# SCO® LLI Driver Disk

## Release and Installation Notes

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# **Driver Disk**
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*Chapter 1*

# *Introduction*

These *SCO® LLI Driver Disk Release and Installation Notes*, which are referred to here as simply *Release Notes*, contain the latest information on the SCO LLI Driver Disk. The introductory sections discuss notational conventions, the contents of the SCO LLI Driver Disk, supported operating environments and the new features of this release. Subsequent sections contain a product overview, installation and configuration information, removal procedures, and known problems with this release. Appendixes provide detailed sample procedures for configuring the supported transport stacks over LLI drivers as well as a set of supplemental manual pages.

**NOTE** Please read through this entire document before installing the software or configuring your drivers.

## *Conventions used in this guide*

This guide uses the following notational conventions:

| | |
|---|---|
| **bold** | Commands, command options, and daemons appear in bold. |
| BOLD CAPS | Parameters contained in files appear in uppercase bold. |
| *italics* | Files and directories appear in italics. Italics are also used for emphasis. |
| ***bold italics*** | Variables that you supply are in bold italics. For example, in the command **path:*pathname***, you replace the variable "pathname" with an actual pathname when you type the command. |
| ⟨⟩ | Special keys that you press are in angle brackets, ⟨ ⟩. For example, ⟨Ctrl⟩**x** means to hold down the Control key and press the **x** key simultaneously, then release them. |
| `Courier` | System responses and programming examples appear in Courier style font. |

## *Contents of the SCO LLI Driver Disk*

The SCO LLI Driver Disk contains both software and documentation.

- The software consists of a disk labeled SCO LLI Driver Disk, Release 3.1.0.
- The documentation consists of these *Release Notes* and a set of supplemental manual pages.

## *Supported operating environments and networking products*

This version of the SCO LLI Driver Disk enables machines running on the following platforms to link the listed transport stacks and networking products to the supported networking cards.

- Platforms
  - SCO UNIX® System V/386 Release 3.2 version 4.0
  - SCO MPX™ Release 2.0
  - SCO Open Desktop® Release 2.0
- Transport Stacks and related networking products
  - SCO TCP/IP Release 1.2.0
  - Microsoft® LAN Manager for UNIX systems using either Microsoft NetBEUI or SCO TCP NetBIOS Release 1.1 and later
  - SCO/Retix® OSI Release 1.0.0
  - SCO IPX/SPX Release 1.0.2
  - SCO NFS Release 1.2.0

## *New features of the SCO LLI Driver Disk*

### *Since Release 3.0.0*

This release of the SCO LLI Driver Disk supports for the first time Novell's Internetwork Packet Exchange/Sequence Packet Exchange (IPX/SPX) protocol stack. SCO IPX/SPX allows you to easily connect SCO and Novell systems. IPX/SPX supports remote logins from Novell Netware® clients and distributed MS-DOS®-to-UNIX and UNIX-to-UNIX applications in Novell Netware environments.

Unfortunately, this release no longer supports SCO UNIX System V Releases prior to Release 3.2 Version 4.0. This is due to kernel configuration parameter changes. Some of the drivers included with SCO LLI 3.1.0 may work on earlier versions of the operating system but they have not been tested and are not

supported. For the same reason, the LLI 3.1.0 drivers are not supported on releases of SCO Open Desktop prior to 2.0, or on SCO MPX releases prior to 2.0. Additionally, this release of the SCO LLI Driver Disk does not support releases of the networking products prior to those mentioned in "Supported operating environments and networking products" (page 2).

## *Since Release 1.0.2*

This release of the SCO LLI Driver Disk also includes support for more network adapter cards than in previous releases, including more cards for twisted-pair Ethernet networks For a complete list of cards supported for LLI 3.1.0, see "Supported cards" (page 10).

*Chapter 2*

# *Overview of the SCO LLI Driver Disk*

The SCO LLI Driver Disk provides a common interface for SCO's networking products. This chapter provides a quick overview of the LLI Driver Disk. It is divided into two sections. The first section presents basic information on networking. The second discusses information specific to the SCO LLI Driver Disk.

- If the SCO LLI Driver Disk is the first networking product you have used, begin with the section "Basics of Networking." This section provides the background you need to understand subsequent sections.
- All readers should read the section, "Using the SCO LLI drivers."

## *Basics of networking*

Networking means connecting your computers together so that they can share information. Effective networking increases productivity by using computer resources more efficiently. A network puts the combined power of the hardware and software of every machine in your system at your fingertips.

A network, in the physical sense, consists of cables or phone lines that connect computers and data communication cards. However, a network is not useful unless it has programs on each computer that let people access the various computers on the network.

Computers on a network communicate in agreed ways called protocols. Protocols dictate which signals computers use across cables, how they tell one another that they have received information, and how they exchange information.

Protocols are more accurately termed protocol "stacks" or protocol "suites". These terms reflect the fact that the communications functions are complex and are usually divided into independent layers or levels. A stack is a collection of protocol layers that implement network communication. The protocol associated with each layer communicates only with the layers immediately above and below it, and assumes the support of underlying layers. Lower layers are closer to the hardware and higher layers are closer to the user. The number of layers and tasks that each layer performs depends on which stack you are using.

Although there are many different types of networks, they fall into two general categories: wide area networks (WANs) and local area networks (LANs).

- A WAN connects computers over long distances using phone lines and sometimes satellite connections. Computers on a WAN can be several hundred feet apart or on the other side of the world from each other. Sometimes a computer must go through additional computers, routers, or gateways to reach the one it wants to talk to.
- A LAN connects computers that are in the same office or in adjacent buildings. All the computers on a LAN are connected to a single cable, unless they use a gateway or bridge. A computer on a LAN can talk directly to any other computer on that LAN.

Most networks are a combination of wide and local area networks.

## *Using the SCO LLI drivers*

The SCO LLI Driver Disk provides a standard way for many different protocol stacks and networking products to communicate with your computer's networking hardware. The drivers included with the disk conform to the SCO LLI drivers specifications. Because they conform to a standard set of parameters, you can use a single configuration tool (**netconfig**) to configure any or all of them.

### *Using multiple transport stacks*

Because the SCO LLI drivers provide a standard way for networking hardware and software to communicate, you can easily configure different transport protocol stacks for use on the same machine. The SCO protocol stacks that you can use with the LLI Driver Disk include the following products:

- SCO TCP/IP Release 1.2.0
- SCO Retix OSI Release 1.0.0
- SCO IPX/SPX Release 1.0.2
- Microsoft LAN Manager for UNIX systems Release 1.1 or later, using either Microsoft NetBEUI or SCO TCP NetBIOS transport stacks

Transport stacks supplied by other vendors may also be able to use the LLI drivers, but SCO does not support them and they have not been tested.

Although all of SCO's networking stacks can live together on the same machine, you may need more than one card to make them work together. The question of whether a single card is adequate to service multiple stacks depends upon which type of "framing" your stacks use. At present, SCO's transport stacks use either "802.3" or "Ethernet II" framing. NetBEUI and OSI use 802.3 framing and TCP/IP uses Ethernet II framing. IPX/SPX can be set to use either Ethernet II or 802.3 framing.

The following rules determine whether multiple transport stacks can use the same networking card. The rules apply to both Ethernet and Token-Ring cards.

- Only one 802.3 stack can use a network card at a time.
- Any number of Ethernet II stacks can share the same networking card.
- Any number of Ethernet II stacks can share the same networking card with one 802.3 stack.

If you intend to use two or more 802.3 stacks, you must use one networking card per 802.3 stack.

**Two protocol stacks**

If you intend to use two protocol stacks on a single card the following combinations are possible:

- TCP/IP and NetBEUI
- TCP/IP and OSI
- TCP/IP and IPX/SPX (using either 802.3 or Ethernet II framing)
- OSI and IPX/SPX (using Ethernet II framing)
- NetBEUI and IPX/SPX (using Ethernet II framing)

Any other combination of two protocol stacks will require multiple network cards.

**Three protocol stacks**

If you intend to use three protocol stacks on a single card the following combinations are possible:

- TCP/IP and NetBEUI and IPX/SPX (using Ethernet II framing)
- TCP/IP and OSI and IPX/SPX (using Ethernet II framing)

Any other combinations of three protocol stacks will require multiple network cards.

The SCO versions of these protocol stacks have been tested in all of the above configurations and are supported. While it is possible that other vendor's versions of these stacks will work together in the same way, they have not been tested and are not supported.

*Chapter 3*

# *Installing the SCO LLI drivers*

This chapter discusses the following aspects of the SCO LLI Driver Disk installation:

- hardware and software requirements that your machine must meet before you can install the SCO LLI Driver Disk
- the installation procedure itself

## *Hardware requirements*

You must have the following hardware in order to install and configure a network using the SCO LLI Driver Disk:

- a 386 or 486™ computer based on Industry Standard Architecture (ISA), Extended Industry Standard Architecture (EISA), or Micro Channel™ Architecture (MCA)
- a supported network card designed for your machine

The procedure for installing and configuring networking cards varies depending on the type of card and machine. For information on configuring your hardware, consult the section entitled "Configuration parameters" (page 19). and the documentation that came with your card or machine.

## *Supported cards*

The SCO LLI Driver Disk supports the following cards for AT® machines:

COMPAQ® 32-bit DualSpeed Token-Ring Controller
Hewlett-Packard® (HP®) 27245A EtherTwist Adapter Card/8
HP 27247A EtherTwist Adapter Card/16
HP 27250A ThinLAN Adapter Card/8
HP 27248A EtherTwist EISA Adapter Card/32
IBM® Token-Ring Network PC Adapter
IBM Token-Ring Network PC Adapter II (long and short card)
IBM Token-Ring Network 16/4 Adapter
Microdyne™ (Excelan) EXOS 205 and 205T
Microdyne (Excelan) EXOS 205T/16
NOVELL® NE2000
NOVELL NE3200
Racal Datacomm® NI6510
Racal Datacomm ES3210
Standard Microsystems® (SMC®) 8003EP EtherCard PLUS Elite ™
SMC8003WC EtherCard PLUS Elite 10T™
SMC8013EPC EtherCard PLUS Elite 16™
SMC8013WC EtherCard PLUS Elite 16T™
SMC8013EWC EtherCard PLUS Elite 16 Combo™
Western Digital® (WD®) 8003 EtherCard PLUS series cards
WD8003 EtherCard PLUS Elite series cards
WD8013 EtherCard PLUS series cards
WD8013 EtherCard PLUS Elite series cards
3Com® 3C501 EtherLink™
3Com 3C503 EtherLink II & EtherLink II TP
3Com 3C503-16 EtherLink II/16 & EtherLink II/16 TP
3Com 3C507 EtherLink 16 & EtherLink 16 TP

The SCO LLI Driver Disk supports the following cards for machines with Micro Channel architecture:

IBM Token-Ring Network PC Adapter/A
IBM Token-Ring Network 16/4 Adapter/A
IBM Token-Ring Network 16/4 Busmaster Server Adapter/A
SMC8013EP/A EtherCard PLUS Elite/A™
SMC8013WP/A EtherCard PLUS Elite 10T/A™
WD8003 EtherCard PLUS series cards
WD8003 EtherCard PLUS Elite series cards
WD8013 EtherCard PLUS series cards
WD8013 EtherCard PLUS Elite series cards
3Com 3C523 & 3C523B EtherLink/MC
3Com 3C523 EtherLink/MC TP

## *Software requirements*

In order to use the SCO Driver Disk, you must also have networking products that use the drivers. If you are using SCO UNIX System V/386 Release 3.2 Version 4.0, you need at least one of the following:

- SCO TCP/IP
- SCO Retix OSI
- SCO IPX/SPX
- Microsoft LAN Manager for UNIX systems, using either SCO TCP NetBIOS or Microsoft NetBEUI

SCO Open Desktop 2.0 includes TCP/IP and it can be upgraded to include the rest. If you don't know which are included with your Open Desktop system, use **custom** to list the products installed on your machine.

## *Installation procedure*

### *Special considerations for LLI upgrades*

If you are upgrading to a newer version of the SCO LLI Driver Disk, or adding the LLI Driver Disk after installing either the COMPAQ EFS or IBM Networking Supplement, or upgrading your ODT 2.0 LLI Drivers, you must first remove the LLI driver portion of your earlier package or the earlier version of the LLI Driver Disk. Complete the steps below that are appropriate to your platform in order to safely remove your old drivers and to insure that you have the information necessary to reconfigure your networking system after you install the new SCO LLI Driver Disk.

**Upgrading LLI on ODT 2.0**

To upgrade the LLI Drivers installed with ODT 2.0, you must first make a note of your current network configuration and then remove the old drivers before installing the new. This involves the following steps:

1. Read the section entitled "Installing and removing additional software" in the SCO Open Desktop Installation Guide.
2. Log in as *root*.
3. Run **netconfig** and make a note of the configured networking chains.
4. Run **lliconfig** and make a note of the parameters for all the configured drivers.

5. If you are not already in the System Maintenance mode, use the following command to reboot the machine:

   **/etc/shutdown -i1**

   **NOTE** **shutdown -i1** safely shuts down networking services before allowing you to enter System Maintenance mode. For more information on the **shutdown** command, see the **shutdown**(ADM) manual page.

   As the super user, you have access to all the system files, so be careful not to overwrite, delete or corrupt any files by accident.

6. Enter the *root* password when you see the prompt:

```
INIT: New run level: S

INIT: SINGLE USER MODE

Type CONTROL-d to proceed with normal startup,
(or give the root password for system maintenance):
```

7. At the shell prompt, type:

   **custom**

8. When you see the Custom menu, use the → to highlight Remove, and press ⟨Enter⟩.
9. At the Remove screen, use the ↓ key to highlight Open Desktop, and press ⟨Enter⟩.
10. At the prompt, use the → to select Service Components, and press ⟨Enter⟩.
11. At the prompt for removable Service Components, use the ↓ to select LLI Drivers, and press ⟨Enter⟩.
12. You see a list of LLI drivers with ALL highlighted at the top. Press ⟨Enter⟩ to select ALL.
13. You see a message indicating that the system is executing the removal script. If networking chains have been configured, you see messages indicating that they are being removed.
14. When all the LLI drivers have been removed, you are asked if you want to relink the kernel. To save time, wait to relink the kernel until after you have removed and installed all the software that you plan to at this time.
15. You return to the Custom menu. Exit **custom** by selecting quit and pressing ⟨Enter⟩.
16. If you did not install ODT with floppy disks, use **vi** or any other ASCII editor to change the mediatype to "F" (for floppy disk) in */etc/perms/bundle/odtps*. If you did install ODT with floppy disks, go on to the next step.

**NOTE** After you complete the installation process, remember to change the mediatype back to its original value.

17. Remove the file */etc/perms/lli*.
18. Install the LLI Driver Disk Version 3.1.0 according to the instructions you found in the section entitled "Installing packages of Open Desktop service components" in your Open Desktop Installation Guide.

    **NOTE** During ODT installation, **custom** prompts you with a floppy volume number. Whatever the requested volume number, insert the LLI 3.1.0 Driver Disk.

19. Using **vi** or other ASCII editor restore the mediatype to its original value in */etc/perms/bundle/odtps*.
20. After you complete the installation procedure below, use **netconfig** and the notes you took in steps 1 and 2 to reconfigure your networking chains.

**IBM networking supplement, COMPAQ EFS, and LLI standalone upgrades**

If you are upgrading LLI as a stand-alone product, or as an update to systems using either the IBM Networking Supplement or COMPAQ EFS, complete the following steps:

1. Run **netconfig** and make a note of the configured networking chains.
2. Run **lliconfig** and make a note of the parameters for all the configured drivers.
3. If you are updating a previous release of the LLI Driver Disk, follow the removal directions in the *Release notes* that accompanied your earlier release. If you are adding the SCO LLI Driver Disk to either the COMPAQ EFS or IBM Networking Supplement, follow the directions for driver removal that accompanied your product.

   **NOTE** Both the COMPAQ EFS and the IBM Networking Supplement require that you remove your drivers one at a time. Make sure that you remove all the installed drivers from your package before installing the SCO LLI Driver Disk Release 3.1.0.

4. Install the new LLI Driver Disk according to the "UNIX installation procedure" below.
5. After you install the new LLI drivers, use **netconfig** and the notes you made in steps 1 and 2 to reconfigure your networking chains.

## *UNIX installation procedure*

If you are installing the SCO LLI drivers for the first time, you should become familiar with the **custom** menu and its operation. The **custom**(ADM) utility for SCO UNIX platforms is described in the *SCO UNIX Installation Guide* in the appendix entitled "Installing and removing additional software." If you are running Open Desktop, the utility is described in the *SCO Open Desktop Installation and Update Guide* in the appendix entitled "Installing and removing additional software."

To install the SCO LLI Driver Disk, complete the following steps:

1. If you are not already in the System Maintenance mode, use the following command to reboot the machine:

   **/etc/shutdown -i1**

   **NOTE** **shutdown -i1** safely shuts down networking services before allowing you to enter System Maintenance mode. For more information on the **shutdown** command, see the **shutdown**(ADM) manual page.

2. Enter the *root* password when you see the prompt:

```
INIT: New run level: S

INIT: SINGLE USER MODE

Type CONTROL-d to proceed with normal startup,
(or give the root password for system maintenance):
```

3. Enter System Maintenance (single-user) mode by typing the *root* password.

   As the super user, you have access to all the system files, so be careful not to overwrite, delete, or corrupt any files by accident.

4. At the prompt, type:

   **custom**

   When you see the Custom menu, the Install option is highlighted.

5. Press ⟨Enter⟩ to begin the installation.

   **custom** displays the Install screen with a list of currently installed software at the bottom right corner of the screen.

   **custom** highlights A New Product.

6. Press ⟨Enter⟩

7. **custom** offers you a choice of installing the Entire Product, Disks, or Files. **custom** highlights Entire Product.

8. Press ⟨Enter⟩ to select the Entire Product option.
9. **custom** directs you to insert Distribution Floppy Volume 1.
10. Insert Volume 1 in the drive, then press ⟨Enter⟩.

    The following message appears at the top of the screen:

```
Installing custom data files ...
```

    Next, **custom** leaves the Install screen and checks for the correct installation environment. The following messages appear briefly:

```
Executing Product Prep script
```

```
Creating file lists ...
```

    After the prep script, **custom** again prompts you to insert the SCO LLI Driver Disk Floppy Volume 1 and highlights the Continue option.
11. Verify that Volume 1 is in the drive, then press ⟨Enter⟩.

    The following message appears at the top of the screen:

```
Extracting files ...
```

    The system leaves the Install screen to execute the SCO LLI Driver Disk initialization script. The following message appears briefly:

```
Executing SCO LLI Driver disk Init Script
```

    You then see messages indicating progress as each driver is installed. When all of the drivers are installed, the following message appears at the bottom of your screen:

```
After installing the SCO LLI Driver Disk,
please use netconfig to add drivers to
your system. Press ⟨Enter⟩ to continue.
```

12. Press any key to continue with the installation.

The following message appears briefly on the screen:

```
Checking file permissions . . .
```

You return to the main **custom** menu. The software list on your screen now includes the SCO LLI Driver Disk.

You can choose to continue installing other products or you can quit **custom.**

13. To quit **custom,** use → to highlight the Quit option, and press ⟨Enter⟩. **custom** prompts you to confirm that you want to quit, and highlights the Yes option. Press ⟨Enter⟩.
14. Once you have installed the LLI Driver Disk, you must configure the drivers to work with your networking products. Please refer to for more information about configuring your driver and to the appendixes for the appropriate configuration scenario for your networking stack.

*Chapter 4*

# *Configuring the SCO LLI drivers*

This chapter describes the information needed for configuring the LLI drivers to your networking card. It is divided into three sections. The first describes the steps you must complete to perform the configuration. The second section presents a general overview of the parameters necessary to configure the SCO drivers. The third presents card-specific configuration information.

Sample configuration procedures for configuring drivers over SCO TCP/IP, Microsoft NetBEUI, SCO IPX/SPX and SCO Retix OSI are located in the appendixes.

**NOTE** Please familiarize yourself with the specifications for the existing cards and drivers in your machine before installing new or additional drivers.

## *Configuration checklist*

To configure your card and driver, perform the following tasks:

1. Read the section entitled "Configuration parameters" (page 19).
2. Make a copy of Table 4-1 (page 18) for each card you intend to install on your system.
3. Read the information for each card you intend to install in the section entitled "Card-specific information" (page 24) below.
4. Read your card's documentation. Although many of the settings are supplied in "Card-specific information" (page 24), much of the configuration information is specific to your system, card, or machine.
5. Enter the information for each networking card in your machine's logbook as well as in the table(s) copied in step 2.

6. Attach the completed table(s) to your machine.
7. Use your EISA utility to configure your card (if yours is an EISA machine).
8. Use **netconfig** to configure your driver(s).
9. If you have an ISA card, configure your card either manually or, if a hardware setup program came with your card, with the setup program. Consult your card's documentation for more information as to how to configure your card's hardware.

**NOTE** You should use **mkdev** rather than **netconfig** to make chains between the card, the LLI drivers and the SCO TCP/IP Version 1.1.3. Use **netconfig** to create the chains between the LLI drivers and any transport stack other than SCO TCP/IP Version 1.1.3.

**Table 4-1 LLI 3.1.0 network card information**

| | |
|---|---|
| _____ | Card name and number |
| _____ | Cable type (if applicable) |
| _____ | DMA channel (if applicable) |
| _____ | Interrupt Vector (IRQ) |
| _____ | I/O base address (if applicable) |
| _____ | RAM address (if applicable) |
| _____ | Ring routing (Token-Ring only) |
| _____ | ROM address (if applicable) |
| _____ | Shared RAM size (if applicable) |
| _____ | Slot number (if applicable) |

## *Configuration parameters*

Configuring the LLI drivers requires that you perform two basic tasks--set up your card to work with your computer's hardware, and configure an SCO driver to work with your card. While the basic procedure is the same, there are two differing ways to go about configuring your machine and driver depending upon whether your machine uses Industry Standard Architecture (ISA) or Extended Industry Standard Architecture (EISA).

If you have an EISA machine, and you are installing either a COMPAQ Token-Ring card or a NOVELL NE3200 you must first use your machines EISA configuration utility to provide the basic hardware information to your machine. Second, you must run **netconfig** to configure a driver to match your card. With these two cards, **netconfig** checks the information stored via your machine's EISA configuration utility and, assuming the parameters don't conflict with those of any other installed driver, creates a driver for your networking card. If any conflict is found, **netconfig** withdraws and prompts you to fix the problem.

**NOTE** Be extra careful about possible conflicts when installing ISA cards on EISA machines. EISA configuration utilities cannot see ISA cards, and therefore cannot check for possible card conflicts.

If you have an ISA card, or if you are installing either a Racal or HP EISA card, the procedure is similar, but reversed. You must still configure your card and driver, but we recommend you use **netconfig** to configure the driver first, and then use the parameters obtained using **netconfig** to configure the card.

Consult your card's documentation to determine how to set up your card's hardware.

**NOTE** If you install an SMC8003 or SMC8013 card (WD8003 or 8013 series), or a 3Com 3c507 card, use either **smcsetup** (for SMC and WD cards) or **e3dsetup** (for 3c507 cards) to configure the hardware setup for your card. For more information about either **smcsetup** or **e3dsetup**, refer to the manual pages included with this release. For the information necessary to configure your card's driver, consult the section for your card in "Card-specific information" (page 24).

Each machine can support from one to four of a given networking card type, depending on the type of card and capacity of your machine.

To configure a driver for your card, you may be required to know:

- your networking system's cable type
- the DMA setting used by your card

- an acceptable interrupt vector
- an acceptable I/O base address
- an acceptable RAM base address together with the size of the RAM buffer or shared RAM size
- an acceptable ROM address
- whether you wish to enable Token-Ring routing
- a slot number

The parameters you supply must match those acceptable to the card and they must not conflict with the settings already in use by other hardware installed on your system.

To determine many of the settings already in use by the devices installed on your machine, consult your machine's logbook or use the following command:

**hwconfig -h**

This produces a screen that resembles the following:

```
device          address     vec  dma  comment
======          =======     ===  ===  =======
serial        0x3f8-0x3ff     4    -  unit=0 type=Standard nports=1
floppy        0x3f2-0x3f7     6    2  unit=0 type=96ds15
console             -         -    -  unit=vga type=0 12 screens=68k
e3B           0x300-0x30f     3    -  type=3c503 addr=02:60:8c:9f:ed:44
disk          0x1f0-0x1f7    14    -  type=W0 unit=0 cyls=967 hds=9 secs=34
```

In this display "device" is the name of the device driver. "address" specifies the starting and finishing memory address of the driver's working space. "vec" is the interrupt vector number. "dma" is the direct memory access number. The "comment" section contains other information relevant to that device using the form "parameter=value". For more information on the comment section, consult the **hwconfig**(ADM) manual page in your *UNIX System Administrator's Reference.*

## *Cable type*

When you configure certain cards (for example, the 3Com 503 driver), you need to specify whether the board connects to "thick," "thin" or "twisted-pair" Ethernet cable. Thick and thin are both coaxial cable. Thick cable is approximately 1/2-inch in diameter, and thin is approximately 1/4-inch in diameter. Twisted pair resembles slightly thicker phone cable.

- Both thin and twisted-pair cable provide a direct connection to the network without using a transceiver.

- Thick cable is used to connect your card to a transceiver, which in turn connects to the Ethernet cable.

## *DMA channel*

Some cards (for example, the HP EtherTwist EISA Adapter Card/32) require that you specify the direct memory access or "DMA" channel you want the card to use. Direct memory access permits data to be transferred between memory and a device without the intervention of the system's central processing unit. Each DMA chip has eight circuits or channels for conveying data. DMA channel 4 is reserved for use by the system. During configuration, you may choose to use any (or none) of the channels. If you choose a DMA channel for your networking card that is currently in use by another device, **netconfig** prompts you to select another channel.

## *Interrupt vectors*

An interrupt is an instruction that halts processing momentarily so that input/output or other operations can occur. Processing resumes after the specific operation takes place. Consequently, it is important that each device installed in your system be provided with a IRQ setting that does not conflict with the settings used by the hardware and other peripherals.

To install a networking card and driver software, you must choose an interrupt vector (IRQ) setting for the card. The following table lists some typical hardware interrupt settings:

**Table 4-2 Typical interrupt vectors**

| Hardware | Interrupt Vector (IRQ) |
|---|---|
| ISA, EISA, or MC machine | |
| clock interrupt | 0 |
| console (keyboard) interrupt | 1 |
| floppy controller interrupt | 6 |
| Hard disk | varies |
| Serial ports | |
| com1 | 4 |
| com2 | 3 |
| Parallel ports | |
| lpt0, lpt1 | 7 |
| lpt2 | 5 |

Consult the card's documentation to learn its acceptable IRQ settings.

After you determine your hardware's IRQ settings, choose settings for each networking card that you plan to install, making sure that the settings you choose do not conflict with each other. The documentation for each

networking card should indicate whether you need to configure the card physically to use the chosen IRQ setting. The operating system reserves interrupt vectors 4, 3, and 7 for com1, com2, and lpt0 respectively. These "devices" are often referred to as serial input-output devices or *"sio"* devices. If you choose any setting that is either a setting reserved for another use or is in use by another device, a conflict occurs. The configuration utilities resolve such conflicts by prompting you to remove or change the reserved setting.

**WARNING** If you assign both *sio* interrupt vectors 3 and 4 to other drivers, you will remove the *sio* driver from the Link Kit. On a system running SCO MPX™, you cannot link the kernel if the *sio* driver is removed. To correct this problem, use **netconfig** to remove one of the drivers that uses an *sio* interrupt vector and reassign that vector to the *sio* device. Then reconfigure the driver you removed, using a different interrupt vector.

For details on this problem and the work-around, see the section "sio Interrupt Vectors under MPX" in these release notes.

## *I/O base address*

The I/O base address is the initial address for a unique area of memory allocated for input/output data control to a specific network card. For example, 0x300, or 300, is the default I/O base address for the 3Com 3c501 card. The I/O base address must match the hardware configuration on the card, and other devices must not use this I/O base address. If you enter an I/O base address that is already in use by another device, **netconfig** may delete that device.

## *RAM base address*

When required, the RAM buffer base address is the address of a unique area of memory allocated to the host machine and network card for read/write operations. Other devices must not use this address. If you assign a networking card a RAM base address that is used by another device, the configuration utility prompts you to select another address.

### RAM buffer size

Some cards (for example, most SMC cards) require that you specify the RAM buffer size or size of the shared RAM as well as the base address. A RAM buffer specifies the amount of random access memory that is set aside for use by the networking card and host machine. Consult the documentation that comes with your card and the card-specific section later in this chapter to determine which buffer sizes your card requires.

## *Ring routing (IBM Token-Ring cards only)*

IBM Token-Ring networking allows you to establish connections from your machine to other machines in the following ways:

- on a local ring
- to other rings using "gateways"
- to other networks using a Token-Ring "bridge"

A local ring is a LAN connected with Token-Ring cards.

A gateway is created when you install more than one Token-Ring card on the same machine and connect those cards to different rings with different network numbers. Token-Ring gateways will route network traffic to the LANs connected to it without using Token-Ring routing as long as all the LAN's use the same protocol (TCP/IP for example).

A Token-Ring bridge is a Token-Ring machine that is connected to several different networks. If Token-Ring routing is enabled, all of the Token-Rings connected via a bridge appear to each other as members of a single local area network. Token-Ring routing allows your card to route network traffic across Token-Ring bridges regardless of the protocol stack used by any of the connected networks.

If you intend to connect your machine to a network that includes a bridge, and if you intend to send information from your machine across the bridge, you must enable Token-Ring routing. Without Token-Ring routing, while you can still receive information from the networks connected via the bridge, you can only send information to machines on your local ring.

During configuration you can enable or disable this function when the following prompt is displayed:

```
Restrict broadcasts to the local ring (y/n) [N] or 'q' to quit:
```

To select Token-Ring routing, enter **n** at this prompt. If you decide not to use Token-Ring routing (that is, if you decide to restrict broadcasts to the local ring), enter **y**.

**NOTE** Disabling token ring routing only prohibits transmission off the local ring. For example, even if you have disabled token ring routing, if a bridge to another ring exists on the local ring, and if a machine on the remote ring has token ring routing enabled, it can still transmit to your machine.

If you do not use Token Ring routing, the program creates a routing inhibitor file to suppress routing. A file norouteN, where N is the device number, is created and placed in either */usr/lib/lli/btok* for Busmaster token ring devices or */usr/lib/lli/tok* for non-busmaster devices.

For more information on Token-Ring routing, see your card's documentation.

### *ROM base address*

Some cards (for example, IBM Token-Ring cards) require that you specify a ROM base address. Like the RAM base address, the ROM base address specifies a specific part of ROM memory that is set aside for networking use. If you have more than one card requiring that you specify a ROM address, make sure you do not give them the same addresses.

### *Slot number*

Some cards (for example,the HP EtherTwist EISA Adapter Card/32) are meant to be used on machines using the Extended Industry Standard Architecture (EISA) bus. If you install one of these cards, during the configuration process you may be required to provide its slot number. This number refers to the slot in which the card is inserted.

## *Card-specific information*

### *COMPAQ 32-bit DualSpeed Token-Ring Controller*

Before installing the COMPAQ 32-bit DualSpeed Token-Ring controller, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19).

Because this card is an EISA card, to configure your card and driver you must begin by running your machines EISA configuration routine. After you have configured your card with that utility you may run **netconfig** to configure your card's driver.

To complete the installation of your COMPAQ card you will need the following information.

**EISA configuration information**

| | |
|---|---|
| Cable type | Select the connector type on your EISA configuration screen. Acceptable types are shielded (IBM Token-Ring Network PC Adapter Cable or equivalent) or unshielded (twisted pair). |

Interrupt type/number

The default interrupt type and number is edge-triggered 15. While we recommend edge-triggered interrupts, you may select any type or number so long as the one selected does not conflict with any installed device.

> **WARNING** Even though the EISA configuration utility senses interrupt conflict and will not allow you to install conflicting EISA cards, it cannot sense ISA cards. Thus, if you have any ISA cards installed on your machine, you must ensure that you do not select an interrupt for your EISA card that is already in use by an ISA card. If you create an interrupt conflict, you won't be able to configure your LLI driver.

You may install up to four COMPAQ Token-Ring cards in your system if you make sure that the interrupts you select do not conflict with any other installed device.

Speed

You must set the speed of the COMPAQ card to match the speed of the network (either 4 or 16 Mbps).

**netconfig information**

To complete the installation of a COMPAQ Token-Ring card, you need the following:

Card name

*ctr*
The first ctr card installed on your system is referred to as ctr0. If you install more than one ctr card on your system, the cards are numbered sequentially starting with 0.

## *HP 27248A EtherTwist EISA Adapter Card/32*

Before installing the HP EISA/32 card, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the card, you need the following:

Card name

*hpe*
The first hpe card installed on your system is referred to as hpe0. If you install more than one hpe card on your system, the cards are numbered sequentially starting with 0.

Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44).

Cable type — not required

DMA channel — *3*
This DMA channel is used if you press ⟨Enter⟩ at the prompt. If you change the DMA channel or install more than one card, make sure you select a channel not used by another device.

Interrupt vector (IRQ) — *5*
This setting is used if you press ⟨Enter⟩ at the prompt.

> **CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

I/O base address — not required

RAM address — not required

ROM address — not required

Slot number — There is no default slot number. When you physically install your card, you must make a note of which slot your card occupies.

## *HP 27245, 27247A, 27250A ISA cards*

The SCO LLI Driver Disk supports the following HP ISA cards:

- HP 27245A EtherTwist Adapter Card/8
- HP 27247A EtherTwist Adapter Card/16
- HP 27250A ThinLAN Adapter Card/8

Before installing any HP ISA card, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the card, you need the following:

Card name — *hpi*
The first hpi card installed on your system is referred to as hpi0. If you install more than one hpi card on your system, the cards are numbered sequentially starting with 0.

Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44).

| | |
|---|---|
| Cable type | not required |
| DMA channel | not required |
| Interrupt vector (IRQ) | *2*<br>This setting is used if you press ⟨Enter⟩ at the prompt. |

**CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

| | |
|---|---|
| I/O base address | *300*<br>This address is used if you press ⟨Enter⟩ at the prompt. |

**CAUTION** If you use a base address for your networking card that is already in use by another device, **netconfig** removes that device. If you want to continue to use the original device, you must supply it with another base address.

| | |
|---|---|
| RAM address | not required |
| ROM address | not required |
| Slot number | not required |

## *IBM Token-Ring cards*

The SCO LLI Driver Disk supports the following IBM Token-Ring cards:

- IBM Token-Ring Network PC Adapter
- IBM Token-Ring Network PC Adapter II (long and short)
- IBM Token-Ring Network 16/4 Adapter
- IBM Token-Ring Network PC Adapter/A
- IBM Token-Ring Network 16/4 Adapter/A

Before installing any of the IBM Token-Ring cards mentioned above, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19).

### Special IBM Token-Ring installation considerations

When you configure a driver on your SCO UNIX system, **netconfig** checks to make sure that the new driver's parameters are different from the parameters for drivers already on the system. This creates some special problems for the IBM Token-Ring Network Adapter II cards and IBM Token-Ring 16/4 adapters. Parameters for these adapters include shared RAM addresses and configurable ROM addresses.

The RAM addresses are hardware-coded for AT-type machines (d8000-dbfff for the primary or first adapter card and d4000-d7fff for the secondary adapter card). When you run **netconfig** to configure these cards, you set the ROM addresses (on both AT-type and Micro Channel machines), as well as the RAM addresses (on MC machines),

On AT-type machines, during configuration **netconfig** checks RAM and ROM addresses for conflicts with currently installed drivers. However, **netconfig** can record only one set of addresses for future conflict checking. Because the RAM addresses are hardware coded on the AT type machines, **netconfig** records the variable ROM addresses.

This means that if you install another driver with shared RAM addresses after you install an IBM Token-Ring driver, **netconfig** cannot detect possible conflicts with the shared RAM addresses the Token-Ring adapter uses. Thus, if you install another driver that uses shared RAM addresses after you install a Token-Ring adapter, take extra precautions not to introduce RAM address conflicts.

**NOTE** **netconfig** copies the file:

*/etc/conf/pack.d/sio/space.c*
to
*/etc/conf/pack.d/sio/space.c.rls*

and removes the COM3 entry from *space.c*. This corrects a problem that caused the Token-Ring card to appear as a serial card with a different name at boot time.

### Standard installation considerations

To complete the installation of an IBM Token-Ring card, you need the following:

Card name — *tok*
The first tok card installed on your system is referred to as tok0. You can install the Token-Ring using either one or two adapter cards. If you are using two cards, make sure to use the Primary-Alternate switches on the cards to set up one as the primary adapter and the

other as the alternate adapter. Obtain switch information for these cards from the documentation supplied by the card manufacturer.

Cable type
not required

DMA channel
not required

Interrupt vector (IRQ)
2
This setting is used if you press ⟨Enter⟩ at the prompt.

> **CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

You should install your primary adapter card using IRQ2, which is the factory default. If you are installing an alternate adapter, use IRQ3. You can also use IRQ6 and IRQ7 to install Token-Ring adapter cards.

I/O base address
*300*
If this address is in use, you must choose another. If you attempt to use a base address that is already in use by another device, that device is removed.

> **CAUTION** Because the tok adapter also uses I/O address 2f0 for writing network information, no other device can use that address.

RAM address
*d8000*
This address is used if you press ⟨Enter⟩ at the prompt. If you want to add additional cards or change that address, make sure that you do not choose an address used by another device.

ROM address
*cc000*
If you want to add additional cards or change that address, make sure that you do not choose an address used by another device.

Ring routing
IBM Token-Ring networks require that you decide whether to use Token-Ring routing.

If you do not use Token-Ring routing, the program creates the file */usr/lib/lli/tok/noroute0*. This file suppresses Token-Ring routing for the primary

adapter. If you have installed a secondary adapter, the file */usr/lib/lli/tok/noroute1* suppresses Token-Ring routing for the secondary adapter.

**NOTE** Even though ring routing is not enabled, if you install two Token-Ring cards on the same machine, and those cards are connected to different networks, your machine may function as a Token-Ring "gateway". Gateway machines route network traffic across differing rings as long as both networks use the same protocol stack.

Shared RAM size — *16 K*
This size is used if you press ⟨Enter⟩ at the prompt.

## *IBM Token-Ring Network 16/4 Busmaster Server Adapter/A*

Before installing an IBM Busmaster card, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the card, you need the following information:

Card name — *btok*
The first btok card installed on your system is referred to as btok0. If you install more than one btok card on your system, the cards are numbered sequentially starting with 0. Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44).

Cable type — not required

DMA channel — not required

Interrupt vector (IRQ) — 2
This setting is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

I/O base address

*86a0*
This address is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a base address for your networking card that is already in use by another device, **netconfig** removes that device. If you want to continue to use the original device, you must supply it with another base address.

RAM address

not required

ROM address

not required

Ring routing

IBM Token-Ring networks require that you decide whether to use Token-Ring routing.

## *Microdyne (Excelan) EXOS 205, 205T and 205T/16*

Before installing an Microdyne EXOS card, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the card, you need the following information:

Card name

*exos*
The first exos card installed on your system is referred to as exos0. If you install more than one exos card on your system, the cards are numbered sequentially starting with 0.

Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44).

**CAUTION** The exos card only operates at bus speeds of 8 MHz or less.

Cable type

not required
If you install the exos card using Thinnet ethernet cable, you must make sure that each female end is connected to a network cable or to a 50 ohm terminator resistor.

DMA channel

not required

Interrupt vector (IRQ)

2
This setting is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

I/O base address

*310*
This address is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a base address for your networking card that is already in use by another device, **netconfig** removes that device. If you want to continue to use the original device, you must supply it with another base address.

RAM address

*cc000*
This address is used if you press ⟨Enter⟩ at the prompt. If you want to add additional cards or change that address, make sure that you do not choose an address used by another device.

ROM address

not required

Slot number

not required

## *NOVELL NE2000*

Before installing an NE2000 card, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the NE2000, you need the following:

Card name

*nat*
The first nat card installed on your system is referred to as nat0. If you install more than one nat card on your system, the cards are numbered sequentially starting with 0.

Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44).

Cable type

not required

DMA channel

not required

Interrupt vector (IRQ)

2
This is the setting that is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a vector for your networking card that is already in use by another device, you must either remove that device or select another vector for your networking card. If you remove the device, you must supply it with a new vector before it can be used.

I/O base address — *300*
This address is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a base address for your networking card that is already in use by another device, **netconfig** removes that device. If you want to continue to use the original device, you must supply it with another base address.

RAM address — not required

RAM buffer size — not required

ROM address — not required

Slot number — not required

## *NOVELL NE3200*

Begin installation of the NOVELL NE3200 card by completing the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19).

Because the NE3200 is an EISA card, begin the configuration process by running your machines EISA configuration routine. After configuring your card, run **netconfig** to configure your networking chains.

To complete the installation of your NE3200 card you will need the following information.

**EISA configuration information**

Cable type — Select the connector type on your EISA configuration screen. Acceptable types are BNC (for thin cable) and DIX (for thick cable).

Interrupt type/number — The default interrupt type and number is edge-triggered 15.

**WARNING** Even though the EISA configuration utility senses interrupt conflict and will not allow you to install conflicting EISA cards, it cannot sense ISA cards. Thus, if you have any ISA cards installed on your machine, you must ensure that you do not select an interrupt for your EISA card that is already in use by an ISA card. If you create an interrupt conflict, you won't be able to configure your LLI driver.

You may install up to four NE3200 cards in your system if you make sure that the interrupts you select do not conflict with any other installed device.

### Interrupt sharing

Although we do not recommend it, sharing of interrupts is possible with the NE3200 card. To enable interrupt sharing complete the following steps:

1. Use an ASCII editor to edit the DOS file *!NVI0701.CFG* found on your NOVELL configuration diskette.
2. Find the line containing the string TRIGGER = LEVEL.
3. On the next line, insert the string SHARE = YES. The resulting section should look similar to this:

```
TRIGGER = LEVEL
SHARE = YES
INIT = IOPORT(1) LOC (2-0) 001-101
```

4. Save the file
5. Copy the file to your EISA system configuration diskette.
6. Use the EISA configuration utility that came with your machine to configure multiple NE3200 cards to use the same interrupt.

### netconfig information

To complete the installation of the NE3200 card you must also run **netconfig** to create and configure a driver for your card. **netconfig** requires the following information:

Card name

*ne*

The first ne card installed on your system is referred to as ne0. If you install more than one ne card on your system, the cards are numbered sequentially starting with 0.

## *Racal Datacomm ES3210 (EISA)*

Before installing the Racal ES3210 card, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the card, you need the following:

| | |
|---|---|
| Card name | *i3B*<br>The first i3B card installed on your system is referred to as i3B0. If you install more than one i3B card on your system, the cards are numbered sequentially starting with 0.<br><br>Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44). |
| Cable type | **netconfig** will prompt you for your cable type. When it does, you must input your internet cable type (thick, thin or twisted pair). |
| DMA channel | *none*<br>You will use none of the available DMA channels if you press ⟨Enter⟩ at the prompt. |
| Interrupt vector (IRQ) | *9*<br>This setting is used if you press ⟨Enter⟩ at the prompt.<br><br>**CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used. |
| I/O base address | The I/O base address for the i3B is defined by the slot number. See "Slot number" for more information. |
| RAM address | *d0000*<br>This address is used if you press ⟨Enter⟩ at the prompt. If you want to add additional cards or use a different address, make sure no other device uses the new address[es]. |
| ROM address | not required |
| Slot number | There is no default slot number. When you physically install your card, you must make a note of which slot your card occupies. |

## *Racal Datacomm NI6510 (ISA)*

Before installing the NI6510 Racal card complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the card, you need the following:

| | |
|---|---|
| Card name | *i6E*<br>Only one i6E card may be installed on any given system. |
| Cable type | not required |
| DMA channel | *3*<br>The channel is used if you press ⟨Enter⟩ at the prompt. If you change the DMA channel or install another card, make sure you select a channel not used by another device. |
| Interrupt vector (IRQ) | *9*<br>This setting is used if you press ⟨Enter⟩ at the prompt.<br><br>**CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used. |
| I/O base address | *360*<br>This base address is used if you press ⟨Enter⟩ at the prompt. If you want to change the default address of the original card, make sure that you do not choose an I/O address used by another device.<br><br>**CAUTION** If you use a base address for your networking card that is already in use by another device, **netconfig** removes that device. If you want to continue to use the original device, you must supply it with another base address. |
| RAM address | not required |
| ROM address | not required |
| Slot number | not required |

## *SMC 8003 or 8013 series cards*

(The cards were formerly marketed by Western Digital as the WD8003 or WD8013 series cards.)
The SCO LLI Driver Disk supports the following SMC cards:

- SMC8003EP EtherCard PLUS Elite
- SMC8003WC EtherCard PLUS Elite 10T
- SMC8013WC EtherCard PLUS Elite 16T
- SMC8013EPC EtherCard PLUS Elite 16
- SMC8013EWC EtherCard PLUS Elite 16 Combo
- SMC8013EP/A EtherCard PLUS16 Elite/A
- SMC8013WP/A EtherCard PLUS16/A Elite 10T/A

Before installing any of these SMC cards, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of an SMC card you must follow these steps

1. Use **netconfig** to configure the driver.
2. Use **smcsetup** to configure the card.

**netconfig** configures the device driver for your card. **smcsetup** configures the card. Although **netconfig** and **smcsetup** require similar information, you should configure the driver first. **netconfig** checks the parameters you supply for conflicts with other devices. If any conflicts are found, **netconfig** prompts you to select another parameter. Once you have selected a driver configuration that does not conflict with other devices, those parameters should be supplied to the SMC card with **smcsetup**. For more information on **smcsetup** see the manual page included with the SCO LLI Driver Disk. Both **netconfig** and **smcsetup** require the following additional information.

| | |
|---|---|
| Card name | *wdn*<br>The LLI Driver Disk refers to the SMC card as "wdn". The installation requires that you know whether your card is an 8003 or an 8013 (Elite). The first SMC card installed on your system is referred to as wdn0. If you install more than one smc card on your system, the cards are numbered sequentially starting with 0.<br>Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44). |
| Cable type | not required |

DMA channel — not required

Interrupt vector (IRQ) — *3*

This setting is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

I/O base address — *240*

This address is used if you press ⟨Enter⟩ at the prompt.

**CAUTION**

- If this address is in use, you must choose another. If you attempt to use a base address that is already in use by another device, it may be removed.
- Do not use I/O base addresses 200, 220, 340, 3c0, or 3e0 for the SMC 8003E and 8013EBT cards. Because of register-address aliasing, these addresses can cause your machine to hang at boot time.

RAM address — *d0000*

This is the address that is used if you press ⟨Enter⟩ at the prompt. If you want to add additional cards or change that address, make sure that you do not choose an address used by another device.

RAM buffer size — *8* or *16*

SMC cards require that you specify the size of the RAM buffer. Consult your card's documentation to determine which buffer size your card requires.

ROM address — not required

Slot number — not required

## *Western Digital 8003 and 8013 series cards*

For installation information for the Western Digital 8003 EtherCard Plus and 8013 EtherCard Plus Elite series cards, please refer to "SMC 8003 or 8013 series cards" (page 37). Follow the procedure outlined in the SMC section to install your Western Digital card.

## *3Com 3c501*

Before installing a 3Com 3c501 card, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the 3Com 3c501 card, you need the following:

Card name
*e3A*
The first e3A card installed on your system is referred to as e3A0. If you install more than one e3A card on your system, the cards are numbered sequentially starting with 0.

Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44).

Cable type
not required

DMA channel
not required

Interrupt vector (IRQ)
*3*
This setting is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

I/O base address
*300*
This is the address that is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a base address for your networking card that is already in use by another device, **netconfig** removes that device. If you want to continue to use the original device, you must supply it with another base address.

RAM address
not required

ROM address
not required

Slot number
not required

## *3Com 3c503 cards*

The SCO LLI Driver Disk supports the following 3Com 3c503 cards:

- 3c503 EtherLink II
- 3c503 EtherLink II TP
- 3c503-16 EtherLink II/16
- 3c503-16 EtherLink II/16 TP

Before installing a 3Com 3c503 card complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the card, you need the following:

Card name

*e3B*

The first e3B card installed on your system is referred to as e3B0. If you install more than one e3B card on your system, the cards are numbered sequentially starting with 0.

Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44).

**NOTE** The 3Com 3c503-16 and 3c503-16 TP "stretch" cards have an 8 bit mode and a 16 bit mode configurable by a jumper on the card. Make sure the jumper is set to the 16-bit mode to obtain the best performance.

Cable type

**netconfig** will prompt you for your cable type. When it does, you must input your internet cable type (thick, think or twisted pair).

DMA channel

not required

Interrupt vector (IRQ)

*3*

This setting is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

I/O base address

*300*

This address is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a base address for your networking card that is already in use by another device, **netconfig** removes that device. If you want to continue to use the original device, you must supply it with another base address.

| | |
|---|---|
| RAM address | not required |
| ROM address | not required |
| Slot Number | not required |

## *3Com 3c507 EtherLink 16 or EtherLink 16 TP*

Before installing either of the 3Com 3c507 cards, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the 3c507 card you must follow these steps:

1. Use **netconfig** to configure the driver.
2. Use **e3dsetup** to configure the card.

**netconfig** configures the device driver for your card. **e3dsetup** configures the card. Although **netconfig** and **e3dsetup** require similar information, you should configure the driver first. **netconfig** checks the parameters you supply for conflicts with other devices. If any are found, **netconfig** prompts you to select another parameter. Once you have selected a driver configuration that does not conflict with other devices, those parameters should be supplied to the e3D card with **e3dsetup**. For more information on **e3dsetup** see the manual page included with the SCO LLI Driver Disk.

**NOTE** When you use **e3dsetup** to configure your card, note that the 3c507 cards can be set to use either 8- or 16-bit data transfers. Acceptable values for this (the **-data** option are **s** (or standard) for 8-bit data transfer and **t** (or turbo) for 16-bit data transfer. The 3c507 card does not work in 16-bit mode with some motherboard chip sets. If your 3c507 card does not work in 16 bit mode, try the 8-bit mode. For more information see the **e3dsetup**(ADM) manual page included with the SCO LLI Driver Disk.

Both **netconfig** and **e3dsetup** require the following additional information:

| | |
|---|---|
| Card name | *e3D*<br>The first e3D card installed on your system is referred to as e3D0. If you install more than one e3D card on your system, the cards are numbered sequentially starting with 0. |

Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44).

Cable type — not required

DMA channel — not required

Interrupt vector (IRQ) — *3*
This setting is used if you press ⟨Enter⟩ at the prompt.

> **CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

I/O base address — *300*
This address is used if you press ⟨Enter⟩ at the prompt.

> **CAUTION** If you use a base address for your networking card that is already in use by another device, **netconfig** removes that device. If you want to continue to use the original device, you must supply it with another base address.
>
> Because the e3D card uses the I/O base address 100 for storing other network information, you cannot use that address for any other device.

RAM address — *c0000*
This address is used if you press ⟨Enter⟩ at the prompt. If you want to add additional cards or change that address, make sure that you do not choose an address used by another device.

ROM address — not required

Slot number — not required

## *3Com 3c523 series cards*

The SCO LLI Driver Disk supports the following 3c523 Cards.

- 3c523 EtherLink/MC
- 3c523B EtherLink/MC
- 3c523 EtherLink/MC TP

**WARNING** 3c523 cards may cause the system to "panic" or spontaneously reboot when used with 486 ™ machines under heavy loads. For more information, see the section entitled Known limitations of this release (page 49).

Before installing any of the 3c523 cards, complete the "Configuration checklist" (page 17), making sure you are familiar with the information found in the section entitled "Configuration parameters" (page 19). To complete the installation of the card, you need the following:

Card name
*e3C*
The first e3C card installed on your system is referred to as e3C0. If you install more than one e3C card on your system, the cards are numbered sequentially starting with 0.

Default settings for multiple card installations are found in the section entitled "Default card settings" (page 44).

Cable type
not required

DMA channel
not required

Interrupt vector (IRQ)
*12*
This setting is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a vector for your networking card that is already in use by another device, you are prompted to remove it or choose another vector for your card. If you remove the device, you must supply it with a new vector before it can be used.

I/O base address
*300*
This address is used if you press ⟨Enter⟩ at the prompt.

**CAUTION** If you use a base address for your networking card that is already in use by another device, **netconfig** removes that device. If you want to continue to use the original device, you must supply it with another base address.

RAM address
*c0000*
This address is used if you press ⟨Enter⟩ at the prompt. If you want to add additional cards or change that address, make sure that you do not choose an address used by another device.

ROM address
not required

Slot number
not required

## *Default card settings*

| Card name | Card number | IRQ number | I/O base address | RAM address | ROM address | DMA channel |
|---|---|---|---|---|---|---|
| COMPAQ Token-Ring | ctr0* | N/A | N/A | N/A | N/A | N/A |
| | ctr1 | N/A | N/A | N/A | N/A | N/A |
| | ctr2 | N/A | N/A | N/A | N/A | N/A |
| | ctr3 | N/A | N/A | N/A | N/A | N/A |
| HP27248A | hpe0 | 5 | N/A | N/A | N/A | 3 |
| EtherTwist | hpe1 | 7 | N/A | N/A | N/A | 2 |
| EISA Adapter | hpe2 | 10 | N/A | N/A | N/A | 6 |
| Card/32 | hpe3 | 11 | N/A | N/A | N/A | 5 |
| HP27245A, | hpi 0 | 2 | 300 | N/A | N/A | N/A |
| 27247A & 27250A ISA | hpi1 | 3 | 240 | N/A | N/A | N/A |
| cards | hpi2 | 5 | 280 | N/A | N/A | N/A |
| | hpi3 | 7 | 2C0 | N/A | N/A | N/A |
| IBM Token-Ring | tok 0 | 2 | N/A | d8000 | cc000 | N/A |
| | tok1 | 3 | N/A | d4000 | dc000 | N/A |
| IBM Token-Ring | btok0 | 2 | 86a0 | N/A | N/A | N/A |
| 16/4 Busmaster | btok1 | 3 | 96a0 | N/A | N/A | N/A |
| | btok2 | 4 | a6a0 | N/A | N/A | N/A |
| | btok3 | 5 | b6a0 | N/A | N/A | N/A |
| Microdyne 205T | exos0 | 2 | 310 | cc000 | N/A | N/A |
| | exos1 | 3 | 300 | c0000 | N/A | N/A |
| | exos2 | 5 | 320 | c4000 | N/A | N/A |
| | exos3 | 7 | 330 | c8000 | N/A | N/A |
| NOVELL NE2000 | nat0 | 2 | 300 | N/A | N/A | N/A |
| | nat1 | 3 | 320 | N/A | N/A | N/A |
| | nat2 | 4 | 340 | N/A | N/A | N/A |
| | nat1 | 5 | 360 | N/A | N/A | N/A |
| NOVELL NE3200 | ne0 | N/A | N/A | N/A | N/A | N/A |
| | ne1 | N/A | N/A | N/A | N/A | N/A |
| | ne2 | N/A | N/A | N/A | N/A | N/A |
| | ne3 | N/A | N/A | N/A | N/A | N/A |
| Racal ES3210 | i3B0 | 1 | N/A | d0000 | N/A | NONE |
| | i3B1 | 2 | N/A | d4000 | N/A | NONE |

*(Continued on next page)*

*(Continued)*

| Card name | Card number | IRQ number | I/O base address | RAM address | ROM address | DMA channel |
|---|---|---|---|---|---|---|
| | i3B2 | 4 | N/A | d8000 | N/A | NONE |
| | i3B3 | 5 | N/A | dc000 | N/A | NONE |
| Racal NI6510 | i6E0 | 9 | 360 | N/A | N/A | 3 |
| SMC8003 | wdn0 | 3 | 240 | d0000 | N/A | N/A |
| SMC8013 | wdn1 | 2 | 380 | d2000 | N/A | N/A |
| | wdn2 | 5 | 260 | d4000 | N/A | N/A |
| | wdn3 | 7 | 340 | d6000 | N/A | N/A |
| WD8003 | wdn0 | 3 | 240 | d0000 | N/A | N/A |
| WD8013 | wdn1 | 2 | 380 | d2000 | N/A | N/A |
| | wdn2 | 5 | 260 | d4000 | N/A | N/A |
| | wdn3 | 7 | 340 | d6000 | N/A | N/A |
| 3Com 3c501 | e3A0 | 3 | 300 | N/A | N/A | N/A |
| | e3A1 | 2 | 310 | N/A | N/A | N/A |
| | e3A2 | 5 | 330 | N/A | N/A | N/A |
| | e3A3 | 7 | 350 | N/A | N/A | N/A |
| 3Com 3c503 | e3B0 | 3 | 300 | N/A | N/A | N/A |
| | e3B1 | 2 | 310 | N/A | N/A | N/A |
| | e3B2 | 5 | 330 | N/A | N/A | N/A |
| | e3B3 | 4 | 350 | N/A | N/A | N/A |
| 3Com 3c507 | e3D 0 | 3 | 300 | N/A | N/A | N/A |
| | e3D1 | 2 | 310 | N/A | N/A | N/A |
| | e3D2 | 5 | 330 | N/A | N/A | N/A |
| | e3D3 | 4 | 350 | N/A | N/A | N/A |
| 3Com 3c523 | e3C 0 | 12 | 300 | c0000 | N/A | N/A |
| | e3C1 | 7 | 1300 | c8000 | N/A | N/A |
| | e3C2 | 3 | 2300 | d0000 | N/A | N/A |
| | e3C3 | 2 | 3300 | d8000 | N/A | N/A |

*Card number 0 of each type indicates the first card of that type installed on the system, number 1 indicates the second, and so forth.

*Chapter 5*

# *Removing the SCO LLI drivers*

**NOTE** If you are removing the LLI Drivers from ODT 2.0, refer to the section entitled "Upgrading LLI on ODT 2.0" (page 11) or to the section entitled "Installing and removing additional software" in your Open Desktop Installation Guide.

If you are removing the SCO LLI drivers, in most cases you are upgrading to a newer version of the product. If that is the case, we recommend that you complete the following steps before removing the drivers. Use the information you obtain in these initial steps to reconfigure your drivers after you install the newer version of the LLI Driver Disk.

1. Run **netconfig** and make a note of the configured networking chains.
2. Run **lliconfig** and make a note of the parameters for all the configured drivers.

**CAUTION** If you need to remove the SCO LLI Driver Disk from a system running SCO TCP/IP, Release 1.1.3, first remove the LLI Drivers, then remove TCP/IP, then reinstall TCP/IP.

To remove the SCO LLI Driver Disk, follow the instructions below.

1. If you are not already in the System Maintenance mode, use the following command to reboot the machine:

   **/etc/shutdown -i1**

   **NOTE** **shutdown -i1** safely shuts down networking services before allowing you to enter System Maintenance mode. For more information on the **shutdown** command, see the **shutdown**(ADM) manual page.

2. Enter the *root* password when you see the prompt:

```
INIT: New run level: S

INIT: SINGLE USER MODE

Type CONTROL-d to proceed with normal startup,
(or give the root password for system maintenance):
```

   As the super user, you have access to all the system files, so be careful not to overwrite, delete, or corrupt any files by accident.

3. At the shell prompt enter:

   **custom**

4. When you see the Custom menu use the → to highlight Remove and press ⟨Enter⟩.

   **custom** displays the Remove screen, with a list of currently installed software at the bottom right corner.

5. Use the ↓ to highlight SCO LLI Driver disk, then press ⟨Enter⟩.

   The Remove screen appears with a list of currently installed SCO LLI drivers at the bottom. **custom** highlights the All option.

6. Select all by pressing ⟨Enter⟩.

   You see a message that the system is executing the removal script. If networking chains have been configured, you see messages indicating that they are being removed.

7. You are asked if you want to relink the kernel. To save time, wait to relink the kernel until after you have removed and installed all the software that you plan to at this time. If you choose not to relink the kernel you see the following message:

```
Creating file list ...
```

   You return to the main **custom** menu.

   If you have removed the software using the All option, the software list on your screen no longer includes the SCO LLI Driver disk.

   You can continue installing or removing other products or you can quit **custom**.

8. When you are ready to quit **custom**, use → to highlight the Quit option. Press ⟨Enter⟩. **custom** asks you to confirm that you want to quit, and highlights the Yes option. Press ⟨Enter⟩.

*Chapter 6*

# *Known limitations of this release*

This chapter describes the known limitations the SCO LLI Driver Disk Release 3.1.0.

## *LLI Release 3.1.0 online manual pages and ODT Version 2.0*

SCO LLI Driver Disk Release 3.1.0 installs the latest online manual pages on all supported platforms. However, ODT Version 2.0 contains an older version of the LLI online manual pages. These pages are not removed during the LLI installation process. Thus, when using ODT Version 2.0 the following command accesses the older manual pages:

**man** ***manual page name***

While the older manual pages are only slightly different, you can update them by removing the following four files from your ODT system:

*/usr/man/cat.ADM/e3dsetup.ADM.Z*
*/usr/man/cat.ADM/llicnfg.ADM.Z*
*/usr/man/cat.ADM.llistat.ADM.Z*
*/usr/man/cat.ADM/wdnsetup.ADM.Z*

Make sure you remove only those files ending with a "Z". They are the older manual page files.

ODT Version 2.0 also contains a Bookreader online version of the manual pages which can be accessed through SCO Help. These manual pages cannot be updated.

The printed manual pages included with these *Release Notes* are the new versions. See Appendix E (page 81).

## *Microsoft NetBEUI protocol tuning for use with the NE2000*

When using Microsoft LAN Manager for UNIX Systems Release 1.1 with NetBEUI and the NE2000 card under a heavy load, you may see connections freeze or disconnect. This is due to a problem with the way NetBEUI handles packet retransmission and error conditions. If you see these problems, you need to tune three of NetBEUI's protocol parameters.

To do so, first bring your system into single user mode. From the system prompt, type:

**/usr/lib/netbeui/nbeconfig**

When prompted, change the following three parameters:

| Parameter | Old value | New value |
|---|---|---|
| KEY_ADAPT | 1000 | 0 |
| KEY_MAXOUT | 10 | 1 |
| KEY_MAXIN | 10 | 1 |

When prompted, relink the kernel and reboot.

To increase performance, you can experiment with higher `KEY_MAXOUT` and `KEY_MAXIN` values, but the new values above are known to work. For more information, see "Adjusting NetBEUI Tunable Parameters" in the *Microsoft LAN Manager for UNIX Systems Administrator's Guide.*

## *LAN Manager failure with IPX/SPX*

If you run Microsoft LAN Manager for UNIX Systems and SCO IPX/SPX under a sustained heavy load on the same machine, LAN Manager may produce an error resembling the following:

```
LAN Manager: MDELV bad msg in buf
```

If it does, you must reboot for LAN Manager to work. The LLI driver and all other protocol stacks continue to function normally.

## *llistat and the 3Com 3c501*

With four 3Com 3c501 cards installed on one machine, multiple **llistat** and **llistat -c** commands may cause some machines to panic.

## *NFS data corruption with Microdyne 205T on MPX systems*

Under heavy load on SCO MPX platforms, data corruption can occur when using NFS with the Microdyne 205T card. One solution to this problem is to specify a smaller NFS buffer size with the **mount** command. See the SCO NFS documentation for more information.

## *Data corruption with TCP/IP and Racal ES3210 and NI6510 cards*

Under heavy load, you can lose data when using TCP/IP with either of the two Racal cards. This problem is most often seen on faster machines.

## *nping errors with the Racal ES3210 and NI6510*

When you run SCO IPX/SPX over a Racal ES3210 the IPX/SPX command **nping** returns the following error:

```
nping zero packets received
```

This error also occurs when running the Racal NI6510 with IPX/SPX on a machine with MPX installed.

Other IPX/SPX network services are not effected.

## *netconfig prompt error with SMC and Western Digital cards*

During driver configuration for both Western Digital and SMC 8013 elite series cards, **netconfig** prompts for an Input/Output base address and offers an acceptable range resembling the following:

```
Enter I/O base address (800..f800) [800] or 'q' to quit:
```

When you choose an address within the acceptable range, **netconfig** generates an incorrect error message that resembles the following:

```
io address 800 is not in the range 200 through 3e0
```

Nevertheless, configuration continues successfully. You can safely ignore this message if you choose an address that falls within the acceptable range.

## *Token-Ring source routing*

For the most part, Token-Ring source routing is handled by the networking card driver. LLI Release 3.1.0 drivers support Token-Ring source routing for the TCP/IP and OSI stacks. Although future releases of Microsoft LAN Manager for UNIX Systems may not support Token-Ring source routing, the NetBEUI included with Microsoft LAN Manager for UNIX Systems Release 1.1 also supports Token-Ring routing. However, the drivers included with LLI Release 3.1.0 do not support Token-Ring routing with IPX/SPX.

This means that if you are running IPX/SPX (or a version of Microsoft NetBEUI later than 1.1) on a Token-Ring segment that is connected to other networks via a Token-Ring bridge, you cannot route network traffic to machines located on the other networks. However, if the other networks are running stacks that support Token-Ring routing, information from those networks will be routed to your machine.

For IPX/SPX, one solution to this problem may be to use IPX/SPX Token-Ring routing. See the IPX/SPX documentation for further information.

## *Remote nbstatus and the Racal NI6510 card*

On some machines, if you run Microsoft LAN Manager for UNIX Systems Release 1.1. with the Racal NI6510 card, your machine will not respond to a remote **nbstatus**. If another machine tries to **nbstatus** the machine with the NI6510 installed, **nbstatus** will fail.

With some motherboard chip sets, the card will not function at any level.

## *Serial input/output (sio) interrupt vectors under MPX*

The *sio* drivers use interrupt vectors 3 and 4. You can assign either of these interrupt vectors to another driver, but if you assign both 3 and 4 to other drivers, you remove the *sio* drivers from the Link Kit. On a system running SCO MPX, you cannot link the kernel if the *sio* drivers are removed. You get an error message similar to the following when you try to relink:

```
undefined       first referenced
symbol             in file
sio_tty         /etc/conf/pack.d/crllry/Driver.o
ld fatal: Symbol referencing errors. No output
written to unix
```

If you get this error message, use the following procedure to restore the *sio* device. See the section entitled "Configuration parameters" (page 19) for more information about *sio* interrupt vectors.

1. If you are not already in System Maintenance mode, use the following command to reboot the machine:

   **/etc/shutdown -i1**

   **NOTE** **shutdown -i1** safely shuts down networking services before allowing you to enter System Maintenance mode. For more information on the **shutdown** command, see the **shutdown**(ADM) manual page.

2. Enter the *root* password when you see the prompt:

```
INIT: New run level: S

INIT: SINGLE USER MODE

Type CONTROL-d to proceed with normal startup,
(or give the root password for system maintenance):
```

   As the super user, you have access to all the system files, so be careful not to overwrite, delete, or corrupt any files by accident.

3. Enter the following command:

   **netconfig**

4. Select **2** to remove a chain of protocol elements. You see a list of chains currently configured on the system. Enter the number that appears in front of the chain that you want to remove. After **netconfig** completely removes the chain, **netconfig** asks whether you want to restore the vector to the *sio* device.

5. Enter **y** to restore the vector to the *sio* device.

   **netconfig** then returns you to the original menu.

6. Enter **a** to add a chain that includes the driver you removed. Remember to use an interrupt vector that does not conflict with the *sio* driver.

7. When you finish all your changes, enter **q** to quit **netconfig** and relink the kernel.

8. When you finish, you must reconfigure the card itself. If your card is software-configurable, run the card configuration routine. If your card is not software-configurable, you must reconfigure the card by hand.

## *Spontaneous reboot with some 3Com 523 cards*

On a 486 Micro Channel machine after several hours under heavy load, the 3Com 523 EtherLink/MC card may cause the system to panic or spontaneously reboot. This problem is much more likely to occur when the card is used with Microsoft LAN Manager for UNIX Systems Release 1.1 and the Microsoft LAN Manager for UNIX Systems Release 1.1 Performance Supplement, configured using NetBEUI.

## *Network card performance issues with large data transfers*

If a given networking card is not fast enough to keep up with the data it is asked to transfer, network products such as NFS and LAN Manager can experience delays and timeouts when engaged in large data transfers. If this happens with NFS, the following message appears:

```
NFS timeout
```

If this happens with UNIX LAN Manager Client, LAN Manager prints the following message:

```
terminating read ahead with server server name.
```

Other networking services and applications that use unreliable transports (like UDP) can also suffer from this problem.

For example, since the 3Com 3C501 card has a limited buffering capability, the timeout error occurs when using NFS and a large (8K or more) buffer size. It can also occur when transferring data over a 16 megabit Token-Ring between a machine with a fast Token-Ring card and a machine with a slow one.

For NFS you can solve the problem by specifying a smaller buffer size in the mount command. An example of a mount command is:

**mount -f NFS,rsize=1024,wsize=1024 remote_host:/tmp /mnt**

For additional details, consult the SCO NFS documentation.

For the LAN Manager Client, you can solve the problem by reducing the read-ahead and/or write-behind configuration values in the */usr/lib/lm/constable* file, or by configuring a smaller network buffer size in the */usr/lib/lm/lmxrc* file. For LAN Manager Server, configure a smaller network buffer size in the *lanmanx.ini* file. For additional details, consult the LAN Manager documentation.

## *Extreme load and the Microdyne (Excelan) EXOS 205, 205T and 205T/16*

Under extreme load, machines using any of the EXOS cards may panic.

## *Initial hardware configuration report and the NOVELL NE2000*

If you remove your NE2000 card after installing your driver, the hardware configuration screen printed during boot-up will incorrectly list the card as installed.

*Appendix A*

# *netconfig NetBEUI sample driver configuration*

This appendix presents a sample configuration showing how to use **netconfig** to configure Microsoft LAN Manager Release 1.1 Server over a Microsoft NetBEUI transport stack and 3Com 501 card. It is not a sample for any other release of Microsoft LAN Manager. The procedure for any driver is similar, with some differences depending on the networking cards that you are configuring for your network.

Follow these steps to configure your network with **netconfig**:

1. If you are not already in the System Maintenance mode, use the following command to reboot the machine:

   **/etc/shutdown -i1**

   **NOTE** **shutdown -i1** safely shuts down networking services before allowing you to enter System Maintenance mode. For more information on the **shutdown** command, see the **shutdown**(ADM) manual page.

2. Enter the *root* password when you see the prompt:

```
INIT: New run level: S

INIT: SINGLE USER MODE

Type CONTROL-d to proceed with normal startup,
(or give the root password for system maintenance):
```

   As the super user, you have access to all the system files, so be careful not to overwrite, delete, or corrupt any files by accident.

3. At the system prompt, enter the following:

   **netconfig**

4. Press ⟨Enter⟩.

   The following menu appears:

```
No chains configured:
Available options:

  1. Add a chain
  2. Remove a chain
  q. Quit
Select option:
```

5. Enter **1** to select the Add a Chain option, then press ⟨Enter⟩.

   A list of available top-level products appears:

```
Num Name   Description
 1. lmxc   LAN Manager Client for UNIX Systems
 2. lmxs   LAN Manager Server for UNIX Systems
Select top level of chain to Add or q to quit:
```

   In the example shown above, both LAN Manager Client and LAN Manager Server are installed. If only one application is installed, only one is listed.

6. To select LAN Manager Server, enter **2**, then press ⟨Enter⟩.

   You see the following prompt:

```
Add chain : lmxs->
Num  Name       Description
  1. nbe        NetBEUI
Select next level of chain to Add or q to quit:
```

7. To select the Microsoft NetBEUI transport, enter **1**, then press ⟨Enter⟩.

   You are prompted to choose from a list of network drivers similar to the following:

```
Add chain : lmxs->nbe->
Num Name  Description
  1. e3A   3Com 501 Driver
  2. e3B   3Com 503 Driver
  3. e3C   3Com 523 Driver
  4. e3D   3Com 507 Driver
  5. exos  Excelan 205 Ethernet Driver
  6. hpe   HP-EISA-32 SCO LLI Driver
  7. hpi   HP-ISA SCO LLI Driver
  8. i3B   ES-3210 Racal Interlan Driver
  9. i6E   NI6510 Racal Interlan Driver
 10. tok   IBM Token Ring Network Adapter Driver
 11. wdn   SMC/WD 8003/8013 Series Driver
Select next level of chain to Add or q to quit:
```

   The list of drivers depends on the software currently installed.

8. Enter the number corresponding to the network adapter over which you want to configure Microsoft NetBEUI, then press ⟨Enter⟩. The remainder of this sample procedure describes the screens that you see if you choose **1**.

   The following prompt asks you to confirm the selected product chain:

```
Add chain lmxs->nbe->e3A0 (y/n):
```

9. If the displayed product chain is correct, type **y**, then press ⟨Enter⟩. If the chain is incorrect, type **n**, then press ⟨Enter⟩ to return to the **netconfig** main menu. You can then either quit **netconfig** or add a different chain of products.

   The following messages appear while the selected chain is configured:

```
Adding: lmxs->nbe->e3A0
Configuring 3Com501 board 0
```

   You also see driver-specific prompts, which vary depending on the network adapter you choose in step 5. For instructions on how to respond to these prompts, see Chapter 4 (page 17).

10. Respond to the driver-specific prompts. For instructions on responding to these prompts, see the section entitled "Configuration parameters" (page 19).

After you respond to all of the driver-specific prompts, **netconfig** begins configuring the specified chain of products. You see a series of messages indicating the progress of the configuration.

After **netconfig** configures the chain of products, the following prompt appears:

```
Do you want to start the LMX Server every time you
go multiuser (y/n)
```

11. If you want LAN Manager Server to start every time you leave system-maintenance mode, enter **y**, then press ⟨Enter⟩. Otherwise, enter **n**, then press ⟨Enter⟩.

    The following messages and prompts appear:

```
Currently configured chains:
 1. lmxs->nbe->e3A0
     lmxs  Microsoft LAN Manager Server for UNIX Systems
     nbe   NetBEUI
     e3A0  3Com 501 ethernet driver, board 0

Available options:
 1. Add a chain
 2. Remove a chain
 q. Quit
Select option:
```

12. If you want to add another chain, select option **1** and repeat the **netconfig** procedure.

    After you configure all the drivers that you want on your system, enter **q** to quit **netconfig**.

13. Finally, you are asked if you want to relink the kernel. To save time, wait to relink the kernel until you install all the software that you plan to install at this time. If you choose not to relink the kernel (by entering **n**), you return to the command line.

    If you enter **y** to relink the kernel, a message confirms that choice. Then, you see this prompt:

```
Do you want this kernel to boot by default? (y/n)
```

14. Enter **y**. You see several messages, including:

```
Do you want the kernel environment rebuilt? (y/n)
```

15. Enter **y**. This procedure takes a few minutes. When the rebuild is complete, you return to the command line.

For more information about Microsoft NetBEUI's tunable parameters, see the *LAN Manager Administrator's Guide*. The guide also contains definitions and descriptions of these parameters.

*Appendix B*

# *netconfig OSI sample driver configuration*

This appendix presents a sample configuration showing how to use **netconfig** to configure SCO Retix LT-610 Release 1.0.0 over an SMC Driver. The procedure for any driver is similar, with some differences depending on the networking cards that you are configuring for your network.

Follow these steps to configure your network with **netconfig**:

1. If you are not already in the System Maintenance mode, use the following command to reboot the machine:

   **/etc/shutdown -i1**

   **NOTE** **shutdown -i1** safely shuts down networking services before allowing you to enter System Maintenance mode. For more information on the **shutdown** command, see the **shutdown**(ADM) manual page.

2. Enter the *root* password when you see the prompt:

```
INIT: New run level: S

INIT: SINGLE USER MODE

Type CONTROL-d to proceed with normal startup,
(or give the root password for system maintenance):
```

   As the super user, you have access to all the system files, so be careful not to overwrite, delete, or corrupt any files by accident.

3. At the system prompt, enter the following and press ⟨Enter⟩:

   **netconfig**

   A listing of configured chains appears, followed by a menu of options. If no chains are configured, you see the following:

```
No chains configured:
Available options:

  1. Add a chain
  2. Remove a chain
  q. Quit
Select option:
```

   If you already had a chain configured, such as SCO TCP/IP over a SMC 8013 network adapter card, you would see something like the following:

```
Currently configured chains:
 1. tcp-ip->wdn0
     tcp-ip  SCO TCP/IP Runtime System for SCO UNIX
     wdn0    SMC/WD 8003/8013 Series Driver, board 0

Available options:
  1. Add a chain
  2. Remove a chain
  3. Reconfigure an element in a chain
  q. Quit
Select option:
```

4. Enter **1** to select the Add a Chain option, then press ⟨Enter⟩.

   A list of available top-level products appears:

```
Num Name    Description
 1. lt610    Retix OSI LT-610 Lower Layers
 2. netbios  SCO NetBIOS Runtime System for SCO UNIX
 3. sco_tcp  SCO TCP/IP Runtime System for SCO UNIX
Select top level of chain to Add or q to quit:
```

   The list you actually see reflects the products available on your system.

5. To add a chain using LT-610 from the example list, enter **1**, then press ⟨Enter⟩.

   You are prompted to choose a network driver from a list similar to the following:

```
Num Name  Description
  1. e3A   3Com 501 Driver
  2. e3B   3Com 503 Driver
  3. e3C   3Com 523 Driver
  4. e3D   3Com 507 Driver
  5. exos  Excelan 205 Ethernet Driver
  6. hpe   HP-EISA-32 SCO LLI Driver
  7. hpi   HP-ISA SCO LLI Driver
  8. i3B   ES-3210 Racal Interlan Driver
  9. i6E   NI6510 Racal Interlan Driver
 10. wdn   SMC/WD 8003/8013 Series Driver
 11. tok   IBM Token Ring Network Adapter Driver
Select next level of chain to Add or q to quit:
```

   The list of drivers actually displayed reflects the software currently installed on your system.

6. Enter the number corresponding to the network adapter over which you wish to configure LT-610, then press ⟨Enter⟩. The remainder of this sample procedure describes the screens that you see if you choose item number **10**.

   The following prompt asks you to confirm the selected product chain:

```
Add chain lt610->wdn0 (y/n):
```

7. If the displayed product chain is correct, type **y**, then press ⟨Enter⟩. If the chain is incorrect, type **n**, then press ⟨Enter⟩ to return to the **netconfig** main menu. You can then either quit **netconfig** or add a different chain of products.

   If you type **y** in response to the previous prompt, you see the following messages while the selected chain is being configured:

```
Adding: lt610->wdn0
Configuring SMC/WD 8003/8013 Series Driver,
board 0
```

   You may also see driver-specific prompts, which vary depending on the network adapter you choose in step 5. For instructions on how to respond to these prompts, see Chapter 4 (page 17).

**NOTE** Please consult the *SCO/Retix OSI LT-610 Installation Instructions* for additional information that may be of help while you perform steps 8 through 13.

8. The Network Service Configuration menu appears, and is similar to the following example:

```
                Network Services Configuration
1. ESIS support for end systems configuration ( default )
2. ESIS support for intermediate systems configuration
3. No ESIS support, static routing tables for end system configuration
3. No ESIS support, static routing tables for intermediate system
   configuration
```

9. Enter the number that corresponds to the configuration you want.

   The following prompt appears:

```
Network Entity Title address:
```

10. Enter the Network Entity Title that you have obtained for this system.

**NOTE** Every system on the network requires a unique Network Entity Title and at least one unique NSAP address.

11. The following prompt appears:

```
Number of NSAP addresses  [1]:
```

12. Enter the number of NSAP addresses assigned to your system. Enter each NSAP address as a continuous string of hexadecimal digits. Do not include any spaces, periods, or other punctuation in the address.

    The drivers are installed in the kernel.

    Note that, if you chose to install an Intermediate System in step 8, you are now given the option of installing WAN support. Once that is done, you continue with the next step.

13. The following prompt appears:

```
Would you like the lower layers started
when the system boots? (y n)
```

If you enable automatic startup by entering **y** at this prompt, the executable script file */etc/rc2.d/S40osi* is created. This script runs automatically whenever the system is booted. It consists of a single command that starts LT-610.

14. Press ⟨Enter⟩ when instructed.

    At this point, **netconfig** begins configuring the specified chain of products. You see a series of messages indicating the progress of the configuration, including the automatic configuration of various STREAMS parameters.

    If you have SCO TCP/IP configured over the same card over which you just configured LT-610, you see a screen similar to the following:

```
Currently configured chains:
 1. tcp-ip->wdn0
     tcp-ip  SCO TCP/IP Runtime System for SCO UNIX
     wdn0    SMC/WD 8003/8013 Series driver,
               board 0
 2. lt610->wdn0
     lt610 Retix OSI LT-610 Lower Layers
     wdn0  SMC/WD 8003/8013 Series driver,
             board 0

Available options:
 1. Add a chain
 2. Remove a chain
 q. Quit
Select option:
```

15. Select **q** to quit the **netconfig** menu, and confirm the exit by pressing ⟨Enter⟩.

16. Finally, you are asked if you wish to relink the kernel. To save time, wait to relink the kernel until you install all the software that you plan to install at this time. If you choose not to relink the kernel (by entering **n**), you return to the command line.

    If you enter **y** to relink the kernel, a message confirms that choice. Then, you see the following prompt:

```
Do you want this kernel to boot by default? (y/n)
```

17. Enter **y**. You see several messages, including:

```
Do you want the kernel environment rebuilt? (y/n)
```

18. Enter **y**.

    This procedure takes a few minutes. When the rebuild is complete, you are returned to the command line. LT-610 is now configured over your selected network adapter card.

*Appendix C*

# *netconfig IPX/SPX sample driver configuration*

This appendix presents a sample configuration showing how to use **netconfig** to configure SCO IPX/SPX Release 1.0.2 over a 3Com 3c523 Driver. The procedure for any driver is similar, with some differences depending on the networking cards that you are configuring for your network.

Follow these steps to configure your network with **netconfig**:

1. If you are not already in the System Maintenance mode, use the following command to reboot the machine:

   **/etc/shutdown -i1**

   **NOTE** **shutdown -i1** safely shuts down networking services before allowing you to enter System Maintenance mode. For more information on the **shutdown** command, see the **shutdown**(ADM) manual page.

2. Enter the *root* password when you see the prompt:

```
INIT: New run level: S

INIT: SINGLE USER MODE

Type CONTROL-d to proceed with normal startup,
(or give the root password for system maintenance):
```

   The super user has access to all the system files, so be careful not to overwrite, delete, or corrupt any files by accident.

3. At the system prompt, enter the following:

   **netconfig**

4. Press ⟨Enter⟩. A listing of configured chains appears, followed by a menu of options. If no chains are configured, you see the following:

```
No chains configured:
Available options:

  1. Add a chain
  2. Remove a chain
  q. Quit
Select option:
```

If you already had a chain configured, such as SCO TCP/IP over a SMC/WD 8013 network adapter card, you would see output similar to the following:

```
Currently configured chains:
 1. tcp-ip->wdn0
     sco_tcp SCO TCP/IP for SCO UNIX
     wdn0    SMC/WD 8003/8013 Series Driver,
             board 0

Available options:
  1. Add a chain
  2. Remove a chain
  3. Reconfigure an element in a chain
  q. Quit
Select option:
```

5. Enter **1** to select the Add a Chain option, then press ⟨Enter⟩:

   A list of available top-level products appears:

```
Num Name    Description
 1. sco_ipx  SCO IPX/SPX for SCO UNIX
 2. sco_tcp  SCO TCP/IP for SCO UNIX
Select top level of chain to Add or q to quit:
```

The list you actually see reflects the products available on your system.

6. To add a chain using SCO IPX/SPX from the list, enter **1**, then press ⟨Enter⟩.

   You are prompted to choose a network driver from a list similar to the following:

```
Num Name  Description
  1. e3A   3Com 501 Driver
  2. e3B   3Com 503 Driver
  3. e3C   3Com 523 Driver
  4. e3D   3Com 507 Driver
  5. exos  Excelan 205 Ethernet Driver
  6. hpe   HP-EISA-32 SCO LLI Driver
  7. hpi   HP-ISA SCO LLI Driver
  8. i3B   ES-3210 Racal Interlan Driver
  9. i6E   NI6510 Racal Interlan Driver
 10. tok   IBM Token Ring Network Adapter Driver
 11. wdn   SMC/WD 8003/8013 Series Driver
Select next level of chain to Add or q to quit:
```

   The menu presents a list of drivers that are currently installed on your system.

7. Enter the number corresponding to the network adapter over which you wish to configure IPX/SPX, then press ⟨Enter⟩. The remainder of this sample procedure describes the screens that you see if you choose item number **3**.

   The following prompt asks you to confirm the selected product chain:

```
Add chain sco_ipx->e3C0 (y/n):
```

8. If the displayed product chain is correct, type **y**, then press ⟨Enter⟩. If the chain is incorrect, type **n**, then press ⟨Enter⟩ to return to the **netconfig** main menu. You can then either quit **netconfig** or add a different chain of products.

   If you type **y** in response to the previous prompt, you see the following messages while the selected chain is configured:

```
Adding: sco_ipx->e3C0
Configuring 3Com 3C523 driver,
board 0
```

   You may also see driver-specific prompts, which vary depending on the network adapter you choose in step 6. For instructions on how to respond to these prompts, see Chapter 4 (page 17).

You then see a screen resembling the following:

```
Installing SCO IPX/SPX over e3C0

Changing Streams resources needed for IPX/SPX.....done.
Installing drivers into link kit...ipx ipxe nvt spx xecho done.
Copying files......done.
Saving etc/gettydefs in /usr/lib/ipxrt/save....done
Editing etc/gettydefs....done.
```

**netconfig** prompts for the name to be assigned to the server. This name should be the same as the current machine name.

```
Enter NVT SERVER NAME [current machine name]:
```

9. Press ⟨Enter⟩ to accept your current machine name as the server name. Otherwise, enter a valid server name.

   **netconfig** then prompts for the Service Advertising reply delay.

```
Enter SAP reply delay (1 to 300) [1]
```

10. Press ⟨Enter⟩ to accept the default [1] or enter a number between 1 and 300.

    **netconfig** then prompts for the internal network number. This number must be **unique** for every machine on all sub-networks.

```
Enter INTERNAL NETWORK NUMBER (8 hex digits)
```

11. Enter a valid hexadecimal number up to 8 digits long.

    **netconfig** then prompts for the network number. This must be different from the internal network number. It is common to all machines on a given sub-network.

```
Enter NETWORK NUMBER (8 hex digits):
```

12. Enter a valid hexadecimal digit up to 8 digits long.

    **netconfig** displays the LAN type menu.

```
Available LAN TYPES:
        1. ETHERNET_II
        2. ETHERNET_802.3
        2. ETHERNET_802.2
        3. TOKEN_RING
Select Option [2]:
```

13. Select the LAN type. NOVELL IPX/SPX networks, by default, are configured to use Ethernet 802.3 framing. If you intend to use 802.3 framing, press ⟨Enter⟩ to accept the default (option 2), an Ethernet network using 802.3 framing.

    **CAUTION** If you choose `ETHERNET_802.3`, you cannot use your e3C0 card to run either NetBEUI or OSI. Only one 802.3 stack can operate on a given card at one time. For more information on using multiple stacks on one card, see "Using multiple transport stacks" (page 6).

    Once you select the LAN type, **netconfig** displays the following protocol number selection menu:

```
Available PROTOCOL NUMBERS:
        1. Global SAP (FF)
        2. DEFAULT (-2)
Select Option [2]:
```

    Press ⟨Enter⟩ to accept the default protocol number, option 2.

    **NOTE** If you choose LAN type 802.3, the SCO LLI Driver Disk Release 3.1.0 only supports SCO IPX/SPX using protocol number 2 (`DEFAULT (-2)`). Therefore, if you select LAN TYPE 802.3 you should use the default -2 protocol number. For more information see the SCO IPX/SPX documentation set.

14. After selecting a protocol number, **netconfig** displays a screen similar to the following:

```
16 pseudo-ttys are configured
Do you wish to add pseudo-ttys? (y/n/q) y
```

    If you intend to add pseudo-ttys press ⟨Enter⟩. In not enter **n** and press ⟨Enter⟩.

15. **netconfig** displays a screen similar to the following:

```
IPX/SPX Configuration Complete.
press any key to continue
```

Press any key to complete the configuration process

16. **netconfig** displays the following screen:

```
Currently configured chains:
 1. tcp-ip->wdn0
     tcp-ip  SCO TCP/IP Runtime System for SCO UNIX
     wdn0    SMC/WD 8003/8013 Series Driver, board 0
 2. sco_ipx->e3C0
     sco_ipx SCO IPX/SPX for UNIX
     e3C0  3Com 3c523 Driver, board 0

Available options:
 1. Add a chain
 2. Remove a chain
 3. Reconfigure an element in a chain
 q. Quit
Select option:
```

17. Select **q** to quit the **netconfig** menu, and confirm the exit by pressing ⟨Enter⟩.
18. Finally, you are asked if you wish to relink the kernel. To save time, wait to relink the kernel until you install all the software that you plan to install at this time. If you choose not to relink the kernel (by entering **n**), you return to the command line.

    If you enter **y** to relink the kernel, a message confirms that choice. Then, you see the following prompt:

```
Do you want this kernel to boot by default? (y/n)
```

19. Enter **y**. You see several messages, including:

```
Do you want the kernel environment rebuilt? (y/n)
```

20. Enter **y**.

This procedure takes a few minutes. After rebuilding the kernel environment, reboot the system. IPX/SPX is now configured over your selected network adapter card driver.

*Appendix D*

# *netconfig TCP/IP sample driver configuration*

This appendix presents a sample configuration showing how to use **netconfig** to configure an Excelan driver on SCO TCP/IP 1.2.0. The procedure for any driver is similar, with some differences depending on the networking cards that you are configuring for your network.

**NOTE** Even though it is not supported, if you intend to install an LLI 3.1.0 driver on a platform running TCP/IP 1.1.3, you must use the **mkdev** utility. SCO TCP/IP Release 1.1.3 does not use **netconfig**. If you are using TCP/IP 1.1.3 refer to the TCP/IP *Release and Installation Notes* for a **mkdev** sample driver configuration.

Follow these steps to configure your network with **netconfig**:

1. If you are not already in the System Maintenance mode, use the following command to reboot the machine:

   **/etc/shutdown -i1**

   **NOTE** **shutdown -i1** safely shuts down networking services before allowing you to enter System Maintenance mode. For more information on the **shutdown** command, see the **shutdown**(ADM) manual page.

2. Enter the *root* password when you see the prompt:

```
INIT: New run level: S

INIT: SINGLE USER MODE

Type CONTROL-d to proceed with normal startup,
(or give the root password for system maintenance):
```

As the super user, you have access to all the system files, so be careful not to overwrite, delete, or corrupt any files by accident.

3. At the system prompt type:

   **netconfig**

4. Press ⟨Enter⟩ A listing of configured chains appears, followed by a menu of options. In no chains are configured, you see the following:

```
No chains configured:
Available options:

  1. Add a chain
  2. Remove a chain
  q. Quit
Select option:
```

If you already had a chain configured, such as SCO IPX/SPX over an SMC/WD 8013 network adapter card, you would see output similar to the following:

```
Currently configured chains:
 1. sco_ipx->wdn0
     sco_ipx SCO IPX/SPX for SCO UNIX
     wdn0    SMC/WD 8003/8013 Series Driver, board 0

Available options:
  1. Add a chain
  2. Remove a chain
  3. Reconfigure an element in a chain
  q. Quit
Select option:
```

5. Enter **1** to select the Add a Chain option, then press ⟨Enter⟩:

   A list of available top-level products appears:

```
Num Name    Description
 1. sco_ipx  SCO IPX/SPX for SCO UNIX
 2. sco_tcp  SCO TCP/IP for SCO UNIX
Select top level of chain to Add or q to quit:
```

The list you actually see reflects the products available on your system.

6. To add a chain using SCO TCP/IP from the list, enter **2**, then press ⟨Enter⟩.

   You are prompted to choose a network driver from a list similar to the following:

```
Num Name  Description
  1. e3A   3Com 501 Driver
  2. e3B   3Com 503 Driver
  3. e3C   3Com 523 Driver
  4. e3D   3Com 507 Driver
  5. exos  Excelan 205 Ethernet Driver
  6. hpe   HP-EISA-32 SCO LLI Driver
  7. hpi   HP-ISA SCO LLI Driver
  8. i3B   ES-3210 Racal Interlan Driver
  9. i6E   NI6510 Racal Interlan Driver
 10. tok   IBM Token Ring Network Adapter Driver
 11. wdn   SMC/WD 8003/8013 Series Driver
Select next level of chain to Add or q to quit:
```

   The menu presents a list of drivers that are currently installed on your system.

7. Enter the number corresponding to the network adapter over which you wish to configure TCP/IP, then press ⟨Enter⟩. The remainder of this sample procedure describes the screens that you see if you choose item number **5**.

   The following prompt asks you to confirm the selected product chain:

```
Add chain sco_tcp->exos0 (y/n):
```

8. If the displayed product chain is correct, type **y**, then press ⟨Enter⟩. If the chain is incorrect, type **n**, then press ⟨Enter⟩ to return to the **netconfig** main menu. You can then either quit **netconfig** or add a different chain of products.

   If you type **y** in response to the previous prompt, you see the following messages while the selected chain is configured:

```
Adding: sco_tcp->exos0
Configuring Excelan 205 Ethernet Driver, board 0
```

   You may also see driver-specific prompts, which vary depending on the network adapter you choose in step 6. For instructions on how to respond to these prompts, see Chapter 4 (page 17), and your SCO TCP/IP *Release and Installation Notes*

You then see a screen resembling the following:

```
Installing SCO TCP/IP over exos0
```

When done, **netconfig** displays a screen similar to the following:

```
TCP/IP Configuration Complete...

Currently configured chains:
 1. tcp-ip->exos0
     tcp-ip  SCO TCP/IP Runtime System for SCO UNIX
     exos0   Excelan 205 Ethernet Driver, board 0
 2. sco_ipx->e3C0
     sco_ipx SCO IPX/SPX for UNIX
     e3C0  3Com 3c523 Driver, board 0

Available options:
 1. Add a chain
 2. Remove a chain
 3. Reconfigure an element in a chain
 q. Quit
Select option:
```

9. Select **q** to quit the **netconfig** menu, and confirm the exit by pressing ⟨Enter⟩.
10. Finally, you are asked if you wish to relink the kernel. To save time, wait to relink the kernel until you install all the software that you plan to install at this time. If you choose not to relink the kernel (by entering **n**), you return to the command line.

    If you enter **y** to relink the kernel, a message confirms that choice. Then, you see the following prompt:

```
Do you want this kernel to boot by default? (y/n)
```

11. Enter **y**. You see several messages, including:

```
Do you want the kernel environment rebuilt? (y/n)
```

12. Enter **y**.

    This procedure takes a few minutes. After rebuilding the kernel environment, reboot the system. TCP/IP is now configured over your selected network adapter card driver.

*Appendix E*

# *Supplementary manual pages*

# e3dsetup

configure 3Com 3c507 EtherLink 16 and 16 T network adapter cards

## *Syntax*

**e3dsetup** [*-option*] [*value*]

**e3dsetup** **-conn:**[*aui* | *other*]
**-data:**[*data_addressing_mode*]
**-help**
**-io:**[*base_I/O_address*]
**-irq:**[*IRQ_line*]
**-ram:**[*RAM_window_starting_address*]
**-ramsize:**[*RAM_window_size*]
**-rom:**[*boot_ROM_starting_address*]
**-romsize:**[*boot_ROM_size*]
**-zerowait:**[*e* | *d*]

## *Description*

The **e3dsetup** command configures 3Com EtherLink 16 network adapter cards. For your protection, only the superuser in single-user (or maintenance) mode should run this command. If you attempt to run **e3dsetup** without entering single-user mode, the command produces the following message:

```
WARNING: All networking must be stopped and the system
should be in Single-User mode, Do you wish to continue? (y/n) [y]
```

See the "Warnings" section for more information before running this command.

Because **e3dsetup** can only configure one card at a time, only one 3c507 adapter card may be physically installed in your computer for configuration at one time. If you intend to install more than one 3c507 card, you must install, configure and remove them sequentially. After you have configured all of your network adapter cards, you may install as many as four of them in your computer, provided that you have assigned each of them a unique base I/O address and a unique IRQ line. You should also make sure that the RAM window and the boot ROM address spaces, if defined, do not overlap address spaces defined for other adapter cards or devices. See the **-ram**, **-ramsize**, **-rom** and **-romsize** options for more information.

If you install more than one 3c507 card, and later want to reconfigure one or more of them, you must remove all of the cards except the one to be reconfigured. If you want to reconfigure any of the others, you must remove the first reconfigured card and install the next card to be reconfigured. Proceed in this manner until all your 3c507 cards have been reconfigured. Once the last card has been reconfigured, all the remaining cards may be reinstalled.

To display or change adapter card configurations interactively, enter the **e3dsetup** command with no options. The command begins by attempting to find all software configurable cards (up to four) installed in the computer. If more than one 3Com 3c507 adapter card is found, the **e3dsetup** command prints the current configurations for all of them, then prints a warning message and exits. If, however, you have only one card installed, the command displays the configuration of that card and prompts you to change the configuration. If you want to change the configuration of the adapter card, enter **y**. If you do not want to change the configuration, enter **n**.

If you enter **y**, the command presents each configuration option in sequence and displays its current value. If you want to retain the displayed value for that option, press ⟨Enter⟩. If you want to change the configuration value for that option, enter the new value and press ⟨Enter⟩.

To change the configuration of an adapter card from the command line, enter the following:

**e3dsetup [option]:[*value*]**

The command first verifies that there is only one 3Com 3c507 adapter card installed in the computer. If more than one card is found, **e3dsetup** prints the current configurations for all the cards found, then prints a warning message and exits. If only one card is found, the command reads the option(s) and their value(s), verifies that the value(s) specified are valid, and changes the configuration. All omitted options retain their current values.

## *Options*

**-conn:*connection_type*** specifies the type of physical connection used between the network adapter card and the network. Acceptable values are **aui** (thick Ethernet, external transceiver) or **other** (either twisted pair or thin Ethernet with a built in transceiver).

**-data:*s* | *t*** specifies whether 8- or 16-bit data transfers are used. Acceptable values for this option are **s** for standard 8-bit data transfer and **t** for turbo 16-bit data transfer. Note that the 3c507 card does not work in 16-bit mode with some motherboard chip sets. If your 3c507 card does not work in 16-bit mode, try the 8-bit mode.

**-help** displays the help screen

**-io:*I/O_base_address*** specifies the base I/O address for the network adapter card. The address must be specified using three hexadecimal digits, lie in the range from 200 through 3E0 inclusive, and be a multiple of hexadecimal 10. In other words, legal addresses are 200, 210, 220, and so forth. However, the following are not allowed: 2F0, 370, 3B0, 3C0 and 3D0.

**-irq:***interrupt_request* specifies the Interrupt request (IRQ) used by the network adapter card. Acceptable values are 3, 5, 7, 9, 10, 11, 12 and 15. Network adapter cards prior to Revision 04 do not support IRQ 11.

**-ram:***RAM_address* specifies the starting address of the RAM window. The RAM window is adapter card memory that is mapped into the physical address space of the computer. Acceptable values for this option are: C0000, C8000, D0000, D8000, F00000, F20000, F40000, F60000 or F80000. Note that addresses above D0000 limit acceptable values of the **ramsize** options. This option is used in conjunction with the **ramsize** option to specify the address space of the RAM window. See the **ramsize** option for more information.

**ramsize:***RAM_size* specifies the size of the RAM window in Kilobytes. The RAM window is adapter card memory that is mapped into the physical address space of the computer. In general, acceptable values for this option are 16, 32, 48, and 64. However, if you specify a RAM window starting address of D8000, the only acceptable values are 16 or 32. Furthermore, if you specify a RAM window starting address of F00000 or greater, the only acceptable value is 64. This option is used in conjunction with the **ram** option to fully specify the address space of the RAM window. Note that the address space of the RAM window may not overlap address spaces defined for other adapter cards or other devices.

**-rom:***boot_ROM_address* specifies the starting address of the boot ROM. The address must be a hexadecimal value in the range from C0000 through DE000. Further, the address must be an integral multiple of hexadecimal 2000. In other words, legal addresses are C0000, C2000, C4000, and so forth.

**-romsize:***boot_ROM_size* specifies the size of the boot ROM in Kilobytes. Acceptable values for this option are 0, 16, 32, and 64. Specify a size of 0 if the adapter card has no boot ROM or if you want to disable the boot ROM.

**-zerowait:***e* | *d* specifies whether the adapter card is to use zero wait states for RAM access. Wait states, if used, effectively slow down the data transfer rate of the RAM on board the adapter card. Acceptable values for this option are **d** for disable and **e** for enable. If you specify **d**, wait states are added. If you specify **e**, no wait states are added.

## *Warnings*

You should first use **netconfig** or **mkdev** to configure the device driver before you run **e3dsetup** to configure your card. Both **netconfig** and **mkdev** check the parameters you supply for conflicts with those already in use by other devices. Once you resolve the conflicts, use the device driver's values to configure the card.

You are strongly urged to run this program in single-user mode only. This precaution avoids problems that might arise from specifying an incorrect base I/O address for the network adapter card or from specifying a base I/O address or IRQ that is already used by another adapter card or device. It is also important that no part of the RAM and ROM address spaces defined for the network adapter card overlaps address spaces defined for other adapter cards or other devices. This includes devices such as small built-in LED or LCD displays used to show disk cylinder data or CPU clock speed.

## *See also*

Consult the documentation accompanying the 3Com 3C507 EtherLink 16 or 16TP network adapter card for additional information about installing and configuring the card.

# lliconfig

display all LLI drivers currently configured on the system

## Syntax

**lliconfig**

## Description

The **lliconfig** utility lets you see which LLI drivers are currently configured on your system. It also displays how the drivers are configured into networking product systems or "chains". **lliconfig** displays (if applicable) each driver's board name, interrupt vector, I/O address, RAM address and DMA channel.

## Examples

Here is sample output from **lliconfig**:

```
The following LLI drivers are configured:
     Board    Interrupt    IO Addr     RAM Addr      DMA Channel
     e3B0     3            300         0-0             none
     wdn0     2 (9)        240         d0000-d1fff     none
The following LLI chains are configured:
     Driver           Configured under
     e3B0                     netconfig (nbe)
     wdn0                     netconfig (sco_tcp)
```

In this example, e3B0 indicates that your machine has one 3Com 3c503 installed and configured using interrupt vector 3 and a base I/O address of 300. The 0-0 in the RAM address column for the e3B0 board indicates that the board does not have a RAM address. The DMA Channel is none. The (9) in the interrupt vector column for the wdn0 board indicates that interrupt vector 9 is sometimes referred to as 2 by the **wdn0** driver.

The example also indicates that **netconfig** was used to set up a networking chain between the **e3B0** driver and Microsoft NetBEUI as well as between the **wdn0** driver and SCO TCP/IP.

## Files

*/etc/lliconfig*
*/usr/lib/lli/chains*

## See also

**mkdev**(ADM), **netconfig**(ADM)

# llistat

display LLI driver statistics

## *Syntax*

**llistat** [**-cls**]
[*-device_name*]

## *Description*

The **llistat** utility provides a standard method of displaying statistics:

- to verify your driver board's name and address
- to verify that your driver board is installed correctly
- to check for network problems

**llistat** displays each driver board's name and address, the Multicast address table, the number of frames that have gone in and out, the number of frames with errors, and the number of collisions (if any).

Here is sample output from **llistat:**

```
Device        SNPA/MAC address     Factory Address
/dev/e3B0     02:60:8c:3c:2f:4a    02:60:8c:3c:2f:4a
        Multicast address table
        Frames:       In       Out   Errs In   Err out Collisions
                   172999       750         0         0          10
```

In this example, /dev/e3B0 in the Device column indicates the name of the lli device driver. The 02:60:8c:3e:2f:4a in the SNPA/MAC address column indicates the address currently in use on the driver board. The similar numbers in the Factory Address column indicates the built-in address assigned by the board manufacturers. These two addresses are often the same. The Multicast address table gives the multicast address in the same form. In this example, the driver board is not using a multicast address and the table is empty. The columns in the Frames row indicate the number of frames that have gone in and out of the board, the number of frames that have gone in and out with errors, and the number of collisions. Frames that have collisions are resent. You can expect to have a few errors, but you might have a network problem if a large percentage of frames have gone in and out with errors.

## *Options*

| | |
|---|---|
| **-c** | clears all statistics |
| **-l** | displays all available statistics, one statistic to a line |
| **-s** | verifies the device name only |
| ***-device_name*** | allows you to specify a single device name. If you do not use this option and there is more than one lli device configuration, **llistat** shows you the configuration for all of the devices. |

## *Files*

*/usr/bin/llistat*
*/usr/lib/lli/chains*

## *See also*

**lliconfig**(ADM)

# smcsetup

configures supported Standard Microsystems (SMC) and Western Digital 8003 and 8013 series network adapter cards

## *Syntax*

**smcsetup** [*option*] [*configuration option*]

**smcsetup** **-default**
**-factory**
**-help**
**-io:***base_I/O_address* [*configuration_option:value*]
**-node:***node_address* [*configuration_option:value*]
**-v**

## *Description*

The **smcsetup** command configures supported SMC and Western Digital network adapter cards. For your protection, only the super user in single-user (or maintenance) mode should run this command. If you attempt to run **smcsetup** without entering single-user mode, the command produces the following message.

```
WARNING: All networking must be stopped and the system
should be in Single-User mode, Do you wish to continue? (y/n) [y]
```

See the "Warnings" section for more information before running this command.

If you enter the **smcsetup** command without any options, the command begins by checking to see if you are in multi- or single-user mode. It then attempts to find all software configurable cards (up to four) installed in the computer. It displays the configuration of each card, and asks if you want to change the configuration. If you do not want to, enter **n** (or **q** if you have more than one adapter card installed).

If you do want to change the configuration of an adapter card, enter the number of that card (or enter **y** if you have only one card installed). **smcsetup** presents the configuration options in sequence. Press ⟨Enter⟩ to accept the current value. To change the current value, enter the new value and press ⟨Enter⟩.

If you have multiple cards, and you want to display or modify the configuration of a single adapter card, enter its base I/O address or Ethernet node address as follows:

**smcsetup -io:***base_I/O_address*

or

**smcsetup -node:***node_address*

**smcsetup** then presents the configuration sequence for that card only.

If you want to change a single configuration value on a single card, first enter:

**smcsetup -io:*card_address***

***card address*** refers to the base I/O address or the card to be reconfigured. Alternatively, the card may also be specified by entering:

**smcsetup -node:*node_address***

***node_address*** refers to the ethernet node address of the card to be reconfigured. After you specify the card to be reconfigured, enter the configuration option for the value you want to change, followed by the new value.

For example, the following commands change the interrupt request for the specified cards to 7.

**smcsetup -io:240 -irq:7**
or
**smcsetup -node:132.147.152.19 -irq:7**

In the above example, **smcsetup** searchs for an SMC or Western Digital card with either an I/O base address of 240 or an ethernet node address of 132.147.152.19. If it finds a card matching either specification, it changes the interrupt vector for that card to 7. For each configuration option specified, the new value replaces the current value. Omitted options retain their current values.

You can install as many as four SMC or Western Digital network adapter cards in your computer, provided that you have assigned each of them both a unique base I/O address and a unique IRQ line.

## *Options*

| | |
|---|---|
| **-default** | forces the adapter card to its default configuration. This option overrides all other options, including **-factory**. |
| **-factory** | forces the adapter card to the factory configuration. This option overrides all other options except **-default**. The factory configuration is the same as the default configuration, except that interrupts are disabled. |
| **-help** | displays the help screen |
| **-io:*base_I/0_address*** | allows the user to specify a given card in a multi-card installation by identifying its base I/O address. Once the card is specified, the user may reconfigure all or part of the configuration parameters with the configuration options. |
| **-node:*node_address*** | allows the user to specify a given card in a multi-card installation by identifying its Ethernet node address. Once the card is specified, the user may reconfigure all or part of the configuration parameters with the configuration options. |
| **-v** | displays the **smcsetup** version number |

## *Configuration options*

**-irq:***interrupt_request*
specifies the interrupt request (IRQ) line the network adapter card uses. This option also has the effect of enabling the IRQ line specified. Acceptable values for this option are 2, 3, 4, 5, 7, 10, 11, and 15. Note that IRQ 2 maps into IRQ 9. Also, some adapter cards do not support all of the above values.

**-link_int:***e or d*
specifies whether Link Integrity is enabled or disabled. Acceptable values for this option are **e** (enabled) or **d** (disabled). This option cannot be used with SMC or Western Digital 8013WC and 8013EWC series network adapter cards. For these adapter cards, use the **-netconn** option instead of the **-link_int** option.

**-netconn:***connection_type*
specifies the type of physical connection used between the network adapter card and the network. This option must be used for those cards that lack a hardware jumper for this purpose. Acceptable values for this option are **1** (BNC or 10BaseT), **2** (AUI or 10BaseT), and **3** (Twisted Pair with No Link Integrity).

**-newio:***I/O_address*
specifies the new base I/O address in hexadecimal for a network adapter card. The address must be in the range from hexadecimal 200 through 3E0 and must be a multiple of hexadecimal 20. In other words, legal addresses are 200, 220, 240, and so forth.

**-ram:***RAM_address*
specifies the starting address of the RAM window. The RAM window is the RAM on the adapter card that is mapped into the physical address space of the computer. The address must be a hexadecimal value in the range from 80000 through FE000. Also, the address must be an integral multiple of **-ramsize**. See the **-ramsize** option for more information. For 8013 adapter cards, recall that addresses above 1 Mbyte are specified with six hexadecimal digits.

**-ramsize:***RAM_size*
specifies the size of the RAM window in Kilobytes. The RAM window is the RAM on the adapter card that is mapped into the physical address space of the computer. Acceptable values for this option are 8 and 16. The starting address of the RAM window is specified with the **-ram** option. The address space of the RAM

window, defined by the **-ramsize** and **-ram** options, must be reserved for a given adapter card and not overlap address spaces defined for other adapter cards or devices.

**-rom:***boot_ROM_address* specifies the base address of the boot ROM. The address must be a hexadecimal value in the range from 80000 through FC000. Also, the address must be an integral multiple of **-romsize**. This option is ignored if **-romsize** is 0.

**-romsize:***boot_ROM_size* specifies the size of the boot ROM in Kilobytes. Acceptable values for this option are 0, 16, 32, or 64. Specify a size of 0 if the adapter card has no boot ROM or if you want to disable it. The address space for the boot ROM, defined by the **-romsize** and **-rom** options, must be reserved for a given adapter card and not overlap address spaces defined for other adapter cards or devices.

**-wait:***y* | *n* specifies whether or not the adapter card is to use zero wait states for RAM access. Acceptable values for this option are **y** for yes and **n** for no. If you specify **y**, wait states are added to slow down the data transfer rate of the RAM on the adapter card. If you specify **n**, no wait states are added.

## *Notes*

Depending on the cards you are installing, you may have to set hardware jumpers to allow the configuration settings you specify with **smcsetup** to take effect. Consult the documentation accompanying your adapter card for more information.

## *Warnings*

You should first use **netconfig** (or **mkdev**) to configure the driver before you run **smcsetup** to configure your card. Both **netconfig** and **mkdev** check the parameters you supply for conflicts with those already in use by other devices. Once you resolve any conflicts, use the driver's values to configure the card.

You are strongly urged to run this program in single-user mode only. This precaution avoids problems that might arise from specifying an incorrect base I/O address for a network adapter card or from specifying a base I/O address that is already being used by some other device. If multiple adapters cards are

to be configured, it is recommended that you configure them one at a time to reduce the chance of configuring more than one card with the same base I/O address. It is also important that no part of the RAM and ROM address spaces defined for a given network adapter card be shared with either other adapter cards or another device. This includes devices such as small built-in LED or LCD displays used to show disk cylinder data or CPU clock speed.

## *See also*

Consult the documentation accompanying your network adapter card for additional information about installing and configuring the card.

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