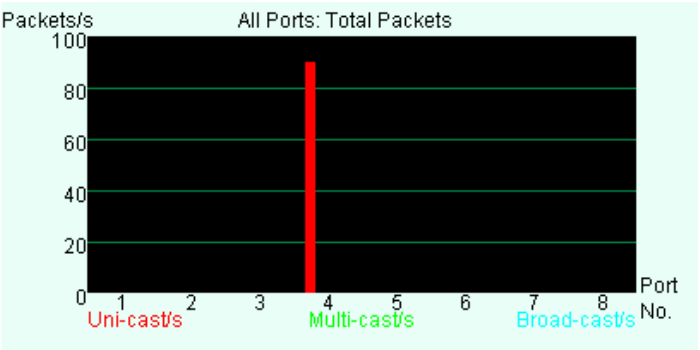
Monitor by Port

Access the Monitor by Port function by expanding the **Port** folder, as shown to the right. Monitor by Port has two options, **All Ports**, and **Port*i***, in which ***i*** = 1, 2, …, 8.



The **Port*i*** options are identical to the Monitor by Server function discussed above, in that users can view graphs that show All Packets, TX Packets, RX Packets, or Error Packets activity, but in this case, only for an individual port.

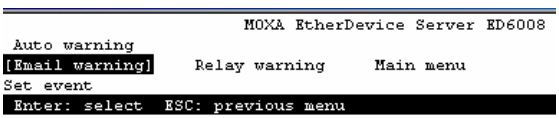
The **All Ports** option is essentially a graphical display of the individual port activity that can be viewed with the Console Monitor function discussed above. The All Ports option shows three vertical bars for each port. The height of the bar represents **Packets/s** for the type of packet, at the instant the bar is being viewed. That is, as time progresses, the height of the bar moves up or down so that the user can view the change in the rate of packet transmission. The red colored bar shows **Uni-cast** packets, the green colored bar shows **Multi-cast** packets, and the blue colored bar shows **Broad-cast** packets. The graph is updated every few seconds, allowing the user to analyze data transmission activity in real-time.



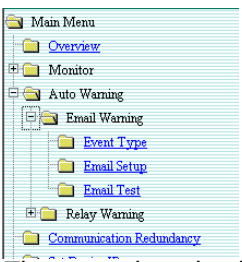
Auto Warning

The Auto Warning function uses e-mail or relay output to alert the user when certain user-configured events take place. The various Auto Warning menu items can be accessed from either the Console utility, or Web Browser interface.

Email Warning



← Console **Email Warning** menu

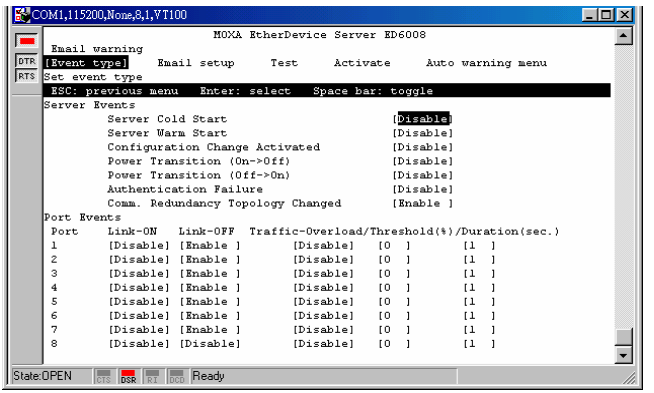


← Web Browser **Email Warning** menu

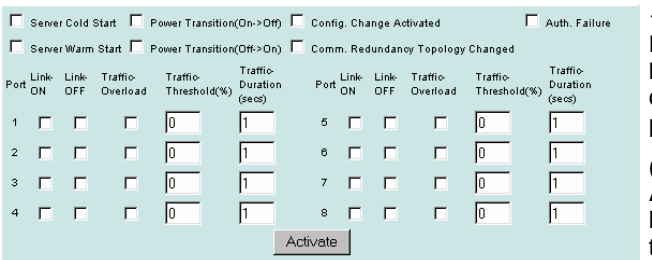
There are three basic steps required to set up the Email Warning function:

STEP 1

Select the desired **Event types** from the Console or Web Browser Event type page. (A description of each event type is given later in the *Event Types* subsection.)



← Console **Event_type** configuration page

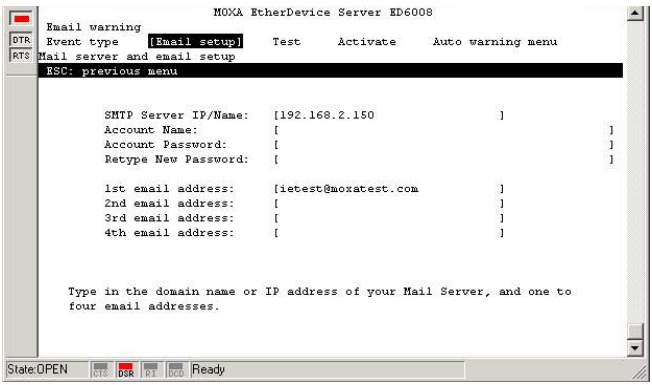


← Web Browser **Event Type** configuration panel

(Click on **Activate** before closing the window.)

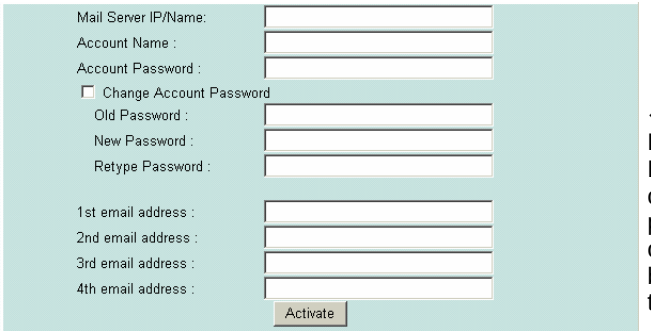
STEP 2

To configure EDS's email setup from the Console interface, enter your Mail Server IP/Name (IP address or name), Account Name, Account Password, Retype New Password, and the email address(es) to which warning messages will be sent.



← Console **Email-Setup** configuration page

To configure EDS's email setup from the browser interface, enter your Mail Server IP/Name (IP address or name), Account Name, check the Change Account Password box, enter Old Password (Default value is empty), New Password, Retype Password, and the email address(es) to which warning messages will be sent. If your mail server did not support authentication mechanism, we strongly recommend you not to enter your Account Name and Account Password. Since, it may cause some problems for delivering e-mail warning messages.

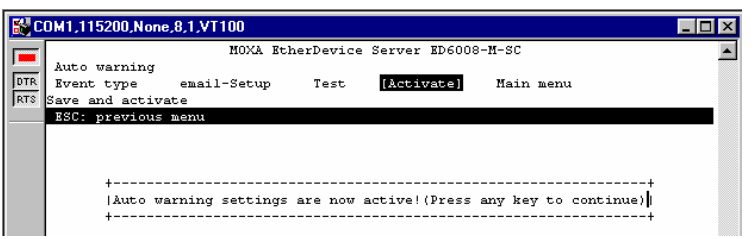


← Web Browser Email Setup configuration panel (Click on Activate before closing the window.)

STEP 3

Activate your settings.

- When using the Web Browser interface, activate the settings by clicking on the **Activate** button—once from the **Event Type** page, and once from the **Email Setup** page.
- When using the Console utility, activate by first highlighting the **Activate** menu option, and then press **Enter**. You should receive the **Auto warning settings are now active! (Press any key to continue)** message.



NOTE *Auto warning e-mail messages will be sent through an authentication protected SMTP server that supports the CRAM-MD5, LOGIN, and PAIN methods of SASL (Simple Authentication and Security Layer) authentication mechanism.*
We strongly recommend you not to enter your Account Name and Account Password if auto warning e-mail messages can be delivered without authentication mechanism.

Event Types

Event Types can be divided into two basic groups: **Server Events** and **Port Events**. Server Events are related to the overall function of the Server, whereas Port Events are related to the activity of a specific port.

Server Event	Warning e-mail is sent when…
Server Cold Start	Power is cut off and then reconnected.
Server Warm Start	EDS is rebooted, such as when network parameters are changed (IP address, netmask, etc.).
Power Transition (On→Off)	EDS is powered up.
Power Transition (Off→On)	EDS is powered down.
Configuration Change Activated	Any configuration item is changed.
Comm. Redundancy Topology Changed	If any Spanning Tree Protocol servers have changed their position (applies only to the root of the tree). If Master of Turbo Ring have changed or backup path is activated.
Authentication Failure	An incorrect password is entered.

Port Event	Warning e-mail is sent when…
Link-on	The port is connected to another device.
Link-off	The port is disconnected (e.g., the cable is pulled out, or the opposing device shuts down).
Traffic-Overload	The port's traffic surpasses the Traffic-Threshold for that port (provided this item is Enabled).
Traffic-Threshold (%)	Enter a nonzero number if the port's Traffic-Overload item is Enabled.
Traffic-Duration (secs)	A Traffic-Overload warning is sent every Traffic-Duration seconds if the average Traffic-Threshold is surpassed during that time period.

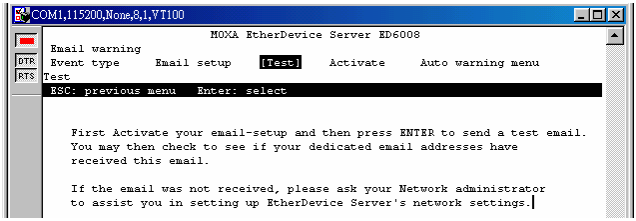
NOTE *The **Traffic-Overload**, **Traffic-Threshold (%)**, and **Traffic-Duration (secs)** Port Event items are related. If you Enable the Traffic-Overload event, then be sure to enter a nonzero Traffic-Threshold percentage, as well as a Traffic-Duration between 1 and 300 seconds.*

Test Email

After configuring and activating your Moxa EtherDevice Server's Event Types and Email Setup, you can use the **Test Email** function to see if your e-mail addresses and mail server address have been properly configured.

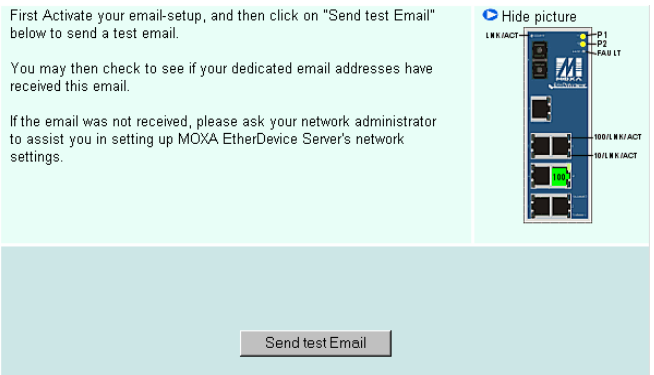
Console Test

Test your email setup from the Console utility's Auto warning **Test** menu.



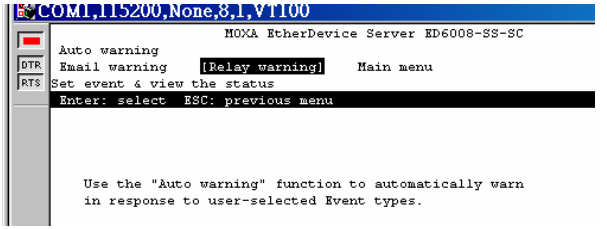
Browser Test

Test your email setup from the Web Browser utility's **Email Test** page, by clicking on **Send test Email**.

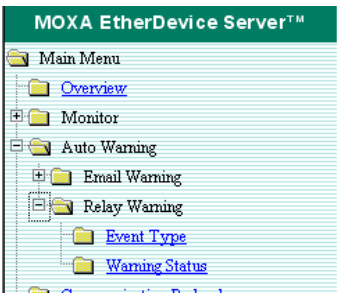


Relay Warning

The Relay Warning function uses relay to alarm the user when certain user-configured events take place. The various Relay Warning menu items can be accessed from either the Console utility, or Web Browser interface.



←Console **Relay** warning menu

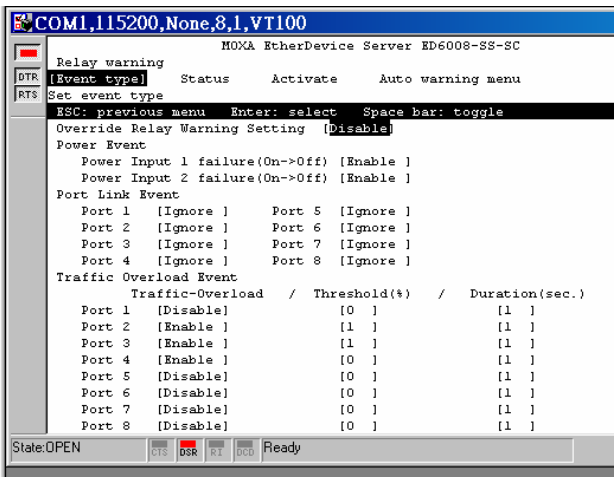


←Web Browser **Relay Warning** menu

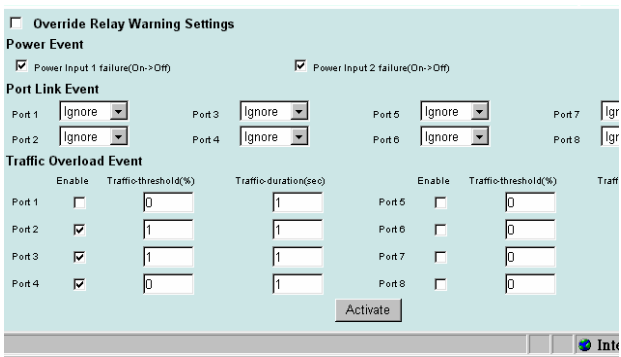
There are only three steps required to set up and display the current Relay Warning status.

STEP 1

Select the desired Event types from the Console or Web Browser Event Type page. (A description of each event type is given later in the Event Types subsection.)



← Console **Event_type** configuration page



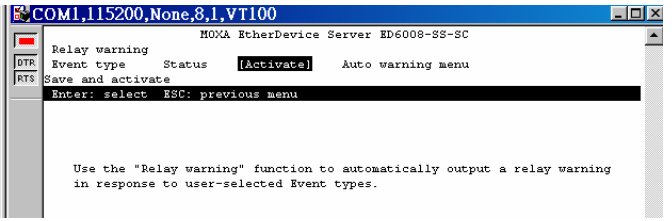
← Web Browser **Event Type** configuration panel

(Click on **Activate** before closing the window.)

STEP 2

Activate your settings.

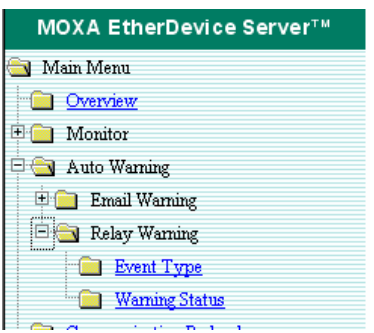
- When using the Web Browser interface, click on the **Activate** button—once from the **Event Type** page.
- When using the Console utility, activate by first highlighting the **Activate** menu option, and then press **Enter**. You should receive the **Auto warning settings are now active! (Press any key to continue)** message.



STEP 3

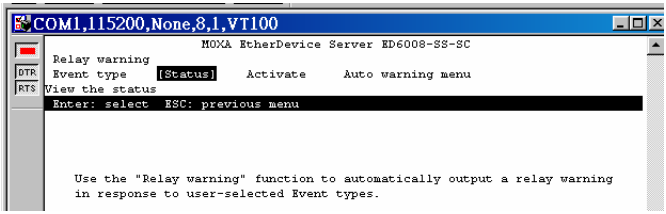
Display Relay Warning status

- When using the Web Browser interface, click Warning Status —once under the Relay Warning folder to display current Relay Warning status.



← Web Browser **Warning Status** menu

- When using the Console utility, highlight the **Status** menu option—once from Relay warning page, and then press **Enter**.



Event Types

Event Types can be divided into three basic groups: **Power Event**, **Port Link Event and Traffic Overload Event**. Power Event is related to the power input status of the Server, whereas Port link Event and Traffic Overload Event are related to the activity of a specific port.

Override Relay Alarm Settings
Enabling (Checkmarking the checkbox) **Override Relay Alarm Settings** will override all event type settings of Relay Warning, and force "Relay" not to react according to Event Type settings.

Disabling (Un-checkmarking the checkbox) **Override Relay Alarm Settings** will make "Relay" to react according to "Event Type" settings.

Power Event	Output a “Relay Warning” in response to
Power Input 1 failure (On->Off)	Power supply to power input 1 fails.
Power Input 2 failure (On->Off)	Power supply to power input 2 fails.

Port Link Event	Output a "Relay Warning" in response to
Ignore	Force "Relay Warning" not to react according to port link
(On->Off)	The port is disconnected (e.g., the cable is pulled out, or the opposing device shuts down).
(Off->On)	The port is connected to another device.

Traffic Overload Event	Output a "Relay Warning" in response to
Enable Traffic-Overload	The port's traffic surpasses the Traffic-Threshold for that port (provided this item is Enabled).
Traffic-Threshold (%)	Enter a nonzero number if the port's Traffic-Overload item is Enabled.
Traffic-Duration (secs)	A Traffic-Overload warning is sent every *Traffic-Duration* seconds if the average Traffic-Threshold is surpassed during that time period.

NOTE *The **Traffic-Overload**, **Traffic-Threshold (%)**, and **Traffic-Duration (secs)** Port Event items are related. If you Enable the Traffic-Overload event, then be sure to enter a nonzero Traffic-Threshold percentage, as well as a Traffic-Duration between 1 and 300 seconds.*

Line-Swap Fast Recovery

The Line-Swap Fast Recovery function, which is enabled by default, allows Moxa EtherDevice Server to return to normal operation extremely quickly after devices are unplugged and then re-plugged into different ports. The recovery time is on the order of a few milliseconds. Compare this with standard commercial switches for which the recovery time could be on the order of several minutes.

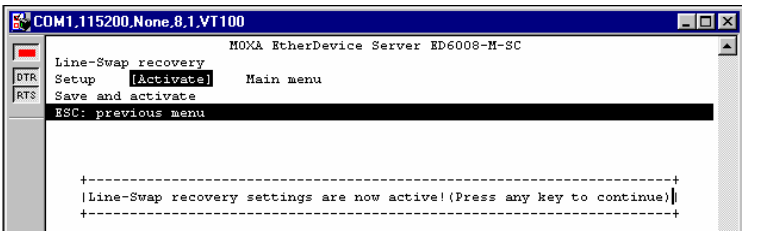
To disable the Line-Swap Fast Recovery function, or to re-enable the function after it has already been disabled, access either the Console utility's **Line-Swap recovery** page, or the Web Browser interface's **Line-Swap fast recovery** page, as shown below.

← Console **Line-Swap recovery** configuration page

← Web Browser Line-Swap fast recovery configuration panel (Click on Activate before closing the window.)

Be sure to activate your setting before exiting.

- When using the Web Browser interface, activate by clicking on the **Activate** button.
- When using the Console utility, activate by first highlighting the **Activate** menu option, and then press **Enter**. You should receive the **Line-Swap recovery settings are now active! (Press any key to continue)** message.



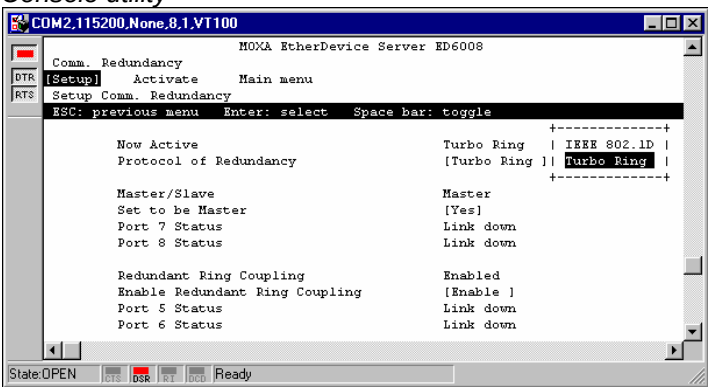
Communication Redundancy

The Communication Redundancy function allows the user to set up *redundant loops* in the network to provide a backup data transmission route in the event that a cable is inadvertently disconnected or damaged. This is a particularly important feature for industrial applications, since it could take several minutes to locate the disconnected or severed cable. For example, if Moxa EtherDevice Server is used as a key communications component of a production line, several minutes of downtime could cause a big loss in production and revenue.

Moxa Ethernet Device Server supports two different protocols to support this communication redundancy function—**Spanning Tree Protocol (IEEE 802.1D)** and **Turbo Ring**.

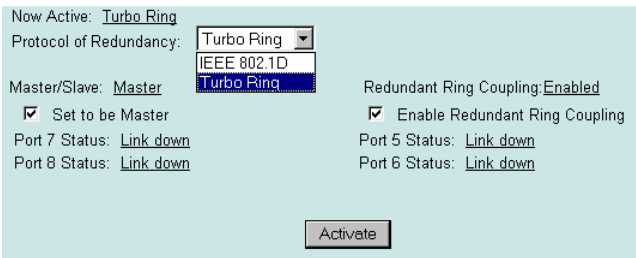
You are only allowed to select one of these two protocols, with the selection procedure illustrated in the following screen shots.

Console utility



← Use the pop-up box to select either **IEEE 802.1D** (Spanning Tree) or **Turbo Ring**.

Web Browser interface



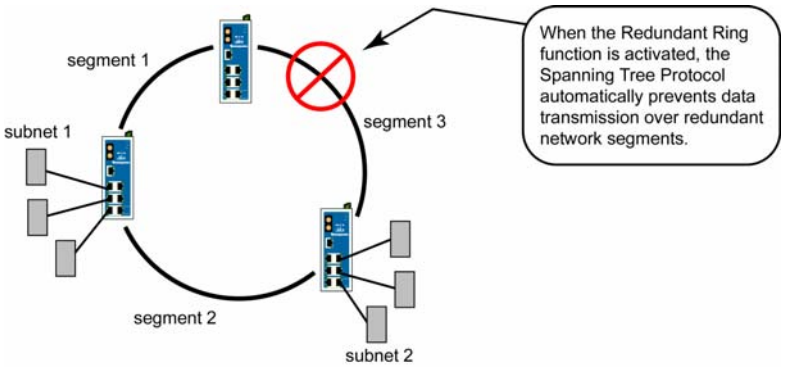
← Use the pop-up box to select either **IEEE 802.1D** (Spanning Tree) or **Turbo Ring**.

Spanning Tree Protocol (802.1D)

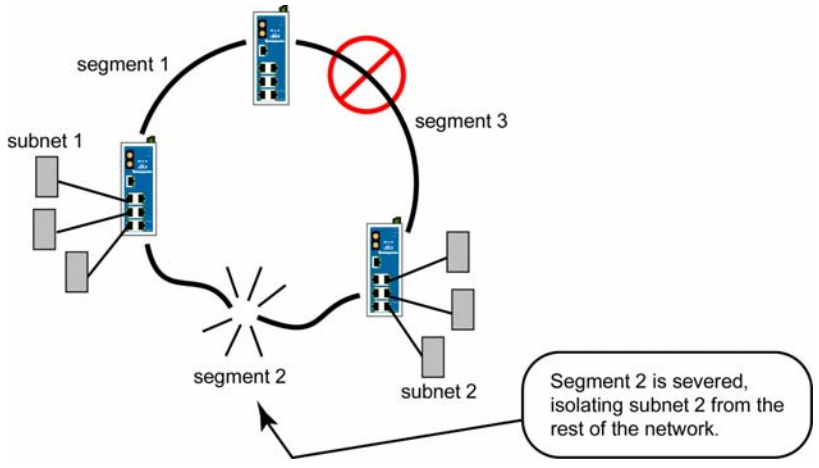
This Communication Redundancy function uses Spanning Tree protocol to identify one switch as the “root” of the network, and then automatically blocks packets from traveling through any of the network’s redundant loops. In the event that one branch of this tree becomes disconnected from the rest of the network, the Spanning Tree protocol automatically readjusts the tree (if possible) so that the part of the network that was disconnected can reestablish contact with the rest of the network.

Perhaps the main advantage to using Spanning Tree protocol (IEEE802.1D) to manage redundant loops is that it is an open protocol, and consequently is compatible with products from other manufacturers (Cisco, for example) that use Spanning Tree protocol.

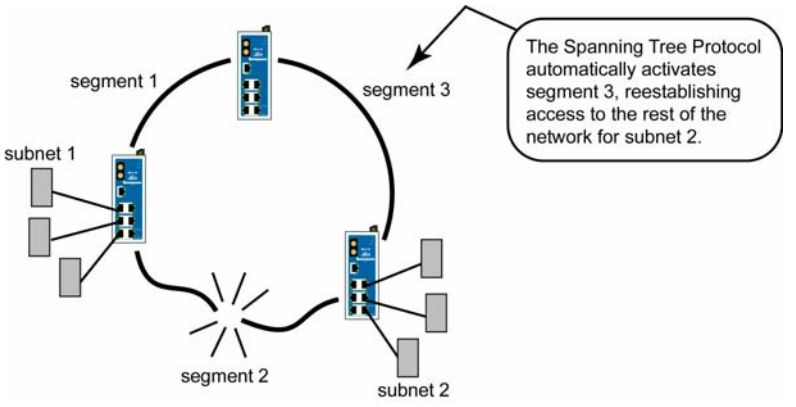
Initial Setup



Network mishap isolates part of the network



Spanning Tree saves the day!

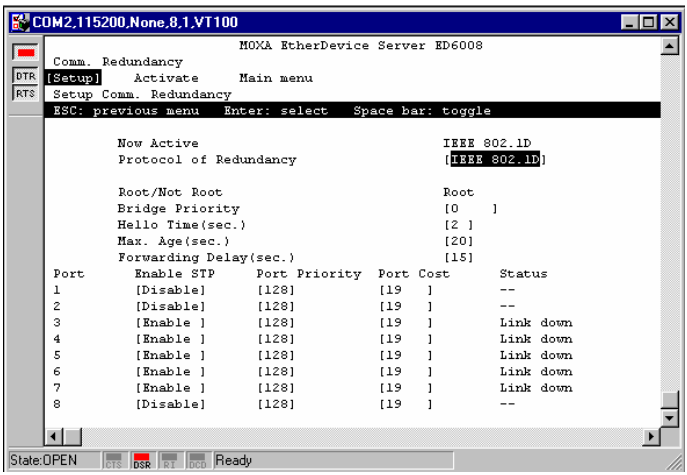


NOTE *We suggest not enabling the Spanning Tree Protocol once the port is connected to a device (PLC, RTU, etc.) as opposed to network equipment. The reason is that it will cause unnecessary negotiation.*

Spanning Tree Protocol—Detailed Setup

The following figures indicate which Spanning Tree Protocol parameters can be configured. A more detailed explanation of each parameter is given below.

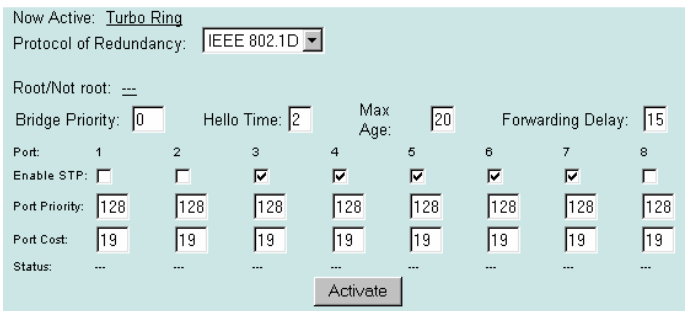
Spanning Tree Protocol (802.1D) Console utility



← Remember to **Activate** your settings.

← Set up Spanning Tree Protocol options here.

Spanning Tree Protocol Web Browser interface



← Set up Spanning Tree Protocol options here.

Spanning Tree Protocol—Configuration Items

Spanning Tree Protocol (IEEE 802.1D)	
Configuration Item	**Description**
Root/Not Root	Indicates if this device is or is not the Root of the Spanning Tree (the root is determined automatically).
Bridge priority	Increase this device's bridge priority by inputting a *lower* number. A device with a higher bridge priority has a greater chance of being established as the root of the Spanning Tree topology.
Hello time (sec.)	The root of the Spanning Tree topology periodically sends out a "hello" message to other devices on the network to check if the topology is healthy. The "hello time" is the amount of time the root waits between sending hello messages (see below for further explanation).
Max. Age (sec.)	If this device is not the root, and it has not received a hello message from the root in an amount of time equal to "Max. Age," then this device will reconfigure itself as a root. Once two or more devices on the network are recognized as a root, the devices will renegotiate to set up a new Spanning Tree topology (see below for further explanation).
Forwarding delay (sec.)	The amount of time this device waits before checking to see if it should change to a different state (see below for further explanation).
Enable STP	Enable or Disable the port as a node

	on the Spanning Tree topology.
Port Priority	Increase this port's priority as a node on the Spanning Tree topology by inputting a *lower* number.
Port Cost	Input a higher cost to indicate that this port is less suitable as a node for the Spanning Tree topology.
Status	Indicates the current Spanning Tree status of this port.

Configuration Limits

We should point out that the Spanning Tree Algorithm places certain limits on three of the configuration items described above:

[Eq. 1]: 1 sec $\leqq$ Hello Time $\leqq$ 10 sec

[Eq. 2]: 6 sec $\leqq$ Max. Age $\leqq$ 40 sec

[Eq. 3]: 4 sec $\leqq$ Forwarding Delay $\leqq$ 30 sec

These three variables are further restricted by the following two inequalities:

[Eq. 4]: 2 * (Hello Time + 1 sec) $\leqq$ Max. Age $\leqq$ 2 * (Forwarding Delay – 1 sec)

Moxa EtherDevice Server's firmware will alert you immediately if any of these restrictions are violated. For example, setting

Hello Time = 5 sec, Max. Age = 20 sec, and Forwarding Delay = 4 sec does not violate Eqs. 1 through 3, but does violate Eq. 4, since in this case,

2 * (Hello Time + 1 sec) = 12 sec, and 2 * (Forwarding Delay – 1 sec) = 6 sec.

You can remedy the situation in any number of ways. One solution is to simply increase the Forwarding Delay value to at least 11 sec.

Turbo Ring

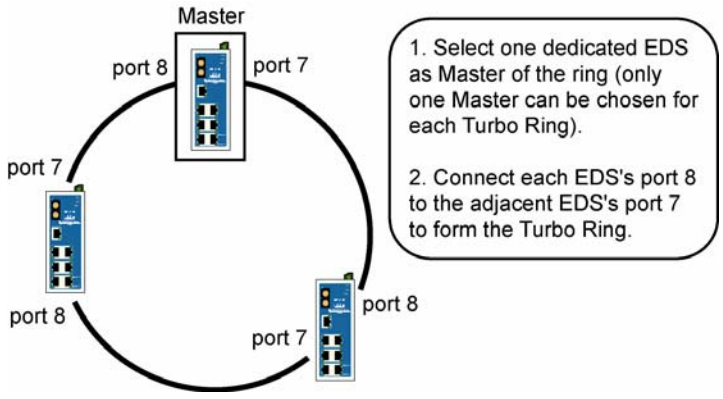
We developed the proprietary Turbo Ring protocol to achieve optimization of communication redundancy and faster recovery time on the network. Our test report shows that the recovery time of Turbo Ring is less than 300 ms with a full load of 120 nodes of network traffic.

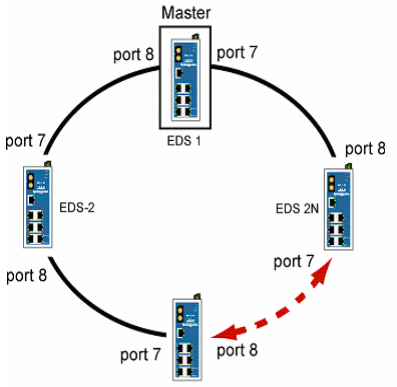
Turbo Ring protocol identifies one switch as the “master” of the network, and then automatically blocks packets from traveling through any of the network’s redundant loops. In the event that one branch of this ring becomes disconnected from the rest of the network, the Turbo Ring protocol automatically readjusts the ring (if possible) so that the part of the network that was disconnected can reestablish contact with the rest of the network. The actual topology of the redundant ring, i.e., which segment will be blocked, is determined by the number of EDSs that make up the ring.

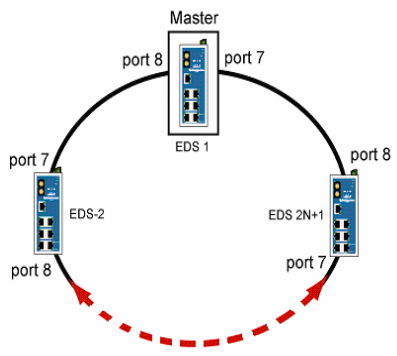
For some systems, it may not be convenient to connect all devices in the system to create one BIG redundant ring, since some devices could be located at a remote site. Turbo Ring’s “Ring Coupling” function helps you separate those distributed devices into different smaller redundant rings, but in such a way that they can still communicate with each other.

NOTE *Ring Coupling and Ring Master do not need to be set up on the same EDS.*

Turbo Ring Initial Setup

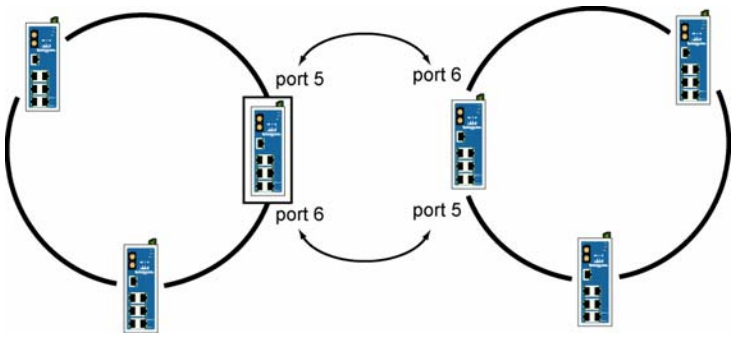


When the number of EDS units in the Turbo Ring is even	
	If there are 2N EDS units (an even number) in the Turbo Ring, then the backup segment is the segment connected to port 8 of the (N+1)st EDS (i.e., the EDS unit directly opposite the Master, as shown in the figure).

When the number of EDS units in the Turbo Ring is odd.	
	If there are 2N+1 EDS units (an odd number) in the Turbo Ring, then the backup segment is the segment directly opposite the Master, as shown in the figure.

NOTE *Turbo Ring only supports ring network topology, for which you should connect port 7 of one EDS to port 8 of another EDS.*

Ring Coupling (When "Turbo Ring with ED6008 series" is enabled)



EDS supports two kinds of coupling topologies (Firmware Ver. 2.3 or later). One is to enable "Turbo Ring with ED6008 series" and the other is to enable "Turbo Ring with EDS series". When you enable "Turbo Ring with ED6008 series", you could only connect ED6008s within one Turbo Ring and use this kind of ring coupling topology shown as above.

STEP 1

Select one EDS from the left and right Turbo Ring. Enter the Communication Redundancy pages of both EDSs and select "Turbo Ring with ED6008 series" from "Protocol of Redundancy".

STEP 2

Select the circled EDSs and check "Enable Redundant Ring Coupling."

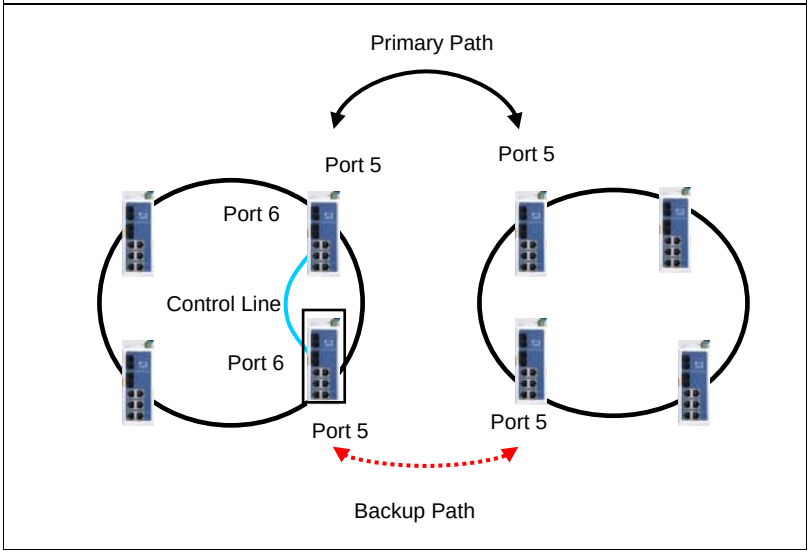
NOTE *Checking "Enable Redundant Ring Coupling" before connecting coupling line.*

STEP 3

Connect port 5 to the opposing EDS's port 6, and port 6 to the opposing EDS's port 5.

NOTE *Checking "Enable Redundant Ring Coupling" before connecting coupling line.*
Turbo Ring's Ring Coupling only supports ports 5 and 6, and the opposing Turbo Ring EDS cannot be enabled for "Redundant Ring Coupling."

Ring Coupling (When "Turbo Ring with EDS series" is enabled)



When you **enable** "Turbo Ring with EDS series", you could connect both ED6008s and other EDSs within one Turbo Ring and use this kind of ring coupling topology shown as above.

STEP 1

Select two EDSs in left Turbo Ring and two EDSs in the right Turbo Ring that will be coupling channels between left and right Turbo Ring. Then enter Communication Redundancy page and select "Turbo Ring with EDS series" from "Protocol of Redundancy" for each one among these four EDSs

STEP 2

Only check the circled EDS with “Enable Redundant Ring Coupling”

STEP 3

Connect two EDSs’ port 5 of left Turbo Ring to another two EDSs’ port 5 of right Turbo Ring as the coupling line. Then connect circled EDS’s port 6 with another EDS’s port 6 in left Turbo Ring as the control line.

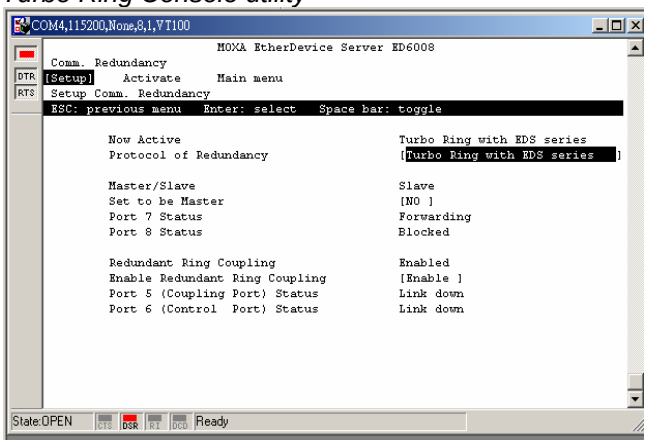
The line connected to the port 5 of the circled EDS with “Enable Redundant Ring Coupling” will be the backup path.

NOTE *Checking “Enable Redundant Ring Coupling” before connecting coupling line.*
Only check one of four EDSs with “Enable Redundant Ring Coupling.”
Port 5 is designated as the coupling port, whereas port 6 is designated as the control port.

Turbo Ring—Detailed Setup

The following figures indicate which Turbo ring Protocol parameters can be configured. A more detailed explanation of each parameter is given below.

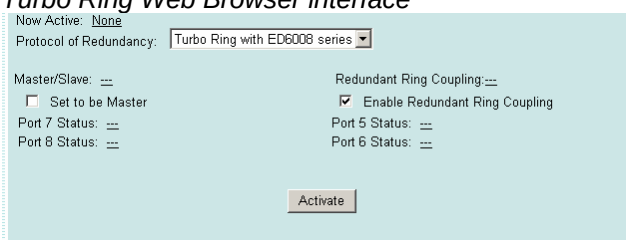
Turbo Ring Console utility



← Remember to **Activate** your settings.

← Set up protocol for redundancy.

Turbo Ring Web Browser interface



← Set up protocol for redundancy.

Turbo Ring Configuration Items

Configuration Item		Turbo Ring Protocol Description
Protocol of Redundancy	IEEE 802.1D	Enable Spanning Tree Protocol as the redundant protocol
	Turbo Ring with ED6008	Enable Turbo Ring as the redundant protocol and connect ED6008s within one Turbo Ring
	Turbo Ring with EDS series	Enable Turbo Ring as the redundant protocol and connect both ED6008s and EDSs within one Turbo Ring
Master/Slave		Indicates if this switch is a Master or Slave of the Turbo Ring (the Master device is set by the user or via auto-negotiation).
Redundant Ring Coupling		Indicates if Redundant Ring Coupling is enabled.
Set to be Master		Set this switch as a Master of the Turbo Ring
Enable Redundant Ring Coupling		Enable Redundant Ring Coupling of this switch
Port 5/7/8 Status (as redundant and coupling port)	Forwarding	Indicates primary path
	Blocked	Indicates back-up path
	Link down	Indicates non-connection
Port 6 Status (as control port)	Active	Indicates proper connection
	Inactive	Indicates improper connection
	Link down	Indicates non-connection

Assigning IP Addresses to Connected Devices

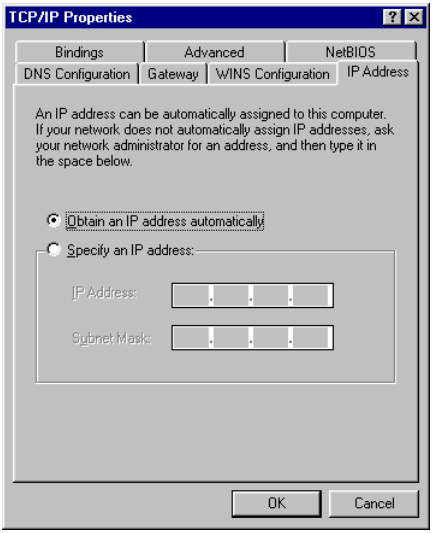
When enabled, the **Set device IP** function allows Moxa EtherDevice Server to automatically assign specific IP addresses to connected devices that are equipped with *DHCP Client* or *RARP* protocol. In effect, Moxa EtherDevice Server acts as a DHCP server by assigning a connected device with a specific IP address stored in Moxa EtherDevice Server's internal memory. Each time the connected device is switched on or rebooted, Moxa EtherDevice Server sends the device the desired IP address.

Take the following steps to use the **Set device IP** function:

STEP 1

Set up the connected devices

Set up the Ethernet-enabled devices connected to Moxa EtherDevice Server for which you would like the IP addresses to be assigned automatically. The devices must be configured to *obtain* their IP address automatically.



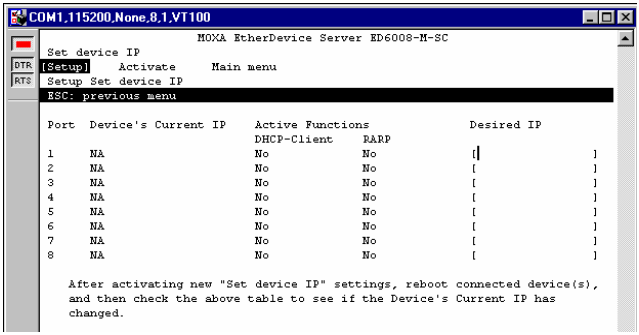
The devices' configuration utility should include a setup page that allows you to choose an option similar to **Obtain an IP address automatically**.

For example, Windows' **TCP/IP Properties** window is shown at the right. Although your device's configuration utility may look quite a bit different, this figure should give you some idea of what to look for.

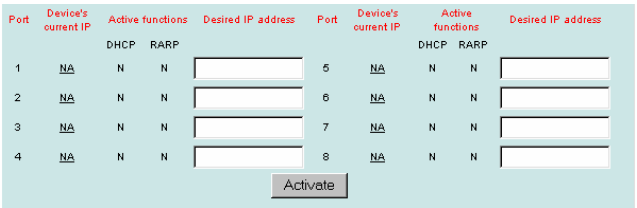
You also need to decide which of Moxa EtherDevice Server's ports your Ethernet-enabled devices will be connected to. You will need to set up each of these ports separately, as described in the following step.

STEP 2

Configure Moxa EtherDevice Server's Set device IP function, either from the Console utility or from the Web Browser interface. In either case, you simply need to enter the Desired IP for each port that needs to be configured.



← Console **Set device IP** configuration page

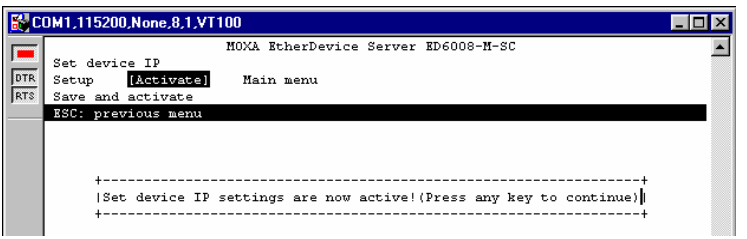


← Web Browser Set device IP configuration panel (Click on Activate before closing the window.)

STEP 3

Be sure to activate your settings before exiting.

- When using the Web Browser interface, activate by clicking on the **Activate** button.
- When using the Console utility, activate by first highlighting the **Activate** menu option, and then press **Enter**. You should receive the **Set device IP settings are now active! (Press any key to continue)** message.



Mirror Port

The Mirror port function can be used to monitor data being transmitted through a specific port. This is done by setting up another port (the mirror port) to receive the same data being transmitted to, from, or both to and from, the port under observation. This allows the network administrator to “sniff” the observed port and thus keep tabs on network activity.

Take the following steps to set up the Mirror Port function:

STEP 1

Configure Moxa EtherDevice Server’s **Mirror Port** function from either the Console utility or Web Browser interface. You will need to configure three settings:

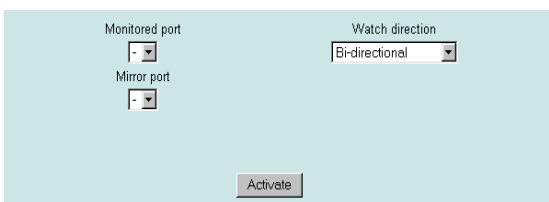
Monitored Port Select the port number of the port whose network activity will be monitored.

Mirror Port Select the port number of the port that will be used to monitor the activity of the monitored port.

Watch Direction Select one of the following three watch direction options:

- **Input data stream**
  Select this option to monitor only those data packets coming *into* Moxa EtherDevice Server's port from an external connection.
- **Output data stream**
  Select this option to monitor only those data packets being sent *out through* Moxa EtherDevice Server's port.
- **Bi-directional**
  Select this option to monitor data packets both coming *into*, and being sent *out through*, Moxa EtherDevice Server's port.

← Console **Mirror port** configuration page

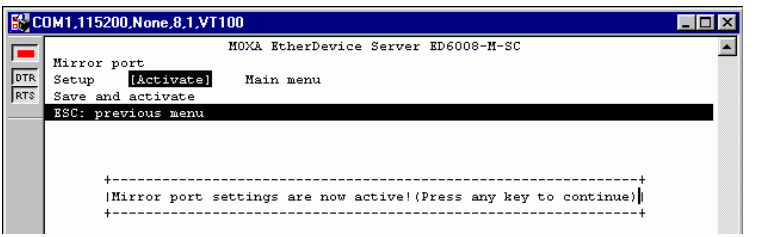


← Web Browser Mirror port configuration panel (Click on Activate before closing the window.)

STEP 2

Be sure to activate your settings before exiting.

- When using the Web Browser interface, activate by clicking on the **Activate** button.
- When using the Console utility, activate by first highlighting the **Activate** menu option, and then press **Enter**. You should receive the **Mirror port settings are now active! (Press any key to continue)** message.

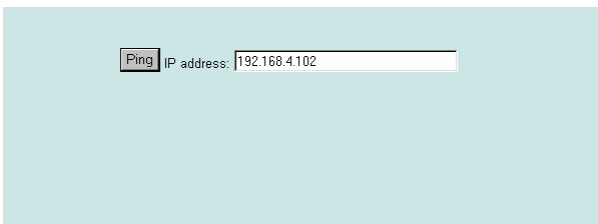


Segment Integrity

The **Segment Integrity** function uses the *ping* command to give users a simple but powerful tool for troubleshooting network problems. The function's most unique feature is that even though the ping command is entered from the user's PC keyboard, the actual ping command originates from Moxa EtherDevice Server itself. In this way, the user can essentially "sit on top of Moxa EtherDevice Server" and send ping commands out through its ports.

To use the Segment Integrity function, type in the desired IP address, and then press **Enter** from the Console utility, or click on **Ping** when using the Web Browser interface.

← Console **Segment integrity** configuration page



← Web Browser Segment Integrity configuration panel (Click on Activate before closing the window.)

Cable Tester

The **Cable tester** function gives you a quick way to test an Ethernet cable to determine if it is a *straight-through* cable, *cross-over* cable, or *is not wired correctly or has a short*. The Cable tester function works by isolating ports 1 and 2 from the rest of Moxa EtherDevice Server's ports. For this reason, you should first check that ports 1 and 2 are not in use before testing an Ethernet cable.

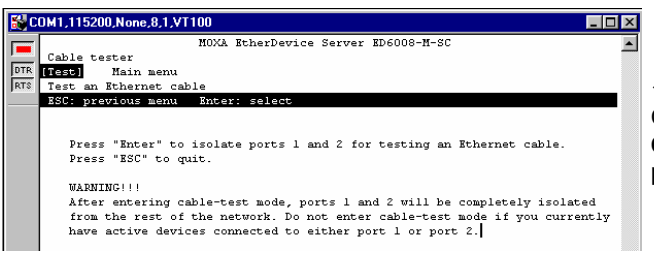
ATTENTION

*Before entering **cable-test mode**, check to make sure that ports 1 and 2 are not in use. After entering cable-test mode, ports 1 and 2 will be completely isolated from the rest of the network. Do not enter cable-test mode if you currently have active devices connected to ports 1 or 2.*

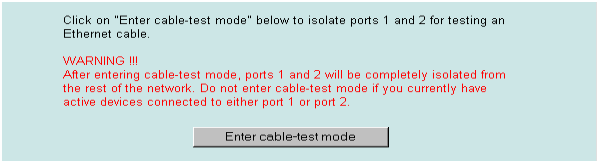
The **Cable tester** function can be accessed from either the Console utility, or from the Web Browser interface. Take the following steps to use the **Cable tester** function:

STEP 1

Enter Cable-test mode.



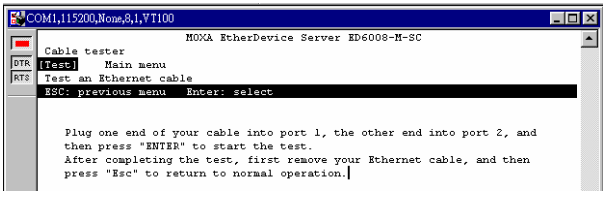
← Console **Cable tester** page



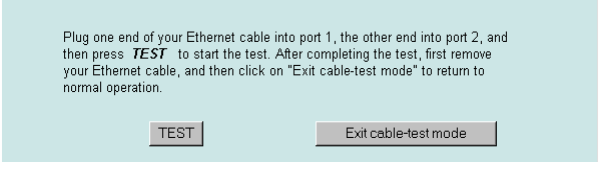
← Web Browser **Cable tester** panel

STEP 2

Plug one end of your cable into port 1, the other end into port 2, and then press **Enter** from the Console utility, or click on **Test** from the Web Browser interface:



← Console: Press Enter to start testing your Ethernet cable



← Web Browser: Click on Test to start testing your Ethernet cable

STEP 3

Examine the results of the test. There are three possible responses:

1. The cable is not wired correctly or has a short.
2. Straight-through cable
3. Cross-over cable

STEP 4

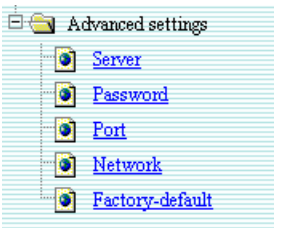
Exit Cable-test mode.

Advanced Settings

The **Advanced settings** functions can be accessed from either the Console utility or from the Web Browser interface, although for technical reasons, the menu items are slightly different.

```
Advanced settings
Server  Port  Network  Factory-default
```

← Console **Advanced settings** menu



← Web Browser **Advanced settings** menu

In what follows, we discuss each **Advanced settings** category separately.

Server

The Console utility and Web Browser interface configuration options are somewhat different, so we first discuss the Console configuration, and then discuss the Web Browser configuration.

NOTE *Moxa EtherDevice Server's default User Name is:* admin, *and by default, the Password is not set (i.e., is* blank*). You are required to use a User Name (i.e., it must be non-vacuous), although the Password is optional.*

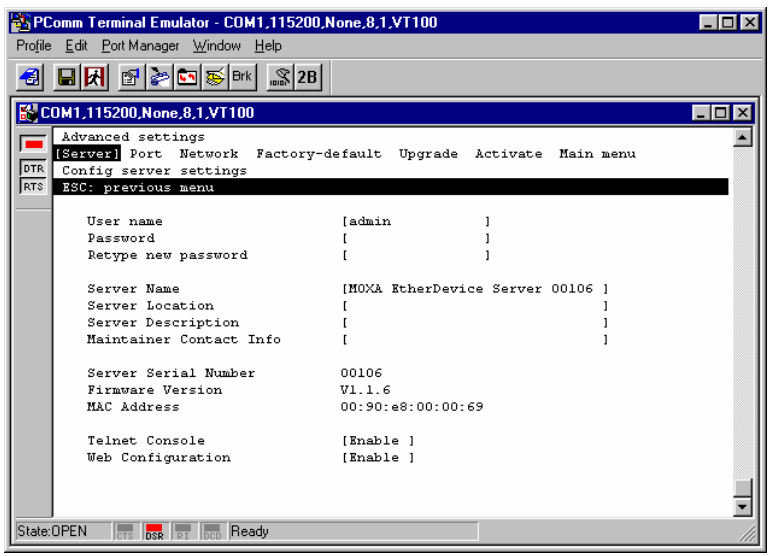
NOTE *Warning e-mail messages will have **sender** given in the form:*

Moxa_EtherDevice_Server_0001@Server_Location

*where **Moxa_EtherDevice_Server** is the default Server Name, **0001** is EDS's serial number, and **Server_Location** is the default Server Location. If you have problems sending warning e-mail, check that your SMTP parameters are configured correctly.*

Console Configuration

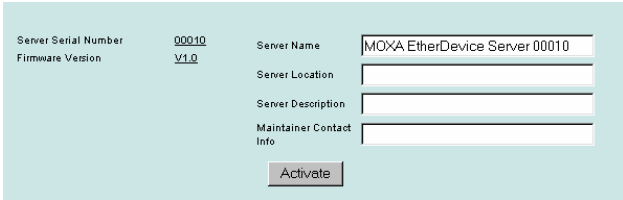
The Console utility's **Server** category allows the user to configure information related to the basic function of Moxa EtherDevice Server. A description of each configuration item is given below.



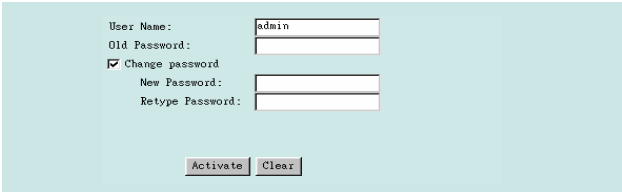
Configuration Item	Description
User name	If a Password is set, then the User name is required when logging into either the RS-232 Console, Telnet Console, or Web Browser interface.
Password	If a Password is already set, then you will be required to type the Password when logging into either the RS-232 Console, Telnet Console, or Web Browser interface.
Retype new password	If you type a new password in the Password field, you will be required to retype the password in the Retype new password field before exiting the Server page.
Server Name	These four items are included to provide the user with a convenient means of storing key information about Moxa EtherDevice Server—particularly useful when you are responsible for maintaining a large number of Servers.
Server Location	
Server Description	
Maintainer Contact Info	
Server Serial Number	Assigned by Moxa
Firmware Version	Changes each time you update the firmware.
MAC Address	Assigned by Moxa
Telnet Console	Select **Enable** to allow users to access the Telnet Console over the network
	Select **Disable** to prevent users from accessing the Telnet Console
Web Configuration	Select **Enable** to allow users to access the Web Browser interface over the network
	Select **Disable** to prevent users from accessing the Web Browser interface

Web Browser Configuration

The Web Browser interface's **Server** and **Password** categories allow the user to configure information related to the basic function of Moxa EtherDevice Server, as shown in the figures below.



← Web Browser **Server** configuration panel



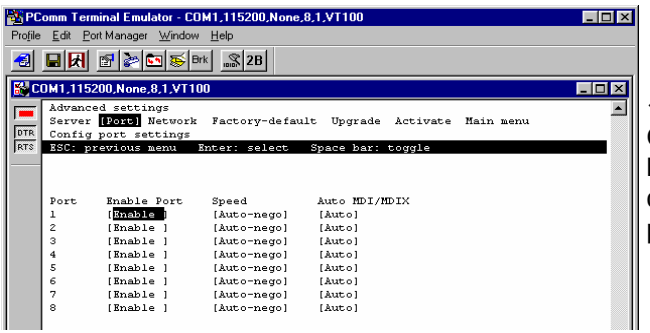
← Web Browser **Password** configuration panel

NOTE ***To reset the User Name*** *from the Web Browser interface, type the new username in the User Name text box, type the current password in the Old Password text box, uncheck the Change password check-box, and then click on Activate.*

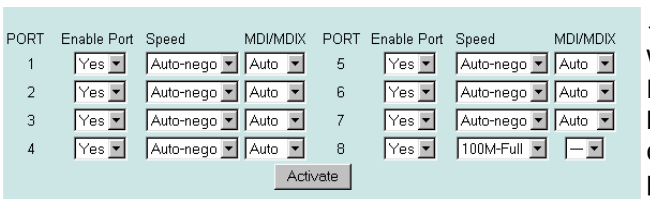
To reset the Password *from the Web Browser interface, type the User Name, Old Password, check-mark the Change password check-box, type the New Password, retype the New password, and then click on Activate.*

Port

The **Port** settings are included to give the user control over Port Access, Port Transmission Speed, and Port Type (MDI or MDIX). These items can be configured from either the Console utility or Web Browser interface. An explanation of each configuration item is given below.



← Console **Port** configuration page



← Web Browser **Port** configuration panel

Port Access

Enable Port	Description
Enable	Choose this option to allow data transmission through the port.
Disable	Choose this option to immediately shut off port access.

NOTE *If a connected device or sub-network is wreaking havoc on the rest of the network, the **Disable** option under **Advanced Settings/Port** gives the administrator a quick way to immediately shut off access through this port.*

Port Transmission Speed

Speed	Description
Auto-nego	This is the default Speed option. It allows the port to access any of the four transmission types listed below.
100M-Full	Choose one of these fixed speed options if the opposing Ethernet device has trouble auto-negotiating for line speed.
100M-Half	
10M-Full	
10M-Half	

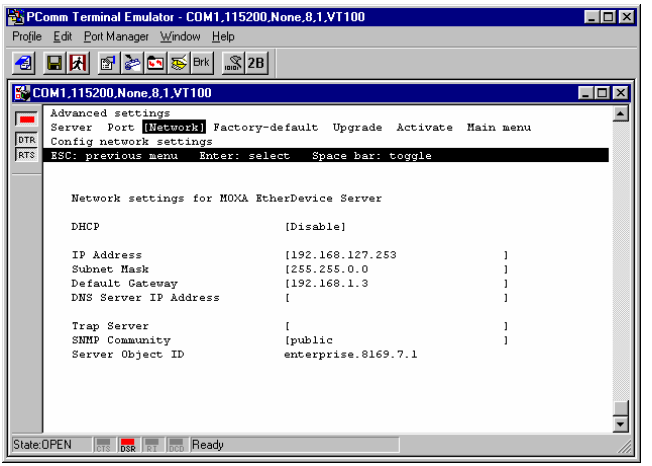
Port Type

MDI	Choose the MDI or MDIX option if the opposing Ethernet device has trouble auto-negotiating for port type, or if you chose a fixed speed option.
MDIX	

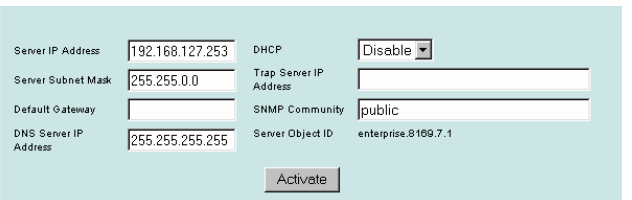
NOTE *Moxa EtherDevice Server does not support simultaneously selecting **a fixed Speed** option and **Auto** under **Auto MDI/MDIX**.*
*If you choose a fixed **Speed** option, then you must choose either **MDI** or **MDIX** under **Auto MDI/MDIX**.*

Network

The **Network** configuration allows users to modify the usual TCP/IP network parameters. These items can be configured from either the Console utility or Web Browser interface. An explanation of each configuration item is given below.



← Console **Network** page



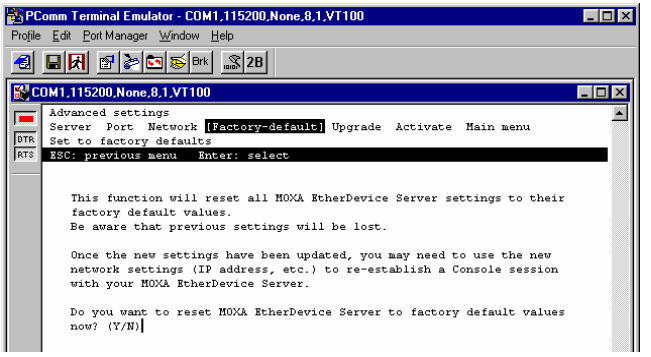
←]Web Browser **Network** panel

Configuration Item	Description
DHCP	Select **Enable** to have Moxa EtherDevice Server's IP address automatically assigned by your network's DHCP server.
	Select **Disable** to set up Moxa EtherDevice Server's IP address manually.
IP Address	Identifies Moxa EtherDevice Server on a TCP/IP network.
Subnet mask	Identifies the type of network Moxa EtherDevice Server is connected to. Enter 255.255.0.0 for a Class B network, and 255.255.255.0 for a Class C network.
Default Gateway	Enter your router's IP address if your LAN connects to an outside network.
DNS Server's IP Address	Enter the IP address of the DNS Server used by your network.*
Trap Server IP Address	Enter the IP address of the Trap Server used by your network.
SNMP Community	Provides some added managerial security, since only SNMP servers with the same "SNMP Community" can read the EDS's MIB values.
Server Object ID	The private SNMP Object ID of Moxa EtherDevice Server.

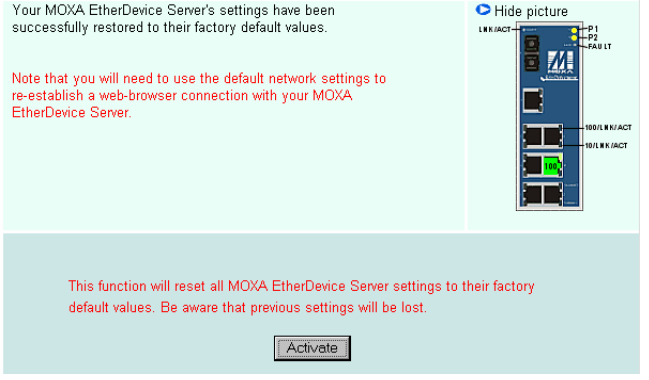
*After entering the DNS Server's IP address, you can input Moxa EtherDevice Server's url (e.g., www.eds.company.com) in your browser's address field, instead of entering the IP address.

Factory Default

The Factory Default function is included to give users a quick way of restoring Moxa EtherDevice Server's configuration settings to their factory default values. This function can be accessed from either the Console utility or Web Browser interface.



← Console **Factory default** page



← Web Browser **Factory default** panel

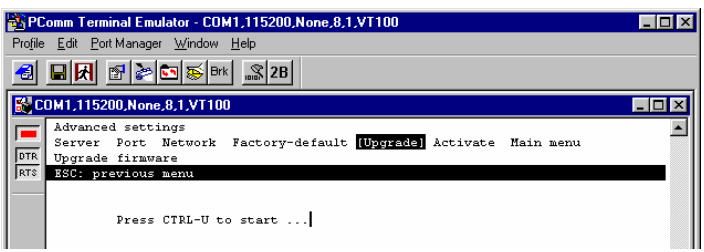
NOTE *After activating the Factory Default function, you will need to use the default network settings to re-establish a web-browser or Telnet connection with your Moxa EtherDevice Server.*

Upgrade Firmware by Console

In this section, we explain how to upgrade EDS's firmware via the console port. Recall from a previous section in this chapter that the console connection parameters are 115200, None, 8, 1, VT100.

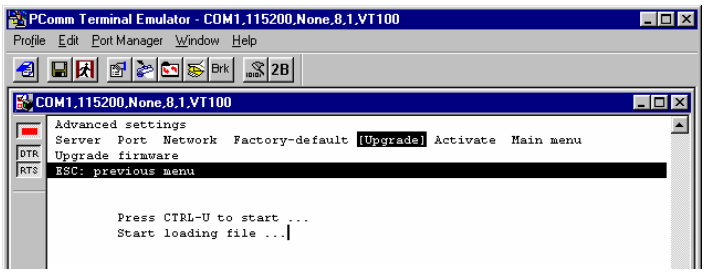
STEP 1

Activate the Console Upgrade function, and then press CTRL-U to start.



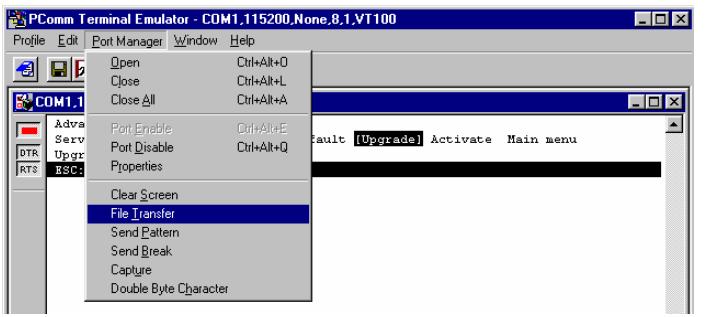
STEP 2

Once the Start loading file … message appears, you can locate the *.rom firmware file that contains the new firmware.



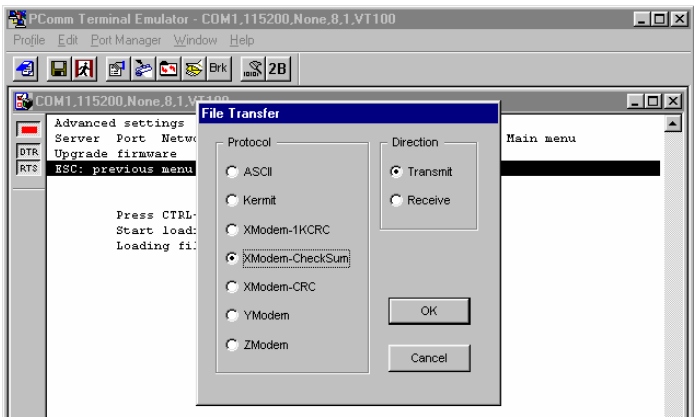
STEP 3

Select **File Transfer** under the **Port Manager** menu.



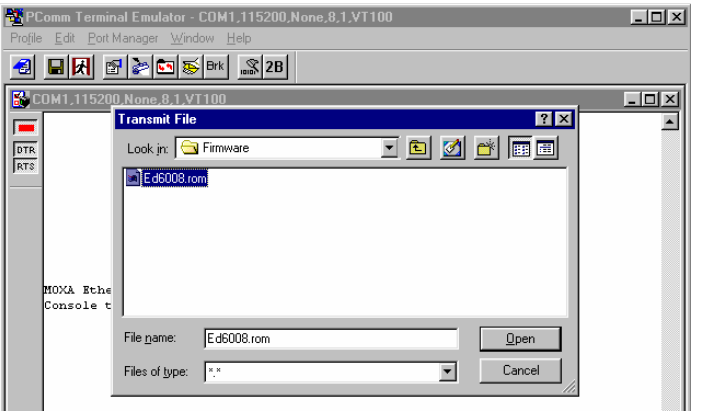
STEP 4

Select the **Xmodem-CheckSum** file transfer protocol, and then click **OK**.



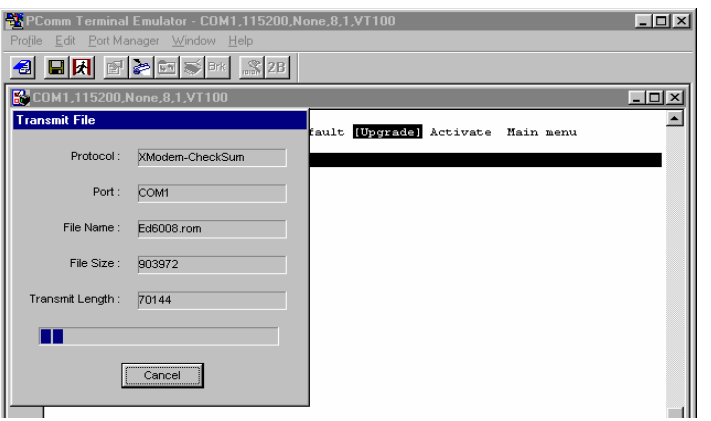
STEP 5

Use the **Look in** dropdown window to locate the correct *.rom file, in this case **Ed6008.rom**, and then click on **Open**.



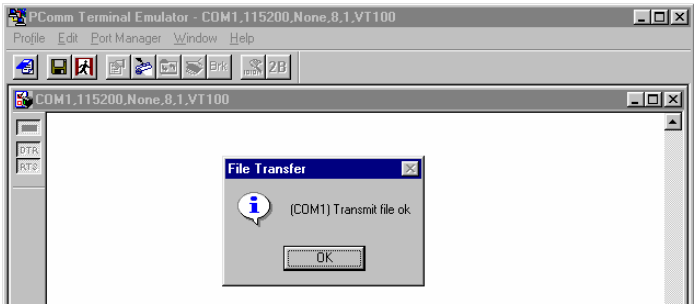
STEP 6

The file transfer will begin.



STEP 7

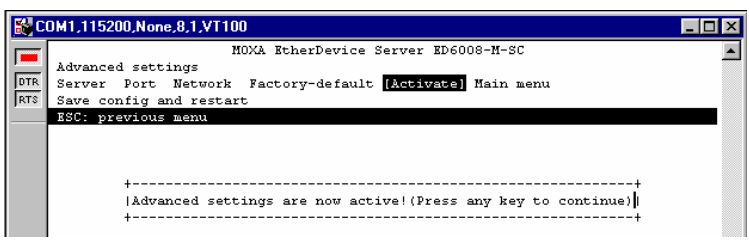
When the **(COM1) Transmit file OK** message appears, click **OK** to complete the upgrade procedure.



Activate Settings

You must activate your settings before exiting **Advanced settings**.

1. When using the Web Browser interface, activate by clicking on the **Activate** button before closing the web pages (**Server**, **Password**, **Port**, **Network**, and **Factory default**) discussed above.
2. When using the Console utility, activate by first highlighting the **Activate** menu option, and then press **Enter**. You should receive the **Advanced settings are now active! (Press any key to continue)** message.



4
EDS Configurator GUI

EDS Configurator is a comprehensive Windows-based GUI that can be used to conveniently configure and maintain multiple Moxa EtherDevice Servers. A suite of useful utilities is available to help you: locate Moxa EtherDevice Servers attached to the same LAN as the PC host (regardless of whether or not you know the Servers' IP addresses), connect to a Moxa EtherDevice Server whose IP address is known, modify one or multiple Moxa EtherDevice Servers' network and/or serial configurations, and update the firmware of one or more Moxa EtherDevice Servers. EDS Configurator is designed to provide you with instantaneous control of *all* of your Moxa EtherDevice Servers, regardless of location. You may download the EDS Configurator software from Moxa's website free of charge.

The following topics are covered in this chapter:

- **Starting EDS Configurator**
- **Broadcast Search**
- **Search by IP address**
- **Upgrade Firmware**
- **Modify IP Address**
- **Export Configuration**
- **Import Configuration**
- **Unlock Server**

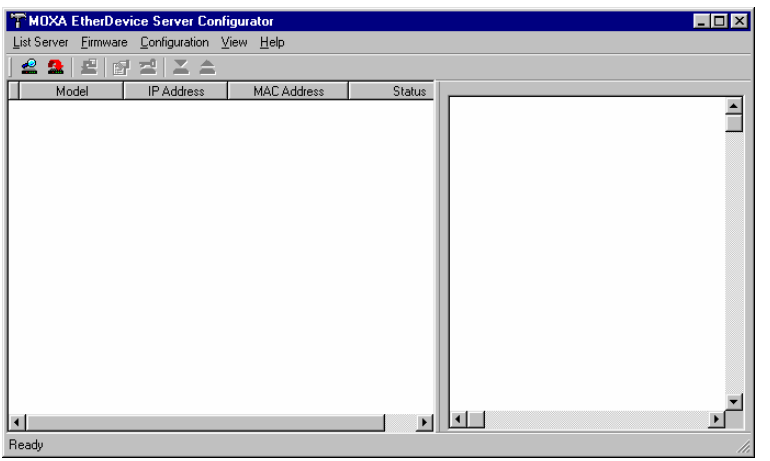
Starting EDS Configurator

To start EDS Configurator, locate and then run the executable file **edscfgui.exe**.

NOTE *You may download the EDS Configurator software from Moxa's website at www.moxa.com.*

For example, if the file was placed on the Windows desktop, it should appear as follows. Simply double click on the icon to run the program.

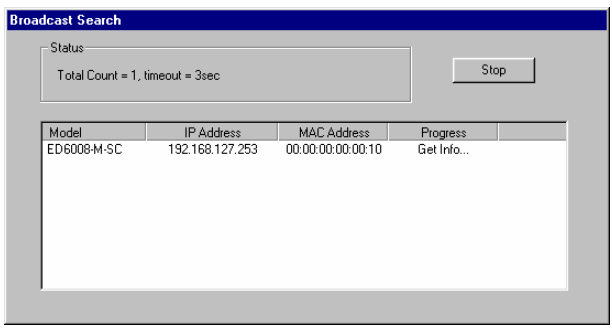
The Moxa EtherDevice Server Configurator window will open, as shown below.



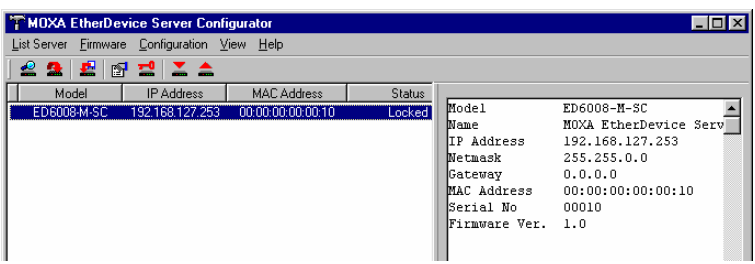
Broadcast Search

Use the Broadcast Search utility to search the LAN for all connected Moxa EtherDevice Servers. Since the search is done by MAC address, Broadcast Search will not be able to locate Moxa EtherDevice Servers connected outside the PC host's LAN. Start by clicking on the Broadcast Search icon , or by selecting **Broadcast Search** under the **List Server** menu.

The Broadcast Search window will open, displaying a list of all Servers located on the network, as well as the progress of the search.



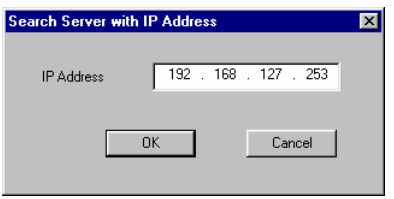
Once the search is complete, the Configurator window will display a list of all Servers that were located.



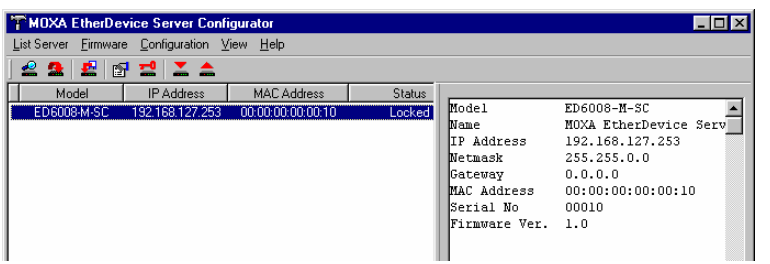
Search by IP address

This utility is used to search for Moxa EtherDevice Servers one at a time. Since the search is conducted by IP address, you should be able to locate any Moxa EtherDevice Server that is properly connected to your LAN, WAN, or even the Internet. Start by clicking on the Specify by IP address icon , or by selecting **Specify IP address** under the **List Server** menu.

The **Search Server with IP Address** window will open. Enter the IP address of the Server you wish to search for, and then click **OK**.



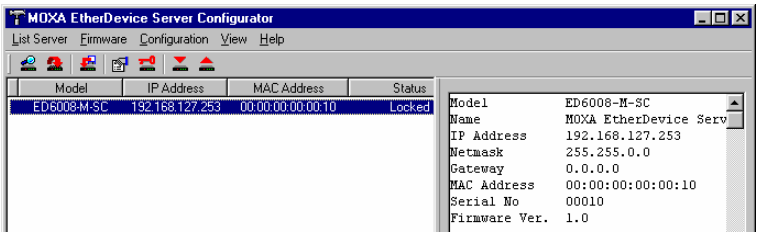
Once the search is complete, the Configurator window will add the Server to the list of Servers.



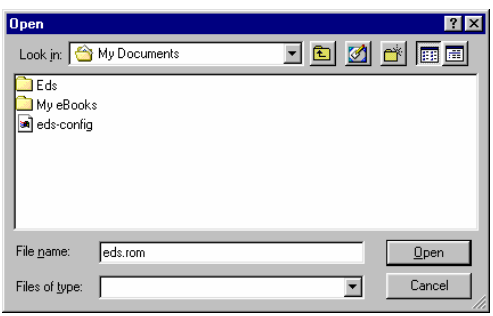
Upgrade Firmware

Keep your Moxa EtherDevice Server up to date with the latest firmware from Moxa. Take the following steps to upgrade the firmware:

1. Download the updated firmware (*.rom) file from the Moxa website (www.moxa.com).
2. Highlight the server (from the **Moxa EtherDevice Server Configurator** window) whose firmware you wish to upgrade.



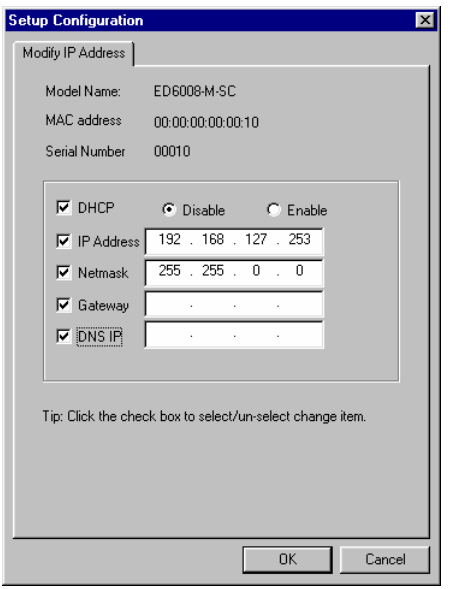
3. Click on the Upgrade Firmware toolbar icon , or select Upgrade under the Firmware menu. If the Server is Locked, you will be prompted to input the server's User Name and Password.
4. Use the Open window to navigate to the folder that contains the firmware upgrade file, and then click on the correct "*.rom" file (eds.rom in the example shown below) to select the file. Click on Open to activate the upgrade process.



Modify IP Address

You may use the Modify IP Address function to easily reconfigure Moxa EtherDevice Server's network settings. Start by clicking on the Modify IP address icon , or by selecting **Modify IP address** under the **Configuration** menu.

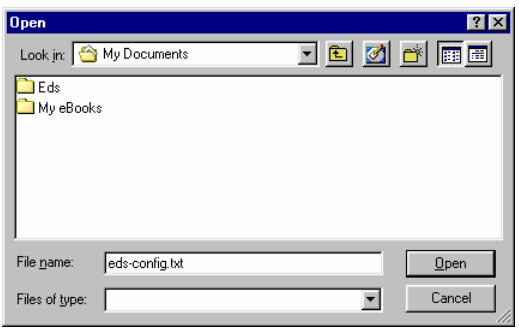
The **Setup Configuration** window will open. Checkmark the box to the left of those items that you wish to modify, and then Disable or Enable DHCP, and enter IP Address, Netmask, Gateway, and DNS IP. Click **OK** to accept the changes to the configuration.



Export Configuration

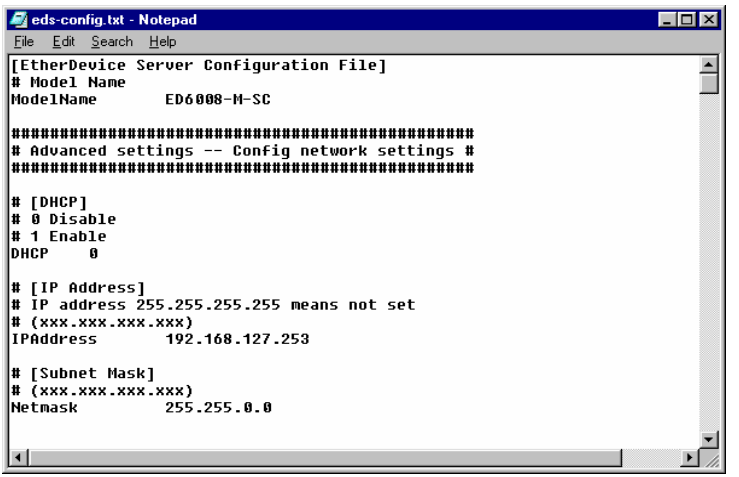
The **Export Configuration** utility is used to save the entire configuration of a particular Moxa EtherDevice Server to a text file. Take the following steps to export a configuration:

1. Highlight the server (from the NPort Server list in the Configurator window's left pane), and then click on the **Export** toolbar icon or select **Export Configuration** from the **Configuration** menu. Use the **Open** window to navigate to the folder in which you want to store the configuration, and then type the name of the file in the File name input box. Click on **Open**.



2. Click OK when the Export configuration to file OK message appears.

3. You may use a standard text editor, such as Notepad under Windows, to view and modify the newly created configuration file.

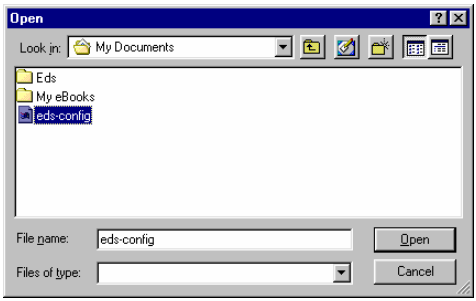


Import Configuration

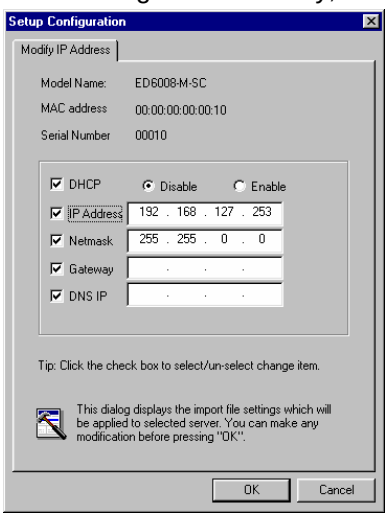
The **Import Configuration** function is used to import an entire configuration from a text file to Moxa EtherDevice Server. This utility can be used to transfer the configuration from one Moxa EtherDevice Server to another, by first using the Export Configuration function (described in the previous section) to save a Server configuration to a file, and then using the Import Configuration function. Take the following steps to import a configuration:

1. Highlight the server (from the Moxa EtherDevice Server list in the Configurator window's left pane), and then click on the **Import** toolbar icon , or select **Import Configuration** from the **Configuration** menu.

2. Use the **Open** window to navigate to the text file that contains the desired configuration. Once the file is selected, click on **Open** to initiate the import procedure.



3. The **Setup Configuration** window will be displayed, with a special note attached at the bottom. Parameters that have been changed will be activated with a check mark. You may make more changes if necessary, and then click **OK** to accept.



4. Click on Yes in response to the following warning message to accept the new settings.

Unlock Server

The Unlock Server function is used to open a password protected Server so that the user can modify its configuration, import/export a configuration, etc. To begin with, we point out that there are six possible responses under the **Status** column. The **Status** of a Moxa EtherDevice Server indicates how the server was located (by Moxa EtherDevice Server Configurator), and what type of password protection it has.

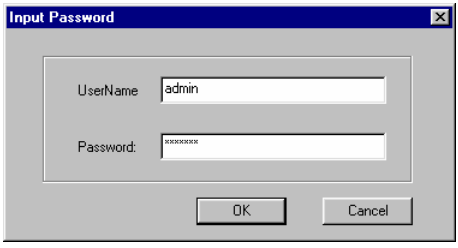
The six options are as follows (note that the term **Fixed** is borrowed from the standard *fixed IP address* networking terminology):

- **Locked**
  The Server is password protected, "Broadcast Search" was used to locate it, and the password has not yet been entered from within the current Configurator session.
- **Unlocked**
  The Server is password protected, "Broadcast Search" was used to locate it, and the password has been entered from within the current Configurator session. Henceforth during this Configurator session, activating various utilities for this Server will not require re-entering the server password.
- **blank**
  EDS is not password protected, and "Broadcast Search" was used to locate it.

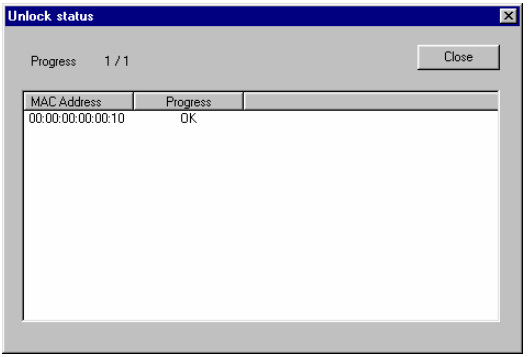
- **Fixed**
  EDS is not password protected, and "Search by IP address" was used to locate it manually.
- **Locked Fixed**
  EDS is password protected, "Search by IP address" was used to locate it manually, and the password has not yet been entered from within the current Configurator session.
- **Unlocked Fixed**
  EDS is password protected, "Search by IP address" was used to locate it manually, and the password has been entered from within the current Configurator session. Henceforth during this Configurator session, activating various utilities for this Moxa EtherDevice Server will not require re-entering the server password.

Follow the steps given below to unlock a locked Moxa EtherDevice Server (i.e., a Moxa EtherDevice Server with Status "Locked" or "Locked Fixed").
Highlight the server (from the Moxa EtherDevice Server list in the Configurator window's left pane), and then click on the **Unlock** toolbar icon , or select **Unlock** from the **Configuration** menu.

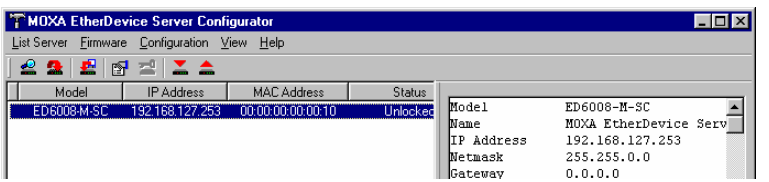
1. Enter the Server's **User Name** and **Password** when prompted, and then click **OK**.



2. When the **Unlock status** window reports Progress as **OK**, click on the **Close** button in the upper right corner of the window.



3. The Status of the Server will now read either **Unlocked** or **Unlocked Fixed**.



A

SNMP Agents with MIB II

Moxa EtherDevice Server comes with built-in SNMP (Simple Network Management Protocol) agent software that supports cold/warm start trap, line up/down trap, and RFC 1213 MIB-II.

In this appendix, we cover the following topics.

- **Supported SNMP Variables**
- **MIB Value Descriptions**

Supported SNMP Variables

The following tables list the standard MIB-II groups, as well as the variable implementation for ED6008.

System MIB	Interfaces MIB	IP MIB
sysDescr	ifNumber	ipForwarding
sysObjectID	ifIndex	ipDefaultTTL
sysUpTime	ifDescr	ipInReceives
sysContact	ifType	ipInHdrErrors
sysName	ifMtu	ipInAddrErrors
sysLocation	ifSpeed	ipForwDatagrams
sysServices	ifPhysAddress	ipInUnknownProtos
sysORLastChange	ifAdminStatus	ipInDiscards
sysORID	ifOperStatus	ipInDelivers
sysORDescr	ifLastChange	ipOutRequests
sysORUpTime	ifInOctets	ipOutDiscards
	ifInUcastPkts	ipOutNoRoutes
	ifInNUcastPkts	ipReasmTimeout
	ifInDiscards	ipReasmReqds
	ifInErrors	ipReasmOKs
	ifInUnknownProtos	ipReasmFails
	ifOutOctets	ipFragOKs
	ifOutUcastPkts	ipFragFails
	ifOutNUcastPkts	ipFragCreates
	ifOutDiscards	ipAdEntAddr
	ifOutErrors	ipAdEntIfIndex
	ifOutQLen	ipAdEntNetMask
	ifSpecific	ipAdEntBcastAddr
		ipAdEntReasmMaxSize
		ipNetToMediaIfIndex
		ipNetToMediaPhysAddress
		ipNetToMediaNetAddress
		ipNetToMediaType
		ipRoutingDiscards

ICMP MIB	UDP MIB	TCP MIB
icmpInMsgs	udpInDatagrams	tcpRtoAlgorithm
icmpInErrors	udpNoPorts	tcpRtoMin
icmpInDestUnreachs	udpInErrors	tcpRtoMax
icmpInTimeExcds	udpOutDatagrams	tcpMaxConn
icmpInParmProbs	udpLocalAddress	tcpActiveOpens
icmpInSrcQuenchs	udpLocalPort	tcpPassiveOpens
icmpInRedirects		tcpAttemptFails
icmpInEchos		tcpEstabResets
icmpInEchoReps		tcpCurrEstab
icmpInTimestamps		tcpInSegs
icmpInTimestampReps		tcpOutSegs
icmpInAddrMasks		tcpRetransSegs
icmpInAddrMaskReps		tcpConnState
icmpOutMsgs		tcpConnLocalAddress
icmpOutErrors		tcpConnLocalPort
icmpOutDestUnreachs		tcpConnRemAddress
icmpOutTimeExcds		tcpConnRemPort
icmpOutParmProbs		tcpInErrs
icmpOutSrcQuenchs		tcpOutRsts
icmpOutRedirects		
icmpOutEchos		
icmpOutEchoReps		
icmpOutTimestamps		
icmpOutTimestampReps		
icmpOutAddrMasks		
icmpOutAddrMaskReps		

SNMP MIB	DOT3 MIB
snmpInPkts	dot3StatsIndex
snmpOutPkts	dot3StatsAlignmentErrors
snmpInBadVersions	dot3StatsFCSErrors
snmpInBadCommunityNames	dot3StatsSingleCollisionFrames
snmpInBadCommunityUses	dot3StatsMultipleCollisionFrames
snmpInASNParseErrs	dot3StatsSQETestErrors
snmpInTooBigs	dot3StatsDeferredTransmissions
snmpInNoSuchNames	dot3StatsLateCollisions
snmpInBadValues	dot3StatsExcessiveCollisions
snmpInReadOnlys	dot3StatsInternalMacTransmitErrors
snmpInGenErrs	dot3StatsCarrierSenseErrors
snmpInTotalReqVars	dot3StatsFrameTooLongs
snmpInTotalSetVars	dot3StatsInternalMacReceiveErrors
snmpInGetRequests	dot3StatsEtherChipSet
snmpInGetNexts	dot3StatsSymbolErrors
snmpInSetRequests	dot3StatsDuplexStatus
snmpInGetResponses	
snmpInTraps	
snmpOutTooBigs	
snmpOutNoSuchNames	
snmpOutBadValues	
snmpOutGenErrs	
snmpOutGetRequests	
snmpOutGetNexts	
snmpOutSetRequests	
snmpOutGetResponses	
snmpOutTraps	
snmpEnableAuthenTraps	

BRIDGE MIB	BRIDGE MIB
dot1dBaseBridgeAddress	dot1dStpPortDesignatedBridge
dot1dBaseType	dot1dStpPortDesignatedPort
dot1dBasePort	dot1dStpPortForwardTransitions
dot1dBasePortIfIndex	dot1dTpLearnedEntryDiscards
dot1dBasePortCircuit	dot1dTpAgingTime
dot1dBasePortDelayExceededDiscards	dot1dTpFdbAddress
dot1dBasePortMtuExceededDiscards	dot1dTpFdbPort
dot1dStpProtocolSpecification	dot1dTpFdbStatus
dot1dStpPriority	dot1dTpPort
dot1dStpTimeSinceTopologyChange	dot1dTpPortMaxInfo
dot1dStpTopChanges	dot1dTpPortInFrames
dot1dStpDesignatedRoot	dot1dTpPortOutFrames
dot1dStpRootCost	dot1dTpPortInDiscards
dot1dStpRootPort	
dot1dStpMaxAge	
dot1dStpHelloTime	
dot1dStpHoldTime	
dot1dStpForwardDelay	
dot1dStpBridgeMaxAge	
dot1dStpBridgeHelloTime	
dot1dStpBridgeForwardDelay	
dot1dStpPort	
dot1dStpPortPriority	
dot1dStpPortState	
dot1dStpPortEnable	
dot1dStpPortPathCost	
dot1dStpPortDesignatedRoot	
dot1dStpPortDesignatedCost	

MIB Value Descriptions

Note that MIB values are based on a private enterprise's MIB; "enterprises.moxa.industrialEthernet.etherDevice" are given below.

edPortsNumber Gives the number of ports that are attached to this system.
serverModel Shows the server model of this system.
serialNumber Shows the serial number of this system.
firmwareVersion Shows the firmware version of this system.
enableWebConfig Shows the enable status of web configuration of this system.
enableTelnetConsole Shows the enable status of telnet console of this system.
lineSwapRecovery Shows the enable status of line swap recovery of this system.
networkSetting.serverIpAddr Shows the server IP address of this system's network setting.
networkSetting.serverIpMask Shows the server IP mask of this system's network setting.
networkSetting.defaultGateway Shows the default gateway of this system's network setting.
networkSetting.enableDhcpClient Shows the enable status of dhcp client setting for this system.
networkSetting.dnsServerIpAddr Shows the DNS server IP address of this system's network setting.
networkSetting.snmpCommunityName Shows the SNMP community name of this system's network setting.

networkSetting.trapServerIpAddr Shows the SNMP trap server IP address of this system's network setting.
portSetting.portTable.portEntry.portSettingIndex Gives the port number of this system's port setting.
portSetting.portTable.portEntry.portEnable Shows the port enable value of this system's port setting.
portSetting.portTable.portEntry.portSpeed Shows the port speed of this system's port setting.
portSetting.portTable.portEntry.portMDI Shows the port MDI value of this system's port setting.
monitor.power1InputStatus Shows the power1 status of this system.
monitor.power2InputStatus Shows the power2 status of this system.
monitor.monitorTable.monitorEntry.monitorPortIndex Gives the port number of this system's monitoring.
monitor.monitorTable.monitorEntry.monitorLinkStatus Shows the port link status of this system.
monitor.monitorTable.monitorEntry.monitorSpeed Shows the port speed status of this system.
monitor.monitorTable.monitorEntry.monitorAutoMDI Shows the port MDI status of this system.
monitor.monitorTable.monitorEntry.monitorTraffic Shows the port traffic of this system.
autoWarning.emailService.mailServerIpAddr Shows the mail server IP address of this system.
autoWarning.emailService.firstEmailAddr Shows the first e-mail address of this system's auto warning.
autoWarning.emailService.secondEmailAddr Shows the second e-mail address of this system's auto warning.

autoWarning.emailService.thirdEmailAddr Shows the third e-mail address of this system's auto warning.
autoWarning.emailService.fourthEmailAddr Shows the fourth e-mail address of this system's auto warning.
autoWarning.eventType.serverColdStart Shows the enable status of server cold start events of this system's auto warning.
autoWarning.eventType.serverWarmStart Shows the enable status of server warm start events of this system's auto warning.
autoWarning.eventType.configChange Shows the enable status of server configuration changed events of this system's auto warning.
autoWarning.eventType.powerOn2Off Shows the enable status of server power off events of this system's auto warning.
autoWarning.eventType.powerOff2On Shows the enable status of server power on events of this system's auto warning.
autoWarning.eventType.authFail Shows the enable status of server authentication fail events of this system's auto warning.
autoWarning.eventType.commRedundancyTopologyChanged Shows the enable status of comm. redundancy topology changed events of this system's auto warning
autoWarning.portAutoWarningTable.portAutoWarningEntry.portIndex Gives the port number of this system's auto warning port setting.
autoWarning.portAutoWarningTable.portAutoWarningEntry.portLinkOn Shows the enable status of port link on events of this system's auto warning.

autoWarning.portAutoWarningTable.portAutoWarningEntry.portLinkOff Shows the enable status of port link off events of this system's auto warning.
autoWarning.portAutoWarningTable.portAutoWarningEntry.portTrafficOverload Shows the enable status of port traffic overload events of this system's auto warning.
autoWarning.portAutoWarningTable.portAutoWarningEntry.portTrafficThreshold Shows the threshold value of port traffic overload events of this system's auto warning.
setDeviceIp.setDevIpTable.setDevIpEntry.setDevIpIndex Gives the port number of this system's dedicated device IP setting.
setDeviceIp.setDevIpTable.setDevIpEntry.setDevIpCurrentIpofDevice Shows the port auto detected IP addresses of this system's dedicated device IP setting.
setDeviceIp.setDevIpTable.setDevIpEntry.setDevIpPresentBy Shows the port IP presented by of this system's dedicated device IP setting.
setDeviceIp.setDevIpTable.setDevIpEntry.setDevIpDedicatedIp Shows the port dedicated IP address of this system's dedicated device IP setting.
mirroring.targetPort Shows the target port of this system's mirroring.
mirroring.mirroringPort Shows the mirroring port of this system's mirroring.
mirroring.monitorDirection Shows the mirroring direction of this system's mirroring.

protocolOfRedundancySetup Shows the protocol of Redundancy.
turboRing.turboRingDesignated Master.Module The MAC address of the bridge which is the Master of the Turbo Ring.
turboRing.turboRingMaster Shows this system is the Master of Turbo Ring.
turboRing.turboRingMasterSetup Shows the Master setup status of Turbo Ring.
turboRing.turboRingPortTable.turboRingPortEntry.turboRingPortIndex Gives the port number of Turbo Ring.
turboRing.turboRingPortTable.turboRingPortEntry.turboRingPortDesignatedBridge The MAC address of the bridge which this port considers to be the Designated Bridge for this port's segment.
turboRing.turboRingPortTable.turboRingPortEntry.turboRingPortDesignatedPort The Port Number of the port on the Designated Bridge for this port's segment.
turboRing.turboRingPortTable.turboRingPortEntry.turboRingPortStatus Shows the port status of Turbo Ring.
turboRing.turboRingEnableCoupling Shows the enable status of the Turbo Ring's Ring Coupling.
turboRing.turboRingCouplingPortTable.turboRingCouplingPortEntry.turboRingCouplingPortIndex Shows the port number of Turbo Ring's Ring Coupling.
turboRing.turboRingCouplingPortTable.turboRingCouplingPortEntry.turboRingCouplingPortStatus Shows the port Status of Turbo Ring's Ring Coupling.

spanningTree.root Shows this system is the root of the spanning tree.
spanningTree.bridgePriority Shows the bridge priority value of spanning tree.
spanningTree.helloTime Shows the bridge hello time value of spanning tree.
spanningTree.maxAge Shows the bridge max age time value of spanning tree.
spanningTree.forwardingDelay Shows the bridge forwarding delay time value of spanning tree.
spanningTree.spanningTreeTable.spanningTreeEntry.spanningTreeIndex Gives the port number of spanning tree.
spanningTree.spanningTreeTable.spanningTreeEntry.enable Shows the port enable status of spanning tree.
spanningTree.spanningTreeTable.spanningTreeEntry.portPriority Shows the port priority value of spanning tree.
spanningTree.spanningTreeTable.spanningTreeEntry.portCost Shows the port cost value of spanning tree.
spanningTree.spanningTreeTable.spanningTreeEntry.status Shows the port status of spanning tree.