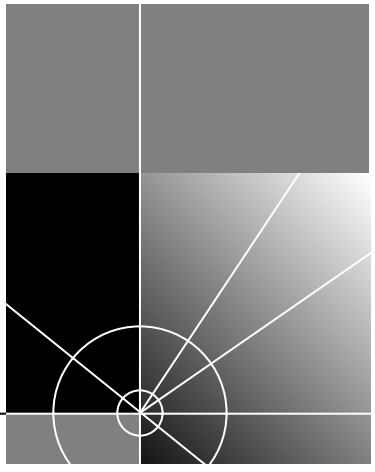
New Installation for Enterprise OS Software

Version 11.4



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3Com Corporation
5400 Bayfront Plaza
Santa Clara, California
95052-8145

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ABOUT THIS GUIDE

Introduction

This guide describes how to get started with your new NETBuilder II® bridge/router. It describes how to install Enterprise OS software and perform the initial system boot. It also explains how to access and use the command-line interface to establish basic settings.

If you are upgrading software from an earlier version, see *Upgrading Enterprise OS Software*.

If the information in the release notes shipped with your product differs from the information in this guide, follow the release notes.

Before you use the information in this guide, you must first install the bridge/router according to your hardware installation guide.

Additional Information

When you have completed the procedures in this guide, you will find valuable information in *Using Enterprise OS Software*, which will help you configure your software for bridging, routing, and wide area protocols, according to the particular needs of your network. For a comprehensive description of NETBuilder® software commands, see *Reference for Enterprise OS Software*.

Audience Description

This guide is intended for network administrators who:

- Have experience in planning, maintaining, and troubleshooting local or wide area networks.
- Are familiar with network protocols, bridging and routing, and network management.
- Will be responsible for configuring and operating NETBuilder II bridge/routers.

How to Use This Guide

The chapters in this guide include the following information to help you install and configure NETBuilder software:

- **Chapter 1** describes NETBuilder II systems that can use Enterprise OS software version 11.4 and it also provides start-up checklists.
- **Chapter 2** describes how to install Enterprise OS software and boot a NETBuilder II system.
- **Chapter 3** describes how to change the primary boot source on a NETBuilder II system.
- **Chapter 4** describes how to log on to the system; obtain Network Manager privileges; set passwords, time, date, and system administrator information; assign Internet addresses; set up security; and verify system operation.
- **Appendix A** has instructions on how to obtain technical support.

Conventions

Table 1 and Table 2 list conventions that are used throughout this guide.

Table 1 Notice Icons

Icon	Notice Type	Alerts you to...
	Information note	Important features or instructions
	Caution	Risk of personal safety, system damage, or loss of data
	Warning	Risk of severe personal injury

Table 2 Text Conventions

Convention	Description
`Syntax`	Evaluate the syntax provided and supply the appropriate values. Placeholders for values you must supply appear in angle brackets. Example: Enable RIPIP using: `SETDefault !<port> -RIPIP CONTrol = Listen` In this example, you must supply a port number for <port>.
`Commands`	Enter the command exactly as shown in text and press the Return or Enter key. Example: To remove the IP address, enter: **`SETDefault !0 -IP NETaddr = 0.0.0.0`**  *This guide always gives the full form of a command in uppercase and lowercase letters. However, you can abbreviate commands by entering only the uppercase letters and the appropriate value. Commands are not case-sensitive.*
`Screen displays`	This typeface represents information as it appears on the screen.
The words “enter” and “type”	When you see the word “enter” in this guide, you must type something, and then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says “type.”
[Key] names	Key names appear in text in one of two ways: ■ Referred to by their labels, such as “the Return key” or “the Escape key” ■ Written with brackets, such as [Return] or [Esc]. If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press [Ctrl]+[Alt]+[Del].

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`http://www.3com.com/products/yr2000.html`

1 OVERVIEW

This chapter is an overview of how to get started with your new NETBuilder II® system. This chapter provides you with an installation checklist that describes the basic steps for starting a NETBuilder II system with a Dual Processor Engine (DPE) module.

NETBuilder II Systems

The NETBuilder II system consists of a 4-Slot, 8-Slot, or 8-Slot Extended chassis with a main processor (DPE) module, and Enterprise OS software.

Your new bridge/router is either an EZBuilt preassembled NETBuilder II system or a NETBuilder II system that you have assembled from components.

EZBuilt Preassembled NETBuilder II System

If you have an EZBuilt NETBuilder II system, it was preassembled before delivery. This guide assumes that you have followed the instructions in the hardware installation guide to:

- Set up the system.
- Attach the network and power cables.
- Install a local terminal, PC (with a terminal emulation application), or modem to the console port of the main processor module.

Component System

If you have a NETBuilder II system that you have assembled yourself from components, this guide assumes that you have followed the instructions in each hardware installation manual to:

- Install the system components.
- Attach the network and power cables.
- Install a local terminal, PC (with a terminal emulation application), or modem to the console port of the main processor module.

NETBuilder II Chassis DPE Module

The DPE module has two built-in flash memory drives. The upper drive is drive A, and the lower drive is drive B.

Software

The Enterprise OS software is available from 3Com on a preinstalled 20 MB flash memory card or on CD-ROM. 3Com recommends that you buy the preinstalled flash memory card for first time NETBuilder II installations.

See the *Enterprise OS Software Release Notes* for information about the different software packages that are available for your NETBuilder II system. The procedures in this guide apply to all software packages.

Installation Checklist

This section contains a checklist for installing software and booting a NETBuilder II system with a DPE module.

Install System Software and Boot — See Chapter 2.

- ❑ Install software from a flash memory card.

Change the Primary Boot Source — See Chapter 3.

- ❑ Change the primary boot source default as needed.

Configure Basic Settings — See Chapter 4.

- ❑ Log on to the system.
- ❑ Familiarize yourself with the command-line or menu-driven user interface (UI), storing configuration parameter values, and getting help.
- ❑ Obtain Network Manager privilege level.
- ❑ Change the Network Manager password.
- ❑ Adjust the time and date if necessary. Time and date are preset and may need to be adjusted for your time zone.
- ❑ Set system administrator information:
  - ❑ System name and location
  - ❑ System contact name and phone number
  - ❑ Login banner
- ❑ Assign IP addresses/subnet masks to individual ports or one address to the system.
- ❑ Set up the bridge/router for SNMP.
- ❑ Set up system security.
- ❑ Use the browser-based Web Link application for further configuration.

Configure Specific Services for Your Network — See *Using Enterprise OS Software* and *Reference for Enterprise OS Software*.

2 INSTALLING SOFTWARE AND BOOTING A NETBUILDER II SYSTEM

This chapter contains the following procedures:

- Installing and booting Enterprise OS software
- Making a backup copy of the software flash memory card

Installing Software and Performing Initial Boot

Enterprise OS software can be installed in the following ways:

- From a flash memory card with preinstalled software. 3Com recommends this method.

  EZBuilt NETBuilder II systems have a factory-installed software flash memory card. To boot your EZBuilt system, see "Booting an EZBuilt NETBuilder II System."

  For component NETBuilder II systems to boot from a flash memory card, they must have a flash memory drive installed. For installation instructions, see the *NETBuilder II Flash Memory Drive Installation Guide*. After you have installed a flash memory drive, see "Booting a Component NETBuilder II System" on page 10 for instructions on booting your system.
- From CD-ROM on a UNIX or Windows network management station using TFTP

Booting from the Flash Memory Card

To start the NETBuilder II system from a flash memory card with preinstalled software, follow the procedures in this section.

Prerequisites

Before you boot your new NETBuilder II system, you need to complete all setup and installation instructions in the hardware guide provided with the system and system components. You also need to connect a console to your system.

Booting an EZBuilt NETBuilder II System

The EZBuilt NETBuilder II system comes with a factory-installed flash memory card that contains the Enterprise OS software. To boot an EZBuilt NETBuilder II system, follow these steps:

1. Turn on the EZBuilt NETBuilder system.

   The NETBuilder II system boots from the default boot source a:/primary/boot.29K (the flash memory drive).

2. When the boot operation is complete, press the Return key on the console.

   The Enterprise OS console prompt should appear on the screen.

   If the console is not operating properly (if you see incorrect characters, or no characters), see the setup instructions in the hardware installation guide.

   You are ready to establish basic settings on your system. See Chapter 4 for more information.

Booting a Component NETBuilder II System

To boot a component NETBuilder II system, follow these steps:

1. Insert a flash memory card with preinstalled software in drive A on the DPE module.
2. Turn on the NETBuilder II bridge/router.

   The NETBuilder II system boots from the default boot source a:/primary/boot.29K (the flash memory drive).
3. When the boot operation is complete, press the Return key on the console.

   The Enterprise OS console prompt should appear on the screen.

   If the console is not operating properly (if you see incorrect characters, or no characters), see the setup instructions in the hardware installation guide.

   You are ready to establish basic settings on your system. See Chapter 4 for more information.

   If you want to change the primary boot source from the default or adjust system configuration parameters, see Chapter 4 and the description in the SysconF appendix in *Reference for Enterprise OS Software*.

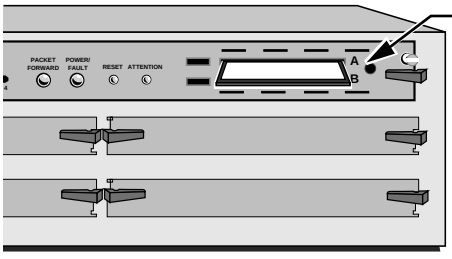
Making a Backup of the Flash Memory Card

As part of the installation procedure, 3Com recommends that you create a backup of your Enterprise OS software on a blank flash memory card. See the software release notes for a list of flash memory cards that can be used with the DPE module.

Prerequisites

Before you begin this procedure, complete the following tasks:

1. Boot your NETBuilder II system with software on a flash memory card inserted into drive A of the DPE module.

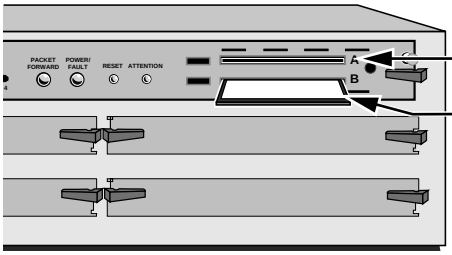


2. Log on to the system as root.

Procedure

To make a backup copy of the Enterprise OS software flash memory card, follow these steps:

1. Insert a supported blank flash memory card into drive B of the DPE module.



2 Format the blank flash memory card in drive B by entering:

```
FORMAT b:
```

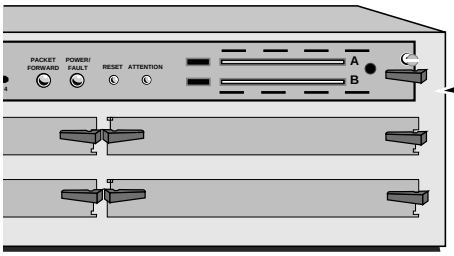
Type Y for yes when the formatting confirmation message is displayed.

3 Create a directory on the formatted flash memory card by entering:

```
MakeDir b:\primary
```

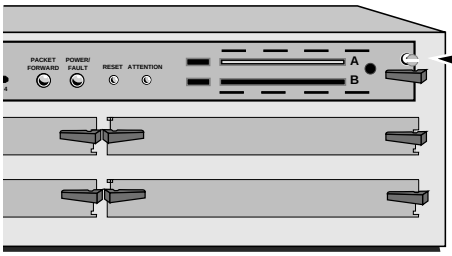
4 Copy the software from the Enterprise OS software flash memory card in drive A to the formatted flash memory card in drive B by entering:

```
COpy a:\primary\* b:\primary
```



Copy contents of drive A to the directory you created on drive B

5 After you have copied the software, replace the original Enterprise OS software flash memory card in drive A with the backup copy from drive B.



Replace original card in drive A with new copy from drive B. Keep the original card as a backup.

Keep the original Enterprise OS software flash memory card in a safe place and protect it from accidental damage. The original is your backup in the rare event that the Enterprise OS software or the backup flash memory card becomes corrupted. See "Using the Backup Flash Card" on page 11 for instructions on installing the backup flash memory card.

6 The Enterprise OS software boot files for a DPE module are factory shipped with a:/primary/boot.29k as the default primary boot source. If you have installed the Enterprise OS software on drive A, and you want to keep the same boot file as the boot source, reboot your NETBuilder II bridge/router by entering:

```
ReBoot
```

7 If you want to configure your primary boot source to a drive and file other than the default, see Chapter 3 for instructions on configuring the boot source for the NETBuilder II bridge/router.

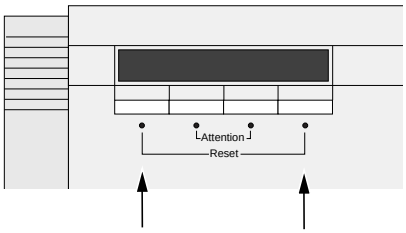
Using the Backup Flash Card

If the Enterprise OS software has been corrupted and you need to reboot, use your original Enterprise OS software flash memory card to reset your system by following these steps:

1 Remove the corrupted flash memory card from the DPE module.

2 Insert the original Enterprise OS software flash memory card into drive A on the DPE module.

3 Reboot the NETBuilder II bridge/router by pressing the two outer buttons on the LCD control panel.



Press Reset buttons to reboot

The system boots from the Enterprise OS software flash memory card in drive A.

4 Make a copy of the flash memory card in drive A by following the steps in the previous procedure.

You will need to either obtain an additional flash memory card or reformat the corrupted flash memory card. If you choose to reformat a corrupted flash memory card, inspect the card to make sure that it is not damaged. Always keep the original Enterprise OS software flash memory card in a safe place and protect it from accidental damage.

3 CHANGING THE BOOT SOURCE

This chapter describes how to change the primary boot source on a bridge/router or tunnel switch.

The Enterprise OS software boot files for the main processor module are factory shipped with a:/primary/boot.29k as the default primary boot source for NETBuilder bridge/routers. If you have installed the Enterprise OS software flash memory card into drive A, and you want to keep the default boot source, go to Chapter 4.

If you want to adjust system configuration settings, see the SysconF appendix in *Reference for Enterprise OS Software* for instructions.

3Com recommends that you initially use the ReBoot command to boot the bridge/router or tunnel switch. If this command fails, use the BT command.

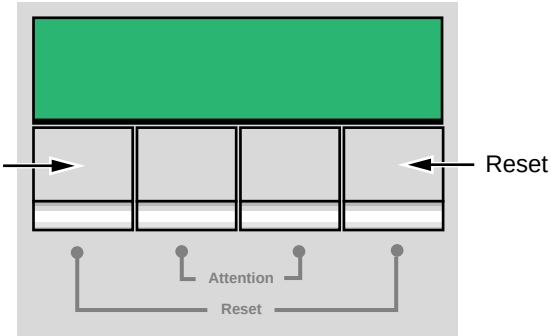
Using the Boot Command

The Boot Monitor utility Boot (BT) command allows you to reboot or to override the default boot path. The BT command is useful if the boot path has a typing error or if you have a malfunctioning drive. If you enter a new boot path, the Primary Boot Source parameter is updated to reflect the new path.

To reboot the NETBuilder II bridge/router (or tunnel switch) using the Boot Monitor utility Boot command, follow these steps:

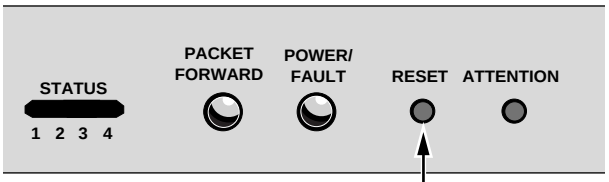
1 Reset the system in one of two ways. Either press the two outer buttons on the LCD control panel on the front of the NETBuilder chassis, or press the reset button on the main processor module.

LCD control panel buttons on front panel of a NETBuilder II bridge/router



Push both reset buttons simultaneously

Main processor module



Reset button

The console displays the following startup message:

```
Do you want to enter the boot monitor? (y/n)
```

Entering Y within five seconds enters the boot monitor. If you enter N or enter nothing, the NETBuilder II system begins booting the software.

For more information about the Boot Monitor utility, see the Firmware appendix in *Reference for Enterprise OS Software*.

2 To enter the Boot Monitor utility, enter r:

3 Enter a boot path using:

```
BT <drive>:/<path>/<filename>
```

If you do not enter the <drive> value, drive A is used. To boot from drive A, enter:

```
BT a:/primary/boot29.k
```

The system attempts to boot from the specified image file. If an error occurs, a message is sent to the console and you are returned to the boot monitor.

For more information about the Boot Monitor utility, see the Boot Monitor appendix in *Reference for Enterprise OS Software*.

Configuring the Primary Boot Source

Drive A is the default primary boot source. This procedure establishes drive B as the primary boot source.

This procedure is provided as an example showing how to use the command. For actual operations, 3Com recommends that you boot from drive A and assign drive B to capture dumps.

Prerequisites

Before beginning this procedure, complete the following tasks:

- Install the system software and boot the NETBuilder II system according to the instructions in Chapter 2.
- Attach a terminal, a PC with a terminal emulation program, or a modem for using a remote PC to the console port on the main processor module and make sure the terminal is operating properly. If the terminal is not operating properly, see the hardware installation guide for setup instructions.

Procedure

To change the primary boot source to a drive or file other than the default or the current drive setting, follow these steps:

1 Press the Return key.

The following prompt is displayed on your console:

```
NetLogin:
```

2 Log on as root by entering:

```
root
```

3 Press the Return key.

Pressing the Return key when prompted for the password enters a null string, which is the default local password.

The bridge/router system prompt is displayed:

```
Enterprise OS #
```

You are now ready to enter software commands.

4 At the Enterprise OS prompt, enter:

SysconF 2

The Primary Boot Source menu is displayed:

```
Primary Boot Source:
1. Boot Filename:                    a:/primary/boot.29k
2. Config File Source                a:/primary
3. IP Addresses                Client:none Subnet Mask:none
4. FTP Login Parameters
Enter parameter number or press Q to quit:
```

5 Enter 1 to select a boot filename.

Information similar to the following is displayed:

```
Current Boot Filename: a:/primary/boot.29k
Enter Boot Filename (CR = no change):
```

6 Enter a new boot filename (such as b:/primary/boot.29k) and press the Return key.

The configuration files must reside on the same drive as the boot source. If the drive you specify is different from the configuration boot source drive, you are prompted to change the configuration file source to the same drive.

If the boot drive you specify conflicts with the one set in the Dump Destination parameter, you are prompted for a different drive.

7 Enter q to quit the menu.

The System Configuration menu showing the new entries is displayed:

```
System Configuration
1. Serial Ports                 Console:  9600
2. Primary Boot Source          b:/primary/boot.29k, b:/
3. Secondary Boot Source        b:/secondar/boot.29k, b:/
4. Test Boot Source             a:/primary/boot.29k, a:/:
5. Boot Sources                 Primary and Secondary
6. Dump Destination             Partial dump only
7. Recovery Procedure
8. MP Boot Source
9. Boot Statistics              Booted:  1 Exceptions:  0
Enter parameter number or press Q to quit:
```

8 Enter q to quit the configuration program.

9 At the prompt, enter:

ReBoot

The NETBuilder II bridge/router reboots using the newly established drive B as the primary boot source.

For drive B to function as the boot source, a flash memory card with software version 11.4 must be installed in drive B.

4 CONFIGURING BASIC SETTINGS

This chapter describes preliminary tasks for configuring basic bridge/router settings. Before you begin configuring ports and paths (described in *Using Enterprise OS Software*), complete the following tasks:

- Log on to the system.
- Familiarize yourself with the user interface.
- Learn how to get help.
- Set up IP routing.
- Store configuration parameter values.
- Obtain Network Manager privileges.
- Change the Network Manager password.
- Set the time and date.
- Set system administrator information.
- Assign IP addresses and subnet masks to individual ports or one address for the bridge/router or tunnel switch.
- Set up the Simple Network Management Protocol (SNMP).
- Set up NETBuilder security.

To perform these tasks, you can either attach a console to the console port and log onto the system locally, or you can use the Web Link applications, which is a web-based configuration tool. For information on how to log on to the system locally, see "Logging on to the System" on page 17.

Web Link contains a complete user interface to the configuration parameters required to set up and configure a bridge/router or tunnel switch.

Logging on to the System

To log on to the bridge/router or tunnel switch, follow these steps:

1. Turn the bridge/router on or press the two outer (reset) buttons on the LCD panel on the front of the chassis.

   The bridge/router takes a few minutes to complete the initialization process. Startup messages appear on your console display.

   When you see the following message:

   ```
   System Initialized and Running
   ```

   the bridge/router has finished booting.

2. Press the Return key.

   The following prompt is displayed on your console:

   ```
   NetLogin:
   ```

3 Log on as root:

root

4 Press the Return key.

Pressing the Return key when prompted for the password enters a null string, which is the default local password. Later in this chapter, you will be instructed on how to change the password.

The bridge/router system prompt is displayed:

```
Enterprise OS #
```

You are now ready to begin entering software commands.

Setting Up IP Routing

You must set up the port that accesses the server for IP routing. To set up IP routing, follow these steps:

1 Log on as root and press the Return key.

The password prompt is displayed.

2 At the password prompt, press the Return key.

The network manager prompt (Enterprise OS #) is displayed.

3 Set up an IP address and subnet mask using:

```
SETDefault !<port> -IP NETaddr = <IP address> [<subnet mask>]
```

For more information on IP configuration, see *Reference for Enterprise OS Software.*

This step needs to be completed using the console port before telnet or Web Link can be used.

4 Enable IP routing by entering:

SETDefault -IP CONTrol = RO

5 Enable a routing protocol. For example, to enable RIP use:

```
SETDefault !<port> -RIPIP CONTrol = (Listen, Talk)
```

This step is optional.

6 Ensure your configuration by verifying that the bridge/router can access other devices on the network, use:

```
PING <IP address>
```

where <IP address> is the IP address of another device on the network.

Learning About the User Interfaces

This section describes how to access the bridge/router user interface and provides an overview of the Web Link, menu-driven, and command-line interfaces.

This section also includes the following information:

- How to specify values, set members, or set addresses when using either the Web Link, menu-driven or command-line interface
- How to use online help

Accessing the User Interface

To access the user interface or to modify the configuration of the bridge/router or tunnel switch, use one of the following methods:

- Access the bridge/router commands locally through the console port.
- Establish an HTTP session with the bridge/router using the Web Link application.
- Establish a Telnet session with the bridge/router using security passwords.
- Use a device (for example, a workstation) on the same extended network or internetwork to access the bridge/router through the Telnet protocol. Enterprise OS software also supports outgoing Telnet.

  The software supports TCP and UDP over Bigger Addresses (TUBA), which means you can Telnet to the bridge/router using an IP address or an OSI NSAP address from a PC or workstation. For more information about using Telnet on a workstation, see the manual that accompanies the workstation.
- View and configure a subset of bridge/router parameters from a remote host using SNMP. For information on preparing the bridge/router to run SNMP, see *Using Enterprise OS Software*.

Web Link Versus Menu-Driven Versus Command-Line Interface

After accessing the bridge/router user interface, you can issue a command in one of three ways:

- Use the Web Link application if you are unsure of the command syntax and you have a compatible web-based browser on your network management station.
- Use the menu-driven interface if you are unsure of the command syntax.

  For more information about the MEnu command, see *Reference for Enterprise OS Software*. For information on how to use the menu-driven interface, see the next section.
- Enter the command at the system prompt if you know the exact syntax.

  For information about the command line and rules for entering commands, see "Using the Command-Line Interface" on page 21.

  The syntax for each command and parameter is described in *Reference for Enterprise OS Software*.

Using the Web Link Application

To log onto and configure a bridge/router using Web Link, follow these steps:

1. Install the hardware and install all cables.
2. Log on to the system and set up IP routing. See "Setting Up IP Routing" on page 18 for instruction on how to set up the IP address.
3. Set up your management workstation with a valid IP address.

   To communicate with the bridge/router or tunnel switch, the IP address of the management station should be an unused IP address in the range 10.1.0.2 - 10.1.255.254; subnet mask 255.255.0.0.

   Once your management station possesses a valid IP address, the Web Link application can be opened in the web browser running on the management station.
4. Point your browser at the bridge/router interface IP address.

   You are prompted to enter a user name and password.

5 Log in as root. Type:

```
root
```

or

```
admin
```

6 Click the OK button to enter a null string as the password, which is the default local password.

The default Web Link page opens in the browser window.

Web Link Interface Description

The Web Link application window has three frames. All of the frames can be resized by dragging the frame borders using the left mouse button.

Web Link Banner Frame Click Help, Documentation, the 3Com Library, 3Com Support, and 3Com Contacts in the banner to access these resources.

The Configuration shortcut takes you to the configuration form for the bridge/router or tunnel switch. The Diagnostics shortcut provides access to further diagnostics of the bridge/router or tunnel switch. The Health shortcut provides access to device statistics.

Web Link Navigator Frame The Web Link Navigator Frame provides links to the Health, Configuration, Diagnostics and Help Functions

Web Link Summary Frame The Summary Frame contains a graphic of the device being configured and a form showing current values for the selected parameters.

After you have entered Web Link, you can use the options to configure whatever services are required.

Using the Menu-Driven Interface

The MEnu command allows you to perform the following operations:

- List the services available on the bridge/router or tunnel switch.
- Choose a service and see the list of parameters available for the service.
- List the parameters in the current service.
- Choose a parameter and see the commands used with it.
- Check the active and default values of a particular parameter.
- Display the syntax of a particular parameter.
- Enter the new value of a parameter.

To use the menu-driven interface, you must have Network Manager privilege. When using the menu-driven interface, you cannot access some parameters; for example, you cannot alter the number of lines on the screen, or change privilege level. Accessing the NETBuilder bridge/router through the REMote command requires the command-line interface.

To use the menu-driven interface, follow these steps:

1 Access the main menu by entering:

```
MEnu
```

The Main menu (Level 1) is displayed.

Depending on your software package, the number of services in your Main menu may vary.

2 Select the service you want to use.

For example, selecting 1 from the Main menu (Level 1) display generates a menu for the SYS Service.

3 Select the parameter you want to configure.

For example, if you select the NMPrompt parameter from the SYS Service menu (Level 2) menu, information for that parameter is displayed.

The first part of the screen displays the value of the parameter; the second part lists the commands you can choose. For information on help menus, see "Getting Help" on page 34. For complete rules for entering commands and using aliases and history substitution, see "Using Aliases" on page 26, "Command History Substitution" on page 26, and "Command-Line Parameter Attributes" on page 27.

4 To return to the previous menu level, press the Return key.

If you are at the Main menu (level 1) and press the Return key, you return to the command-line interface.

Using the Command-Line Interface

This section describes how to enter commands and provides detailed information about using the command-line interface.

To use the command-line interface, follow these steps:

1 Type the command name.

If the command does not include a service name, parameter, or values, skip to step 3. If the command requires more information or if you want to include optional arguments, continue to step 2a.

If you need help identifying the parts of a command, see Figure 1.

a If the command has additional options, such as a port or path number, include them after the command name.

Including a specific port or path number in the command focuses the command on that port or path. If the port or path number is not included, the command acts on all ports or paths.

For more information on ports and paths, see Chapter 1 in *Using Enterprise OS Software*. For more information on commands, see Chapter 1 in *Reference for Enterprise OS Software*.

b If the command includes a parameter, type the service name (if necessary), the parameter name, and values.

The service name focuses the action of the command on a particular bridge/router or tunnel switch service.

In some cases, you may not need to enter the service name. For example, if a parameter is unique to a service, the service does not need to be specified. If two or more services have parameters of the same name, you must include the service name in the syntax. For more information, see "Entering Service Names in Command Lines" on page 25.

The value part of the command specifies how you want the parameter to be set. Values include numerics, strings, or addresses, depending on the parameter. For additional information, see "Syntax for Assigning Values" on page 28.

2 After entering the complete command, press the Return key.

The bridge/router software includes online help for commands, services, parameters, and syntax, described in "Getting Help" on page 28. The syntax that appears in online help is the full-form syntax; it contains full names and visual cues for entering commands. You can also enter commands using an abbreviated version of the syntax.

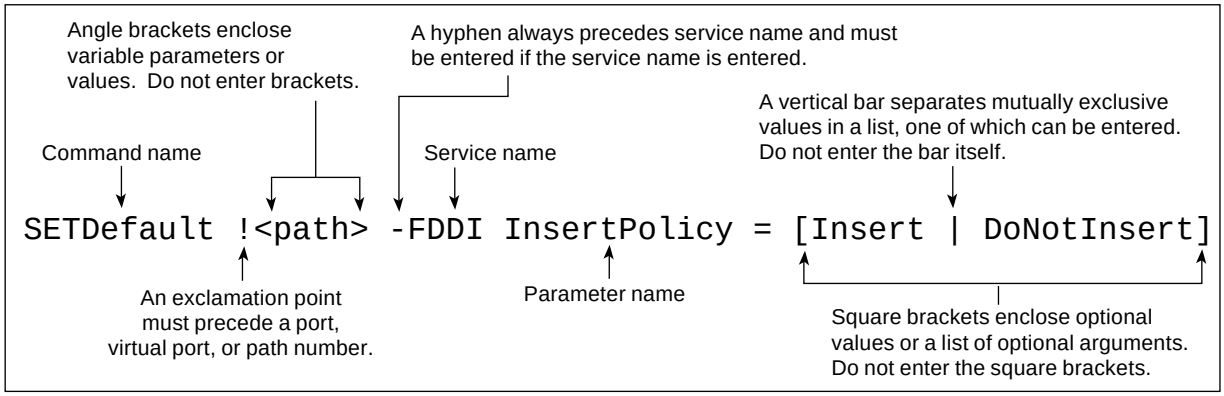
For information on full-form and abbreviated syntax, read the following sections and see Figure 1 and Figure 2. For additional information on short cuts for entering commands, see "Using Aliases" on page 26 and "Command History Substitution" on page 26.

Full-Form Syntax

To display the full-form syntax (provided by online help in Enterprise OS software) type a question mark (?) or a question mark with other options, as described in "Getting Help" on page 34.

Figure 1 shows the parts and symbols that make up command syntax. For more information on symbols, see "Symbols" on page 23.

Figure 1 Full-Form Syntax



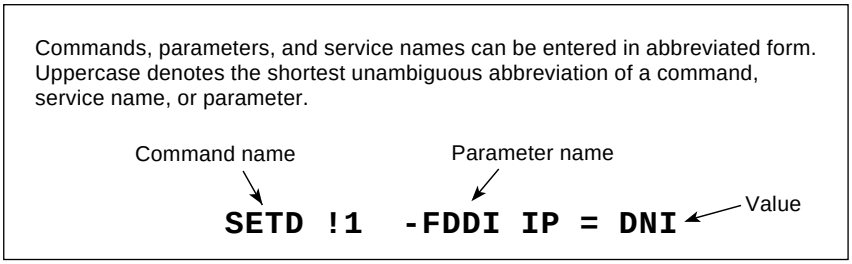
NETBuilder bridge/router or PathBuilder switch guides and online help use upper- and lowercase letters to distinguish the full form of commands and command syntax from the abbreviated form. You can enter a command in abbreviated form by typing only the uppercase portion. It does not matter whether you type the command in upper- or lowercase letters.

Abbreviated Syntax

Abbreviated syntax is the shortest unambiguous abbreviation of a command, parameter, or value that can be entered. You can enter the abbreviated form in lower- or uppercase letters at the Enterprise OS prompt.

Figure 2 shows the abbreviated syntax that corresponds to the full-form syntax in Figure 1.

Figure 2 Abbreviated Syntax



Additional syntax examples are provided in "Full and Abbreviated Syntax Examples" on page 24.

Symbols

You may see a variety of symbols shown as part of the command syntax. These symbols usually explain how to enter the command, and you do not type them as part of the command itself. The exceptions to this rule are parentheses, the hyphen, and the exclamation point, which you do type as part of the command. Table 3 summarizes command syntax symbols.

Table 3 Command Syntax Symbols

Symbol	Description
angle brackets < >	Enclose a variable or value. You must specify the variable or value; for example, in the syntax: `DELete -IP ADDRess <IP address>` you must supply an address for <IP address> when you enter the command. Do not type the angle brackets.
square brackets [ ]	Enclose an optional value or a list of optional arguments. One or more values or arguments can be specified. For example, in the syntax: `SET PRIvilege = [User | NetMgr]` you can specify either User or NetMgr when you enter the command. Do not type the square brackets.
parentheses ( )	Enclose a list of values that can be assigned to a single parameter. At least one of them must be selected. You must type the parentheses and separate the values with a comma if you are assigning more than one value. For example, in the syntax: `SET CurrentPorts = ALL | (<port>, <port>)` you can specify two port numbers by enclosing them in parentheses and separating them with a comma when you enter the command.
vertical bar |	Separates mutually exclusive items in a list, one of which must be entered. For example, in the syntax: `SET ScreenLength = [None | <line>(6–100)]` you can specify either the word None or a number between 6 and 100 when you enter the command. Do not type the vertical bar.
ellipsis . . .	Following a parameter name or value, indicates that one or more additional arguments may be specified on the same command line. For example, in the syntax: `ADD !<port> -IP SecAuthIn <authority> [<authority> ...] [ANY]` you can specify multiple authorities (GENSER, SIOP, SCI, NSA, DOE, NONE) when you enter the command. Do not type the ellipsis.

Table 3 Command Syntax Symbols (continued)

Symbol	Description
hyphen -	A letter preceded by a hyphen represents a command option. Also, when you enter a service name as part of the command, you must precede the service name with a hyphen. For example, in the command: **SETDefault -BRidge CONTrol = Bridge** You must include the hyphen with the service name BRidge when you enter the command.
braces { }	Enclose a list of values, one of which must be entered. For example, in the syntax: `SETDefault !<subaddr #> -Gateway SubAddrMap = {(<IPaddr> | <PSAPaddr>)	None}` you must enter either an IP address, PSAP address, or the word None when you enter the command. Do not type the braces.
exclamation point !	A number preceded by an exclamation point represents a port, virtual port, or path number. For example, in the syntax: `SHow [!<port>] -DECnet CONFiguration` the exclamation point must be included before the port number when you enter the command. The exclamation point is also used to see a profile number. See the PROFile Service chapter in *Reference for Enterprise OS Software*.

Full and Abbreviated Syntax Examples

The following examples show the full form first, followed by the abbreviated command syntax.

The full-form command syntax:

```
ADD !<port> -NRIP AdvToNeighbor <network>%<mac address> [...]
```

can be abbreviated to:

```
ADD !<port> -NRIP ATN <network>%<mac address> [...]
```

Replacing the variables in this abbreviated command syntax with values might specify, for example, that a neighbor on port 2, network number &10, with address %080002030ef2, receives RIP and SAP updates:

```
ADD !2 -NRIP ATN &10%080002030ef2
```

The full-form command syntax:

```
SETDefault -IP CONTrol = ([ROute | NoROute], [RelaySrcRoute |
  NoRelaySrcRoute], [SplitLoad | NoSplitLoad], [Filtering | NoFiltering],
  [SECurity | NoSECurity], [FwdSubnetBcast | NoFwdSubnetBcast],
  [FwdAllSubnetBcast | NoFwdAllSubnetBcast])
```

can be shortened by abbreviating it to:

```
SETD -IP CONT = ([RO | NRO], [RSR | NRSR], [SL | NSL], [F | NF], [SEC |
  NSEC],[FSB | NFSB], [FASB | NFASB])
```

The following command uses this abbreviated syntax to enable IP routing, packet filtering, and security:

```
SETD -IP CONT = (RO, F, SEC)
```

Variations in Command Syntax

Each command has its own syntax. When a command is used for configuring parameters, its syntax or values may change according to the parameter and service. For example, the SETDefault command sets the NetMapTime parameter in the SYS Service and the MaxAge parameter in the STP Service. In the following example, the general syntax is followed by the syntax variations (different values for different parameters) appropriate to each parameter:

```
SETDefault <parameter> = <value>
SETDefault -SYS NetMapTime = <number>(0 to 120 seconds)
SETDefault -STP MaxAge = <second> (6-40)
```

Entering Service Names in Command Lines

When you are configuring or displaying parameters that appear in more than one service, you must provide a service name to distinguish them. You can enter the service name in abbreviated form, but the name must be preceded by a hyphen. For example, to indicate BRidge Service, type -BR.

Abbreviated service names are indicated in uppercase in this guide.

There are three exceptions:

- If you have previously set the CurrentServices parameter to the desired service, you do not need to enter the service name. The system prompt indicates the current service if you set a single service with the CurrentServices parameter. For information on using the CurrentServices parameter, see *Reference for Enterprise OS Software*.
- Environment parameters do not have a service name. For descriptions of these parameters, see *Reference for Enterprise OS Software*.
- You do not need to enter a service name when the parameter name is unique.

Determining the Display of Ports and Virtual Ports

You can control which ports are displayed in the output of the SHow and SHowDefault commands by setting the CurrentPorts parameter. If you have a bridge/router with several ports, for example a NETBuilder II bridge/router with multiport I/O modules installed, you may want to limit the display to information on certain ports instead of all ports. If you are interested only in displaying information for port 2 and virtual port V3, as well as the paths mapped to these ports, set the CurrentPorts parameter by entering:

```
SET CurrentPorts = (2, V3)
```

Now when you enter SHow and SHowDefault commands, only information for port 2 and virtual port V3, and the paths mapped to these ports, is displayed.

If you have a NETBuilder II bridge/router with a multiport module installed, you must enter its ports individually when setting the CurrentPorts parameter. For instance, if you have an Ethernet 2-Port 10BASE-FL module, the A and B ports are distinct. If you specify port 1 with the CurrentPorts parameter, the software assumes you mean port 1A. For information on port and path numbering conventions for multiport modules, see Chapter 1 in *Using Enterprise OS*

Software. For more information about the CurrentPorts parameter, see *Reference for Enterprise OS Software*.

The syntax convention for ports, virtual ports, and group ports is:

```
!<port>
```

For a port, <port> is a variable ID number, for example, !1. For a virtual port or group port, <port> is the letter V followed by a variable ID number, for example, !V1.

When you create a virtual port or group port, it functions in the same way as a port. Unless otherwise specified, the term "port" refers to virtual ports and group ports as well as ports. For more information on ports, virtual ports, and group ports, see Chapter 1 in Using Enterprise OS Software.

Using Aliases

To avoid entering lengthy commands, you can create an alias to represent any command. To define an alias, use:

```
ADD -SYS ALias <alias name> <arguments…>
```

For example, if you use the SHow -SYS NetMAP command often, create an alias called ntmap by entering:

```
ADD -SYS ALias ntmap SHow -SYS NetMAP
```

When you want to display the network map, at the bridge/router prompt enter:

```
ntmap
```

For more information about aliases, see *Reference for Enterprise OS Software*.

Command History Substitution

The bridge/router "remembers" the last 10 commands you enter. To display a list of these commands, at the bridge/router prompt enter:

```
SHow History
```

For more information see *Reference for Enterprise OS Software*. Each command in the display is numbered. To repeat any of the commands, use the event designator, represented by an exclamation point (!).

You can use history substitution with the following options:

`!!`	Repeats the previous command.
`!<n>`	Repeats the command numbered <n>. For example, entering !100 repeats the command numbered 100. If you know the command number, you do not need to display it first.
`!-<n>`	Repeats the command whose number is the current command number minus <n>. The current command number is shown on the screen preceding the bridge/router prompt. For example, if the current command is 100 and <n> is 2, command number 98 is repeated.

`!<string>` Repeats the most recent command that starts with the variable <string>. The SHow History command might display:

```
166 setdefault !1 -path control = enabled
167 show -path configuration
168 show history
169 set screenlength = 23
170 setdefault -bridge control = bridge
171 show statistics ?
```

If you enter !SETD at the prompt, the most recent occurrence of the SETDefault command is executed:

```
setdefault -bridge control = bridge
```

`!?<string>` Repeats the most recent command containing <string>. In the preceding example, if you enter !?stat, the command show statistics ? (number 171) is executed. You can also repeat a previous command with modifications by using the syntax described next.

`^<string1>`
`^<string1>^<string2>` Repeats the most recent command that contains <string1>. If <string2> is specified, it replaces <string1> in that command. For example, suppose you made a typing mistake when you entered the following SETDefault command:

```
seed welcomestring = “You are talking to the 3Com NETBuilder”
```

To repeat the command with the correct spelling of SETD, you do not need to reenter the entire command. Enter:

```
^seed^setd
```

The following command is then displayed and executed:

```
setd welcomestring = “You are talking to the 3Com NETBuilder”
```

Privilege Level

The privilege level determines which commands and parameters a user can access. The network manager must set the Network Manager password and the User password to be the same in order to provide equal levels of security. If only the Network Manager password is set, any other user receives User level privileges. See “Changing the Password” on page 35 for more information.

You can change the privilege level with the SET PRIvilege command. For more information, see *Reference for Enterprise OS Software*.

Command-Line Parameter Attributes

Parameter values, set members, and addresses can be expressed either as numbers or as text. This section provides guidelines for specifying numeric values, strings, and addresses. For details on the values permitted for each parameter, see *Reference for Enterprise OS Software*.

Syntax for Assigning Values

Most parameters must be assigned a value of a particular type. Table 4 shows the possible types.

Table 4 Parameter Value Types

Type	Meaning	Example
Numbers	Represent the numerical value of a parameter.	15, 1024
Names	Usually represent either system-defined parameter or parameter values (written as *param-name* or *value*) or user-defined macros or files (written as *macroname* or *filename*).	Route, None
Strings	Some parameter values can be set to user-defined strings, ranging from a single character (written as *char*) to a multicharacter string (written as *string*).	"A," "B," "password"
Addresses	Two types of addresses can be assigned: media addresses for Ethernet, FDDI, token ring, and wide area protocols (SMDS, X.25, Frame Relay) and network layer addresses.	#311040800245, 129.213.24.30

The SET, SETDefault, and SYSgen commands require both parameter names and parameter values. The parameter name is followed by an equal sign (=) and a value. Spaces are permitted, but not required, before and after the equal sign, for example:

```
SETDefault -SYS ScreenLength = 30
```

The ADD and DELete commands also require both parameter names and parameter values. These commands modify sets of objects. No equal sign precedes the value that is added or deleted as a set member, for example:

```
ADD -IP ADDRess 10.0.0.1 %080002001234
```

Numeric Values

To assign a hexadecimal value to a parameter, precede the number with a percent sign (%). Alphabetic characters can be entered in upper- or lowercase letters.

To assign a decimal number, type the number without any preceding symbol.

Names

To assign a name, type the name in the command. Names, unlike strings, do not require quotation marks; however, the character length of the name may be limited.

Strings

String values fall into two categories: single characters and variable-length strings. Table 5 lists the conventions for entering string values.

Table 5 Conventions for Entering Strings

String Type	Characters	Valid Characters	Examples
Single characters	Enclose in apostrophes.	All alphanumeric characters and symbols	'S', 's','$'
Variable-length strings	Enclose in quotation marks.	All alphanumeric characters and symbols	"Hello!"

Characters in a string are case-sensitive. For example, "ABC" is different from "abc."

A few characters have special meaning to the bridge/router and must be preceded by a backslash (\) in string text to prevent them from being misinterpreted. These symbols are the apostrophe ('), backslash (\), caret (^), and quotation mark ("). For

example, to include an apostrophe in string text, enter a backslash followed by an apostrophe (\'). To include a backslash (\) in string text, enter two backslashes (\\). The first backslash prevents the bridge/router from treating the second as a special character.

When specifying AppleTalk zone strings, you can use the extended AppleTalk ASCII character set. For more information, see *Using Enterprise OS Software.*

You can assign a string to the PATH NAme parameter, and use this string as an instance identifier. For example, you can assign the name "testnet" to path 2 by entering:

```
SETDefault !2 -PATH NAme = "testnet"
```

In subsequent path-specific commands, you can substitute the path name for !2. For example, if you want to set the connector type on path 2 after assigning a name to this path, enter:

```
SETDefault !testnet -PATH CONNEctor = RS232
```

This same feature is available for port-specific commands. You can assign a name to a port and then substitute the port name for !<port> in subsequent commands. To assign a name to a port, use:

```
SETDefault !<port> -PORT NAme = "<string>"
```

For more information on the NAme parameter, see *Reference for Enterprise OS Software*.

Port and Path Naming Restrictions

Port and path names are subject to the following restrictions:

- The name string can contain a maximum of eight characters, the first of which must be alphabetic.
- No blank spaces are allowed. The only nonalphanumeric characters allowed are the asterisk (*), underscore (_), period (.), and hyphen (-).
- Two ports or two paths cannot have the same name, but a port name can be the same as a path name.
- Alphabetic characters are stored and displayed as entered. Names are case-insensitive when compared with previously entered names. For example, port2 and PORT2 are evaluated as the same name.

ISDN-Related Syntax Variation

The syntax for some parameters is different for built-in Integrated Services Digital Network (ISDN) interfaces. The syntax variation for these parameters is presented in *Reference for Enterprise OS Software* in the following format:

For non-ISDN interfaces

```
SETDefault !<path> -PATH remoteDialNo = "<string>"
SHow [!<path> | !*] -PATH remoteDialNo
SHowDefault [!<path> | !*] -PATH remoteDialNo
```

For built-in ISDN interfaces

```
SETDefault !<connectorID.channelID> -PATH remoteDialNo = "<string>"
SHow [!<connectorID.channelID> | !<connectorID>.*] -PATH remoteDialNo
SHowDefault [!<connectorID.channelID> | !<connectorID>.*] -PATH
  remoteDialNo
```

The syntax variation for non-ISDN interfaces applies to local area network (LAN) and data terminal equipment (DTE) interfaces.

Enterprise OS software menus and help strings do not display the syntax variation for ISDN interfaces.

The variation in syntax is caused partially by the different path-numbering convention used for ISDN. For information, see *Using Enterprise OS Software*. Special parameter values related to built-in ISDN interfaces can also cause a variation in syntax.

Some parameters in ISDN-specific software are connector-related and require that you specify a connector number (<connectorID>), for example, 2. Other parameters are channel-related and require that you specify both a connector and a channel number (<connectorID.channelID>), for example, 2.1. When you specify both a connector and a channel number, you must separate them with a decimal point.

If you do not specify a channel number in a command that requires both a connector and a channel number, the software assumes the first channel associated with the connector. For example, if you specify connector number 2 when the syntax requires that you to specify both a connector and a channel number, the software assumes you mean 2.1.

To specify all channels associated with a connector, specify the connector number, a decimal point, and an asterisk, for example, 2.*

Address Formats

The following summary describes media addresses and network layer addresses the bridge/router uses and their formats. For detailed information on protocol-specific addressing, see *Reference for Enterprise OS Software*.

Media Addresses

MAC

Contains 12 hexadecimal digits preceded by a percent sign (%). The NETBuilder II bridge/router has a media access control (MAC) address (physical) for each LAN interface (Ethernet, FDDI, or token ring), for each HSS interface, and for the main processor module.

The MAC address and the network identifier constitute a network address, which is the only address used by Xerox Network Systems (XNS) and Internetwork Packet Exchange (IPX) routers. IP routers have both MAC addresses for their LAN interfaces and Internet addresses for their configured ports. Internet addresses are described in "Network Layer Addresses."

Each MAC address is assigned by 3Com. A MAC address can be displayed by entering:

```
SHow -SYS ADDRess
```

The following is an example of a MAC address:

%080002001326

Frame Relay Requires an address called a Data Link Connection Identifier (DLCI). DLCIs are assigned by the appropriate authority at subscription time. A DLCI follows an at sign (@) and can range from 1 through 1022 decimal. The DLCI identifies a virtual circuit on the Frame Relay network, and is used by the local bridge/router to send a packet to a router on the other end of the circuit. The following is an example of a Frame Relay address:

@22

In the standard (local) addressing convention, the DLCI number has only local significance; a duplicate number can be used by other bridge/router or tunnel switches. In the global addressing convention, identifiers used throughout the Frame Relay network are unique, and all traffic to a node has the same destination DLCI number.

ATM Consists of an 8-bit virtual path identifier (VPI) and a 16-bit virtual circuit identifier (VCI), usually represented in VPI.VCI format, where VPI is a decimal number between 0 and 255 and VCI is a decimal number between 0 and 65,535. The following is an example of an Asynchronous Transfer Mode (ATM) address:

107.44

Some vendors' DSUs require an ATM address that consists of a 0-bit VPI and a 10-bit VCI. In this case, the 10-bit VCI maps directly to a Frame Relay DLCI.

SMDS There are two types of Switched Multimegabit Data Service (SMDS) addresses: individual addresses, for unicast traffic, and group addresses, for multicast traffic. An individual address routes data to a unique node. Packets sent to a group address are delivered to all nodes that share that address. Both types of address begin with a dollar sign. They are distinguished by the first or control digit: hexadecimal C for an individual address and hexadecimal E for a group address. Each address has 15 decimal digits following the control digit and resembles a telephone number. The software automatically right-pads shorter addresses with hexadecimal F to the full length. The following are examples of individual and group SMDS addresses:

C14085551212FFFF	Individual Address
E14085551234FFFF	Group Address

X.25 Consists of up to 15 decimal digits and can vary in length. The address looks similar to a telephone number and is preceded by a pound sign (#). An X.25 address is also referred to as a data terminal equipment (DTE) address.

When a device is attached to a public data network (PDN), the network provider assigns it an X.25 address or an international data number (IDN). The first four digits indicate the country and PDN to which the device is attached. The remaining digits represent a unique device address determined by the network provider. The following is an example of an X.25 address:

#311041503333

ISDN — An ISDN address is a phone number provided by your telecommunications carrier. It can include a dial prefix, country code, area code, and phone number. It can consist of a maximum of 30 characters. If you create a subaddress, you must separate the phone number and the subaddress with a semicolon (;). The subaddress can be composed of a maximum of 20 characters.

The following is an example of a valid ISDN address, including a subaddress:

011122134567000;200

For complete information on ISDN addresses, see *Using Enterprise OS Software*.

Network Layer Addresses

AppleTalk — Consists of the network number and node ID. Each AppleTalk node address is unique throughout the AppleTalk Internet. For details on assigning an AppleTalk address, see *Reference for Enterprise OS Software*. The following is an example of an AppleTalk address:

4.23

DECnet — Consists of an area address and a node address. The area number identifies the area to which the router belongs. Enter an area number between 1 and 63. The node number assigned to the router must be unique within the area. Enter a node number between 1 and 1,023. For details on assigning a DECnet address, see *Reference for Enterprise OS Software*. The following is an example of a DECnet address:

1.15

Internet — Also known as an IP address. It consists of up to 12 decimal digits arranged in four three-digit fields separated by periods, as shown in the following format:

xxx.xxx.xxx.xxx

Leading zeros can be omitted. For example, the following addresses are the same:

010.002.002.001

10.2.2.1

An Internet address is required for:

- A bridge/router port to perform IP routing
- The bridge/router to be accessed via Telnet
- The bridge/router to respond to the PING command from another host
- The bridge/router to participate in SNMP-based network management

An address includes both a network number and a host number. The actual format of these numbers varies depending on the class of address being designated. Address class is determined by the value in the first octet of the address.

Table 6 shows valid address classes, the range of the first address field, and the resulting address format. The maximum value for any single field is 255.

Table 6 Internet Address Format

Class	Range of First Address Field	Address Format
A	0–127	nnn.hhh.hhh.hhh*
B	128–191	nnn.nnn.hhh.hhh*
C	192–223	nnn.nnn.nnn.hhh*
D	224–239	yyy.yyy.yyy†

* n represents a digit of the network number; h represents a digit of the host number.
† Class D addresses are used for multicast applications as assigned by the Internet Assigned Numbers Authority (IANA).

For more information on Internet addresses, subnet masks, and variable length subnet masks, see *Using Enterprise OS Software*.

IPX

Leading zeros can be omitted. Consists of an ampersand (&) followed by a network address, which contains eight hexadecimal digits, followed by the MAC address.

You may need to enter an IPX address when using the bridge/router for IPX routing. The network address uniquely distinguishes one IPX network from all other IPX networks. The following example addresses are the same:

&00003333%080002005678

&3333%080002005678

OSI

Open System Interconnection (OSI) network addresses are called network service access points (NSAPs). NSAPs are of variable length and format, although they are always considered to have the following three parts:

- Area address (variable length)
- System ID (six octets)
- N-selector (one octet)

The system ID and N-selector are the last seven octets of the MAC address, and the area address is everything but the system ID and N-selector. The following is an example of an OSI address:

/49/0053080002A0089D01

where the area address is: /49/0053

the system ID is: 080002A0089D

and the N-selector is: 01

For more information on the OSI addressing scheme, OSI routing domains, and area addresses, see *Using Enterprise OS Software.*

VIP

A VINES Internet Protocol (VIP) address is globally unique, fixed, and permanent for servers and routers only. Each node has a two-field, 48-bit Internet address, which is derived from the 32-bit VINES network number and the 16-bit subnetwork number.

The Internet address has eight hexadecimal digits (VIP network ID) and four hexadecimal digits (subnetwork ID) separated by a colon (:). The Internet address (logical network) is independent of any data link layer address assigned to a node on a physical medium. The following is an example of a VIP address:

02A01339:0001

XNS — Consists of a network address followed by a MAC address. The network address distinguishes between different XNS Ethernet networks. It contains eight hexadecimal digits, and is preceded by an ampersand (&), which is used for identification. Leading zeros can be omitted. The following addresses are the same:

&3333%080002001326

&00003333%080002001326

Getting Help

The user interface provides help menus as memory aids. To display the help menu, enter a question mark (?). The question mark can be used with different options as described in Table 7.

Table 7 Online Help Syntax Summary

Syntax	Description
?	Displays the help menu. Different commands are displayed depending on whether Network Manager privilege or User privilege is in effect. The commands are organized according to services.
-?	Displays a list of services.
-service?	Displays a list of commands within the service. For example, to display a list of commands in the SYS Service, enter: **-SYS?** If there are no commands under the service, a message is displayed to indicate this. For example, enter this command at the prompt: **-IDP?** A message similar to the following appears: `No commands available in IDP service`
command -service?	Displays a list of parameters that can be used with the command within the service. For example, to display a list of PORT Service parameters that can be used with the SETDefault command, enter: **SETDefault -PORT?**
command ?	Displays parameters by service name that can be used with the command. Only parameters in services specified by the CurrentServices parameter are displayed.
command -service parameter?	Displays syntax for the command used with the parameter. For example, to display the syntax for the SETDefault command used with the CONTrol parameter in the SNMP Service, enter: **SETDefault -SNMP CONTrol?**

Storing Configuration Parameter Values

Configuration parameters are stored in flash memory or on the disk of another server (for example, the TFTP/FTP server that boots the bridge/router or tunnel switch). In this guide, the term "disk" refers to either the local flash memory drive or the hard disk on another server.

When the bridge/router is booted, it copies configuration parameters from the disk to memory. Parameter values on the disk are *default values* and values in memory are *active values*. You can alter the default and active values with the SETDefault

and SET commands. For more information, see *Reference for Enterprise OS Software*.

When the new value of a parameter takes effect depends on whether its active value has been changed. Some commands change the active value only, some change the default value, and some change both. If you display the parameter after modifying it and see the new value, the new value has taken effect immediately. If a command changes only the default value, the new value takes effect only after reboot. In this guide, if the description does not specify when the new value of a parameter takes effect after being enabled or disabled, it is effective immediately after it is set.

Obtaining Network Manager Privilege Level

Before changing the Network Manager password, you must obtain Network Manager privilege.

To display or change the privilege level, follow these steps:

1 To determine the current privilege level, enter:

```
SHow PRIvilege
```

If the following message is displayed, you already have Network Manager privilege:

```
PRIvilege = NetMgr
```

If the following message is displayed, go to step 2:

```
PRIvilege = User
```

You also can determine the privilege level from the Enterprise OS prompt. The following prompt is displayed at the Network Manager privilege level:

```
Enterprise OS #
```

The following prompt is displayed at the User privilege level:

```
Enterprise OS >
```

2 If you are currently at User privilege level, enter the following command to change the privilege level from User to Network Manager:

```
SET PRIvilege = NetMgr
```

The following prompt is displayed:

```
Password:
```

3 Press the Return key.

A null string is entered, which is the default password.

After obtaining Network Manager privilege, proceed to the next section to change the Network Manager password.

Changing the Password

Changing the Network Manager password prevents unauthorized users from accessing the bridge/router or tunnel switch. You should change the password immediately after you log on for the first time.

The privilege level determines which commands and parameters a user can access. Each level has its own password. You must set the Network Manager password and

the User password to be the same in order to provide equal levels of security. If only the Network Manager password is set, any other user receives User level privileges.

Users with NetMgr privileges can lower their privileges without a password. Users with User privileges cannot raise their privileges. To raise privileges after lowering them, you must enter the password again.

The Network Manager password must be set before the User password. The User password must be cleared before the Network Manager password.

To change the password, follow these steps:

1. At the Enterprise OS prompt (Enterprise OS #), enter:

   SysPassWord

   When a menu is displayed, Select 1, Set Network Manager Privilege Password.

2. Enter the new Network Manager password. Retype it when prompted to do so.

   You are returned to the SysPassWord menu.

3. Enter 2.

4. Enter the new User password and retype it when prompted to do so.

5. Press the Return key to exit the SysPassWord menu and return to the Enterprise OS prompt (Enterprise OS #).

   Go to the next section to set the time and date on the system.

Setting the Time and Date

To set the time and date on your system, use:

```
SET -SYS DATE = YY/MM/DD HH:MM[:ss]
```

For example, to set the date and time to January 10, 1995, 9:40 a.m., enter:

SET -SYS DATE = 1995/1/10 09:40

The NETBuilder II bridge/router contains a real-time clock, so you do not need to set the date after each reboot to keep it correct.

For more information on these parameters, see *Reference for Enterprise OS Software*. Proceed to the next section to enter system administrator information.

Setting System Administrator Information

As system administrator, you can set the system name, location, and system contact so that other system administrators can contact you for information. If you are planning to use SNMP, you must set the system administrator information; otherwise, these settings are optional.

Before performing the procedure, you need to decide on or obtain the following information:

- System name
- System location
- System contact person and phone number

To set system administrator information, follow these steps:

1. Specify a name for the node, using:

   ```
   SETDefault -SYS SysNAMe = "<string>"
   ```

   For example, to set the bridge/router name as "Sales.SanJose," enter:

SETDefault -SYS SysNAMe = “Sales.SanJose”

The system name can contain no more than 255 characters. The default value is “ “ (null string).

2 Specify the system location, using:

`SETDefault -SYS SysLOCation = “<string>”`

For example, to set the system location as “SecondFloor.Lab,” enter:

SETDefault -SYS SysLOCation = “SecondFloor.Lab”

The system location can contain no more than 255 characters. The default value is “ “ (null string).

3 Specify a string that identifies the contact person managing the bridge/router or tunnel switch, using:

`SETDefault -SYS SysCONtact = “<string>”`

For example, to specify John Smith as the system contact and a number to reach him, enter:

SETDefault -SYS SysCONtact = “John Smith (408) 555-1111”

The system contact string can contain no more than 255 characters. The default value is “ “ (null string). Users can obtain this information by entering:

SHow -SYS SysCONtact

Proceed to the next section to assign an Internet address.

4 Specify a banner string to be displayed by the bridge/router or tunnel switch:

The banner string can contain no more than 110 characters. The default value is “ “ (null string). Use:

`SETDefault -SYS BannerString = “<string>”`

The SYStem service BannerString parameter allows you to input a text string that is used as a information message for a bridge/router or tunnel switch. The string can be up to 110 characters long and is displayed immediately prior to the word “NetLogin:” when you are connecting to a bridge/router console. The banner string is suppressed if the InterAction parameter is set to NoLOGin. This banner string is redisplayed with each login retry.

Assigning Internet Addresses

This section describes how to assign one or more Internet addresses to the system using the NETaddr parameter in the IP Service. Before you assign an Internet address, you must determine:

- Whether you want your network to connect to the Internet, and how to obtain a unique Internet address.
- Whether you want to use the system as a bridge, a router, a bridge/router or a tunnel switch.
- Whether you need subnet addressing.

If you have already decided on these issues, proceed to “Assigning Internet Addresses to a Bridge” on page 38 or to “Assigning Internet Addresses to a Router” on page 38. If you need more information to make your decision, see “Obtaining an

Internet Address" on page 39 and see the subnet information in the *Using Enterprise OS Software*.

Assigning Internet Addresses to a Bridge

Even though a bridge does not route IP traffic, it needs an Internet address to participate in network management and to be accessible from other devices through Telnet or the SNMP.

When assigning an Internet address to an entire bridge, assign the address to port 0 using:

```
SETDefault !0 -IP NETaddr = <IP address>
```

An Internet address assigned to port 0 is considered an Internet address for the entire bridge.

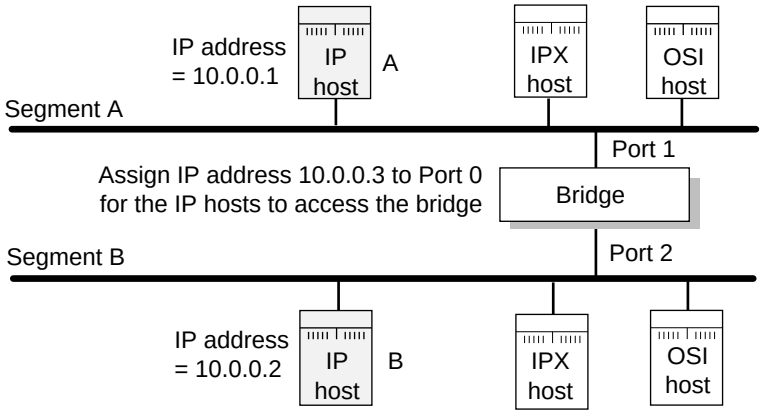
The following example illustrates how to assign an Internet address to a bridge.

Example

Figure 3 shows a configuration in which you need to assign an Internet address to a bridge. Hosts A and B are two hosts belonging to the same IP network, network 10. The IP host on Network A has an Internet address 10.0.0.1, and the one on Network B has an Internet address 10.0.0.2. The bridge forwards packets between these segments. To allow communication between the hosts and the bridge, ports 1 and 2 must reside on the same network. Assigning the same network number to two or more bridge ports is prohibited, so you must assign the address to the entire bridge, entering a command similar to the following:

```
SETDefault !0 -IP NETaddr = 10.0.0.3
```

Figure 3 Assigning an IP Address to the Entire Bridge



After assigning an Internet address to the bridge, go to Chapter 1 in the *Using Enterprise OS Software.*

Assigning Internet Addresses to a Router

If the bridge/router is used to route IP traffic, you must configure the ports on which IP packets are routed by assigning Internet addresses to them. You can assign Internet addresses to individual ports using:

```
SETDefault !<port> -IP NETaddr = <IP address>
```

For more information, see the *Reference for Enterprise OS Software*.

***CAUTION:** Do not assign an Internet address to port 0, or the IP routing function will be disabled.*

The next example illustrates how to assign Internet addresses to a bridge/router or tunnel switch.

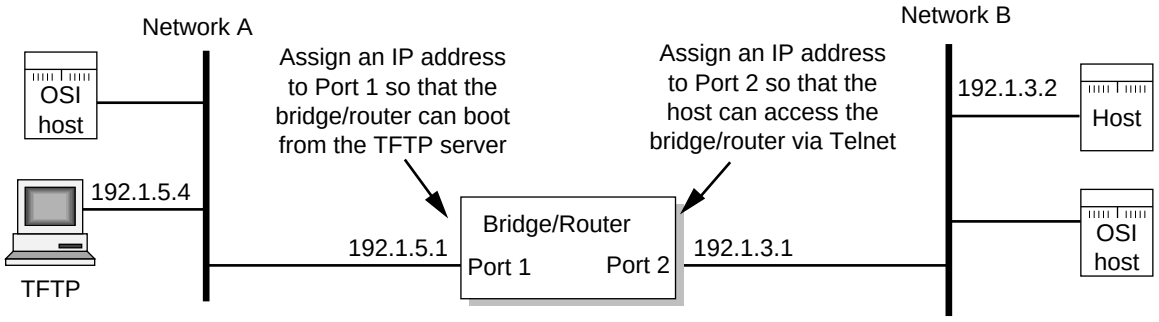
Example In Figure 4, Networks A and B are two different IP networks, and the bridge/router is used for routing IP packets and for bridging OSI packets. To assign an IP address to port 1, enter a command similar to the following:

```
SETDefault !1 -IP NETaddr = 192.1.5.1
```

To assign an address to port 2, enter a command similar to the following:

```
SETDefault !2 -IP NETaddr = 192.1.3.1
```

Figure 4 Assigning an IP Address to a bridge/router Port



For additional information on Internet addresses and subnet masks, see *Using Enterprise OS Software*. After assigning an Internet address or addresses to the bridge/router or tunnel switch, go to Chapter 1 in *Using Enterprise OS Software.*

Obtaining an Internet Address

If you want to connect your TCP/IP network to the Internet, you must obtain a unique address from the central authority, the InterNIC. This central authority provides the following services:

- Registration Services

  Assists in registering networks and domains, and assigns network numbers and other entities to the Internet community.

- Directory and Database Services

  Maintains lists of FTP sites, various types of servers available on the Internet, white and yellow page directories, library catalogs, and data archives. For more information, phone (908) 668-6587 or use network mail (admin@ds.internic.net).

- Information Services

  Offers information about how to get connected to the Internet, pointers to network tools and resources, and seminars on various topics held in locations around the country. For more information, phone (800) 444-4345 or use network mail (info@internic.net).

The Registration Service of the InterNIC assigns a globally unique network number, leaving responsibility for assigning a unique local host number to the network administrator.

To obtain a unique Internet address, contact the following organization:

Network Solutions
Attn: InterNIC Registration Services
505 Huntmar Park Drive
Herndon, VA 22070
1-703-742-4777

800-444-4345 (Referral Desk)
Network mail: HOSTMASTER@RS.INTERNIC.NET

For customers in Europe (including the former Soviet Union and the Middle East), contact the Reseaux IP European (RIPE) Network Coordination Center in the Netherlands using telephone number 3120592 5065.

All other customers abroad should contact Network Solutions at the telephone number given above for assistance in locating network providers in your region.

If you do not plan to be connected to the Internet, you can assign network addresses on your own. However, if you plan on accessing the Internet in the future, you may want to apply for an Internet network address so you will not have to change network addresses when you make the connection.

After obtaining your Internet address, see "Assigning Internet Addresses to a Bridge" on page 38 or to "Assigning Internet Addresses to a Router" on page 38. For additional information on Internet addresses and subnets, see *Using Enterprise OS Software*.

Setting Up the Simple Network Management Protocol

The bridge/router participates in different types of network management activities. Most management activities require configuration because they are disabled by default. The bridge/router manages networks in the following ways:

- Configuring and monitoring from a UNIX or Windows network management station using Transcend Enterprise Manager.
- Remote upgrade management using the Enterprise OS Remote Upgrade Management Utilities supplied on CD-ROM with every Enterprise OS release.
- Building network maps (netmaps).

This guide does not describe in detail how to set up the SNMP Service. See *Using Enterprise OS Software* and *Reference for Enterprise OS Software* for more information.

SNMP allows you to modify and display some Enterprise OS parameters from a network management station. You do not need to attach a terminal to the bridge/router console port to change its configuration. To implement SNMP, follow specifications in RFC 1155, RFC 1157, and RFC 1213. System parameters described in RFC 1213 and 3Com extended parameters can be accessed from the host.

Modifying SNMP Parameters

To enable SNMP read/write access, you need to modify two parameters in the SNMP Service: COMmunity and MANager.

The COMmunity parameter is an SNMP Service parameter that modifies the list of communities. For information on how to use the COMmunity parameter, see *Using Enterprise OS Software* and to *Reference for Enterprise OS Software.*

By default, the community name "ANYCOM" exists with read access to the management information base (MIB) variables and allows unrestricted access to the bridge/router or tunnel switch. To ensure that access is available only to the proper system administrator, 3Com recommends that you delete the "ANYCOM" community name, and add the appropriate community string and the IP address of the manager.

To modify SNMP parameters, follow these steps:

1. Delete the default community string "ANYCOM" by entering:

   DELete -SNMP COMmunity "ANYCOM"

2. Configure at least one new community string with read/write access.

   For example:

   ADD -SNMP COMmunity "private" TRiv RW AL1

3. Add other community strings with read-only access as required.

   For example:

   ADD -SNMP COMmunity "public" TRiv RO AL1

4. Create a new manager with read/write access to the bridge/router or tunnel switch. For security reasons, limit the number of network management stations.

   For example:

   ADD -SNMP MANager "private" 129.213.224.1 255.255.0

5. Enable the SNMP service by entering:

   SETDefault -SNMP CONTrol = (Manage, Trap)

NETBuilder Security

NETBuilder security can be obtained many ways including limiting the access to a particular network or by limiting the access to certain files. Limiting access to a particular network can be accomplished by building Internet firewalls. Limiting access to particular files can be accomplished by using certain commands and parameters.

Building Firewalls for Security

A firewall allows users inside a private network to have outbound access, while restricting outside users from inbound access. For more conceptual information about firewall and its capabilities, and details on how to configure firewalls, see *Using Enterprise OS Software*. For a description and syntax of the various firewall service parameters, see *Reference for Enterprise OS Software*.

Security Commands and Parameters

To make sure that some designated files are accessible only to the system administrator, use the following commands and parameters:

- NetAccess

  This parameter is a SYS Service parameter that determines how a bridge/router can be accessed from another device on the network. For information on how to use the NetAccess parameter, see *Using Enterprise OS Software* and *Reference for Enterprise OS Software.*

- SysPassWord

  This command brings up a menu allowing you to specify the password for the Network Manager and User privilege levels. For information on how to use the SysPassWord command, see *Reference for Enterprise OS Software.*

- RemoteManager

  This parameter is a SYS Service parameter that specifies the Internet addresses of devices that can connect to the bridge/router through the REMote command. For information on how to use the RemoteManager parameter, see *Using Enterprise OS Software* and *Reference for Enterprise OS Software.*

- COMmunity

This parameter is an SNMP Service parameter that modifies the list of communities. For information on how to use the COMmunity parameter, see *Using Enterprise OS Software* and *Reference for Enterprise OS Software.*

What Next?

You are now ready to see *Using Enterprise OS Software* to configure your bridge/router for your specific network needs.

A TECHNICAL SUPPORT

3Com provides easy access to technical support information through a variety of services. This appendix describes these services.

Information contained in this appendix is correct at time of publication. For the most recent information, 3Com recommends that you access the 3Com Corporation World Wide Web site.

Online Technical Services

3Com offers worldwide product support 24 hours a day, 7 days a week, through the following online systems:

- World Wide Web site
- 3Com Knowledgebase Web Services
- 3Com FTP site
- 3Com Bulletin Board Service (3Com BBS)
- 3Com Facts℠ Automated Fax Service

World Wide Web Site

To access the latest networking information on the 3Com Corporation World Wide Web site enter this URL into your Internet browser:

http://www.3com.com/

This service provides access to online support information such as technical documentation and software library, as well as support options that range from technical education to maintenance and professional services.

3Com Knowledgebase Web Services

This interactive tool contains technical product information compiled by 3Com expert technical engineers around the globe. Located on the World Wide Web at **http://knowledgebase.3com.com**, this service gives all 3Com customers and partners complementary, round-the-clock access to technical information on most 3Com products.

3Com FTP Site

Download drivers, patches, software, and MIBs across the Internet from the 3Com public FTP site. This service is available 24 hours a day, 7 days a week.

To connect to the 3Com FTP site, enter the following information into your FTP client:

- Hostname: **ftp.3com.com**
- Username: **anonymous**
- Password: **<your Internet e-mail address>**

You do not need a user name and password with Web browser software such as Netscape Navigator and Internet Explorer.

3Com Bulletin Board Service

The 3Com BBS contains patches, software, and drivers for 3Com products. This service is available through analog modem or digital modem (ISDN) 24 hours a day, 7 days a week.

Access by Analog Modem

To reach the service by modem, set your modem to 8 data bits, no parity, and 1 stop bit. Call the telephone number nearest you:

Country	Data Rate	Telephone Number
Australia	Up to 14,400 bps	61 2 9955 2073
Brazil	Up to 28,800 bps	55 11 5181 9666
France	Up to 14,400 bps	33 1 6986 6954
Germany	Up to 28,800 bps	4989 62732 188
Hong Kong	Up to 14,400 bps	852 2537 5601
Italy	Up to 14,400 bps	39 2 27300680

Country	Data Rate	Telephone Number
Japan	Up to 14,400 bps	81 3 5977 7977
Mexico	Up to 28,800 bps	52 5 520 7835
P.R. of China	Up to 14,400 bps	86 10 684 92351
Taiwan, R.O.C.	Up to 14,400 bps	886 2 377 5840
U.K.	Up to 28,800 bps	44 1442 438278
U.S.A.	Up to 53,333 bps	1 847 262 6000

Access by Digital Modem

ISDN users can dial in to the 3Com BBS using a digital modem for fast access up to 64 Kbps. To access the 3Com BBS using ISDN, call the following number:

1 847 262 6000

3Com Facts Automated Fax Service

The 3Com Facts automated fax service provides technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, 7 days a week.

Call 3Com Facts using your Touch-Tone telephone:

1 408 727 7021

Support from Your Network Supplier

If you require additional assistance, contact your network supplier. Many suppliers are authorized 3Com service partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

When you contact your network supplier for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

If you are unable to contact your network supplier, see the following section on how to contact 3Com.

Support from 3Com

If you are unable to obtain assistance from the 3Com online technical resources or from your network supplier, 3Com offers technical telephone support services. To find out more about your support options, please the 3Com technical telephone support phone number at the location nearest you.

When you contact 3Com for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

Here is a list of worldwide technical telephone support numbers:

Country	Telephone Number	Country	Telephone Number
Asia Pacific Rim			
Australia	1 800 678 515	P.R. of China	10800 61 00137 or
Hong Kong	800 933 486		021 6350 1590
India	+61 2 9937 5085	Singapore	800 6161 463
Indonesia	001 800 61 009	S. Korea	
Japan	0031 61 6439	From anywhere in S. Korea:	00798 611 2230
Malaysia	1800 801 777	From Seoul:	(0)2 3455 6455
New Zealand	0800 446 398	Taiwan, R.O.C.	0080 611 261
Pakistan	+61 2 9937 5085	Thailand	001 800 611 2000
Philippines	1235 61 266 2602		
Europe			
From anywhere in Europe, call:	+31 (0)30 6029900 phone +31 (0)30 6029999 fax		
Europe, South Africa, and Middle East			
From the following countries, you may use the toll-free numbers:			
Austria	0800 297468	Netherlands	0800 0227788
Belgium	0800 71429	Norway	800 11376
Denmark	800 17309	Poland	00800 3111206
Finland	0800 113153	Portugal	0800 831416
France	0800 917959	South Africa	0800 995014
Germany	0800 1821502	Spain	900 983125
Hungary	00800 12813	Sweden	020 795482
Ireland	1800 553117	Switzerland	0800 55 3072
Israel	1800 9453794	U.K.	0800 966197
Italy	1678 79489		
Latin America			
Argentina	AT&T +800 666 5065	Mexico	01 800 CARE (01 800 2273)
Brazil	0800 13 3266	Peru	AT&T +800 666 5065
Chile	1230 020 0645	Puerto Rico	800 666 5065
Colombia	98012 2127	Venezuela	AT&T +800 666 5065
North America	1 800 NET 3Com (1 800 638 3266) Enterprise Customers: 1 800 876-3266		

Returning Products for Repair

Before you send a product directly to 3Com for repair, you must first obtain an authorization number. Products sent to 3Com without authorization numbers will be returned to the sender unopened, at the sender's expense.

To obtain an authorization number, call or fax:

Country	Telephone Number	Fax Number
Asia, Pacific Rim	+65 543 6500	+65 543 6348
Europe, South Africa, and Middle East	+31 30 6029900	+31 30 6029999
Latin America	1 408 326 2927	1 408 326 3355
From the following countries, you may call the toll-free numbers; select option 2 and then option 2:		
Austria	0800 297468	
Belgium	0800 71429	
Denmark	800 17309	
Finland	0800 113153	
France	0800 917959	
Germany	0800 1821502	
Hungary	00800 12813	
Ireland	1800 553117	
Israel	1800 9453794	
Italy	1678 79489	
Netherlands	0800 0227788	
Norway	800 11376	
Poland	00800 3111206	
Portugal	0800 831416	
South Africa	0800 995014	
Spain	900 983125	
Sweden	020 795482	
Switzerland	0800 55 3072	
U.K.	0800 966197	
U.S.A. and Canada	1 800 NET 3Com (1 800 638 3266) Enterprise Customers: 1 800 876 3266	1 408 326 7120 (not toll-free)

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3Com Corporation LIMITED WARRANTY

HARDWARE

3Com warrants its hardware products to be free from defects in workmanship and materials, under normal use and service, for the following lengths of time from the date of purchase from 3Com or its authorized reseller:

Network Interface Cards	Lifetime
Other hardware products *unless otherwise specified above	1 year*
Spare parts and spares kits	90 days

If a product does not operate as warranted above during the applicable warranty period, 3Com shall, at its option and expense, repair the defective product or part, deliver to Customer an equivalent product or part to replace the defective item, or refund to Customer the purchase price paid for the defective product. All products that are replaced will become the property of 3Com. Replacement products may be new or reconditioned. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer.

SOFTWARE

3Com warrants that the software programs licensed from it will perform in substantial conformance to the program specifications therefor for a period of ninety (90) days from the date of purchase from 3Com or its authorized reseller. 3Com warrants the media containing software against failure during the warranty period. No updates are provided. 3Com's sole obligation with respect to this express warranty shall be (at 3Com's discretion) to refund the purchase price paid by Customer for any defective software products, or to replace any defective media with software which substantially conforms to applicable 3Com published specifications. Customer assumes responsibility for the selection of the appropriate applications program and associated reference materials. 3Com makes no warranty or representation that its software products will meet Customer's requirements or work in combination with any hardware or applications software products provided by third parties, that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected. For any third party products listed in the 3Com software product documentation or specifications as being compatible, 3Com will make reasonable efforts to provide compatibility, except where the non-compatibility is caused by a "bug" or defect in the third party's product.

YEAR 2000 WARRANTY

In addition to the Hardware Products Warranty and Software Products Warranty identified above, 3Com warrants that all Heritage 3Com products sold or licensed to Customer on and after January 1, 1998 that are date sensitive will continue performing properly with regard to such date data on and after January 1, 2000, provided that all other products used by Customer in connection or combination with the 3Com products, including hardware, software, and firmware, accurately exchange date data with the 3Com products, with the exception of those products identified at 3Com's Web site, http://www.3com.com/products/yr2000.html, as not meeting this standard. A product is considered a "Heritage 3Com product" if it is a member of a product family which was manufactured by 3Com prior to its merger with US Robotics Corporation. This Year 2000 limited warranty does not apply to Heritage US Robotics Corporation products. If it appears that any such product does not perform properly with regard to such date data on and after January 1, 2000, and Customer notifies 3Com before the later of April 1, 2000, or ninety (90) days after purchase of the product from 3Com or its authorized reseller, 3Com shall, at its option and expense, provide a software update which would effect the proper performance of such product, repair such product, deliver to Customer an equivalent product to replace such product, or if none of the foregoing is feasible, refund to Customer the purchase price paid for such product.

Any software update or replaced or repaired product will carry a Year 2000 Warranty for ninety (90) days or until April 1, 2000, whichever is later.

OBTAINING WARRANTY SERVICE

Customer must contact 3Com's Corporate Service Center or an Authorized 3Com Service Center within the applicable warranty period to obtain warranty service authorization. Dated proof of purchase may be required. Products returned to 3Com's Corporate Service Center must be pre-authorized by 3Com with a Return Material Authorization (RMA) number marked on the outside of the package, and sent prepaid and packaged appropriately for safe shipment, and it is recommended that they be insured. The repaired or replaced item will be shipped to Customer, at 3Com's expense, not later than thirty (30) days after receipt of the defective product by 3Com.

Dead- or Defective-on-Arrival. In the event a product completely fails to function or exhibits a defect in materials or workmanship within the first forty-eight (48) hours of installation but no later than thirty (30) days after the date of purchase, and this is verified by 3Com, it will be considered dead- or defective-on-arrival (DOA) and a replacement shall be provided by advance replacement. The replacement product will normally be shipped not later than three (3) business days after 3Com's verification of the DOA product, but may be delayed due to export or import procedures. When an advance replacement is provided and Customer fails to return the defective product to 3Com within fifteen (15) days after shipment of the replacement, 3Com will charge Customer for the replacement product, at list price.

3Com shall not be responsible for any software, firmware, information, or memory data of Customer contained in, stored on, or integrated with any products returned to 3Com for repair, whether under warranty or not.

WARRANTIES EXCLUSIVE

IF A 3COM PRODUCT DOES NOT OPERATE AS WARRANTED ABOVE, CUSTOMER'S SOLE REMEDY FOR BREACH OF THAT WARRANTY SHALL BE REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT 3COM'S OPTION. TO THE FULL EXTENT ALLOWED BY LAW, THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES, TERMS, OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES, TERMS, OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND SATISFACTORY QUALITY. 3COM NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE OR USE OF ITS PRODUCTS.

3COM SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY CUSTOMER'S OR ANY THIRD PERSON'S MISUSE, NEGLECT, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO REPAIR OR MODIFY, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING, OR OTHER HAZARD.

LIMITATION OF LIABILITY

TO THE FULL EXTENT ALLOWED BY LAW, 3COM ALSO EXCLUDES FOR ITSELF AND ITS SUPPLIERS ANY LIABILITY, WHETHER BASED IN CONTRACT OR TORT (INCLUDING NEGLIGENCE), FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES OF ANY KIND, OR FOR LOSS OF REVENUE OR PROFITS, LOSS OF BUSINESS, LOSS OF INFORMATION OR DATA, OR OTHER FINANCIAL LOSS ARISING OUT OF OR IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE,

USE, PERFORMANCE, FAILURE, OR INTERRUPTION OF ITS PRODUCTS, EVEN IF 3COM OR ITS AUTHORIZED RESELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND LIMITS ITS LIABILITY TO REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT 3COM'S OPTION. THIS DISCLAIMER OF LIABILITY FOR DAMAGES WILL NOT BE AFFECTED IF ANY REMEDY PROVIDED HEREIN SHALL FAIL OF ITS ESSENTIAL PURPOSE.

DISCLAIMER

Some countries, states, or provinces do not allow the exclusion or limitation of implied warranties or the limitation of incidental or consequential damages for certain products supplied to consumers or the limitation of liability for personal injury, so the above limitations and exclusions may be limited in their application to you. When the implied warranties are not allowed to be excluded in their entirety, they will be limited to the duration of the applicable written warranty. This warranty gives you specific legal rights which may vary depending on local law.

GOVERNING LAW

This Limited Warranty shall be governed by the laws of the State of California, U.S.A. excluding its conflicts of laws principles and excluding the United Nations Convention on Contracts for the International Sale of Goods.

3Com Corporation, 5400 Bayfront Plaza, Santa Clara, CA 95052-8145 (408) 764-5000