

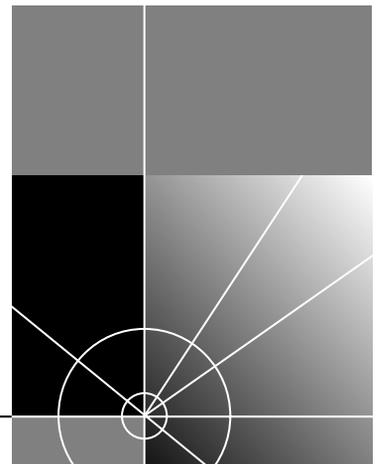


Using SuperStack® II NETBuilder® Software

for Models
222, 224, 227, 228,
326, 327,
422, 424, 427,
526, and 527

<http://www.3com.com/>

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

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Guide written by Ramona Boersma. Edited by Amy Guzules. Technical illustration by Debra Knodel. Production by Ramona Boersma.

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ABOUT THIS GUIDE

Introduction

This guide includes basic software configuration information for your SuperStack® II NETBuilder® bridge/router models 222, 224, 227, 228, 326, 327, 422, 424, 427, 526, and 527.

For information on configuring bridging and routing protocols and features that enhance or fine-tune the performance of your bridge/router such as dial-up or data compression, refer to the *NETBuilder Family Bridge/Router Easy Step Configuration Map* and *Using NETBuilder Family Software*.

This guide is for experienced system integrators and network administrators who are configuring the central node as well as the peripheral node (boundary router).



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

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	<p>The word “syntax” means you must evaluate the syntax provided and supply the appropriate values. Placeholders for values you must supply appear in angle brackets. Example:</p> <p>Enable RIPIP by using the following syntax:</p> <pre>SETDefault !<port> -RIPIP CONTROL = Listen</pre> <p>In this example, you must supply a port number for <port>.</p>
Commands	<p>The word “command” means you must enter the command exactly as shown in text and press the Return or Enter key. Example:</p> <p>To remove the IP address, enter the following command:</p> <pre>SETDefault !0 -IP NETaddr = 0.0.0.0</pre> <p> <i>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.</i></p>
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	<p>Key names appear in text in one of two ways:</p> <ul style="list-style-type: none"> ■ Referred to by their labels, such as “the Return key” or “the Escape key” ■ Written with brackets, such as [Return] or [Esc]. <p>If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example:</p> <p>Press [Ctrl]+[Alt]+[Del].</p>
Menu commands and buttons	<p>Menu commands or button names appear in italics. Example:</p> <p>From the <i>Help</i> menu, select <i>Contents</i>.</p>
Words in <i>italicized</i> type	Italics emphasize a point or denote new terms at the place where they are defined in the text.
Words in bold-face type	Bold text denotes key features.

USING THE BRIDGE/ROUTER IN YOUR NETWORK

This chapter gives an overview of SuperStack II NETBuilder bridge/routers and describes how they fit in your network. It also describes the features of the bridge/router and where to locate information about these features in the documentation set.

Overview

SuperStack II bridge/routers maintain connectivity among small, midsize, and large branch offices and the corporate LAN.

SuperStack II NETBuilder bridge/routers are available in Ethernet and token ring models. Ethernet models are 22x and 42x. Token ring models are 32x and 52x.

Table 1-1 and Table 1-2 list software features and hardware support of each bridge/router.

Table 1-1 SuperStack II NETBuilder Software Features

Feature	Model and Software Package										
	222	224	227	228	326	327	422	424	427	526	527
	Access Router (AB)	IP Router (AA)	Full Router (CF)	Connection Services (CX)	APPN (AF)	Full Router (CF)	Access Router (AB)	IP Router (AA)	Full Router (CF)	APPN (AF)	Full Router (CF)
Bridging	X	X	X	X	X	X	X	X	X	X	X
Boundary Routing® central node			X			X			X		X

(continued)

Table 1-1 SuperStack II NETBuilder Software Features (continued)

Feature	Model and Software Package										
	222 Access Router (AB)	224 IP Router (AA)	227 Full Router (CF)	228 Connection Services (CX)	326 APPN (AF)	327 Full Router (CF)	422 Access Router (AB)	424 IP Router (AA)	427 Full Router (CF)	526 APPN (AF)	527 Full Router (CF)
Protocols											
IP	X	X	X	X	X	X	X	X	X	X	X
IPX	X		X	X	X	X	X		X	X	X
XNS			X	X		X			X		X
BGP		X	X	X		X		X	X		X
OSI			X	X		X			X		X
VINES			X			X			X		X
DECnet			X			X			X		X
AppleTalk			X		X	X			X	X	X
WAN Protocols											
PPP/Multilink PPP	X	X	X	X	X	X	X	X	X	X	X
Frame Relay	X	X	X	X	X	X	X	X	X	X	X
SMDS	X	X	X			X	X	X	X		X
ISDN							X	X	X	X	X
X.25	X	X	X	X	X	X	X	X	X	X	X
X.25 switching/ tunneling	X	X	X	X	X	X	X	X	X	X	X
3Com LLC2 tunneling			X			X			X		X
IBM Protocols											
APPN					X					X	
DLSw			X		X	X		X	X	X	X
LAA						X					X
BRITSS			X		X	X		X	X	X	X
Polled ASYN/C/BISYN/C					X	X				X	X
SDLC			X		X	X		X	X	X	X
SHDLC			X		X	X		X	X	X	X
NetView Service Point						X					X

(continued)

Table 1-1 SuperStack II NETBuilder Software Features (continued)

Feature	Model and Software Package										
	222	224	227	228	326	327	422	424	427	526	527
	Access Router (AB)	IP Router (AA)	Full Router (CF)	Connection Services (CX)	APPN (AF)	Full Router (CF)	Access Router (AB)	IP Router (AA)	Full Router (CF)	APPN (AF)	Full Router (CF)
Other Features											
FTP	X	X	X	X	X	X	X	X	X	X	X
Dial-on-demand	X	X	X	X	X	X	X	X	X	X	X
Virtual Ports (28 max.)	X	X	X	X	X	X	X	X	X	X	X

Table 1-2 SuperStack II NETBuilder WAN Port and Image Support

Model	Active WAN Ports	Software Upgradeable	Memory* Needed for:	
			Single-Image Support	Dual-Image Support
222	3 serial	Yes	2 MB flash 8 MB DRAM	4 MB flash 8 MB DRAM
224	3 serial	Yes	2 MB flash 8 MB DRAM	4 MB flash 8 MB DRAM
227	3 serial	Yes	4 MB flash 8 MB DRAM	4 MB flash 8 MB DRAM
228	3 serial	No	4 MB flash 8 MB DRAM	4 MB flash 8 MB DRAM
326	3 serial	Yes	4 MB flash 8 MB DRAM	8 MB flash 8 MB DRAM
327	3 serial	No	4 MB flash 8 MB DRAM	8 MB flash 8 MB DRAM
422	1 ISDN BRI, 1 serial	Yes	2 MB flash 8 MB DRAM	4 MB flash 8 MB DRAM
424	1 ISDN BRI, 1 serial	Yes	2 MB flash 8 MB DRAM	4 MB flash 8 MB DRAM
427	1 ISDN BRI, 1 serial	No	4 MB flash 8 MB DRAM	4 MB flash 8 MB DRAM
526	1 ISDN BRI, 2 serial	Yes	4 MB flash 8 MB DRAM	8 MB flash 8 MB DRAM
527	1 ISDN BRI, 2 serial	No	4 MB flash 8 MB DRAM	8 MB flash 8 MB DRAM

* See the hardware guide for default memory configurations and upgrade information.

Network Examples

Figure 1-1 shows a topology in which a model 227 bridge/router is connected over a Frame Relay network to access routers B, C, and D in a fully meshed topology (all routers are directly connected to one another).

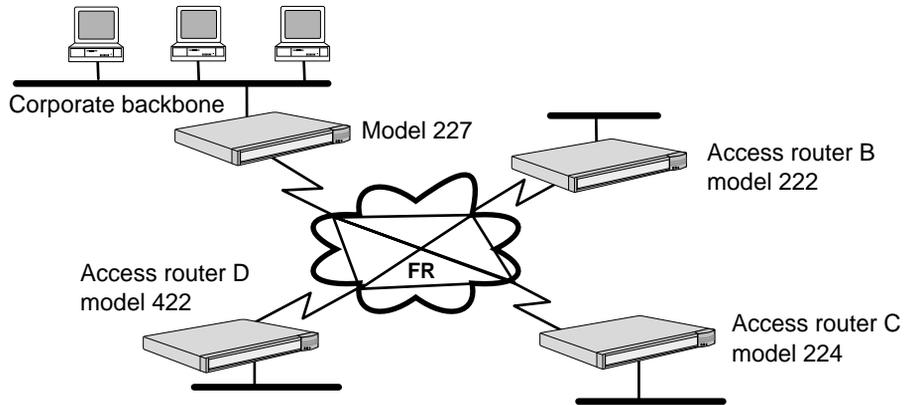


Figure 1-1 SuperStack II Bridge/Routers in a Frame Relay Network

Figure 1-2 shows a Boundary Routing topology in which a model 227 bridge/router is used as a central node.

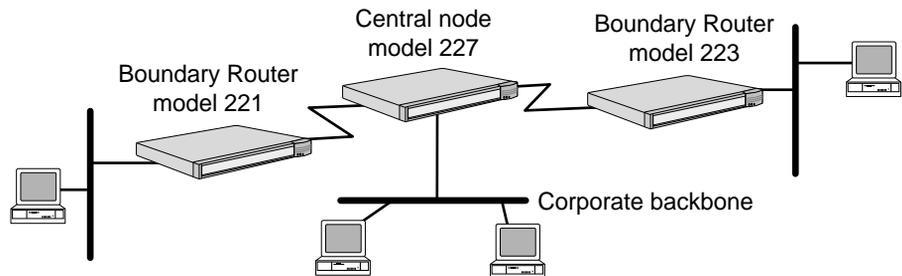


Figure 1-2 SuperStack II Bridge/Routers in Boundary Routing Topology

Figure 1-3 shows a Boundary Routing topology with a model 527 bridge/router acting as a central node, model 323 bridge/routers acting as peripheral nodes and a model 320 bridge/router acting as a FRAD.

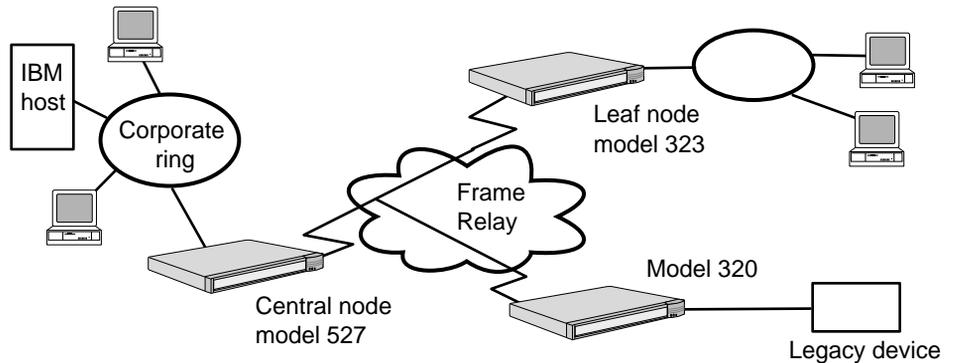


Figure 1-3 Boundary Routing Topology with Model 527 As Central Node

Where to Find Configuration Information

The following configurations of your SuperStack II bridge/router can be found on the *NETBuilder Family Bridge/Router Easy Step Configuration Map*:

- Transparent bridging over Frame Relay, X.25, and PPP
- IP and IPX routing over Frame Relay, X.25, and PPP
- Dial-up, including disaster recovery, bandwidth-on-demand, and dial-on-demand
- Data compression

The following configurations can be found in *NETBuilder Family Bridge/Router Easy Step WAN Configurations*:

- Routing IP over Frame Relay with disaster recovery
- Routing IPX over X.25 with data compression
- Routing IPX over PPP with dial-on-demand
- Routing IP over PPP with bandwidth on demand
- Boundary Routing over Frame Relay

All other features are described in *Using NETBuilder Family Software*.

Configuring the Central Node for Boundary Routing

Models 227, 327, 427, and 527 can be used as a central node in a Boundary Routing environment. Ethernet bridge/routers can be used as a central node only for *Ethernet* boundary routers. Token ring bridge/routers can be used as a central node only for *token ring* boundary routers.

Boundary Routing system architecture treats the remote site as part of the central site LAN, allowing all routing to occur at the central site. A SuperStack II boundary router requires very little or no configuration. You must configure the central site for Boundary Routing by referring to the following chapters in *Using NETBuilder Family Software*:

- "Configuring Boundary Routing System Architecture"
- "Configuring Auto Startup"

2

STARTING UP

This chapter describes how to start up your SuperStack II NETBuilder bridge/router and log on. It also tells you how to use the software user interface.

Starting Up

To start up your SuperStack II bridge/router, plug one end of the power cord into the rear panel of the bridge/router and the other end into your power outlet. If you have a SuperStack II Redundant Power System (RPS), attach one end of the RPS cable to the rear panel of the bridge/router and the other end to the RPS.

Attaching a Console

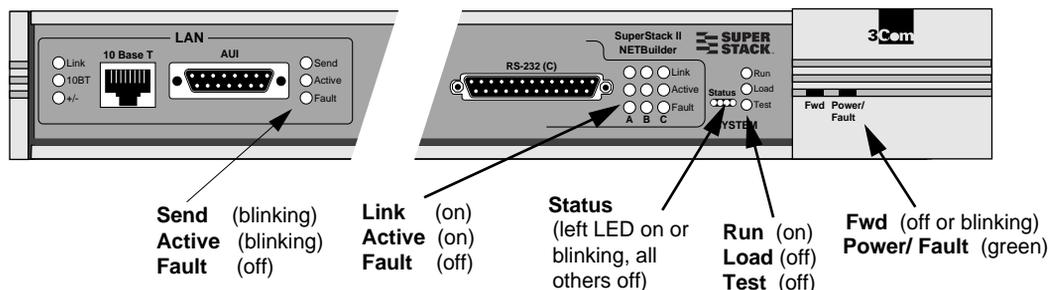
You must attach a console to the bridge/router for initial software configuration. See the hardware installation guide for information about attaching a PC, terminal, or modem to your bridge/router.

Verifying Successful Startup

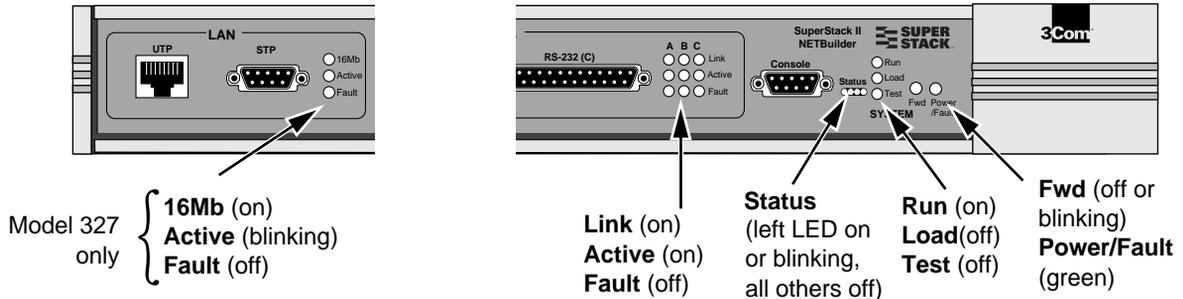
The startup process takes a few minutes. When the startup process has successfully completed, the LEDs on the front panel should resemble one of the following figures.

If the LEDs on your bridge/router appear different from those shown in the figure, the bridge/router may have a problem. Refer to Chapter 5 for more information.

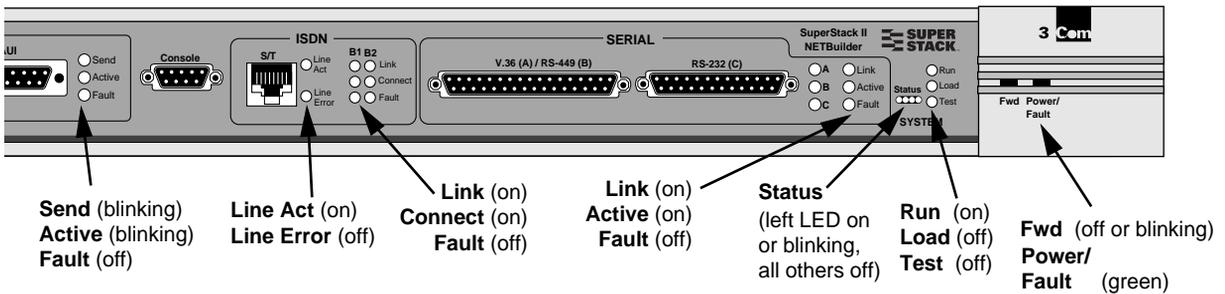
Model 22x



Model 32x

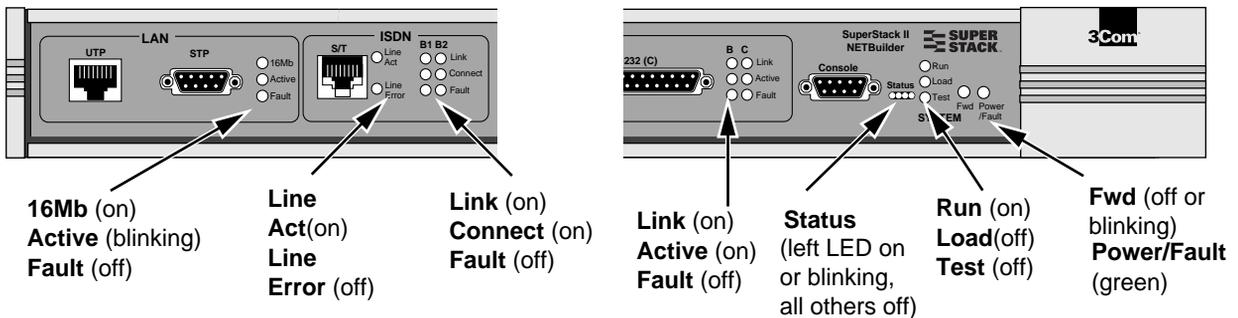


Model 42x



The ISDN Line Act LED may go off if your bridge/router is configured for an ETSI switch. This is normal if there are no ISDN B channel connections. If a B channel is not connected, the Link and Connect LEDs will be off. The LED configuration shown in this figure occurs when all channels are connected.

Model 52x



If your system is connected to a token ring (models 32x and 52x only) with the ring speed of 4 Mb, the 16 Mb LED will not light. The ISDN Line Act LED also may not light if your system is configured for an European Telecommunications Standards Institute (ETSI) switch. This is normal if there are no ISDN B channel connections. If a B channel is not connected, the Link and Connect LEDs will not light. The LED configuration shown in the figure above occurs when all channels are connected.

Logging on to the System

When your bridge/router starts up, it takes a few minutes to complete the initialization process. While the bridge/router is initializing, several messages appear on your terminal. When you see the following message, the bridge/router has finished booting:

```
System Initialized and Running
```

To log on, follow these steps:

- 1 Press any key on the keyboard.

The following prompt is displayed:

```
NetLogin:
```

- 2 Enter:

```
root
```

Root is the default account name. The following prompt is displayed:

```
Password:
```

- 3 Press the Return key.

Pressing the Return key enters a null string, which is the default local password. The Network Manager prompt is displayed:

```
NETBuilder #
```

Chapter 3 describes how to change the password. Once the password is changed, you must enter the new password each time you are prompted.

Choosing the User Interface

This section describes how to access the menu-driven and command-line user interfaces. Detailed information for both types of interfaces is provided so that you can choose the one that best suits your needs.

Accessing the User Interface

To access the user interface and commands, and modify its configuration, you must first attach a console locally to the Console port on the bridge/router.

Once you have configured the software, you can use one of the following methods:

- Use a device (for example, a workstation) on the same extended network or internetwork to access the bridge/router via the Telnet protocol.

The software supports Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). These protocols allow you to Telnet to the bridge/router using an Internet Protocol (IP) address by using public-domain software available from a PC or similar software for a workstation. For more information about using Telnet on a workstation, refer to the manual that accompanies the workstation.

- Use Simple Network Management Protocol (SNMP) to view and configure a subset of the parameters from a remote host. For information on preparing the bridge/router to run SNMP, refer to *Using NETBuilder Family Software*.

Deciding which Interface to Use

Once you have accessed the user interface, you need to decide whether to use the menu-driven or the command-line interface.

- If you are unsure of the command syntax, use the menu-driven interface.

For more information about the MEnu command, refer to *Reference for NETBuilder Family Software*. For information on how to use the menu-driven interface, refer to the next section.

- If you know the exact syntax, enter the command at the system prompt.

For information about the command line and rules for entering commands, refer to Appendix A. To access the command-line, refer to "Using the Command-line Interface" on page 2-6. The syntax for each command and parameter is described in *Reference for NETBuilder Family Software*.

Using Menu

The MEnu command allows you to:

- Display a list of available services.
- Choose a service and display the list of parameters available for that service.
- Display a list of parameters in the current service.
- Choose a parameter and display the commands used with it.
- Check the active and default values of a parameter.
- Display the online help syntax of a 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. To access the SuperStack II system through the REMote command, you must use the command-line interface.

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

- 1 Log on as root or as a user with Network Manager privilege (refer to “Adding User Accounts” on page 3-3 for more information about user accounts).
- 2 If you have not selected a particular service, enter the following command:

MEnu

The Main menu display appears.

- 3 Select the desired service.

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

- 4 Select the parameter you want to configure.

For example, if you selected 27 from the SYS Service menu, a display appears for that parameter.

The first part of the screen displays the value of the parameter. The second part lists the commands from which you can choose. For information on the help menus, refer to “Getting Help” on page A-9. For the complete rules for entering commands and using aliases and history substitution, refer to “Using Aliases” on page A-6 and “Command History Substitution” on page A-6.

- 5 To escape out of a menu, press the Return key, which takes you to the previous menu level.

For example, if you are at the Main menu and you press the Return key, you will return to the command-line interface.

Using the Command-line Interface

For information about the command line and rules for entering commands, refer to Appendix A.

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

- 1 Log on as root or as a user with Network Manager privilege (refer to “Adding User Accounts” on page 3-3 for more information about user accounts).

- 2 Type the command name.

If your command does not require a service name, parameter, or values, skip to step 4. If your command requires more modification, continue to step a.

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

When you include a specific port or path number in the command, that command focuses on that particular port or path. If the port or path number is not included, the command provides information on all ports or paths.

For more information on ports, paths, or commands, refer to *Reference for NETBuilder Family Software*.

- b If the command is modified by a parameter, type the service name (if necessary), the parameter name, and values.

The service part of the command focuses the action of the command on a particular service of the system.

In some cases, you may not need to enter the service name. For example, if a parameter is unique to a particular service, the service need not be specified as part of the command. For more information, refer to “Entering Service Names in Command Lines” on page A-5.

The parameter is the object of the action of the command. If two or more services have parameters of the same name, you must include the service name in the syntax so the command can be executed successfully.

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.

- 3** Press the Return key after typing the complete command.

The software includes online help for commands, services, parameters, and syntax, and is described in “Getting Help” on page A-9. The syntax style that appears in the 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 style.

For more information on syntax, refer to Appendix A.



3

CONFIGURING THE SOFTWARE



Not all protocols or WAN Services are supported by all SuperStack II NETBuilder models.

This chapter provides the following information:

- Administrative tasks
- Path, port, and virtual port concepts, which you need to be familiar with before you start configuring the software
- Basic software configuration, which includes configuring paths, ports, and virtual ports; assigning Internet Protocol (IP) addresses; and setting up security

Once you complete the basic software configuration, you must configure the bridging or routing protocols that you plan to run on your bridge/router. You may also want to fine-tune the performance of your bridge/router by implementing such features as data compression. For more information on configuring bridging and routing protocols and enhanced features, refer to “Where to Go From Here” on page 3-23.

Performing Administrative Tasks

Table 3-1 summarizes the administrative tasks described in this section and indicates whether performing each task is mandatory.

Table 3-1 Administrative Task Summary

Task	Status of Task
Changing the default CONSOLE port baud rate	Do only if you want to attach a terminal with a baud rate other than 9600.
Changing the root password	Mandatory
Adding user accounts	Optional
Setting the time and date	Recommended
Specifying system name, location, and contact person/phone number	Optional

For more information on each of the commands and parameters used in this section, refer to *Reference for NETBuilder Family Software*.

Changing the Default Console Port Baud Rate

To attach a terminal with a baud rate other than 9600, follow these steps:

- 1 Enter the following command at the Network Manager prompt (NETBuilder #):

sysconf

The System Configuration menu is displayed.

- 2 Select the Console Port option.
A submenu displays the console port baud rate options.
- 3 Select the baud rate you want to use.
- 4 Set the terminal baud rate to match the baud rate configured for the Console port.



CAUTION: *Do not reset the bridge/router before changing the terminal baud rate. After the bridge/router resets, the new baud rate is used and you will not be able to access the system software to enter any commands at the default 9600 baud rate.*

- 5 After you change the terminal baud rate, reset the bridge/router by pressing the Reset switch on the front panel.

The new console port baud rate does not become effective until you have reset the bridge/router.

Changing the Root Password

The default root password is a null string, which is generated by pressing the Return key.

You must specify a new password immediately after you log on for the first time. Changing the root password prevents unauthorized users from accessing and executing software commands and parameters.

The root user has two privilege levels and passwords: Network Manager and User. The User privilege enables only a subset of software commands. You should assign passwords for both levels. If you log in as root and enter the Network Manager password, you have Network Manager privilege. If you log in as root with the User password, you have User privilege.



You might log on with the User password if you do not want to create user accounts. If you want to change the privilege level without logging off, use:

```
SET PRiVilege = User | NetMgr
```

The following guidelines exist when changing a password:

- You must be logged on as root with Network Manager privilege.
- You must change the Network Manager password before you change the User password.
- You must clear the User password before you clear the Network Manager password.

To change the password for both privilege levels, enter:

```
SysPassWord
```

A menu is displayed.

Set the Network Manager password and then the User password by following the menu.



CAUTION: *You must set both the Network Manager and the User password. If only the Network Manager password is set, any other logon obtains a User level privilege.*

Adding User Accounts

You can add user accounts with either Network Manager or User privilege. Some commands are available only to root.

To add a user account, log on as root and use:

```
AddUser [<username>]
```

If you do not specify a username, you will be prompted for one. Specify the privilege and password at the prompts.

Delete an account by using:

```
DELEteUser [<username>]
```

To force a user password to expire, use:

```
EXPIre [<username>]
```

Any user can change their password by entering:

```
PassWord
```

To manage multiple users and see all user accounts, enter:

```
UserManage
```

Setting the Time and Date

3Com recommends setting the time and date. Use:

```
SET -SYS DATE = <YYYY/MM/DD HH:MM[:SS]>
```

Enter the time in 24-hour-clock format. For example, to set the date and time to January 10, 1996, 2:40 p.m., enter:

```
SET -SYS DATE = 1996/1/10 14:40
```

Setting System Administrator Information

You can set the system name, location, and contact so that other system administrators can contact you for information. This task is optional.

To set the system name, location, and contact, follow these steps:

- 1 Assign a name by using:

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

For example, to set the system name to Engineering.SanJose, enter:

```
SETDefault -SYS SysNAME = "Engineering.SanJose"
```

- 2 Specify the system location by using:

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

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

```
SETDefault -SYS SysLOCation = "SecondFloor.Lab"
```

- 3 Identify the contact person managing the bridge/router by using:

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

For example, to identify John Smith as the system contact and (408)555-1111 as the phone number at which to reach him, enter:

```
SETDefault -SYS SysCONTACT = "John Smith (408) 555-1111"
```

If the system contact is specified, users can obtain this information by using the SHow -SYS SysCONTACT command.

Paths, Ports, and Virtual Ports

Before configuring the software, familiarize yourself with the concepts and numbering conventions of paths, ports, and virtual ports.

Paths A *path* is a physical interface that connects a bridge/router to a physical network medium such as an Ethernet bus or a serial line. In an ISDN environment, a path also represents the channel over which data is transmitted.

The SuperStack II bridge/router provides multiple paths; each path is associated with a connector, such as an AUI or RS-232 connector.

Ports A *port* is a logical interface used by the software to represent a connection to a network.

By default, ports and paths are configured with the following characteristics:

- There is a one-to-one correspondence.
- One particular path is mapped to one particular port, for example, path 1 is mapped to port 1. This default configuration is called *static port and path binding*. A *static path* is a path that is mapped to a port. All paths are static by default.

Each logical port is usually associated with only one physical path. For serial lines running Frame Relay, Asynchronous Transfer Mode Data Exchange Interface (ATM DXI), X.25, and Switched Multimegabit Data Service (SMDS), the path-to-port correspondence should always be one to one. For serial lines running PPP, multiple paths can correspond to one port.

You can redefine the default mapping so that network traffic that is being routed through a particular logical port can be redirected to a different physical path without manually switching cables on the connector.

Virtual Ports You can configure multiple ports over one path by creating new logical interfaces called *virtual ports*. A virtual port is an object you define through software, and associate with a nonvirtual port, called the *parent port* (see Figure 3-1).

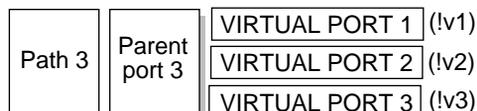


Figure 3-1 Parent Port and Virtual Port

A virtual port functions in the same way as a port, that is, as a logical interface that represents a connection to a network. The virtual port and its parent port share most of their properties, but can be referenced separately by port-oriented software features such as route policy and packet filtering, and can also be distinguished by distinct wide area addresses.

A virtual port can be connected to a network through a path providing a Frame Relay, ATM DXI, or X.25 virtual circuit, or an SMDS Subscriber Network Interface (SNI).

The sample Boundary Routing topology in Figure 3-2 demonstrates the use of virtual ports. This topology shows a model 227 bridge/router with two paths: path 1 and path 3. Path 1 is an Ethernet interface. Path 3 is connected to a Frame Relay network that interconnects multiple local area networks through two SuperStack II Boundary Routers. Two virtual ports have been created on Path 3. Each virtual port is a logical interface that represents a connection to one of the remote local area networks.

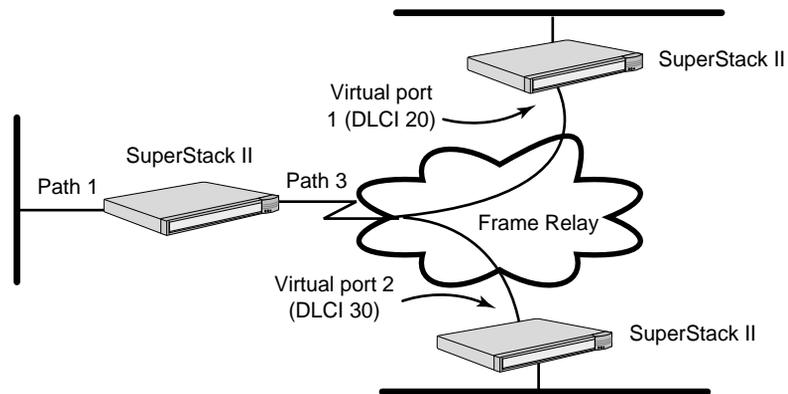


Figure 3-2 Topology Demonstrating Use of Virtual Ports

Table 3-2 provides information on topologies that require virtual ports and the bridge/router in the topology on which the virtual ports should be created.

Table 3-2 Topologies that Require Virtual Ports

Topology	Virtual Ports Required?	Node to Create Virtual Ports On
Boundary Routing over Frame Relay, ATM DXI, or X.25	Yes.	Central node (model 227, 327, 427, or 527)
Traditional routed environment: partially meshed or nonmeshed Frame Relay, ATM DXI, and X.25 topologies	Depends on bridging or routing protocol. Refer to paragraphs that follow this table and "Virtual Ports over Frame Relay, ATM DXI, and X.25" on page 3-7 for more information.	"Hub" router (model 22x, 32x, 42x, or 52x)
SMDS Service where there are more than 127 routers or more than one logical network segment (or 32 segments under IP), or a need to selectively filter packets among groups	Yes.	Depends on configuration
Multidestination dialing (modem pooling) over PPP	Yes, for dynamic dial-up lines.	Central node (model 227, 327, 427, or 527)
Frame Relay environment with disaster recovery configured	Yes.	Nodes on both ends of serial line running Frame Relay

For more information on partially meshed and nonmeshed Frame Relay, SMDS, and X.25 topologies, refer to *Using NETBuilder Family Software*. Frame Relay topologies also apply to ATM DXI.

The maximum number of virtual ports that can be configured on the SuperStack II bridge/routers is 28. There is no per-path limit, except that the total number of virtual ports configured on all paths cannot exceed the maximum.

Virtual Ports over Frame Relay, ATM DXI, and X.25

Frame Relay, ATM DXI, and X.25 are peer-to-peer protocols that connect two nodes on the network. Since Boundary Routing and bridging, Internet Protocol-Open Shortest Path First (IP-OSPF), DECnet IV, VINES, and Xerox Network Systems (XNS) do not provide a technique for dealing with Frame Relay, ATM DXI, or X.25 topologies where bridge/routers are not directly connected to all others (fully meshed), these topologies require virtual ports. With Boundary Routing, when you create a virtual port over a particular path, each remote network attached to the Frame Relay, ATM DXI, or X.25 network is treated as a separate and distinct network.

Internet Protocol-Routing Information Protocol (IP-RIP), Internetwork Packet Exchange (IPX), Intermediate System-to-Intermediate System (IS-IS), DECnet V, and AppleTalk can operate over partially meshed or nonmeshed Frame Relay, ATM DXI, or X.25 topologies without the use of virtual ports. The next-hop split horizon feature in IP-RIP, IPX, and AppleTalk allows communication between bridge/routers that are not directly connected to one another. To configure next-hop split horizon for these routing protocols, you must have a list of neighbors, which can be dynamically generated or manually configured in IP-RIP.

In IPX, you must manually configure neighbors for broadcast multiaccess networks. For nonbroadcast multiaccess (NBMA) networks, for example X.25 and Frame Relay, you can configure dynamic neighbor learning through the CONTROL parameter in the NRIP, SAP, and NLSP Services.

In AppleTalk, next-hop split horizon is configured by adding static mappings to the address mapping table.

You do not need to further configure IS-IS to run over partially meshed or nonmeshed Frame Relay, ATM DXI, or X.25 topologies. Configuring neighbors is sufficient.

Although it is not necessary to define virtual ports on IP-RIP, IPX, or AppleTalk routers in partially meshed or nonmeshed Frame Relay, ATM DXI, or X.25 topologies, virtual ports provide the following additional benefits:

- A virtual port can be defined for each configured neighbor, allowing you to set up such features as filters and routing policies on a per-neighbor basis.
- Virtual ports provide greater control over your network.

If you want your SuperStack II bridge/router to act as an Open System Interconnection (OSI) router in a Frame Relay, ATM DXI, or X.25 topology, you do not need to create virtual ports.

Table 3-3 summarizes each bridging and routing protocol and the technique you must use to deal with the lack of connectivity in partially meshed and nonmeshed Frame Relay, ATM DXI, and X.25 topologies.

Table 3-3 Connectivity in Partially Meshed and Nonmeshed Topologies

Protocol	Technique
Bridging	Virtual port
Boundary Routing	Virtual port
IP-RIP*	Next-hop split horizon
IP-OSPF	Virtual port
IS-IS	No special configuration required
IPX*	Next-hop split horizon
DECnet IV	Virtual port
OSI/DECnet V	No special configuration required
VINES	Virtual port
XNS	Virtual port
AppleTalk*	Next-hop split horizon

*When configuring this protocol and another protocol that requires virtual ports over the same path, use virtual ports.

Virtual Ports over SMDS

Unlike Frame Relay, ATM DXI, and X.25, SMDS provides a connectionless wide area network that also has multicast delivery capability, giving it LAN characteristics. Each attachment point to the SMDS network, the SNI, can be assigned up to 16 individual addresses by the SMDS service provider. These addresses can be used to distinguish up to 16 distinct virtual SMDS ports over the same SNI. Unlike virtual ports for Frame Relay, ATM DXI, or X.25, which connect to a single remote device, each virtual port in an SMDS environment connects to a distinct group of fully meshed devices. This connection allows the creation of a hierarchical, partially meshed structure that can exceed the SMDS address-screen-imposed limitation of 128 addresses in an SMDS network.

SMDS virtual ports provide additional points of control for configuring network and routing protocols, and for selectively applying port-level features such as filtering, route policy control, and route aggregation. Boundary Routing is not supported over SMDS.

For more information on SMDS, refer to *Using NETBuilder Family Software*.

Parent Ports When you configure an X.25, Frame Relay, ATM DXI, or SMDS virtual port, it inherits the attributes of the path over which it is defined. The virtual port also inherits some of the attributes of the port associated with the path through which the virtual port is defined. This port is referred to as the *parent port*.

For example, if you create a Frame Relay, ATM DXI, X.25, or SMDS virtual port associated with a wide area port, the virtual port inherits port attributes from the following sources:

- Default and configured values of PORT Service parameters specified for a wide area port, with the exception of the following PORT Service parameters that are not related to X.25, Frame Relay, ATM DXI, and SMDS virtual ports:

AutoDial	DialRetryCount
COMPressType	DialRetryTime
DialCONFig	DialSamplPeriod
DialCONTRol	DialSTatus
DialDebouncTime	LinkCompStat
DialHistory	OWNer
DialIdleTime	PAths
DialInitState	PathPreference
DialRcvrState	

- Default and configured values of parameters from all other services specified for a wide area port.

To configure a virtual port, you must specify the virtual port and not the parent port. For example, if you are using:

```
SETDefault !<port> -BCN CONTRol = Enabled
```

You must specify the virtual port number instead of the parent port number in the <port> syntax.

Multiple Paths per Port

You can reconfigure the software so that multiple paths are mapped to one wide area port using the ADD -PORT PAths command. If you assign multiple paths to a wide area port, the port must be running PPP.

Multiple paths can be mapped to one port to take advantage of the disaster recovery and bandwidth-on-demand features.

Figure 3-3 shows two sample topologies: the first has one path mapped to one port and the second has two paths mapped to one port (for disaster recovery or bandwidth-on-demand). In the first topology, path 2 (or path 2.1 for ISDN models) is assigned by default to port 2. In the second topology, the software has been reconfigured so that paths 3 and 4 are mapped to port 3. (Since you can cable only one DTE connector at a time on model 42x, you cannot map two paths to one port on these models.)

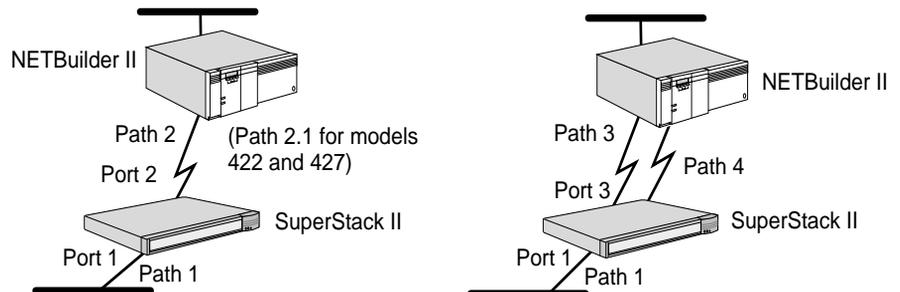


Figure 3-3 Possible Path-to-Port Assignments for a SuperStack II System

For more information on disaster recovery and bandwidth-on-demand, refer to the *NETBuilder Family Bridge/Router Easy Step Configuration Map* and *Using NETBuilder Family Software*.

Virtual ports are numbered Vn , where n is a number from 1 through 28, which is the maximum supported.

Configuring Paths, Ports, and Virtual Ports

This section provides information on configuring local area paths and ports, wide area paths and ports, and virtual ports.

Path, Port, and Virtual Port Numbering

The following tables outline the default port and path numbering for the SuperStack II bridge/router.

Table 3-4 Path and Port Numbering for Models 22x

Path No.	Connector Mapped To	Port No. Mapped To
1	10 Base T or AUI (Depends on which connector is cabled.)	1
2	V.35	2
3	RS-449*	3
4	RS-232	4

* This connector can be converted to an X.21 connector using a cable.

Table 3-5 Path and Port Numbering for Models 32x

Path No.	Connector Mapped To	Port No. Mapped To
1	UTP or STP (Depends on which connector is cabled)	1
2	V.35	2
3	UNIVERSAL*	3
4	RS-232	4

* This connector can be converted to an X.21, V.35, V.36, RS-449, or RS-232 connector using cables.

Table 3-6 Path and Port Numbering for Models 42x

Path No.	Connector Mapped To*	Port No. Mapped To
1	10 Base T or AUI (Depends on which connector is cabled)	1
2.1†	ISDN	2
2.2	ISDN	3
3	V.36/RS-449‡ or RS-232 (Depends on which connector is cabled. You can use only one of these connectors at a time.)	4

* The connector associated with paths 2.1, 2.2, and 3 cannot be reconfigured.

† In an ISDN environment, the path numbering convention differs from the convention in a non-ISDN environment. Instead of numbering only the physical interface or connector, such as path 2, ISDN sometimes requires that you number the connector and the multiple channels that transmit data (path 2.n). For more information, refer to Chapter 2.

‡ The connector marked V.36/RS-449 can be converted to a V.35, V.36, or X.21 connector using a cable.

Table 3-7 Path and Port Numbering for Model 52x

Path No.	Connector Mapped To*	Port No. Mapped To
1	UTP or STP (Depends on which connector is cabled.)	1
2.1†	ISDN	2
2.2	ISDN	3
3	UNIVERSAL‡	4
4	RS-232	5

* The connector associated with paths 2.1, 2.2, and 4 cannot be reconfigured.

† In an ISDN environment, the path numbering convention differs from the convention in a non-ISDN environment. Instead of numbering only the physical interface or connector, such as path 2, ISDN sometime requires that you number the connector and the multiple channels that transmit data (path 2.n).

‡ This connector can be converted to an X.21, V.35, V.36, RS-449, or RS-232 connector using cables.

Configuring Ethernet Paths and Ports (22x and 42x)

By default, the Ethernet path and port are enabled. Perform the following procedure only if one of the following applies:

- You have disabled the Ethernet path or port.
- You want to customize the configuration of your Ethernet path or port by providing a name for each.

To provide a name for and to re-enable your Ethernet path and port, follow these steps:

1 Assign a name to path 1.

For example, to assign the name Floor 1 to path 1, enter:

```
SETDefault !1 -PATH NAmE = "Floor_1"
```

Refer to "Port and Path Naming Restrictions" on page A-7.

2 If necessary, re-enable the path.

If the path was previously disabled, you must re-enable it. For example, to re-enable path 1, enter:

```
SETDefault !1 -PATH CONTrol = Enabled
```

3 Assign a name to port 1.

For example, to assign the name Bldg 1 to port 1, enter:

```
SETDefault !1 -PORT NAmE = "Bldg_1"
```

Refer to "Port and Path Naming Restrictions" on page A-7.

4 If necessary, re-enable the port.

If the port was previously disabled, you must re-enable it. For example, to re-enable port 1, enter:

```
SETDefault !1 -PORT CONTrol = Enabled
```

Configuring Token Ring Paths and Ports (32x and 52x)

To configure the token ring path and port, follow these steps:

1 Configure the ring speed by using:

```
SETDefault !1 -PATH BAud = 4000 | 16000
```

If your system is connected to an intelligent hub, configure the ring speed in the firmware by following these steps:

a Enter the monitor utility by entering:

```
MONitor
```

The system prompts:

```
WARNING: Monitor halts normal operations. Confirm (Y/N)?  
Type Y to continue.
```

- b Configure the firmware by entering:

```
CL
```

- c From the menu that is displayed, select Ring Speed.
- d Select either 4 mb or 16 mb. The Automatic option may not work with your hub.
- e Exit the CL menu by typing Q to quit. You will need to press Return and type Q again to return to the system prompt.
- f At the system prompt, enter:

```
RS
```

This command completes the token ring speed configuration procedure and resets the system.

- g After the system completes booting, log in as root.

- 2 Assign a name to the path.

For example, to assign the name Floor 1 to path 1, enter:

```
SETDefault !1 -PATH NAmE = "Floor_1"
```

Refer to "Port and Path Naming Restrictions" on page A-7.

- 3 If necessary, re-enable the path.

If you configured the -PATH BAud parameter earlier in this procedure or if the path was previously disabled, you must re-enable it. For example, to re-enable path 1, enter:

```
SETDefault !1 -PATH CONTrol = Enabled
```

- 4 Assign a name to the port.

For example, to assign the name Bldg 1 to port 1, enter:

```
SETDefault !1 -PORT NAmE = "Bldg_1"
```

Refer to "Port and Path Naming Restrictions" on page A-7.

- 5 If necessary, re-enable the port.

If the port was previously disabled, you must re-enable it. For example, to re-enable port 1, enter:

```
SETDefault !1 -PORT CONTrol = Enabled
```

Setting the ISDN Switch Type

The default ISDN switch type for models 42x and 52x is ETSI (European Telecommunication Standards Institute). If you are in any European country except France, no further action is required. If you are in France or a country that is not part of Europe, for example, Japan, the United States, or Canada, you need to reconfigure the `-PATH SwitchType` parameter.

Prerequisites

Before reconfiguring the switch type, you must complete the following requirements:

- Determine which switch type you need to specify. The switch type you specify is determined by the country you are in as shown in Table 3-8.

Table 3-8 ISDN Switch Types

Country You Are In	Switch Type
Japan	NTT or KDD
United States, Canada	ATT5ESS, DMS100, or NI1
All European countries except France	ETSI
France	VN3
Australia	AUSTEL

- Be sure the ISDN connector is **not** cabled.

This procedure provides information on reconfiguring the switch type only, which must be performed **before** cabling the ISDN connector. After you complete this procedure, perform the complete hardware installation, including cabling, by referring to the hardware installation guide.

Procedure

- 1 Reconfigure the switch type using:

```
SETDefault !2 -PATH SwitchType = ETSI | NTT | KDD | NI1 |
ATT5ESS | DMS100 | VN3 | AUSTEL
```

For example, to change the default switch type setting to ATT5ESS on the ISDN interface, enter the following command:

```
SETDefault !2 -PATH SwitchType = ATT5ESS
```

- 2 Turn the bridge/router power off then on again.



Once you reconfigure the switch type, you do not need to reconfigure it again unless one of the following events occur: you decide that your ISDN network should interface with a different switch, you reconfigure your primary or second boot source, or you update your hardware or the software on your present system. If you update your hardware or the software on your present system, the default setting of the -PATH SwitchType will automatically be reinstated.

Configuring Wide Area Paths and Ports

Before configuring paths and ports for the ISDN interface on model 42x and 52x bridge/routers, you must decide how you want to use your ISDN interface. For more information, refer to *Using NETBuilder Family Software*.

To configure the wide area paths and ports, follow these steps:

- 1 Assign a name to a path (optional).

For example, to assign the name SF-SJ to path 3, enter:

```
SETDefault !3 -PATH Name = "SF-SJ"
```

Refer to "Port and Path Naming Restrictions" on page A-7.

- 2 If necessary, reconfigure the source of the transmit clock for a path.

By default, the path is configured to derive its transmit clock from an external source such as a modem.

- **Models 32x and 52x** — If you connect a serial connector to an IBM cluster controller, you must change the default setting of the -PATH CLock parameter from External to Internal. Reconfiguring the setting of this parameter to Internal indicates that the SuperStack II system is the source of both transmit and receive clocks.

For example, if you are connecting to an IBM cluster controller, reconfigure path 3 so that it derives its transmit and receive clocks from the SuperStack II system. Enter:

```
SETDefault !3 -PATH CLock = Internal
```



Model 52x users do not need to perform this step for the ISDN path.

- **Models 22x and 42x** — If you connect a serial connector to an IBM cluster controller, you must use a modem eliminator between the two devices. You must ensure clocking is set to External on each device. Contact your 3Com supplier for a list of suggested modem eliminators.

- **Two bridge/routers connected to each other** — If you connect two SuperStack II bridge/routers or a NETBuilder II bridge/router with an HSS V.35 3-Port module to a SuperStack II bridge/router, you must use a modem eliminator between the two devices. You must be sure the default setting of External for the `-PATH CLock` parameter is maintained on each device. Contact your 3Com supplier for a list of suggested modem eliminators.

3 If necessary, reset the baud rate for a path.

The default baud rate setting is 64 kbps. For example, to reset the baud rate of path 3 to 256 kbps, enter:

```
SETDefault !3 -PATH BAud = 256
```

For the range of baud rates available, refer to *Reference for NETBuilder Family Software*.

4 Complete the section for your platform if necessary.

- **42x:**

If you cabled the V.36/RS-449 connector with a V.35, V.36, or X.21 adapter cable, reset the connector type by using:

```
SETDefault !<path> -PATH CONNector = V36 | RS449
```

See Table 3-9 for the connector setting you should select.

Table 3-9 Connector Setting for Converted Connector

Connector Type Converted To	-PATH CONNector Setting
V.35	V36
V.36	V36
X.21	RS449

For example, if you converted the serial connector marked "V.36/RS-449" to X.21 using an X.21 adapter cable, enter the following command:

```
SETDefault !3 -PATH CONNector = RS449
```

- **32x and 52x:**

If you cabled the UNIVERSAL connector, configure the connector type by using:

```
SETDefault !<path> -PATH CONNector = AUTO | V35 | RS232 |
RS449 | X21
```

See Table 3-10 for information on the connector type to select.

Table 3-10 Connector Type Setting for Converted Connectors

Connector Type Converted To	-PATH CONNector Setting
X.21	X21
V.35	V35
RS-449 or V.36	RS449
RS-232	RS232
Any connector type. The software automatically detects the type of connector cabled.	Auto*

*This setting applies only to SuperStack II Bridge/Router model 52x.

For example, to enable the auto connector-detection feature, enter:

```
SETDefault !3 -PATH CONNector = AUTO
```

For example, if you converted the UNIVERSAL connector to a V.36 connector, enter:

```
SETDefault !3 -PATH CONNector = RS449
```

- 5 If necessary, assign multiple paths to a port.

For example, to assign paths 3 and 4 to port 3, enter:

```
ADD !3 -PORT PAtHs 3,4
```

You can assign multiple paths to a port when PPP is the port owner.

If you have changed the value of the -PATH CONNector, -PATH CLock, -PATH BAud, or -PORT PAtHs parameters, or previously disabled the path, you need to re-enable the path.

For example, to re-enable path 3, enter:

```
SETDefault !3 -PATH CONTrol = Enabled
```

If you assigned multiple paths to a port, you need to re-enable each path assigned to the port.

- 6 Repeat steps 1 through 5 for each wide area path you configure.

- 7 If necessary, re-enable a wide area port.

If the port was previously disabled, you must re-enable it. For example, to re-enable port 3, enter:

```
SETDefault !3 -PORT CONTrol = Enabled
```

- 8 Assign a name to a wide area port (optional).

For example, to assign the name San Jose to wide area port 3, enter:

```
SETDefault !3 -PORT NAmE = "SanJose"
```

Refer to "Port and Path Naming Restrictions" on page A-7.

- 9 If necessary, change the default owner of a wide area port by using:

```
SETDefault !<port> -PORT OWNer = PPP | FrameRelay | SMDS |
      X25 | SDLC | Auto
```

See Table 3-11 to determine the default port owner for your wide area ports.

Table 3-11 Default Owner for WAN Ports

Bridge/Router	Default Owner for WAN Ports
All models except model 42x and 52x bridge/routers	Auto
Model 42x and 52x bridge/routers	Auto for serial ports; PPP for ISDN ports

By default, the auto startup feature on the SuperStack II bridge/router can provide an automatic PPP or Frame Relay data link connection. If you plan to run PPP or Frame Relay, you do not need to configure this parameter.



For proper operation, both the -PATH CONNector command and the -PORT OWNer command must be set to AUTO for the auto connector detection feature to work. The auto connector detects a DTE port instantly on initial startup, but may take up to five minutes to detect a cable change during operation.

Auto startup cannot detect a SMDS, X.25, or SDLC data link connection. If the owner of the wide area port is one of these protocols, you need to manually set the value of this parameter to SMDS, X25, or SDLC, as appropriate.

- 10 Repeat steps 7 through 10 for each wide area port you configure.

Configuring Virtual Ports

Before creating virtual ports for the ISDN interface on model 42x bridge/routers, you must decide how you want to use your ISDN interface. For more information, refer to *Using NETBuilder Family Software*.

Before configuring virtual ports, make sure that the owner of the wide area port associated with the path through which the virtual ports will be defined is set appropriately. For instructions, refer to "Configuring Wide Area Paths and Ports" on page 3-16.

To configure virtual ports, follow these steps:

- 1 Create a virtual port for each remote network attached to a Frame Relay, ATM DXI, X.25, or SMDS cloud by using:

```
ADD !<port> -PORT VirtualPort {<path> {<FR_DLCI> | <X.25
DTE> | SMDS}}
```

Virtual ports are numbered Vn , where n is a number from 1 through 28. You do not need to create virtual ports in numerical order.

For example, if you have a remote network on port 1 that uses Frame Relay DLCI 35, add virtual port V1 by entering:

```
ADD !V1 -PORT VirtualPort 1@35
```



ATM DXI ports also use the FR_DLCI value.

If you have a remote network on port 3 that uses X.25 DTE 31107551234, add virtual port V3 by entering:

```
ADD !V3 -PORT VirtualPort 3#31107551234
```

If you have a remote network on port 5 that uses SMDS, add virtual port V4 by entering:

```
ADD !V4 -PORT VirtualPort 5SMDS
```

The command syntax for SMDS virtual ports does not use an individual DTE address. The virtual port does not take effect until its SMDSIndivAddr parameter has been configured.

- 2 If necessary, re-enable the virtual port.

Virtual ports are enabled by default. For example, to re-enable virtual port V3 enter:

```
SETDefault !V3 -PORT CONTrol = Enabled
```

- 3 Assign a name to the virtual port (optional).

For example, to assign virtual port V3 the name First_St, enter:

```
SETDefault !V3 -PORT NAME = "First_St"
```

Some restrictions apply to the name you assign using the -PORT NAME parameter. For more information, refer to “Port and Path Naming Restrictions” on page A-7.

- 4 Repeat steps 1 through 3 for each virtual port you configure.

Assigning Internet Addresses

If you plan only to bridge, the bridge requires one Internet address to participate in network management and to be accessible from other devices through Telnet or SNMP. If you plan to route IP, the bridge/router requires Internet addresses for individual ports.

Assigning Addresses Automatically from BOOTP Servers

If the network administrator at a central site has configured the BOOTP server so that your SuperStack II bridge/router is a BOOTP client, then Internet addresses may have automatically been assigned during the automatic startup process. In this case, no action on your part is required. If you are responsible for configuring the boot configuration file on the BOOTP server so that automatic startup can take place, refer to *Using NETBuilder Family Software*.

To verify whether an Internet address was assigned during the automatic startup process, enter the following command:

```
SHow -IP NETaddr
```

If an Internet address is shown, then the SuperStack II bridge/router has been assigned that address. If an address was not assigned, the following message is displayed:

```
No IP address configured
```

For more information, or if you are unsure if an Internet address has been assigned, contact the network administrator at the central site or your network supplier.

Internet addresses are assigned for individual ports. To verify whether an Internet address was assigned to an individual port, use the following syntax:

```
SHow !<port> -IP NETaddr
```

When the bridge/router is installed for the first time, BOOTP requests are sent from each connected port requesting a BOOTP server to provide the SuperStack II bridge/router port with its Internet address and other configuration information. The ports continue to send BOOTP requests until the request has been answered. Also, every time a path comes up, if there is no Internet address previously assigned to it, BOOTP requests are sent requesting a BOOTP server to provide an Internet address.

After your bridge/router has been installed for the first time, you can control how it handles BOOTP requests using parameters in the BOOTPC Service. For information on this service, refer to *Reference for NETBuilder Family Software*.

Statically Configuring Internet Addresses

To statically configure an Internet address to a specific port for IP routing, refer to the *NETBuilder Family Bridge/Router Easy Step Configuration Map* or *Using NETBuilder Family Software*.

If you statically configure an Internet address to a port, that port will not send BOOTP requests for an Internet address.

To disable the port from acting as a BOOTP client (to stop BOOTP request packets from being sent out and to discard BOOTP reply packets), use:

```
SETDefault !<port> -BOOTPC CONTROL = Disable
```

Setting Up Security

To allow system administrator-only access to files, use these commands and parameters:

- SysPassWord

This command specifies the root password. For information on how to use the SysPassWord command, refer to “Changing the Root Password” on page 3-2. For syntax, privilege level, and description information, refer to *Reference for NETBuilder Family Software*.

- RemoteManager

This SYS Service parameter specifies the Internet addresses of devices that can connect to the system through the REMote command. For information on how to use the RemoteManager parameter, refer to *Reference for NETBuilder Family Software*.

- COMmunity

This SNMP Service parameter modifies the list of communities. For information on how to use the COMmunity parameter, refer to *Reference for NETBuilder Family Software*.

To implement auto startup, many NETBuilder configuration files are by default accessible to any SNMP-based manager with read and write privileges. To set SNMP access to read-only for all managers, enter:

```
DELeTe -SNMP COMMunity "anycom"  
ADD -SNMP COMMunity "anycom" RO
```

- The Audit Log feature generates a log message on a network management workstation that captures configuration changes and events for monitoring bridge/routers. For more information on this feature, refer to *Using NETBuilder Family Software*.

Where to Go From Here

For the minimum steps to get the following features up and running, refer to the *NETBuilder Family Bridge/Router Easy Step Configuration Map*:

- Transparent bridging over Frame Relay, X.25, and PPP
- IP and IPX routing over Frame Relay, X.25, and PPP
- Dial-up, including disaster recovery, bandwidth-on-demand, and dial-on-demand
- Data compression

The following configurations can be found in *NETBuilder Family Bridge/Router Easy Step WAN Configurations*:

- Routing IP over Frame Relay with disaster recovery
- Routing IPX over X.25 with data compression
- Routing IPX over PPP with dial-on-demand
- Routing IP over PPP with bandwidth on demand
- Boundary Routing over Frame Relay

All other features are described in *Using NETBuilder Family Software*.

Configuring the Central Node for Boundary Routing

Models 227, 327, 427, and 527 can be used as a central node in a Boundary Routing environment.

Boundary Routing system architecture treats the remote site as part of the central site LAN, allowing all routing to occur at the central site. A SuperStack II boundary router requires very little or no configuration. You must configure the central site for Boundary Routing by referring to the following chapters in *Using NETBuilder Family Software*:

- "Configuring Boundary Routing System Architecture"
- "Configuring Auto Startup"

4

RELOADING THE SYSTEM SOFTWARE

This chapter describes how to reload your system software if the following conditions occur:

- The boot image has been accidentally deleted or corrupted.
- The device is unable to boot.
- You have removed a flash memory upgrade.

You must have a console attached to your SuperStack II NETBuilder bridge/router to reload the system software.

For information on upgrading your system software to a newer version, refer to *Upgrading NETBuilder Family Software*.

To reload the software, you must have the software installed on a trivial file transfer protocol (TFTP) server on the LAN. Install the software on your server from the CD-ROM.

Loading the Software

The loading procedure in this section:

- Reformats the flash memory.
- Looks up the IP address of the server.
- Transfers the boot.68k file from the server.
- Creates the directory.
- Places the image in the primary directory.

To reload the system software, follow these steps:

- 1 Reset the boundary router by turning the power switch off and on again.

If the boot image has been accidentally deleted or corrupted, the boundary router should go into monitor mode, which is indicated by an angle bracket prompt (>). Go on to the next step.

If the boundary router does not go into monitor mode, then contact your network supplier. You do not need to complete the remaining steps.

- 2 Enter:

CL

The CL command allows you to configure the client address, server address, subnet mask, gateway address, and filename.

When addressing is configured using the CL command, you do not need to use a BOOTP server to acquire addresses. If you do not use the CL command, a BOOTP server must be available on the local LAN with an entry in its database for this device.

- 3 Enter:

FL boot.68k

The FL command formats the flash and uses TFTP to copy the image from the identified server to the flash drive.



If you are using BOOTP instead of locally configured addressing in the CL command, it is not necessary to include the filename.

- 4 Reset the bridge/router by pressing the Power switch on the back panel off then on.

Load Errors

During the software loading process, some hardware or software conditions can cause the process to fail. For more information about load errors, refer to Chapter 5.

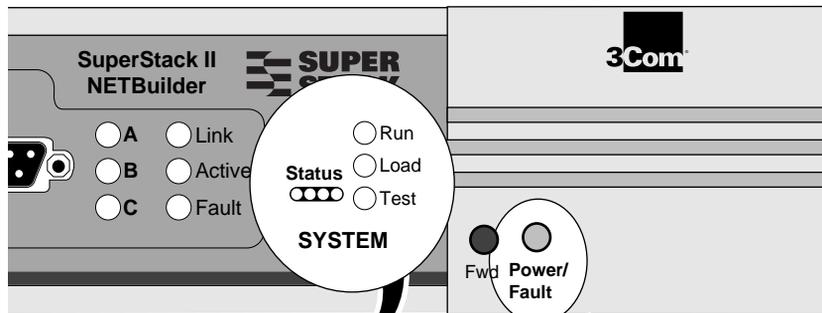
5

TROUBLESHOOTING

This chapter describes problems that may occur with your SuperStack II NETBuilder bridge/router and how to recognize them.

If the Power/Fault LED appears yellow at any time during the startup process, the bridge/router has encountered a problem during system test or system software load. If the Power/Fault LED appears yellow, check the other LEDs as shown in the following figures.

Models 22x and 42x



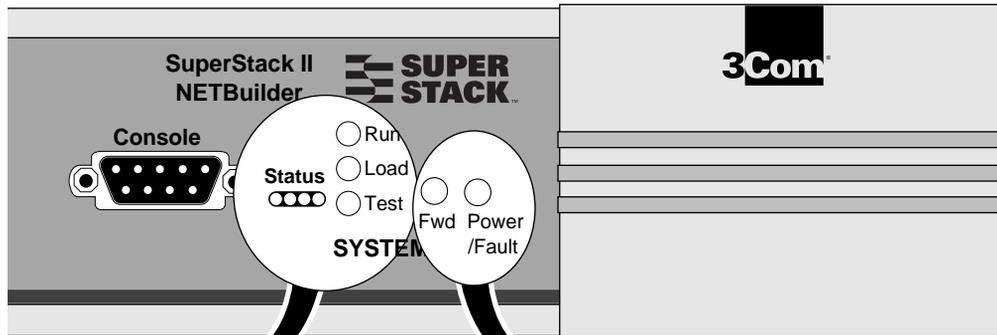
Status LEDs: (Left to right) is each one on or off?

Load LED: is it on constantly, or flashing?

Test LED: Is it on or off?

If the Power/Fault LED appears yellow during startup, check the other LEDs for related indications of the problem.

Models 32x and 52x



Status LEDs: (Left to right) is each one on or off?
Load LED: is it on constantly, or flashing?
Test LED: Is it on or off?

If the Power/Fault LED appears yellow during startup, check the other LEDs for related indications of the problem.

If the Test LED is lit, a problem occurred during the system test phase. Note the pattern of the Status LEDs and compare the results with the information in Table 5-1.

If the Load LED is lit, a problem occurred during the system software load phase. Note the pattern of the Status LEDs and compare the results with the information in Table 5-2.

Troubleshooting During the Test Phase

When a problem occurs during the test phase, the Status LEDs light in a particular pattern. Table 5-1 shows that Status LED pattern, the problem associated with that pattern, and the action to take.

Table 5-1 System Self-test Errors

Status LEDs						Test LED	Power/Fault LED	Meaning and Action
1	2	3	4					
Off	Off	On	On	On	Yellow		<i>EEPROM checksum test failed.</i> Contact your network supplier.	

Troubleshooting During the Load Phase

When a problem occurs during the load phase, the Status LEDs light in particular patterns. Table 5-2 shows the Status LED patterns, the problems associated with these patterns, and the actions to take.

Table 5-2 System Software Load Errors

Status LEDs					Power/Fault LED	Meaning and Action
1	2	3	4	Load LED		
Off	Off	On	On	On	Yellow	<p><i>Software image file has been deleted or boot source and image file names do not match.</i></p> <p>Reload the system software. Refer to “For information on upgrading your system software to a newer version, refer to Upgrading NETBuilder Family Software.” on page 4-1.</p>
On	Off	Off	Off	On	Yellow	<p><i>Unable to transmit BOOTP request. Bridge/router is not connected to Ethernet correctly.</i></p> <p>Check cable connections.</p>
On	Off	Off	On	On	Yellow	<p><i>No response to BOOTP request. BOOTP server not present or incorrectly configured.</i></p> <p>Check BOOTP server configuration and verify the MAC address of the bridge/router. Press Reset to retry the system software load. If the load is unsuccessful, call your network supplier for assistance.</p>
On	Off	On	Off	On	Yellow	<p><i>No response to Address Resolution Protocol (ARP) request from TFTP server. TFTP server not present or incorrectly configured.</i></p> <p>Check TFTP server configuration and verify the MAC address of the bridge/router. Press Reset to retry the system software load. If the load is unsuccessful, call your network supplier for assistance.</p>
On	On	On	On	On	Yellow	<p><i>Write to Flash File System failed.</i></p> <p>Call your network supplier for assistance.</p>

LED Meanings

Table 5-3 provides the meanings for the lit LEDs on a SuperStack II bridge/router.

Table 5-3 LED Meanings

Models	Associated Connector	LED	Meaning
22x, 42x	10 Base T	Link	The platform is connected to functional 10BASE-T equipment.
22x, 42x	10 Base T	10BT	Of the two possible local area connectors, the 10 Base T connector is selected.
22x, 42x	10 Base T	+/-	The polarity of the 10 Base T connection is reversed.
22x, 42x	AUI or 10 Base T (Ethernet)	Send	The system is transmitting a packet to the LAN port. If it is connected correctly to the LAN network, the Active LED for the AUI connector should light at the same time.
32x or 52x	UTP or STP	16 MB	The system is either attempting to enter or has successfully entered the token ring at the rate of 16 MB. This LED will not light if the system is either attempting to enter or has successfully entered the token ring at the rate of 4 MB.
All	AUI or 10 Base T (Ethernet) UTP or STP (token ring)	Active	The system is transmitting or receiving traffic.
All	AUI or 10 Base T (Ethernet) UTP or STP (token ring)	Fault	A packet error is detected.
42x, 52x	ISDN (D channel)	Line Act	The ISDN line is activated.
42x, 52x	ISDN (D channel)	Line Error	Indicates a disconnected cable, or a loss of phantom power.
42x, 52x	ISDN B1, B2	Link	The path using B1 or B2 is up.
42x, 52x	ISDN B1, B2	Connect	An end-to-end B channel connection exists or is in progress.
42x, 52x	ISDN B1, B2	Fault	An error in the received frames is detected.

(continued)

Table 5-3 LED Meanings (continued)

Models	Associated Connector	LED	Meaning
All	V.35, UNIVERSAL (token ring), RS-449 (Ethernet), and RS-232	Link	The path is up.
All	V.35, UNIVERSAL (token ring), RS-449 (Ethernet), and RS-232	Active	A physical connection to an active device such as a digital service unit (DSU) or modem has been established.
All	V.35, UNIVERSAL (token ring), RS-449 (Ethernet), and RS-232	Fault	An error in the received frames is detected.
All	Not applicable. Applies to system.	Status	Provides additional status for the Run, Load, and Test LEDs.
All	Not applicable. Applies to system.	Run	The system software has successfully loaded and is running.
All	Not applicable. Applies to system.	Load	The system software is being loaded.
All	Not applicable. Applies to system.	Test	The system is executing self-tests.
All	Not applicable. Applies to system.	Fwd	A packet is being forwarded between any two ports.
All	Not applicable. Applies to system.	Power/ Fault	If the LED is green, the bridge/router has power. If the LED is yellow, a problem is preventing normal operation.

Troubleshooting the Token Ring Connection (32x and 52x)

Table 5-4 summarizes problems that can occur with a token ring connection and what action you can take. This information applies to Models 32x and 52x only.

Table 5-4 Troubleshooting the Token Ring Connection (Models 32x and 52x only)

Symptom	Cause and Action
<p>The LAN LEDs are doing the following:</p> <ul style="list-style-type: none"> ■ 16 MB LED is blinking slowly (turning on then off at approximately 15 second intervals). ■ The Fault LED is on. 	<p>The following are possible problems indicated by the LED indicators:</p> <p><i>Cable connection problem</i></p> <p>The LAN cable may be improperly connected. Verify that the LAN cable is properly connected at both ends. Check the wall plate if used and the multistation access unit (MAU) of the central wiring center.</p> <p><i>Bad cable</i></p> <p>You may be cabling your STP or UTP connector with a faulty or improperly wired cable. Swap the cable for another cable that is known to work.</p> <p><i>Bad concentrator port</i></p> <p>The port or port connector of the MAU may be defective. Move the station's cable to another MAU port that is known to work.</p> <p><i>Heavy network traffic</i></p> <p>The Activity LED may remain off longer than expected. Wait for network traffic to subside.</p> <p><i>Insertion at the wrong speed</i></p> <p>The system may have attempted to enter the token ring network at the wrong speed. Check the setting of the ring speed for path 1 (SHow !1 -PATH BAud). Make sure that the setting of this parameter matches the speed of the token ring network. Also, check the path to make sure that it is enabled (SHow !1 -PATH CONTrol).</p> <p><i>Duplicate node address</i></p> <p>Check to make sure that the MAC address of the system on your network is unique.</p> <p><i>Token ring experiencing network error recovery</i></p> <p>The Activity LED may remain off longer than expected. Wait for normal token ring operation after an automatic error recovery.</p> <p>If none of these actions solves your problem, contact your network supplier.</p>

(continued)

Table 5-4 Troubleshooting the Token Ring Connection (Models 32x and 52x only) (continued)

Symptom	Cause and Action
Path 1 is up, but the system does not appear to be communicating with other network devices.	<p><i>The system may have attempted to enter the token ring at the wrong speed.</i></p> <p>Check the setting of the ring speed for path 1 (SHow !1 -PATH BAud). Make sure that the setting of this parameter matches the speed of the token ring network.</p>
The following error message appears: This is the only station on the ring	<p><i>If your system is the first device to enter the ring, disregard this message. If there are multiple nodes on the ring, your system may be isolated.</i></p> <ol style="list-style-type: none"> 1 Determine the number of nodes on your ring. 2 If there are multiple nodes on the ring, check the setting of the ring speed for path 1. (In monitor mode, enter CL, then select ring speed from the menu that displays.) Make sure that the setting of this parameter matches the speed of the token ring network.
One of these error messages appears: Possible ring speed mismatch Adapter is not connected to a ring or Open failed during phase - lobe media.	<p><i>Possible physical connection problem or the system may have attempted to enter the token ring at the wrong speed.</i></p> <ol style="list-style-type: none"> 1 Check your LAN cable. 2 Determine the ring speed of your token ring network. 3 Check the setting of the ring speed for path 1. (In monitor mode, enter the CL, then select ring speed from the menu that displays.) Make sure that the setting of this parameter matches the speed of the token ring network.
Specialty powered wiring center (MAU) or signal conversion device (such as STP-to-fiber optic transceivers) will not work on STP connector.	<p><i>External device may have overstressed the auxiliary power's limits, lowering available voltage to unacceptable levels.</i></p> <p>Refer to the cabling information in your hardware installation manual for voltage, current, and pinout specifications of this feature. Refer to the documentation that accompanies your external device for compatibility information.</p> <p><i>External device may have blown the fuse of the system.</i></p> <p>Return the system for fuse replacement.</p> <p>If these actions do not solve the problem, contact your network supplier.</p>

(continued)

Table 5-4 Troubleshooting the Token Ring Connection (Models 32x and 52x only) (continued)

Symptom	Cause and Action																										
The MAC address of the system does not appear on the token ring network.	<p data-bbox="515 307 1143 333"><i>The MAC address on the network is in noncanonical format.</i></p> <p data-bbox="548 348 1263 479">The MAC address encoded on the EEPROM and printed on the label is in canonical format and needs to be converted to noncanonical format. Each byte, represented by the number pairs below, consists of 8 bits. To convert the canonical byte 1A (in hexadecimal) to the noncanonical byte, you must mirror the bits, as shown.</p> <div data-bbox="548 517 1232 760" style="text-align: center;"> <table style="border-collapse: collapse; margin: auto;"> <tr> <td style="padding: 0 10px;">08</td> <td style="padding: 0 10px;">00</td> <td style="padding: 0 10px;">02</td> <td style="border: 1px solid black; padding: 2px 5px;">1A</td> <td style="padding: 0 10px;">4B</td> <td style="padding: 0 10px;">5C</td> <td style="padding: 0 10px;">canonical (least significant bit first)</td> </tr> <tr> <td colspan="7" style="text-align: center;"><i>is converted to</i></td> </tr> <tr> <td style="padding: 0 10px;">10</td> <td style="padding: 0 10px;">00</td> <td style="padding: 0 10px;">40</td> <td style="border: 1px solid black; padding: 2px 5px;">58</td> <td style="padding: 0 10px;">D2</td> <td style="padding: 0 10px;">3A</td> <td style="padding: 0 10px;">noncanonical (most significant bit first)</td> </tr> </table> <table style="margin: auto;"> <tr> <td style="text-align: center; padding: 0 10px;">1A</td> <td style="text-align: center; padding: 0 10px;">=</td> <td style="text-align: center; padding: 0 10px;">58</td> </tr> <tr> <td style="text-align: center;"> 0001 1010 ↑ ↑ </td> <td style="text-align: center;"> 0101 1000 ↑ ↑ </td> </tr> </table> <p data-bbox="548 774 1263 826">The MacAddrConvert command converts a MAC address in canonical format to noncanonical format. For example, if you enter:</p> <p data-bbox="548 841 943 864">MacAddrConvert 0800021A4B5C</p> <p data-bbox="548 883 901 909">The system displays the following:</p> <p data-bbox="548 925 743 946">%10004058D23A</p> </div>	08	00	02	1A	4B	5C	canonical (least significant bit first)	<i>is converted to</i>							10	00	40	58	D2	3A	noncanonical (most significant bit first)	1A	=	58	0001 1010 ↑ ↑	0101 1000 ↑ ↑
08	00	02	1A	4B	5C	canonical (least significant bit first)																					
<i>is converted to</i>																											
10	00	40	58	D2	3A	noncanonical (most significant bit first)																					
1A	=	58																									
0001 1010 ↑ ↑	0101 1000 ↑ ↑																										

If you experience a problem or receive an error message that is not documented in Table 5-4, contact your network supplier.

Performing Loopback Tests

Performing a Loopback Test on an ISDN Interface

This section describes how to perform a loopback diagnostic test on the ISDN and serial interfaces.

You can perform a loopback test using two B channels on one ISDN line.

Figure 5-1 shows the data flow that occurs when this loopback test is performed. Both of these channels occupy the same physical connector and no modem is required in this configuration.

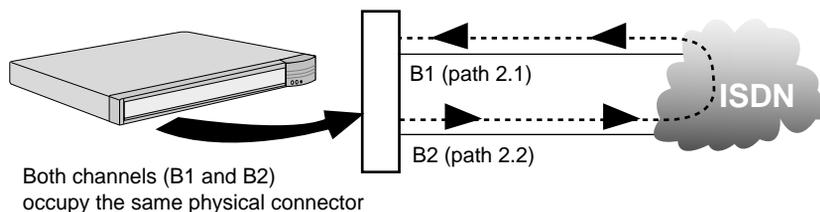


Figure 5-1 ISDN Loopback Testing

To run the loopback diagnostics test, you must have a console connected to your SuperStack II bridge/router.

To perform a loopback test on an ISDN interface, follow these steps:

- 1 Set the path line type to Dialup by using:

```
SETDefault !<path> -Path LineType = Dialup
```

To perform the test shown in Figure 5-1, enter:

```
SETDefault !2.1 -Path LineType = Dialup
SETDefault !2.2 -Path LineType = Dialup
```

- 2 Set the rate adaption parameter to automatically detect the speed of the interface by using:

```
SETDefault !<path> -Path RateAdaption = Auto
```

In the example shown in Figure 5-1, the test originates from path 2.2 and targets 2.1. To specify this for path 2.2, enter:

```
SETDefault !2.2 -Path RateAdaption = Auto
```

- 3 Set the switch type by using:

```
SETDefault !<path> -Path SwitchType = ETSI | NTT | ATT5ESS
| NT1 | DMS100 | KDD | AUSTEL
```

To set the switch type to ETSI, enter:

```
SETDefault !2 -Path SwitchType = ETSI
```

- 4 Establish the local dial numbers for the bearer channels by using:

```
SETDefault !<port> -Path LocalDialNo = "<string>"
```

To establish the local dial numbers for the two bearer channels, enter the following commands:

```
SETDefault !2.1 -Path LocalDialNo = "4962124"  
SETDefault !2.2 -Path LocalDialNo = "4962125"
```

- 5 Configure the ports for loopback testing using the following syntax:

```
SETDefault !<port> -PORT OWNeR = Loopback
```

Enter Loopback as the owner on both the sending and receiving ports. For example, you enter:

```
SETDefault !2 -PORT OWNeR = Loopback  
SETDefault !3 -PORT OWNeR = Loopback
```

- 6 Establish a connection between the two bearer channels by dialing out on one channel and dialing into the other by using:

```
Dial !<path> "<string>"
```

The following example shows dialing port 2 from port 3:

```
Dial !2.2 "4962124"
```

Path 2.2 places a call to the specified number, which is the number for path 2.1. It is not important which port originates or answers the call as long as the port does not try to call itself.

- 7 When the connection is successfully established, select the loopback testing mode by entering:

```
DLTest TestMode Loopback
```

You can specify the number of seconds the test should run. Enter this value any time before entering the DLTest START command. If a value is not specified, an infinite time duration is assumed. To run the test for a specific number of seconds, use:

```
DLTest TestDuration <seconds>
```

Use caution when running for a specified test duration. The test ends abruptly as soon as the time duration expires and a discrepancy between the number of packets transmitted and the number received may result.

- 8 Start the DLTest by using:

```
DLTest Start <sendingport>, <receivingport>
```

The following command starts the DLTest and designates port 2 to send the DLTest data and port 3 to receive and loop back the data:

```
DLtest START 2,3
```

The loopback test is successful when the number of received packets equals or approximately equals the number of transmitted packets. If the test is not successful, verify that your bridge/router is cabled and installed correctly. You can check the number of packets transmitted and the number of errors by using:

```
DLTest Stat
```

- 9 Stop the DLTest by entering:

```
DLTest Abort
```

- 10 Disconnect the call by entering:

```
HangUp !2.2
```

- 11 Change the port owner from loopback to the original owner by using:

```
SETDefault !<port> -PORT OWNeR = PPP
```

Performing a Loopback Test on a Serial Interface

This section describes how to perform a loopback test on a serial data terminal equipment (DTE) line over which PPP is running.

Figure 5-2 shows the data flow that occurs when a loopback test is performed on a serial line. A modem is required in this configuration.

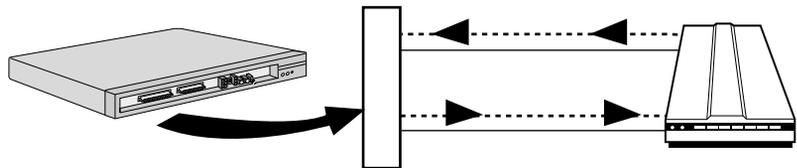


Figure 5-2 Serial Loopback Testing

Before running the serial loopback test, complete the following tasks:

- Attach a console to your bridge/router.
- Place the modem in local loopback test mode. For information, refer to the documentation that accompanies your modem.
- Verify the connector type, path number, and port number that correspond to the serial line you are testing by referring to Table 4-4 or Table 4-5.

To perform a loopback test on a serial interface, follow these steps:

- 1 Disable the auto startup feature on the path you are testing by changing the default value of the `-PATH LineType` parameter from `Auto` to `Leased` by using:

```
SETDefault !<path> -PATH LineType = Leased
```

For example, if you are testing the serial line corresponding to the RS-232 connector on a model 227 bridge/router, enter:

```
SETDefault !4 -PATH LineType = Leased
```

- 2 Verify that the connector type of the path you are testing is set correctly by using:

```
SHow !<path> -PATH CONNector
```

If the actual and configured connector types do not match or if you have model 42x and the connector type is set to `Auto`, reconfigure the connector type using:

```
SETDefault !<path> -PATH CONNector = V35 | RS232 | RS449 |  
X21
```

For example, if you are testing the serial line corresponding to the RS-232 connector, enter:

```
SETDefault !4 -PATH CONNector = RS232
```

- 3 Set the owner of the wide area port you are testing to loopback by using:

```
SETDefault !<port> -PORT OWNer = LoopBack
```

For example, if you are testing the serial line corresponding to the RS-232 connector, enter:

```
SETDefault !4 -PORT OWNer = LoopBack
```

- 4 Select the loopback test mode by entering:

```
DLTest TestMode LoopBack
```

- 5 Specify the number of seconds that the test should run by using:

```
DLTest TestDuration <seconds>
```

If you do not enter a value, the test will run indefinitely. However, use caution when running the test for a specified duration. The test ends abruptly as soon as the time duration expires, and a discrepancy between the number of packets transmitted and the number received may result.

- 6 Start the serial loopback test by using:

DLTest START

If the number of received packets equals or approximately equals the number of transmitted packets, your serial line has passed the serial loopback test. If your serial line does not pass the test, verify that your bridge/router is cabled correctly and that the software is configured correctly. Also, check the number of packets transmitted and the number of errors by entering:

DLTest STATistics

- 7 Stop the serial loopback test by entering:

DLTest Abort

- 8 Restore the owner of the wide area port you are testing from loopback to PPP by using:

```
SETDefault !<port> -PORT OWNer = PPP
```



Failure to perform this step causes the port to remain in loopback mode preventing connectivity through the port. Performing diagnostics on the port will reveal only that the port is down.

For example, if you are testing the serial line corresponding to the RS-232 connector, enter:

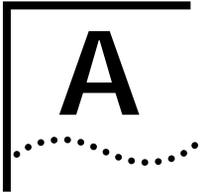
```
SETDefault !4 -PORT OWNer = PPP
```

Memory Dumps

If a SuperStack II bridge/router unexpectedly stops functioning, you may receive a message that instructs you to perform a memory dump. A memory dump provides a view of the internal state of the system, which can help Technical Support determine the cause of the failure.

Refer to the SysconF command appendix in *Reference for NETBuilder Family Software*.





SYNTAX CONVENTIONS

This appendix describes NETBuilder software syntax conventions.

Full Form Syntax

You can see the full form syntax provided by the online help in the software by typing a question mark (?) or a question mark with other options as described in "Getting Help" on page A-9.

An example of full form syntax, including callouts to the parts and symbols that make up the command syntax, is shown in Figure A-1. For more information on symbols, refer to "Symbols" on page A-2.

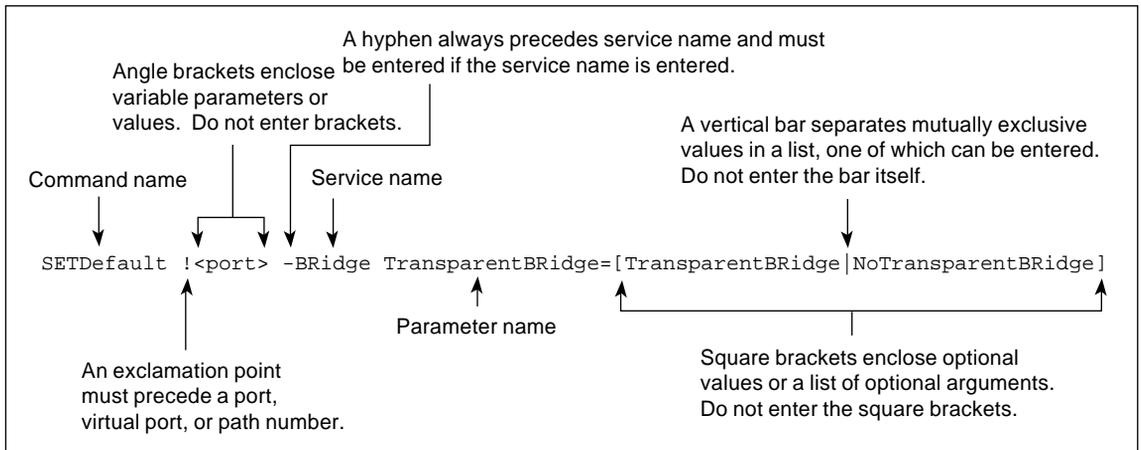


Figure A-1 Full Form Syntax

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

Figure A-2 shows the abbreviated version of the syntax shown in Figure A-1.

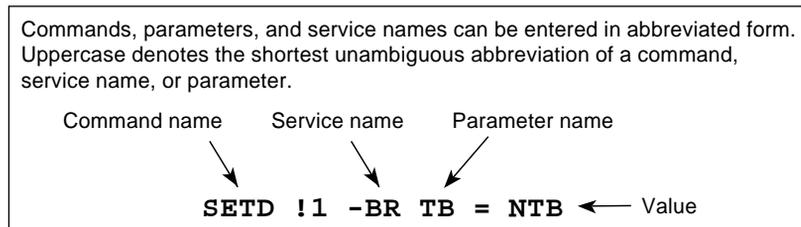


Figure A-2 Abbreviated Syntax

Additional syntax examples are provided in “Full and Abbreviated Syntax Examples” on page A-4.

Symbols Depending on the command, you may see a variety of symbols as part of the command syntax. These symbols are summarized in Table A-1.

Table A-1 Command Syntax Symbols

Symbol	Description
angle brackets < >	Enclose a variable or value. You must specify the variable or value; for example, in the syntax: <code>ADD -SNMP COMMunity <"com.name"></code> you must supply a name for com.name when entering the command.
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: <code>SET PRiVilege = [User NetMgr]</code> you can specify either User or NetMgr when entering the command.

(continued)

Table A-1 Command Syntax Symbols (continued)

Symbol	Description
parentheses ()	<p>Enclose a list of values that can be assigned to a single parameter. At least one of them must be selected. You must enter the parentheses and separate the values with a comma if you are assigning more than one value. For example, in the syntax:</p> <pre>SET CurrentPorts = ALL (<port>[,<port>])</pre> <p>you can specify two port numbers by enclosing them in parentheses and separating them with a comma when entering the command.</p>
vertical bar	<p>Separates mutually exclusive items in a list, one of which must be entered. For example, in the syntax:</p> <pre>SET ScreenLength = [None <line>(6-100)]</pre> <p>you can specify either the keyword None or enter a number between 6 and 100 when entering the command.</p>
ellipsis ...	<p>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:</p> <pre>ADD !<port> -IP SecAuthIn <authority> [<authority> ...] [ANY]</pre> <p>you can specify multiple authorities (GENSER, SIOP, SCI, NSA, DOE, NONE) when entering the command.</p>
hyphen -	<p>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:</p> <pre>SETDefault -BRidge CONTROL = Bridge</pre> <p>the hyphen must be included with the service name BRidge when entering the command.</p>
braces { }	<p>Enclose a list of values, one of which must be entered. For example, in the syntax:</p> <pre>SETDefault !<subaddr #> -Gateway SubAddrMap = {(<IPaddr> <PSAPaddr>) None}</pre> <p>you must enter either an IP address, presentation service access point (PSAP) address, or the keyword None when entering the command.</p>
exclamation mark !	<p>A number preceded by an exclamation mark represents a port, virtual port, or path number. For example, in the syntax:</p> <pre>SHow [!<port>] -DECnet CONFIguration</pre> <p>the exclamation mark must be included before the port number when entering the command.</p>

Full and Abbreviated Syntax Examples

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

The full form syntax:

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

can be abbreviated to:

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

The following abbreviated command specifies that a neighbor on port 2 network number &10 with address %080002030ef2 receives Routing Internet Protocol (RIP) and Service Access Point (SAP) updates:

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

The full form syntax:

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

can be abbreviated to:

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

The following abbreviated command enables IP routing, packet filtering, and security:

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



For consistency and clarity in the NETBuilder family guides, the full form syntax is provided. However, you can use the abbreviated form by only typing the uppercase portion of the command and supplying the appropriate values.

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 the 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 command syntax is followed by the syntax variations (different values for different parameters) appropriate to the parameter associated with a service:

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

Entering Service Names in Command Lines

When you are configuring or displaying a parameter, service names must be provided to differentiate commands that appear in more than one service. The service name may be entered in abbreviated form. The service 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 a single service was set with the CurrentServices parameter. If multiple services are set, the system prompt is displayed. For information on using the CurrentServices parameter, refer to *Reference for NETBuilder Family Software*.
- If the command is for a Global parameter, (the command affects the entire system environment) you must not specify a service name. For descriptions of those parameters affecting the system, refer to *Reference for NETBuilder Family Software*.
- If the parameter name is unique.

Using Aliases

To avoid entering lengthy commands at the prompt, you can customize the command name using an alias. You can create an alias to represent any command. Use the following syntax to define an alias:

```
ADD -SYS ALias <aliasname> <arguments ...>
```

For example, if you use the `SHOW -SYS NetMAP` command often, create an alias called `ntmap` as follows:

```
ADD -SYS ALias NTMAP SHow -SYS NetMAP
```

Each time you want to display the network map, enter:

```
ntmap
```

Command History Substitution

The bridge/router “remembers” the 10 most recent commands you entered. To display a list of these commands, enter:

```
SHow History
```

To repeat any of the commands displayed, use the event designator, which is represented by an exclamation point (!). Table A-2 describes history substitution option syntax.

Table A-2 History Substitution Option Syntax

Syntax	Description
!!	Repeats the previous command.
! <i>n</i> >	Repeats the command line numbered <i>n</i> .
! -< <i>n</i> >	Repeats the command whose number is the current command number minus <i>n</i> . The current command number is printed on the screen preceding the prompt. For example, if the current command is 100 and <i>n</i> is 2, command number 98 is repeated.
! <i>string</i> >	Repeats the most recent command that starts with <i>string</i> . The <code>SHow History</code> command might display the following commands: <pre>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 ?</pre> If you enter <code>!setd</code> at the prompt, the most recent occurrence of the <code>SETDefault</code> command (<code>setd -br cont = b</code> , number 170) is executed.

(continued)

Table A-2 History Substitution Option Syntax (continued)

Syntax	Description
!<string>	Repeats the most recent command containing <i>string</i> .
^<string1> ^<string1>^<string2>	<p>Repeats the most recent command that contains <i>string1</i>. If <i>string2</i> is specified, it substitutes for <i>string1</i> in that command. For example, if you entered this SETDefault command with a typing mistake:</p> <pre>seed welcomestring = "You are talking to the 3Com NETBuilder"</pre> <p>To repeat the command with the correct spelling of SETD, you do not need to reenter the entire command. Enter the following command:</p> <pre>^seed^setd</pre> <p>The following command is displayed and executed:</p> <pre>setd welcomestring = "You are talking to the 3Com NETBuilder"</pre>

Privilege Level

The privilege level determines which commands and parameters you can access. If you log on to the bridge/router with root login, your privilege level is Network Manager, which allows you access to all the commands and parameters.

You can create users with either User or Network Manager privilege. Some commands are available only to root. For more information, refer to "Adding User Accounts" on page 3-3.

Port and Path Naming Restrictions

The following restrictions exist for the -PORT and -PATH NAME parameter:

- The name string can contain a maximum of eight characters, the first of which must be alphabetic.
- No blank spaces are allowed in the name string. The only non-alphanumeric characters allowed are the asterisk (*), the underscore (_), the period (.), the dash (-), and the at sign (@).
- Names must be unique within their type. For example, a path name cannot be the same as an existing path name, but it can be the same as an existing port or virtual port name.
- Alphabetic characters are stored and displayed as entered. Names are not case-sensitive when compared on entry with previously entered names. For example, port2 and PORT2 are evaluated as the same name.

When defining the name parameter, these error messages may be returned:

```
Rejected name - Contains invalid character(s)
Rejected name - Null string not allowed
Rejected name - It is already in use
Rejected name - Must start with alphabetic character
```

ISDN-Related Syntax Variation

The syntax for some parameters in some services is different for ISDN interfaces than it is for all other types of interfaces. The syntax variation for these parameters is presented in the following format:

For non-ISDN interfaces

```
SETDefault !<path> -PATH CONTROL = (Enabled | Disabled)
SHow !<path> -PATH CONTROL
```

For ISDN interfaces

```
SETDefault !<connectorID.channelID> -PATH CONTROL =
  (Enabled | Disabled)
SHow [!<connectorID.channelID> | !<connectorID>.*] -PATH
  CONTROL
SHowDefault [!<connectorID.channelID> | !<connectorID>.*]
  -PATH CONTROL
```



The software menus and help string do not give the syntax variation for ISDN interfaces. Although the software does not give this variation, you must input the syntax for these ISDN-related parameters as shown in this guide.

A different path numbering convention used for ISDN causes the variation in syntax. For complete information on the different path numbering convention, refer to “Paths, Ports, and Virtual Ports” on page 3-5. Also, some of the variations in syntax are the result of the introduction of new ISDN-related parameters.

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

If you do not specify a channel number in a command syntax that requires a connector and channel number, the bridge/router assumes the first channel associated with the specified connector. For example, if you specify only connector number 2 when the command syntax requires that you specify both a connector and channel number, the bridge/router assumes 2.1.

If you want to specify all channels associated with a connector in a command syntax, specify the connector number, a decimal point, then an asterisk, for example, 2.*



A path is the physical interface that connects the bridge/router to a physical medium such as an Ethernet bus, a token ring, or a serial line. In an ISDN environment, a path also represents the channel over which data is transmitted.

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 A-3.

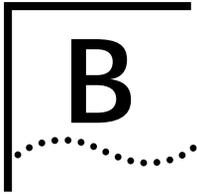
Table A-3 Online Help Syntax Summary

Syntax	Description
?	Displays the help menu. Different commands are displayed depending on whether you have Network Manager privilege or User privilege. The commands are organized according to services. If you have User privilege and you enter a Network Manager command, the following message appears: <code>Insufficient privilege</code>
-?	Displays a list of services available on the bridge/router.
-<service> ?	Displays a list of commands within the selected service. For example, to display a list of commands in the SYS Service, enter the following command: <code>-SYS?</code> If there are no commands under the service you specify, a message is displayed to indicate this. For example: <code>-IDP?</code> <code>No commands available in IDP service</code>

(continued)

Table A-3 Online Help Syntax Summary (continued)

Syntax	Description
<code><command> -<service> ?</code>	Displays a list of parameters within the selected service. For example, to display a list of PORT Service parameters that can be used with the SETDefault command, enter the following command: SETDefault -PORT?
<code><command> ?</code>	Displays the parameters by service name that can be used with the selected command. Only those parameters in services specified by the CurrentServices parameter are displayed.
<code><command> -<service> <parameter> ?</code>	Displays the syntax for a command used with a particular parameter. For example, to display the syntax for the SETDefault command used with the CONTrol parameter in the SNMP Service, enter the following command: SETDefault -SNMP CONTrol?



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 very latest, we recommend that you access 3Com Corporation's 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 Bulletin Board Service (3ComBBS)
- 3ComFactsSM automated fax service
- 3ComForum on CompuServe online service

World Wide Web Site

Access the latest networking information on 3Com Corporation's World Wide Web site by entering our URL into your Internet browser:

`http://www.3com.com/`

This service features the latest information about 3Com solutions and technologies, customer service and support, news about the company, *Net Age*[®] Magazine, and more.

3Com Bulletin Board Service

3ComBBS contains patches, software, and drivers for all 3Com products, as well as technical articles. 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 14400 bps	61 2 9955 2073
Brazil	up to 14400 bps	55 11 547 9666
France	up to 14400 bps	33 1 6986 6954
Germany	up to 28800 bps	4989 62732 188
Hong Kong	up to 14400 bps	852 2537 5608
Italy (fee required)	up to 14400 bps	39 2 27300680
Japan	up to 14400 bps	81 3 3345 7266
Mexico	up to 28800 bps	52 5 520 7853
P.R. of China	up to 14400 bps	86 10 684 92351
Singapore	up to 14400 bps	65 534 5693
Taiwan, R.O.C.	up to 14400 bps	886 2 377 5840
U.K.	up to 28800 bps	44 1442 438278
U.S.A.	up to 28800 bps	1 408 980 8204

Access by Digital Modem

ISDN users can dial in to 3ComBBS using a digital modem for fast access up to 56 Kbps. To access 3ComBBS using ISDN, use one of the following numbers:

408 654 2706 or **408 654 2703**

3ComFacts Automated Fax Service

3Com Corporation's interactive fax service, 3ComFacts, provides data sheets, technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, 7 days a week.

Call 3ComFacts using your Touch-Tone telephone using one of these international access numbers:

Country	Telephone Number
U.K.	44 1442 438279
U.S.A.	1 408 727 7021

Local access numbers are available within the following countries:

Country	Telephone Number	Country	Telephone Number
Australia	1800 678 515	Netherlands	06 0228049
Belgium	0800 71279	New Zealand	0800 446 398
Denmark	800 17319	Norway	800 11062
Finland	98 001 4444	Portugal	0505 442 607
France	05 90 81 58	Russia (Moscow only)	956 0815
Germany	0130 81 80 63	Singapore	800 6161 463
Hong Kong	800 933 486	Spain	900 964 445
Italy	1678 99085	Sweden	020 792954
Malaysia	1800 801 777	U.K.	0800 626403

3ComForum on CompuServe Online Service

3ComForum contains patches, software, drivers, and technical articles about all 3Com products, as well as a messaging section for peer support. To use 3ComForum, you need a CompuServe account.

To use 3ComForum:

- 1 Log on to your CompuServe account.
- 2 Type **go threecom**
- 3 Press [Return] to see the 3ComForum main menu.

Support from Your Network Supplier

If additional assistance is required, 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:

- 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 receive support from your network supplier, technical support contracts are available from 3Com.

Contact your local 3Com sales office to find your authorized service provider using one of these numbers:

Regional Sales Office	Telephone Number	Regional Sales Office	Telephone Number
3Com Corporation		3Com GmbH (cont'd)	
P.O. Box 58145	800 NET 3Com <i>or</i>	Germany	49 30 34 98790 (Berlin)
5400 Bayfront Plaza	1 408 764 5000	(Central European HQ)	49 89 627320 (Munich)
Santa Clara, California	408 764 5001 (fax)	Hungary	36 1 250 83 41
95052-8145		Poland	48 22 6451351
U.S.A.		Switzerland	41 31 996 14 14
3Com Asia Limited		3Com Iberia	
Australia	61 2 9937 5000 (Sydney)	Portugal	351 1 3404501
	61 3 9866 8022 (Melbourne)	Spain	34 1 383 17 00
Hong Kong	852 2501 1111	3Com Ireland 353 1 820 7077	
India	91 11 644 3974	3Com Latin America	
Indonesia	62 21 572 2088	U.S. Headquarters	408 326 2093
Japan	81 6 536 3303 (Osaka)	Northern Latin America	305 261 3266 (Miami, Florida)
	81 3 3345 7251 (Tokyo)	Argentina	541 312 3266
Korea	82 2 319 4711	Brazil	55 11 5181 0869
Malaysia	60 3 732 7910	Chile	562 633 8935
New Zealand	64 9 366 9138	Colombia	571 629 4110
Philippines	632 892 4476	Mexico	52 5 520 7841/7847
P.R. of China	8610 68492568 (Beijing)	Peru	51 1 221 5399
	86 21 63501581 (Shanghai)	Venezuela	58 2 953 8122
Singapore	65 538 9368	3Com Mediterraneo	
Taiwan, R.O.C.	886 2 377 5850	Italy	39 2 253011 (Milan)
Thailand	662 231 8151 5		39 6 5279941 (Rome)
3Com Benelux B.V.		3Com Middle East 971 4 349049	
Belgium	32 2 725 0202	3Com Nordic AB	
Netherlands	31 30 6029700	Denmark	45 39 27 85 00
3Com Canada		Finland	358 0 435 420 67
Calgary	403 265 3266	Norway	47 22 58 47 00
Edmonton	403 423 3266	Sweden	46 8 632 56 00
Montreal	514 683 3266	3Com Russia 007 095 258 09 40	
Ottawa	1 613 566 7055	3Com Southern Africa 27 11 807 4397	
Toronto	416 498 3266	3Com UK Ltd.	
Vancouver	604 434 3266		44 131 240 2900 (Edinburgh)
3Com France 33 1 69 86 68 00			44 161 873 7717 (Manchester)
3Com GmbH			44 162 889 7000 (Marlow)
Austria	43 1 513 4323		
Czech Republic/Slovak Republic	420 2 21845 800		

Returning Products for Repair

Before you send a product directly to 3Com for repair, you must first obtain a Return Materials Authorization (RMA) number. Products sent to 3Com without RMA numbers will be returned to the sender unopened, at the sender's expense.

To obtain an RMA number, call or fax:

Country	Telephone Number	Fax Number
U.S.A. and Canada	1 800 876 3266, option 2	408 764 7120
Latin America	1 408 326 2927	408 764 7120
Europe, South Africa, and Middle East	44 1442 438125	44 1442 435822
Elsewhere	1 408 326 2926	1 408 764 7120

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