Sun microsystems

Sun Enterprise™ Systems Interface 1.0 Installation and User Guide

With Release Notes and Reference Section

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Preface

The *Sun Enterprise Systems Interface 1.0 Installation and User Guide* describes how to install, configure, and use the Sun Enterprise™ Systems Interface (ESI) software that supports the Sun Enterprise Systems Interface board. The manual includes Release Notes in Chapter <$elemparanumonly and Reference Manual pages in Appendix <$elemparanumonly<$elemtext.

This document is intended for the user who installs, configures, and uses Enterprise Systems Interface 1.0 software to transfer files to a Sun server from a mainframe and from a mainframe to a Sun server. This user should have a working knowledge of UNIX® systems, particularly those based on the Solaris™ operating environment. The document is also of interest to the mainframe system programmer who is configuring the mainframe for use with the Sun server. This user should be an experienced mainframe professional with basic TCP/IP administration skills.

How This Book Is Organized

The *Sun Enterprise Systems Interface 1.0 Installation and User Guide* is organized as follows:

Chapter <$elemparanumonly contains Release Notes.

Chapter <$elemparanumonly is an overview of the Sun Enterprise Systems Interface 1.0 software.

Chapter <$elemparanumonly provides detailed instructions on how to install the Sun Enterprise Systems Interface 1.0 software and online documentation.

Chapter <$elemparanumonly describes how to configure and test the Sun Enterprise Systems Interface Transfer Control Protocol/Internet Protocol (TCP/IP) interface for use with standard Sun TCP/IP software.

Chapter <$elemparanumonly describes how to configure, test, and use the Sun Enterprise Systems Interface tape emulation software.

Appendix <$elemparanumonly is the Sun Enterprise Systems Interface 1.0 Reference Section containing copies of the online manual pages.

Appendix <$elemparanumonly describes troubleshooting the Sun Enterprise Systems Interface 1.0 software. It contains a section on obtaining traces and a section on using the diagnostics provided.

Appendix <$elemparanumonly describes how to remove a Sun Enterprise Systems Interface board and add a Sun Enterprise Systems Interface board to the system using Dynamic Reconfiguration (DR).

Appendix <$elemparanumonly tells what you will need to know about configuring mainframe SYSGEN information to work with Sun Enterprise Systems Interface 1.0 software.

Appendix <$elemparanumonly illustrates setting up device instances on a Sun server that correspond to multiple images on the mainframe.

Appendix <$elemparanumonly provides an example of IBM Mainframe TCP/IP Data Set Addressing.

Appendix <$elemparanumonly provides examples of upload and download Job Control Language (JCL) scripts for the mainframe when you are using tape emulation.

Using UNIX Commands

This document does not contain information on basic UNIX commands and procedures such as shutting down the system, booting the system, and configuring devices. See the following for this information:

■ *Solaris Handbook for Sun Peripherals*

Typographic Conventions

TABLE P-1   Typographic Conventions

Typeface	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`%` **`su`** `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename*.

UNIX Shell Prompts

TABLE P-2   Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

Application	Title	Part Number
Reference Manual	Sun Solaris 7 and 8 Reference Manual Collection	
Hardware Installation	*Sun Enterprise Systems Interface Board Installation Guide*	806-5693

If you do not have Solaris or UNIX knowledge, first read the books in the Solaris System Administration collection and consider UNIX system administration training.

Ordering Sun Documentation

Fatbrain.com, an Internet professional bookstore, stocks select product documentation from Sun Microsystems, Inc.

For a list of documents and how to order them, visit the Sun Documentation Center on Fatbrain.com at:

`http://www1.fatbrain.com/documentation/sun`

Accessing Sun Documentation Online

The `docs.sun.com`[SM] web site enables you to access Sun technical documentation on the Web. You can browse the `docs.sun.com` archive or search for a specific book title or subject at:

`http://docs.sun.com`

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docfeedback@sun.com

Please include the part number of your document (806-5690-10) in the subject line of your email.

Release Notes

This chapter contains the Sun Enterprise Systems Interface 1.0 Release Notes:
Following are the issues discussed:

- "<$elemtext
- "<$elemtext

General Issues

This section discusses general issues for this Sun Enterprise Systems Interface 1.0
software release.

Minimum Hardware Requirement

The minimum hardware requirement is one processor per Sun Enterprise Systems
Interface board.

Supported Platforms

The Sun Enterprise Systems Interface board and software are supported on the Sun
Enterprise 3x00, 4x00, 5x00, 6x00, and 10000 servers. Please contact your customer
support or sales representative for information about other supported platforms.

PCI I/O Board Limitation

On the Sun Enterprise 3x00, 4x00, 5x00, and 6x00 servers, you can have only one Sun Enterprise Systems Interface (ESI) board per Peripheral Component Interconnect (PCI) Input/Output (I/O) board.

Known Software Bugs

This section describes software bugs that were known at the time of release and that you may notice or that can affect the operation of the Sun Enterprise Systems Interface 1.0 software or board.

Bug ID 4373467 - `prtdiag` Command Does Not Show the ESI Board

The Sun Enterprise Systems Interface board is not displayed in the `prtdiag`(1M) command output, because the `prtdiag` command does *not* show PCI cards that have their PCI class code register set to 0xFF, or *unknown*.

Overview

This chapter describes the Sun Enterprise Systems Interface 1.0 software. The Sun Enterprise Systems Interface 1.0 software enables high-speed data exchange between a Sun server and an IBM or plug-compatible mainframe.

Sun Enterprise Systems Interface 1.0 software comprises three components:

- TCP/IP interface software, which allows TCP/IP transfer by emulating an IBM 3172 TCP/IP device.
- Tape emulation software, which provides bulk file transfer by emulating an IBM 3490 Tape device.
- Enterprise Systems Interface driver (low-level driver)

Uses for the TCP/IP Interface Software

The Transfer Control Protocol/Internet Protocol (TCP/IP) interface software is designed for use with high bandwidth TCP/IP–based applications that need to exchange high volumes of data between a mainframe and a Sun server. Some of the applications that benefit from a direct channel connection to a mainframe are:

- Interactive sessions
- Program-to-program operations
- Web hosting
- Data warehouse loading
- Data consolidation
- File relocation

Uses for the Tape Emulation Software

The Sun Enterprise Systems Interface tape emulation software is designed for use with applications that need to exchange high volumes of data between a mainframe and a Sun server.

Features of the Sun ESI 1.0 Software

The main features of the Sun Enterprise Systems Interface 1.0 software are:

- Installs and configures easily—and you do not need to modify your other software applications.
- Provides flexible connectivity for Enterprise System Connection (ESCON) channels.
- *TCP/IP only:*
  - Provides the fastest TCP/IP connection to the mainframe—outperforms LAN-attached routers and front-end processors.
  - Supports IBM and third-party TCP/IP stacks.
  - Emulates an IBM 3172 control unit operating in pass-through mode.
- *Tape emulation only:*
  - Emulates an IBM 3490 control unit.
  - Provides ability for users to specify file block and record length.
  - Provides *optional* ASCII/EBCDIC conversion.
  - Provides the best throughput for Sun server to mainframe file transfers

Requirements for Using Sun ESI 1.0 Software

The requirements for using Sun Enterprise Systems Interface 1.0 are:

- Hardware—Sun Enterprise Systems Interface Kit, consisting of a Sun Enterprise Systems Interface board, a loopback connector, and a 10-meter cable
- Software—Sun Enterprise Systems Interface 1.0 software package, consisting of the TCP/IP interface software, the tape emulation software, the Enterprise Systems Interface hardware driver, and the online reference manual pages

- Operating System (OS)—Sun Solaris Operating Environment version 7 or 8
- *For TCP/IP only.* TCP/IP software for the IBM mainframe operating system OS 370/390 from one of the following vendors:
  - IBM OS 370/390 TCP/IP
  - Computer Associates SOLVE:TCPaccess
  - Connectivity Systems TCP/IP for VSE
  - Amdahl UTS

External Documentation

The following documents are external to Sun Microsystems and may be useful to you in using Sun Enterprise Systems Interface 1.0 with the mainframe.

- IBM *OS/390 V2R8.0 HCD Bookshelf*, Document Number: SC28-1850
- IBM *Input/Output Program User's Guide and ESCON Channel-to-Channel Reference*, Document Number: GC38-0401
- IBM *TCP/IP for MVS, Customization and Administration Guide*, Version 3.1, Document Number: SC31-7134

For Operating Channel and Devices

- IBM *OS/390 V2R5.0 MVS System Commands*, Document Number: GC28-1781

For Operating TCP/IP

- IBM *OS/390 TCP/IP OpenEdition: User's Guide*, Document Number: GC31-8305
- IBM *OS/390 TCP/IP OpenEdition: Configuration Guide*, Document Number: SC31-8304

Installing Sun ESI 1.0 Software

This chapter explains the configuration information you need to gather before installing the Sun Enterprise Systems Interface 1.0 software and explains the procedure for installing the software. Also, before installing the Sun Enterprise Systems Interface 1.0 software, you need to ensure that the hardware is installed. A Sun Enterprise Systems Interface board should be installed in a PCI bus slot in your Sun server. Refer to the *Sun Enterprise Systems Interface Board Installation Guide* for details.

Gathering Configuration Information for TCP/IP Interface Software

If you are planning to use the TCP/IP interface component of the Enterprise Systems Interface 1.0 software, have the following information available to properly configure your software:

- Obtain two host IP addresses from your network administrator.

  The TCP/IP interface component requires its own separate network, or subnet address, to function. At least two IP addresses are required in this network:

  - One host IP address for the TCP/IP interface
  - One host IP address for the mainframe

- Obtain a default gateway IP address from your network administrator *(optional)*.

  A single default gateway may be defined for the server. If more complex routing is required for your network, the default gateway reflects an IP address assigned to a router that is connected to the same LAN as the Sun Enterprise Systems Interface board.

- Determine if routing protocols are to be used *(optional)*.

A complex network environment may require using a dynamic routing protocol. Currently, the IBM mainframe TCP/IP software provides only the RouteD daemon for Routing Information Protocol (RIP).

- Determine the network media type to be used from the mainframe system programmer.

  The ESI TCP/IP interface software and the mainframe must be configured to use the same media type. The important information is the maximum transmission unit (MTU).

  - Fiber Distributed Data Interface (FDDI) - *Suggested for performance*; maximum transmission unit (MTU) of 4,352 bytes
  - Ethernet - MTU of 1,500 bytes

- Obtain the IBM channel device configuration for the 3172 control unit from the mainframe system programmer. See Chapter <$elemparanumonly for the details of the IBM channel device configuration information.

  The mainframe system administrator needs to configure the mainframe to operate a 3172 control unit using the System Generator (SYSGEN) before completing installation of the Sun Enterprise Systems Interface software. This information is placed into the TCP.PROFILE.TCPIP data set for the mainframe (see Appendix <$elemparanumonly). This information is placed into the `chan.conf` file for the Sun system that contains the ESI board (see Appendix <$elemparanumonly for more information).

<$elemparanum shows a summary of what configuration information is needed, who is the source of the information, and where the information needs to go and on which machines.

TABLE 3-1   Summary of Configuration Information for the TCP/IP Interface

Source	Information	Target	Machine
Network Administrator	Host IP address for the TCP/IP interface	`/etc/hosts` file	Sun
		`TCP.PROFILE.TCPIP` Data Set	Mainframe
	Host IP address for the mainframe	`/etc/hosts` file	Sun
		`TCP.PROFILE.TCPIP` data set	Mainframe
	Default gateway IP address *(optional)*	`/etc/hosts` file	Sun
		`TCP.PROFILE.TCPIP` data set	Mainframe
	Use routing protocols? *(optional)*	Which ones?	Sun
		RouteD for RIP only	Mainframe

TABLE 3-1   Summary of Configuration Information for the TCP/IP Interface

Source	Information	Target	Machine
Mainframe System Programmer	Network media type/MTU size: • FDDI/MTU = 4,352 bytes *(recommended)* • Ethernet/MTU = 1,500 bytes		
		`chan.conf` file	Sun
		`TCP.PROFILE.TCPIP` data set	Mainframe
	Mainframe channel device (3172) configuration	`chan.conf` file	Sun
		`TCP.PROFILE.TCPIP` data set	Mainframe

Gathering Configuration Information for Tape Emulation Software

If you are planning to use the tape emulation component of the Enterprise Systems Interface 1.0 software, have the following information available to properly configure your software:

■ Obtain the IBM channel device configuration for the 3490 control unit from the mainframe system programmer. See Chapter <$elemparanumonly for the details of the IBM channel device configuration information.

The mainframe system administrator needs to configure the mainframe to operate a 3490 control unit using SYSGEN before completing installation of the software. This information is placed into the TCP.PROFILE.TCPIP data set for the mainframe (see Appendix <$elemparanumonly for more information). This information is placed into the `chan.conf` file for the Sun system that contains the ESI board (see Appendix <$elemparanumonly for more information).

Sample Sun ESI Configuration Worksheets

<$elemparanum and <$elemparanum show examples of the configuration information that needs to be gathered for a site. You may want to devise configuration worksheets similar to these tables that are tailored to your own site.

TABLE 3-2   Sample Sun and Mainframe Configuration Details Worksheet

Sun Configuration Details			Mainframe Configuration Details				
Logical CUAddr	Sun Board	Sun Instance	OS390 CHPID	OS390 CU Address	OS390 Dev Address	TCPIP Dev Name	Description
0	0 Top	0	A8	0100	0100-010F		16 3490s
1	0 Top	0	A8	0180	0180-018F	D3172180	16 3172s
0	2 Top	1	A9	0110	0110-011F		16 3490s
1	2 Top	1	A9	0190	0190-019F	D3172190	16 3172s
0	2 Bottom	2	AA	0120	0120-012F		16 3490s
1	2 Bottom	2	AA	01A0	01A0-01AF	D31721A0	16 3172s
0	4 Top	3	AB	0130	0130-013F		16 3490s
1	4 Top	3	AB	01B0	01B0-01BF	D31721B0	16 3172s

TABLE 3-3   Sample IP Addresses Worksheet

Instances	Sun IP Address	Mainframe IP Address	TCPIP Dev Name
Sun Instance 0	192.168.104.10	192.168.104.11	D3172180
Sun Instance 1	192.168.105.10	192.168.105.11	D3172190
Sun Instance 2	192.168.106.10	192.168.106.11	D31721A0
Sun Instance 3	192.168.107.10	192.168.107.11	D31721B0

Installing the Sun ESI 1.0 Software

The Sun Enterprise Systems Interface 1.0 software (SUNWesi) and online reference manual pages (SUNWesimn) are delivered in the Sun Solaris operating environment package format on a CD-ROM. This document is available also on the CD-ROM in .pdf, .ps, and .html format. To install the software and man pages, load and mount the CD-ROM, and then install SUN Enterprise Systems Interface 1.0 software by using the pkgadd(1M) utility.

The directory, file structure, and file definitions are shown in the following example.

```
/etc
   ./etc/opt/SUNWconn/esi
        down6900.bin        #ESI firmware
        down960f.bin        #ESI firmware
        chan.conf           #ESI configuration file
        chanadm             #ESI channel administration program
        changet         #ESI application to transfer to mainframe
        chanput         #ESI application to receive from mainframe
   ./etc/opt/SUNWconn/esi/man   #ESI man pages
        chan.conf
        chanadm
        changet
        chanput
        chanip
        chantape
        esi
   ./etc/init.d
        chancfg             #Init time configuration program
   ./etc/rc0.d
        K15chancfg          #Shutdown configuration kill script
   ./etc/rc2.d
        S99chancfg          #Boot time configuration program
/kernel/drv
        chanip              #TCP/IP interface component
        chanip.conf         #O/S configuration chanip component
        chantape            #Tape emulation component
        chantape.conf       #O/S configuration chantape component
        esi                #Hardware device driver component
/kernel/drv/sparcv9         #64-bit modules for Solaris 7/8
        chanip
        chantape
        esi
```

▼ To Load and Mount the CD-ROM

1. **Log in as superuser.**

2. **Place the CD-ROM into the CD-ROM drive.**

3. **If not mounted automatically, mount the CD-ROM on a local directory.**

   - If the Volume Manager (`vold`) is running on your machine, then the CD-ROM is mounted automatically under `/cdrom/sun_esi_1_0`.
   - If the Volume Manager (`vold`) is *not* running on your machine, create a directory called `/cdrom/sun_esi_1.0` and mount the CD-ROM manually as follows.

   ```
   # mkdir -p /cdrom/sun_esi_1_0
   # mount -o ro /dev/dsk/c0t6d0s0/cdrom/sun_esi_1_0
   ```

   - For detailed instructions on how to load software from a CD-ROM drive mounted on a remote directory, refer to the *Solaris Software and AnswerBook Packages Administration Guide.*

   After mounting the CD-ROM, you see the `/cdrom/sun_esi_1_0/Product` directory. This directory contains the Enterprise Systems Interface 1.0 software packages.

▼ To Install Sun ESI 1.0 Software

The following instructions are for installing Sun Enterprise Systems Interface 1.0 software on a Solaris 7 or 8 operating environment using `pkgadd`(1M).

1. **Log in as superuser.**

2. **Change to the directory where the** `SUNWesi` **and** `SUNWesimn` **packages reside.**

3. **Run the package add command to install** `SUNWesi` **and** `SUNWesimn`**.**

   ```
   # pkgadd -d . SUNWesi SUNWesimn
   ```

During the installation, the `pkgadd`(1M) command:

- Installs the software in the locations listed in the preceding directory and file structure example.
- Loads the following into the Sun Solaris operating environment:
  - Hardware device driver (`esi`)
  - 3172 TCP/IP interface (`chanip`) component

- 3490 tape emulation (`chantape`) component

■ Installs the online reference manual pages in `/opt/SUNWconn/esi/man`

4. Add `/etc/opt/SUNWconn/esi` **to** `$PATH` **and** `/opt/SUNWconn/man` **to** `$MANPATH` **to use the software and the man pages.**

Note – You do *not* have to reboot the system to use the software.

CHAPTER **4**

Configuring and Testing TCP/IP Interface Software

This chapter contains instructions for configuring the Sun Enterprise Systems Interface TCP/IP interface software (`chanip`) to use standard Sun TCP/IP software.

Configuring the TCP/IP Interface Software

Configuring the TCP/IP interface software to work correctly with the hardware involves the following:

- Preparing for configuration
- Defining the Sun Enterprise Systems Interface configuration file (`chan.conf`)
- Administering the Enterprise Systems Interface product (`chanadm`)

There are two parts involved in preparing for configuring the Enterprise Systems Interface TCP/IP interface software:

- Determining data transfer properties
- Identifying control unit addressing parameters

Determining Data Transfer Properties

These data transfer properties are equivalent to options set at the network interface card (NIC) level. They define the behavior of the NIC; that is, what media type to use, and how to transfer packets efficiently based on TCP/IP traffic patterns.

You need to determine three data transfer properties:

- Minimum Packet Size

  Under normal data transfer conditions, performance is optimal when the system accumulates data packets for a number of milliseconds to allow for more data to be transferred at one time. However, performance is not optimal when small packets have to wait; typically, data acknowledgements. This parameter, combined with the transmit interval parameter, allows you to fine-tune the accumulation of data based on the system's unique traffic flow.

- Transmit Interval

  The amount of time in milliseconds to wait for data packets to accumulate in the channel buffer before transferring them across the channel.

- Media Type

  Use FDDI for Fiber Distributed Data Interface if you want the larger Maximum Transmission Unit (MTU) of 4,352 bytes. Use ETH for Ethernet if you want the smaller MTU of 1,500 bytes. For optimal performance, use FDDI. Remember that the important consideration here is what MTU you want.

Identifying Control Unit Addressing Parameters

The TCP/IP interface software control unit parameters correspond to the Input-Output Configuration Program/Input-Output Configuration Data Set (IOCP/IOCD) definition on the mainframe. They must reflect the values defined for the 3172 control unit on the mainframe to work properly.

Up to 16 multiple virtual system (MVS) logical control units, or images, are supported by the Sun Enterprise Systems Interface board for the TCP/IP interface. Each partition has a unique logical control unit address (CUaddr), or control unit image, which needs to be configured in the Sun Enterprise Systems Interface 1.0 software configuration file /etc/opt/SUNWconn/esi/chan.conf. The typical user requires only one CUaddr to connect to the mainframe.

Each CUaddr consists of:

- Logical Control Unit (image)

  Choose the CUaddr that matches the TCP/IP 3172 configuration for the partition defined on the MVS mainframe. (Normally, only one MVS partition exists.)

Note – For mainframes with multiple partitions using the ESCON Multiple Image Facility (EMIF), each partition with a TCP/IP stack requires a unique logical control unit value for the TCP/IP 3172. See Appendix <$elemparanumonly

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- First Device Address

Use the first device address assigned by the mainframe for the 3172 control unit. For 3172, the mainframe always uses pairs of device addresses. Therefore, if you choose `0x40`, the mainframe uses `0x40` and `0x41`. The default value is `0x00`.

Note – The mainframe system programmer determines the actual value.

- Number of Devices

  Define one or more 3172 devices on a particular logical control unit. The number of devices must be in multiples of two; that is, 2, 4, 6, and so on.

Note – The suggested number of devices is two. Throughput performance does not increase by selecting a larger number of devices. Each device pair must share the bandwidth with every additional device pair. This parameter is included only as a way to define multiple 3172 devices on a logical control unit.

Defining the Sun ESI Configuration File

Define the exact system configuration as it exists on the mainframe in the Sun Enterprise Systems Interface configuration file (`/etc/opt/SUNWconn/esi/chan.conf`). See Appendix <$elemparanumonly for the `chan.conf`(4) man page for detailed instructions.

Administering the Sun ESI 1.0 Software

The Sun Enterprise Systems Interface administration program (`chanadm`) reads the `chan.conf` file and furnishes the firmware (`chanip`) and device driver (`esi`) with all the information necessary to operate the mainframe ESCON channel. See Appendix <$elemparanumonly for the `chanadm`(1M) man page for detailed instructions. Specifically, the Sun Enterprise Systems Interface administration program is responsible for:

- Downloading the microcode and programmable gate array (PGA) code to the Sun Enterprise Systems Interface board in the Sun sever
- Configuring the STREAMS below the device driver
- Configuring the STREAMS above the device driver
- Taking the hardware online or offline
- Running diagnostics
- Retrieving board level and device driver internal traces

The Sun Enterprise Systems Interface configuration is read from the `chan.conf` file and sent to the device driver (`esi`). The device driver requires configuration to deliver the data correctly.

Using the Sun ESI Administration Program

Execute the `chanadm` program only when the Sun Enterprise Systems Interface board needs a change to its status, such as during initial configuration. Normally, the `chanadm` program does not require any command line parameters. There are some important points to note about the normal usage of `chanadm`:

- `chanadm` runs automatically at boot time. During installation, entries are made in the `/etc/init.d` and `/etc/rc2.d` directories to allow this.
- Executing `chanadm` modifies only the configuration for interfaces that are offline from the mainframe.
- Executing `chanadm` with no options reprograms all offline interfaces.

See Appendix <$elemparanumonly for the `chanadm`(1M) man page for details of the Sun Enterprise Systems Interface administration program and its options.

Initial Configuration and Testing of the TCP/IP Interface

After the software package is installed, configure the TCP/IP interface (`chanip`) component using the information gathered in "<$elemtext<$elempagenum.

Following is a step-by-step procedure to test the configuration and installation on the server. Substitute your own information for the *XX*s (instance numbers) and *YY*s (logical 3172 device definitions) in the procedure.

Note – This procedure assumes that the mainframe host is already prepared to install this `chanip` software connection.

▼ To Configure and Test the TCP/IP Interface

1. **Become the superuser, and find the Sun Enterprise Systems board instance number.**

```
& su
# prtconf
```

The Sun Enterprise Systems Interface board is listed as:

```
pci116a,6950, instance #XX
```

where *XX* is the instance number to use.

2. **Edit the** `/etc/opt/SUNWconn/esi/chan.conf` **file to use the instance number and perform the mainframe configuration.**

See Appendix <$elemparanumonly for the `chan.conf`(4) man page.

3. **Execute the** `chanadm` **program to configure the Sun Enterprise Systems Interface board.**

```
# chanadm
```

4. **Open the** `chanip`*YY* **device to set up the streams needed for IP to use the device (plumb the device).**

```
# ifconfig chanipYY plumb
```

where *YY* is the logical 3172 device definition.

Each instance supports up to ten 3172 devices; for example, the first logical 3172 device on instance 0 is `chanip0`, the second logical 3172 device is `chanip1`, and so on. Then for each additional instance, add 10; so that the first logical 3172 device on instance 1 is `chanip10`, the second logical 3172 device is `chanip11`, and so on.

Therefore, the numbering convention for the `chanip`*YY* interface is:

- Instance zero is defined as `chanip0` to `chanip9`.
- Instance one is defined as `chanip10` to `chanip19`.
- Instance two is defined as `chanip20` to `chanip29`.
- And so on....

5. **Assign a network address, netmask, and broadcast to the interface and bring it up**

```
# ifconfig chanipYY inet IP address
# ifconfig chanipYY netmask +
# ifconfig chanipYY broadcast +
# ifconfig chanipYY up
```

where *YY* is the logical 3172 device definition and *IP address* is the address assigned to the Sun Enterprise Systems Interface board.

Note – The mainframe system programmer performs steps 6 and 7. For more information, refer to the IBM *OS/390 TCP/IP OpenEdition: User's Guide*, Document Number: GC31-8305 and the IBM *OS/390 TCP/IP OpenEdition: Configuration Guide*, Document Number: SC31-8304.

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6. **Have the mainframe system programmer vary the mainframe channel path ID (CHPID) and devices online to establish communication between the mainframe host and the Sun Enterprise Systems Interface board.**

7. **Have the mainframe system programmer bring up TCP/IP on the mainframe. If TCP/IP is already up, either restart it or vary the new link without restarting.**

8. **As the Sun system administrator, initiate a test** `ping` **between the host and the mainframe to test the new connection.**

```
# ping mainframe_IPaddress
```

Ensuring That Changes Take Effect in the Sun ESI Configuration File

Anytime you modify the Sun Enterprise Systems Interface configuration file (`chan.conf`), follow this procedure for the changes to take effect.

▼ To Ensure That Changes Take Effect in the Sun ESI Configuration File

1. **Change the configuration file (**`etc/opt/SUNWconn/esi/chan.conf`**).**

   See Appendix <$elemparanumonly for the `chan.conf`(4) man page for details about modifying the Sun Enterprise Systems Interface configuration file.

2. **If the interface is connected to TCP/IP on the mainframe, have the mainframe system programmer vary the TCP/IP link inactive.**

3. **Have the mainframe system programmer vary the channel devices and CHPID offline.**

4. **If plumbed, unplumb all interfaces for the channel adapter.**

   ```
   # ifconfig chanipYY unplumb
   ```

5. **Run** `/etc/init.d/chancfg start` **to reconfigure the offline interfaces.**

   ```
   # /etc/init.d/chancfg start
   ```

   This also replumbs any unplumbed TCP/IP interfaces that have a chanip*YY* file, where *YY* is the logical 3172 device definition.

6. **Have the mainframe system programmer vary the channel devices and CHPID online.**

7. **If the interface uses TCP/IP, have the mainframe system programmer vary the link active.**

Note – If there are any syntax errors in the configuration file, syntax errors are logged to the console, and the file is not processed until the error is corrected.

Disabling or Restoring the Automatic Sun ESI Configuration

For normal operations, the Sun Enterprise Systems Interface administration program (`chanadm`) runs automatically at boot time to program the firmware (chanip) and device driver (esi) with the Sun Enterprise Systems Interface configuration information. You can disable or restore this automatic boot time configuration feature.

▼ To Disable the Automatic Sun ESI Configuration

Note – The command in step 1 disables *all* Sun Enterprise Systems Interfaces.

1. **As superuser, type the following to disable the automatic Sun Enterprise Systems Interface configuration at boot time:**

```
# rm /etc/rc2.d/S99chancfg
```

▼ To Restore the Automatic Sun ESI Configuration

1. **As superuser, type the following to restore the automatic Sun Enterprise Systems Interface configuration at boot time:**

```
# ln -s /etc/init.d/chancfg /etc/rc2.d/S99chancfg
```

Configuring the TCP/IP Interface Software for Multiple Interfaces

Use the Sun Solaris `ifconfig`(1M) system administration command to configure the TCP/IP interface (`chanip`) component. `chanip` supports up to 10 3172 device definitions per Sun Enterprise Systems Interface instance.

> **Note –** Keep in mind that each chanip*YY* instance that is configured with
> ifconfig(1M) takes up two devices addresses in the
> /etc/opt/SUNWconn/esi/chan.conf file.

Each instance supports up to ten 3172 devices; for example, the first logical 3172
device on instance 0 is chanip0, the second logical 3172 device is chanip1, and so
on. Then for each additional instance, add 10; so that the first logical 3172 device on
instance 1 is chanip10, the second logical 3172 device is chanip11, and so on.

Therefore, the numbering convention for the chanip*YY* interface is:

- Instance zero is defined as chanip0 to chanip9.
- Instance one is defined as chanip10 to chanip19.
- Instance two is defined as chanip20 to chanip29.
- And so on....

▼ To Create a TCP/IP Module Network Interface

Use the following procedure to create a new TCP/IP interface (chanip) component
network interface to use on board instance one, for example.

> **Note –** Internet Protocol version 6 (IPv6) is *not* supported.

1. Become the superuser, and plumb chanip*YY*.

```
% su
# ifconfig chanipYY plumb
```

where *YY* is the logical 3172 device definition.

2. Assign a network address, netmask, and broadcast to the interface and bring it up.

```
# ifconfig chanipYY inet IP address
# ifconfig chanipYY netmask +
# ifconfig chanipYY broadcast +
# ifconfig chanipYY up
```

where *YY* is the logical 3172 device definition and *IP address* is the network address
for the Sun Enterprise Systems Interface board.

3. Exit.

Note – Remember that using an interface instance requires additional definitions in the `/etc/opt/SUNWconn/esi/chan.conf` file, the mainframe channel configuration, and the mainframe TCP/IP data set.

Creating a Network Configuration Persistent Across System Boots

When you use the preceding procedure to create a network interface, the network interface definition exists only during the current system boot. To make the network interface definition permanent, use the following procedure.

▼ To Make the Network Interface Definition Permanent

Note – This interface is *not* intended for use with the `/etc/`*hostname* files.

1. **Create the file** `/etc/opt/SUNWconn/esi/chanip`*YY***, where** *YY* **is the logical 3172 device definition.**

2. **Edit the file to have the IP address configured for** `chanip`*YY* **or the host name as defined in the** `/etc/hosts` **table.**

3. **(***Optional***) You may want to edit the** `/etc/netmasks` **file to reflect the netmask portion of the IP address; for example:**

```
212.192.10.0      255.255.255.0
```

Note – Make sure to replace the network address 212.192.10.0 with the network address assigned by your network administrator. In the preceding example, a class C network 212.192.10.0, with a netmask of 255.255.255.0, is defined.

Removing a TCP/IP Network Interface

Remove a TCP/IP network interface using the `ifconfig`(1M) command. Note that this command disconnects only the access to the unit from the TCP/IP. It does not unconfigure the underlying control unit devices.

▼ To Remove a TCP/IP Network Interface From Use

1. **Bring** `chanip`*YY* **down**

   ```
   # ifconfig chanipYY down
   ```

   where *YY* is the logical 3172 device definition.

2. **Unplumb** `chanip`*YY*.

   ```
   # ifconfig chanipYY unplumb
   ```

   where *YY* is the logical 3172 device definition.

Configuring, Testing, and Using Tape Emulation Software

This chapter contains instructions for configuring the Sun Enterprise System Interface 1.0 tape emulation software. This chapter includes these sections:

■ "Configuring Tape Emulation Software"
■ "Initial Configuration and Testing of Tape Emulation Devices"
■ "Transferring Files"
■ "<$elemtext

Configuring Tape Emulation Software

Configuring the tape emulation software to work correctly with the hardware involves:

1. Defining the channel configuration file (`chan.conf`)

2. Using the channel interface administration program (`chanadm`) to update the Sun Enterprise System Interface with the new configuration

Identifying Control Unit Addressing Parameters

The Sun Enterprise System Interface tape emulation software control unit parameters correspond to the input-output configuration program/input-output configuration data set (IOCP/IOCD) definition on the mainframe. They must reflect the values defined for the 3490 control unit on the mainframe to work properly.

Up to 16 MVS logical control units, or images, are supported by the Sun Enterprise System Interface for tape emulation. Each partition has a unique logical control unit address (CUaddr), or control unit image, which needs to be configured in the Sun Enterprise System Interface 1.0 software configuration file (`chan.conf`). The typical user requires only one CUaddr to connect to the mainframe.

Each CUaddr consists of:

- Logical Control Unit (image)

Choose the CUaddr that matches the tape emulation 3490 configuration for the partition defined on the MVS mainframe. (Normally, only one MVS partition exists.)

Note – For mainframes with multiple partitions using the ESCON multiple image facility (EMIF), each partition requires a unique logical control unit value for the tape emulation 3490. See Appendix <$elemparanumonly<$elemtext for more information.

- First Device Address

Use the first device address assigned by the mainframe for the 3490 control unit. The default value is `0x00`.

Note – The mainframe system programmer determines the actual value.

- Number of Devices

Define one or more 3490 devices on a particular logical control unit.

Note – The suggested number of devices is one. Throughput performance does not increase by selecting a larger number of devices. Each device must share the bandwidth with every additional device. This option is included only as a way to define multiple 3490 devices on a logical control unit.

See Chapter 4 for the following topics:

- ”<$elemtext
- ”<$elemtext

Defining the Channel Configuration File

See Chapter <$elemparanumonly, ”<$elemtext.

See Chapter <$elemparanumonly, "<$elemtext.

Initial Configuration and Testing of Tape Emulation Devices

After the software package is installed, configure the tape emulation devices using the information gathered in Chapter 3 in the section "<$elemtext. Substitute your own information for the *XX*s in the procedure. Following is a step-by-step procedure to test the configuration and installation on the server.

Note – This procedure assumes that the mainframe host is already prepared to install this new Sun Enterprise System Interface tape emulation software connection.

▼ To Configure and Test Tape Emulation Devices

1. **Become the superuser, and find the Sun Enterprise System Interface instance number.**

   ```
   % su
   # prtconf
   ```

   The Sun Enterprise System Interface hardware is listed as:

   ```
   pci116a,6950, instance #XX
   ```

   where *XX* is the instance number to use.

2. **Edit the** `/etc/opt/SUNWconn/esi/chan.conf` **file to use the instance number and mainframe configuration.**

   See Appendix <$elemparanumonly<$elemtext for the `chan.conf`(4) man page and "<$elemtext for more information.

3. **Execute the** `chanadm` **program to configure the hardware and device drivers.**

```
# chanadm
```

Note – The mainframe system programmer performs step 4.

4. **Have the mainframe system programmer vary the mainframe channel path ID (CHPID) online to establish communication between the mainframe host and the Sun Enterprise Systems Interface board.**

Transferring Files

Sun Enterprise System Interface 1.0 software provides two applications to transfer files to and from the mainframe. See Appendix <$elemparanumonly<$elemtext for more details about the two applications.

1. `changet`(1) receives a file from the mainframe

2. `chanput`(1) sends a file to the mainframe.

Both applications simulate a nonlabeled tape using fixed block records.

A Job Control Language (JCL) script is required on the mainframe for all file transfers. See Appendix <$elemparanumonly<$elemtext for examples of JCL scripts.

▼ To Send or Receive a File

1. **Verify that the** `esi` **adapter is online.**

   The following message shows that the adapter is online:

   ```
   NOTICE: esi: Mainframe ESCON Channel board 0 is online.
   ```

   The message appears on the console and toward the end of the file `/var/adm/messages`.

   Note – Step 2 needs to be performed by a mainframe system programmer.

2. **Have the mainframe system programmer verify that the 3490 device has been varied online on the mainframe.**

3. **Start either the** `changet`**(1) or the** `chanput`**(1) application, depending upon which direction you want to transfer the files:**

   a. **To start** `changet` **to receive files from the mainframe:**

   ```
   # changet
   ```

   b. **To start** `chanput` **to send files to the mainframe:**

   ```
   # chanput
   ```

   See Appendix <$elemparanumonly<$elemtext for details about specifying the various options and the file name for these two commands.

4. **Submit a job on the mainframe to begin the file transfer.**

   See Appendix <$elemparanumonly<$elemtext.

5. **Review the** `changet`**(1M) or** `chanput`**(1M) output and the JCL job output on the mainframe to ensure the file was transferred without errors.**

Messages from the Mainframe

During the file transfer, the mainframe sends information messages. All of these messages are recorded in `/var/adm/messages`. Consult with the mainframe system programmer if you need to know more about these messages.

Mount Message

When the JCL file is submitted, the mainframe first sends a mount message. The mount message tells the operator to start the `changet`(1M) or `chanput`(1M) application. When the application is started, or if it is already running, the tape verification process begins.

The format of the mount message is:

```
Mvolume_name
```

where *volume_name* is the identifier of the volume; for example, `VOL000`. `M` means mount. The entire mount message in this example would be `MVOL000`.

Verification Message

After the mount message is processed, the mainframe sends a series of commands to verify that the application is responding correctly to tape commands. When this tape verification process is complete, the mainframe sends a verification message that the tape application is ready for the file transfer.

The format of the verification message is:

> *volume_name*N

where *volume_name* is the identifier of the volume; for example, `VOL000`. `N` means nonlabeled tape. The entire verification message in this example would be `VOL000N`.

Dismount Command

After the mainframe sends the verification message, the file transfer begins. After the file transfer completes, the mainframe sends a dismount command. The dismount command states that the file transfer is complete, and the `changet` or `chanput` application is finished.

The format of the dismount command is:

> D*volume_name*N or K*volume_name*N

where *volume_name* is the identifier of the volume; for example, `VOL000`. `D` or `K` means dismount and `N` means nonlabeled tape. The entire dismount message in this example would be `DVOL000N` or `KVOL000N`.

System Error Message

After all file transfers are complete, both the output of `changet` or `chanput` and the JCL output must be reviewed to ensure that there were no errors. In case of an error, the mainframe may send a system error message identifier as a message. One example of such an error message is `IEC510`.

Reference Section

This appendix contains the Sun Enterprise Systems Interface 1.0 Reference Section, which includes descriptions of all the online Reference Manual (man) pages that can be executed in the Sun Enterprise Systems Interface (ESI) 1.0 environment.

Reference Manual (`man`) Pages

The following manual pages are included in the software package `SUNWesimn`.

`changet`(1)

Enterprise Systems Interface file transfer from a mainframe to a Sun server using tape emulation - page 37

`chanput`(1)

Enterprise Systems Interface file transfer from a Sun server to a mainframe using tape emulation - page 39

`chanadm`(1M)

Enterprise Systems Interface administration program - page 41

chan.conf(4)

Enterprise Systems Interface configuration file - page 45

chanip(7D)

Enterprise Systems Interface 3172 TCP/IP emulation pseudo driver - page 51

chantape(7D)

Enterprise Systems Interface 3490 tape emulation pseudo driver - page 53

esi(7D)

Enterprise Systems Interface device driver - page 55

NAME | changet - Enterprise Systems Interface file transfer from a mainframe to a Sun server using tape emulation

SYNOPSIS | **changet** [–C *cuaddr*] [–D *devaddr*] [–I *instance*] [–b *blocksize*] [–c] [–r *reclength*] [–v] *filename*

DESCRIPTION | The changet(1) application receives files from a mainframe channel, emulating a 3490 tape device. This device appears to the mainframe as a *not-ready* tape drive. When changet is executed, the device behaves as though a *non-labeled* tape has been inserted into the drive and waits for a mainframe-initiated file transfer.

changet creates a new file for the file transfer. If the files exists, changet fails.

OPTIONS | The following options are supported.

–C *cuaddr*   Specify the control unit address. This must be defined in the chan.conf(4) file. The default value is 0, and the range is between 0 and 255 decimal or 0x0 and 0xFF hexadecimal.

–D *devaddr*   Specify the device address. This must be defined in the chan.conf(4) file. The default value is 0, and the range is between 0 and 255 decimal or 0x0 and 0xFF hexadecimal.

–I *instance*   Specify the instance number identifying the board to use. This must be defined in the chan.conf(4) file. The default value is 0, and the range is between 0 and 255 decimal or 0x0 and 0xFF hexadecimal.

–b *blocksize*   Specify the block size to use for the file transfer. This value must match the value defined by the mainframe file transfer command. The default value is 32760, and the range is between 18 and 32760. The block size must be a multiple of the logical record length in the record length option (–r).

–c   Convert data from EBCDIC to ASCII.

–h   Display the help screen.

–r *reclength*   Specify the logical record length for the file transfer. This value must match the value defined by the mainframe file transfer command. The default value is the value specified in the blocksize option (–b), and the range is between 18 and 32760.

–v   Select verbose output.

Note – If the combination of instance number, control unit address, and device number are not configured in the chan.conf file, changet displays the error Invalid Bind ID.

OPERANDS   The following operands are supported:

filename   Specify the destination file that changet is to create when the file
                    transfer is initiated.

Note – If you specify a file that already exists, changet displays an error and exits.

FILES   The following files are used by this command:

/etc/opt/SUNWconn/esi/chan.conf   ESI configuration file

SEE ALSO   chanput(1), chanadm(1M), chan.conf(4), chanip(7D), chantape(7D), esi(7D)

NAME	chanput - Enterprise Systems Interface file transfer from a Sun server to a mainframe using tape emulation
SYNOPSIS	**chanput** [−C *cuaddr*] [−D *devaddr*] [−I *instance*] [−b *blocksize*] [−c] [−r *reclength*] [−v] *filename*
DESCRIPTION	The chanput(1) application sends files from a Sun server to a mainframe channel, emulating a 3490 tape device. This device appears to the mainframe as a *not-ready* tape drive. When chanput is executed, the device behaves as though a *non-labeled* tape has been inserted into the drive and waits for a mainframe-initiated file transfer.

chanput requires that the transfer file exists. If the transfer file does not exist, chanput fails.

OPTIONS

The following options are supported.

−C *cuaddr*   Specify the control unit address. This must be the value configured in the chan.conf(4) file. The default value is 0, and the range is between 0 and 255 decimal or 0x0 and 0xFF hexadecimal.

−D *devaddr*   Specify the device address. This must be defined in the chan.conf(4) file. The default value is 0, and the range is between 0 and 255 decimal or 0x0 and 0xFF hexadecimal.

−I *instance*   Specify the instance number identifying the board to use. This must be defined in the chan.conf(4) file. The default value is 0, and the range is between 0 and 255 decimal or 0x0 and 0xFF hexadecimal.

−b *blocksize* Specify the block size to use for the file transfer. This value must match the value defined by the mainframe file transfer command. The default value is 32760, and the range is between 18 and 32760. The block size must be a multiple of the logical record length in the record length option (−r).

−c   Convert data from ASCII to EBCDIC.

−h   Display the help screen.

−r *reclength* Specify the logical record length for the file transfer. This value must match the value defined by the mainframe file transfer command. The default value is the value specified in the blocksize option (−b), and the range is between 18 and 32760.

−v   Select verbose output.

Note – If the length of the file being transferred is not a multiple of the logical record length, the file is appended with the EBCDIC value `0x40` until the length is a multiple of the logical record length.

Note – If the combination of instance number, control unit address, and device number are not configured in the `chan.conf` file, `chanput` displays the error `Invalid Bind ID`.

OPERANDS   The following operands are supported:

filename   Specify the destination file that `changet`(1) is to create when the file transfer is initiated.

Note – If you specify a file that does not exist, `chanput` displays an error and exits.

FILES   The following files are used by this command:

`/etc/opt/SUNWconn/esi/chan.conf`   ESI configuration file

SEE ALSO   `changet`(1), `chanadm`(1M), `chan.conf`(4), `chanip`(7D), `chantape`(7D), `esi`(7D)

NAME	chanadm - Enterprise Systems Interface administration program
SYNOPSIS	**chanadm** [-hs] [-f *config_path*] [-v] [[-icugoxtbr] *instance*]
DESCRIPTION	The chanadm program uses the /etc/opt/SUNWconn/esi/chan.conf file to program the Sun Enterprise Systems Interface board. The chanadm program sends firmware files from /etc/opt/SUNWconn/esi and creates device handles to access a remote mainframe via an ESCON channel.
OPTIONS	The following options are supported:

-h   List chanadm options.

-s   Show status of each instance.

-f *config_path*   Specify an alternate path where configuration files are to be found. By default, chanadm looks in /etc/opt/SUNWconn/esi for the configuration files. Also, chanadm needs the firmware files in /etc/opt/SUNWconn/esi to operate the Enterprise Systems Interface. If an alternate *config_path* is defined, then the chan.conf and firmware files must be found in the same directory.

-v   Enable verbose mode.

-i   Initialize (download) the board instance. This option programs the interface firmware and runs before the device configuration (-c). If the device is already configured, it fails to run. To reinitialize a configured interface, unconfigure it first using the -u option.

-c   Configure all the devices for a single instance. Use this option after the firmware initialization option -i. The -c option reads the configuration file (chan.conf) and configures the Enterprise Systems Interface board with the channel information.

-u   Unconfigure the devices for a single instance. Unconfigure breaks down the configuration device links created by the configure option (-c). This option allows the administrator to reinitialize the Enterprise Systems Interface board, if necessary, and reconfigure the devices.

-g   Run diagnostics for the interface. The Enterprise Systems Interface board must be offline (-x) to execute diagnostics.

-o   Go online to the mainframe. This option is normally executed automatically when the devices are configured. If the interface has been placed offline using the -x option, use the -o option to make the interface available (online) to the mainframe.

-x   Go offline from the mainframe. This option forces the interface to
                be unavailable to the mainframe and should be used if the
                normal method for bringing down the channel path does not
                work. Use the -o option to make the interface available (online)
                to the mainframe again.

-t   Obtain a *snapshot* of software driver traces. This option captures
                all of the driver trace buffers and sends them to standard output.

-b   Obtain a *snapshot* of Enterprise Systems Interface hardware
                traces. This option captures the trace buffer contained on the
                hardware interface and sends the output to standard output.

-r   Obtain firmware revisions. This option queries the Enterprise
                Systems Interface board for the revision numbers of the installed
                hardware.

instance   Specify the instance number for the Enterprise Systems Interface
                board that is the target for the chanadm command options -i,
                -c, -u, -g, -o, -x, -t, -b, -r. The instance number must
                correspond to an instance number that exists on the PCI system
                bus and is obtained from prtconf(1M). The instance also must
                be defined in the chan.conf file. See also chan.conf(4).

If no options are specified, the chanadm program attempts to initialize and
configure all interfaces that are currently in the offline state with the mainframe.

EXIT STATUS   The following exit values are returned:

O   No errors occurred.

1   Task could not be completed as specified in the option list.

2   One or more of the necessary file handles could not be opened.

3   Configuration file syntax error occurred.

In addition to an exit status, the specific error is written to the system log file using
syslog(3C).

SEE ALSO   changet(1), chanput(1), prtconf(1M), syslog(3C), chan.conf(4), chanip(7D),
chantape(7D), esi(7D)

NOTES   The chanadm program automatically configures the Enterprise Systems Interface
board and readies it for use by the mainframe. Normally, no options are required to
make the interfaces work properly. If the administrator needs to work with a
specific interface to run diagnostics or perform a Dynamic Reconfiguration (DR),
then it may be necessary to use the fine granularity of control that the separate
options provide.

The `chanadm` program does not operate properly unless the `chan.conf` file is modified to accurately define the channel configuration for every interface that is installed. If an interface is not listed in the `chan.conf` file, `chanadm` ignores it.

NAME | chan.conf - Enterprise Systems Interface configuration file

SYNOPSIS | **/etc/opt/SUNWconn/esi/chan.conf**

DESCRIPTION | The chanadm program uses the /etc/opt/SUNWconn/esi/chan.conf file to program the Sun Enterprise Systems Interface board. The chanadm program sends firmware files from opt/SUNWconn/esi/ and creates device handles to access a remote mainframe via an ESCON channel.   The Enterprise Systems Interface configuration file (chan.conf) defines which interfaces are to be used and what channel device addresses are valid for the interface.

The format has one global section at the top of the file, followed by one or more board sections, each section corresponding to a Enterprise Systems Interface board installed in the system.

The setup file contains sections and variables. A section groups selected variables together and may contain subsections. A variable conveys values to be set for the section.

SYNTAX | The following syntax is used for this command:

- Square brackets [ ] denote a section.

- Variables are denoted as: variable = value.

- Hash mark (#) begins a comment, which continues to the end of the line.

- White space (tabs and spaces) is ignored.

- All uncommented text is case-sensitive.

Skeleton syntax:

```
[global]

[begin board]
    [emulation]
        [control unit]
        [control unit]
        ...
    [emulation]
        [control unit]
    ...
[end board]

[begin board]
    ...
[end board]

...
```

Skeleton rules:

1. There can be only one [global] section, which must be the first section in the file.

2. Each [begin board] through [end board] section defines a board instance in the system. There must be one such section for each board installed.

3. Each board section must contain one or more [emulation] sections.

4. Each [emulation] section must have from one to 16 [control unit] sections.

EXAMPLES

EXAMPLE 1 Sample Configuration File for TCP/IP (3172)

```
[global]
  timeout = Yes                    #allow time-outs for PCI bus

[begin board]
  name = "PCI0 "                   #can be any quoted string
  type = 6950                      #board type in use
  instance = 0                     #instance number from prtconf

  [emulation]
    type = 3172                    #type of control unit
    min_pkt = 250                  #performance parameters
    xmt_interval = 250             #performance parameters
    media = FDDI                   #performance parameters

    [control unit]                 #control unit addressing
      first_devaddr = 0x10         #hex device address
      num_devices = 2              #number of devices to use
      CUaddr = 1                   #logical control unit addr
[end board]
```

EXAMPLE 2 Sample Configuration File for Tape Emulation (3490)

```
[global]
  timeout = Yes                    #allow time-outs for PCI bus

[begin board]
  name = "PCI0 "                   #can be any quoted string
  type = 6950                      #board type in use
  instance = 0                     #instance number from prtconf

  [emulation]
    type = 3490                    #type of control unit

    [control unit]                 #control unit addressing
      first_devaddr = 0x00         #first hex device address
      num_devices = 1              #number of devices to use
      CUaddr = 1                   #logical control unit addr
[end board]
```

PARAMETERS   The following describes the variables and the values for each section. A section, is
                   denoted by [*xxxxx*], and a variable is denoted by *vvvvv* = *yyyyy*. When a section is
                   declared, it must be followed by all of the variables listed for that section.

[global]	Describe the global parameters. This section is always first and occurs only once in the configuration file.
timeout =	Indicate whether the device driver enables or disables time-outs on the Enterprise Systems Interface board. Enabling time-outs means the firmware expects the device driver to respond within a preset time-out period. If the device driver does not respond, the interface is placed offline and an error is logged. The sample configuration file delivered with the package has timeout set to yes.

Possible settings:

yes - Enable time-outs. *Suggested.*

no - Disable time-outs.

[begin board]	Define the beginning of a board section. This section must have a matching [end board] specifier.
name =	Under the [begin board] section, define a unique string to identify the board. Maximum length is 32 characters.
type =	Under the [begin board] section, identify the type of board in use.

Possible settings:

6950 - Sun Enterprise Systems Interface board

instance =	Under the [begin board] section, indicate the instance number of the board in the PCI bus. Obtain the instance number using prtconf(1M).
[emulation]	Within the [begin board] and [end board] sections, begin the definition of a specific emulation to be used for this board.
type =	Under the [emulation] section, indicate the type of emulation.

Possible settings:

3172 - TCP/IP

3490 - Tape Emulation

min_pkt =   *Used with 3172 emulation only.* In the [emulation] section, indicate the minimum size of a packet in bytes that causes the channel to send the data buffer immediately. The sample configuration file delivered with the package has min_pkt set to 250.

Possible settings:

100 to 1500

xmt_interval =   *Used with 3172 emulation only.* In the [emulation] section, specify the amount of time in milliseconds to wait for buffers to accumulate in the channel buffer before transferring them across the channel. The sample configuration file delivered with the package has xmt_interval set to 250.

Possible settings:

0 to 10000

media =   *Used with 3172 emulation only.* In the [emulation] section, specify the frame type for packets sent to the mainframe.

Possible settings:

ETH (or eth) - Ethernet format frames

FDDI (or fddi) - FDDI format frames. *Suggested.*

[control unit]   Define a specific logical control unit associated with an emulation in the system. Up to 16 logical control units may be defined for each Enterprise Systems Interface board. The [control unit] section must be contained within an [emulation] section. An [emulation] section can have one or more [control unit] sections.

CUaddr =   Indicate the logical control unit number that is configured on the mainframe. This corresponds to the Control Unit Address (CUADDR) field in the Input/Output Configuration Program (IOCP) definition on the mainframe. This value must be unique in each [emulation] section under the same [begin board] section.

Possible settings:

0 to 15 - decimal

first_devaddr =	Indicate the first unit address for the logical control unit as configured on the mainframe.	

Possible settings:

0 to 255 - decimal

0x00 to 0xFF - hexadecimal

num_devices = Indicate the number of devices for the logical control unit as configured on the mainframe.

Possible settings:

1 to 256 - decimal

Note – TCP/IP (3172) must have at least two devices and they must be in pairs. Tape Emulation (6490) must have at least one device.

[end board] Mark the end of a board definition as begun by a [begin board] declaration. This declaration can be followed by another [begin board] definition or an end of file.

FILES The following files are supported:

/etc/opt/SUNWconn/esi/chan.conf	ESI configuration file
/etc/opt/SUNWconn/esi/down6900.bin	ESI firmware
/etc/opt/SUNWconn/esi/down960f.bin	ESI firmware

SEE ALSO changet(1), chanput(1), chanadm(1M), prtconf(1M), syslog(3C), chanip(7D), chantape(7D), esi(7D)

NOTES If there are any syntax errors in the configuration file, a syntax error is logged in the system log file using syslog(3C). The configuration file is not processed until the error is corrected.

NAME | chanip - Enterprise Systems Interface 3172 TCP/IP emulation pseudo driver

DESCRIPTION | The `chanip`(7D) driver is a STREAMS-based pseudo driver that emulates an IBM 3172 TCP/IP device. The `chanip` driver uses the `esi`(7D) device driver to communicate with the mainframe on the ESCON channel. The `chanip` driver also connects to the `ip`(7D) driver to establish a network interface.

Open and configure the `chanip` driver with the `esi`(7D) device driver using the `chanadm`(1M) command. Set and maintain configuration parameters that define the connection between `chanip` and `esi`(7D) in the `chan.conf`(4) file.

Administer network interfaces using the `ifconfig`(1M) command.

FILES | The following files are supported:

`/dev/chanip`	ESI TCP/IP device special file
`/etc/opt/SUNWconn/esi/chan.conf`	ESI configuration file

SEE ALSO | `changet`(1), `chanput`(1), `chanadm`(1M), `ifconfig`(1M), `chan.conf`(4), `chantape`(7D), `ip`(7D), `esi`(7D)

NAME | chantape - Enterprise Systems Interface 3490 tape emulation pseudo driver

DESCRIPTION | The chantape(7D) driver is a STREAMS-based pseudo driver that emulates an IBM 3490 tape device. The chantape driver uses the esi(7D) device driver to communicate on the ESCON channel.

Open and configure the chantape driver using the chanadm(1M) command. Then use changet(1) and chanput(1) to transfer files to and from the mainframe. Set and maintain configuration parameters for the chantape driver in the chan.conf(4) file.

FILES | The following files are supported:

| /dev/chantape | ESI tape emulation device special file |
| /etc/opt/SUNWconn/esi/chan.conf | ESI configuration file |

SEE ALSO | changet(1), chanput(1), chanadm(1M), chan.conf(4), chanip(7D), esi(7D)

NAME | esi - Enterprise Systems Interface device driver

DESCRIPTION | The `esi` device driver is a multi-threaded, loadable, clonable, STREAMS hardware driver that controls the PCI-based ESCON adapter. The `esi` device driver supports Dynamic Reconfiguration (DR).

The `esi` device driver handles all Enterprise Systems Interface commands while communicating with a mainframe. Together with the chanip(7D) and chantape(7D) drivers, the Sun platform emulates the IBM 3172 TCP/IP and IBM 3490 tape devices.

Control and configure the `esi` device driver using the chanadm(1M) command. Set and maintain configuration parameters in the `chan.conf`(4) file.

FILES | The following files are supported:

`/dev/esi`	ESI channel device special file
`/etc/opt/SUNWconn/esi/chan.conf`	ESI configuration file

SEE ALSO | changet(1), chanput(1), chanadm(1M), chan.conf(4), chanip(7D), chantape(7D)

Troubleshooting

This appendix describes:

- "<$elemtext
- "<$elemtext

Using Diagnostics

The Sun Enterprise Systems Interface 1.0 software package includes diagnostic software. This is an offline diagnostic. There is no support in the Sun ESI system for the Sun Validation Test Suite (SunVTS). Use the general-purpose `chanadm`(1M) Enterprise Systems Interface administration program to execute the diagnostics.

▼ To Run the Diagnostics Test

1. **Type:**

```
# /etc/opt/SUNWconn/esi/chanadm -g instance
```

The `-g` option specifies diagnostics mode, and *instance* denotes the Enterprise Systems Interface instance number on which to run the diagnostics.

Note – To run diagnostics on a Enterprise Systems Interface instance, the instance must be defined first in the `/etc/opt/SUNWconn/esi/chan.conf` file.

Operating the Sun ESI Diagnostics

The diagnostic utility downloads the `down960f.bin` and `down6900.bin` files to the Sun Enterprise Systems Interface board. When `chanadm` successfully completes programming the firmware, a menu displays the following diagnostic options:

0	Exit
1	Run all non-interactive tests
2	Run cable wrap test and all non-interactive tests
3	Test LEDs

The options are described as follows:

1. Run all non-interactive tests—Runs the local tests that can be performed without removing the channel cables.

Note – To run the cable wrap (loopback) test, remove the ESCON channel cables, if installed, and install the loopback connector.

---

2. Run cable wrap test and all non-interactive tests—Runs in a continuous loop for burn-in testing. This option runs the complete battery of tests to exercise every logical path on the hardware, including the direct memory access (DMA) hardware, which transfers data across the loopback connector.

3. Test LEDs—Tests for proper operation of the light-emitting diodes (LEDs). This test requires operator participation. During this test, all four LEDs visible through the PCI bracket cutouts should blink at separate times in a continuous cycle.

Once either the cable wrap or the non-interactive tests start, they continue indefinitely, or until an error occurs. Each time the battery of tests successfully completes, the iteration number increments.

▼ To Stop the Diagnostics Test

1. **Press Control-C.**

Indicating Errors

When an error occurs, the diagnostic software stops and displays an error code. The test technician needs to note the number of iterations the diagnostics completed and the error code. For more common error conditions, such as removing the loopback connector during testing, the screen displays a brief explanation.

Obtaining Traces

For support for Sun Enterprise Systems Interface 1.0 software problems not outlined in this manual, obtain trace files for your technical support representative. These files provide insight into the activity of the drivers at the time the problem occurred.

The Sun Enterprise Systems Interface 1.0 software provides a trace retrieval using chanadm(1M), which gathers driver traces from all the driver modules and writes them to standard output.

▼ To Acquire Sun ESI 1.0 Software Trace Information

1. Type:

```
# /etc/opt/SUNWconn/esi/chanadm -t filename
```

▼ To Acquire Sun ESI Hardware Trace Information

1. Type:

```
# /etc/opt/SUNWconn/esi/chanadm -b XX filename
```

where *XX* is the instance number obtained from prtconf(1M). The output is sent to standard output and can be redirected to a file.

Using Dynamic Reconfiguration (DR) With Sun ESI 1.0 Software

This appendix describes:

- "Suspending the Operating System and Sun ESI Boards" on page 61
- "Removing a Sun ESI Board from the System" on page 61
- "Adding a Sun ESI Board to the System" on page 63

Suspending the Operating System and Sun ESI Boards

You *cannot* suspend an instance of the Solaris operating environment while any Sun Enterprise Systems Interface boards are online. You must take offline *all* Sun Enterprise Systems Interface boards when:

- Detaching a system board that contains nonpageable kernel memory (typically the lowest-numbered system board)
- Attaching a system board on an E3*x*00, E4*x*00, E5*x*00, or E6*x*00 system using the cfgadm(1M) command.

Removing a Sun ESI Board from the System

You may want to remove the Sun Enterprise Systems Interface board for Dynamic Reconfiguration purposes.

Before physically removing any Sun Enterprise Systems Interface board, you must ensure the following conditions.

- Sun Enterprise Systems Interface board must be offline with the mainframe.
- Sun Enterprise Systems Interface board must be unconfigured using the chanadm(1M) program.

Note – You must perform the removal procedure once for each adapter being removed.

▼ To Remove a Sun ESI Board Using the Recommended Procedure

Use this removal procedure under normal circumstances if you have a connection to the mainframe.

Note – Steps 1 and 2 are performed by the mainframe system programmer.

---

1. **Have the mainframe system programmer stop TCP/IP for the connection you are working with, if you are using a 3172 control unit.**

2. **Have the mainframe system programmer vary the devices and CHPID offline.**

3. **Destroy any streams associated with this interface and close the associated device (unplumb** chanip*YY***).**

   ```
   # ifconfig chanipYY unplumb
   ```

   where *YY* is the logical 3172 device definition.

4. **Unconfigure the Sun Enterprise Systems Interface board.**

   ```
   # chanadm -u XX
   ```

   where *XX* is the instance number of the interface to unconfigure.

5. **Once you have unconfigured all adapters, perform the necessary DR action to detach the system board.**

   For more details, refer to the Sun Dynamic Reconfiguration (DR) manual for your platform.

▼ To Remove a Sun ESI Board Using the Forced Procedure

Use this procedure if the Sun Enterprise Systems Interface board connection is online with the mainframe but must be removed regardless.

⚠️ **Caution –** This action may cause the mainframe channel to be *boxed*. This is a hard error condition that the mainframe system programmer has to correct before you can reuse the channel.

1. **Destroy any streams associated with this interface and close the associated device (unplumb** chanip*YY*).

   ```
   # ifconfig chanipYY unplumb
   ```

   where *YY* is the logical 3172 device definition.

2. **Make the Sun Enterprise Systems Interface board unavailable (offline) to the mainframe and unconfigure the Sun Enterprise Systems Interface board.**

   ```
   # chanadm -xu XX
   ```

   where *XX* is the instance number of the interface to unconfigure.

3. **Once you have made all adapters offline and unconfigured, perform the necessary DR action to detach the system board.**

   For more details, refer to the Sun Dynamic Reconfiguration (DR) manual for your platform.

Adding a Sun ESI Board to the System

You may want to add a Sun Enterprise Systems Interface board for Dynamic Reconfiguration purposes. Use one of the following procedures, depending on the nature of the addition:

- To Perform a New Sun ESI Board Installation
- To Reinsert a Sun ESI Board into the Same System Board and PCI Slot
- To Reinsert a Sun ESI Board into a New System Board and PCI Slot

▼ To Perform a New Sun ESI Board Installation

1. **Use Dynamic Reconfiguration to attach the system board that hosts the Sun Enterprise Systems Interface board.**

2. **Follow the procedures in "To Configure the TCP/IP Devices Initially" in Chapter 4 or "To Configure the Tape Emulation Devices Initially" in Chapter 5, depending on what you are installing.**

▼ To Reinsert a Sun ESI Board into the Same System Board and PCI Slot

If you are reinserting the Sun Enterprise Systems Interface board into the same system board and PCI slot, the instance number for that board *should* remain the same.

1. **Use Dynamic Reconfiguration to attach the system board into the system.**

2. **Execute** `chanadm`**(1M) to initialize and configure the interface.**

3. **Replumb the** `chanip`*YY* **interface, where** *YY* **is 3172 device definition.**

4. **Have the mainframe system programmer vary the CHPID and devices online.**

Note – If the devices are *boxed* and fail to be varied online, have the mainframe system programmer use the unconditional option with the vary command.

---

5. **Have the mainframe system programmer vary the TCP/IP link active.**

▼ To Reinsert a Sun ESI Board into a New System Board and PCI Slot

If you are reinserting the Sun Enterprise Systems Interface into a new system board or PCI slot, the operating system *may* change the instance number. If so, you need to modify the channel configuration file `chan.conf`(4).

1. **Use Dynamic Reconfiguration to attach the system board into the system.**

2. **Ensure the device tree is current.**

```
# drvconfig -i esi
```

3. **Execute** `prtconf`**(1M) to determine the instance number.**

4. **If the instance number has changed, modify the** `/etc/opt/SUNWconn/esi/chan.conf` **file to reflect the new instance number.**

5. **Execute** `chanadm`**(1M) to initialize and configure the interface.**

6. **Replumb the** `chanip`*YY* **interface, where** *YY* **is the logical 3172 device definition.**

7. **Have the mainframe system programmer vary the CHPID and devices online.**

Note – If the devices are *boxed* and fail to be varied online, have the mainframe system programmer use the unconditional option with the vary command.

---

8. **Have the mainframe system programmer vary the TCP/IP link active.**

Configuring Mainframe Information

Each channel adapter attached to a mainframe channel must be described to the mainframe hardware. To communicate with the Sun Enterprise Systems Interface TCP/IP interface or tape emulation software, the mainframe must be configured to operate a 3172 control unit or a 3490 control unit, respectively.

You can configure the mainframe using Input-Output Definition Program (IOCP) macros or the Hardware Configuration Definition (HCD) program, depending on your mainframe operating system. For further information about configuring either device on the mainframe, refer to the IBM *OS/390 V2R8.0 HCD Bookshelf*, Document Number: SC28-1850, *OS/390 V2R5.0 HCD User's Guide*, SC28-1848, or the *Input/Output Program User's Guide and ESCON Channel-to-Channel Reference Manual*, GC38-0401.

This chapter includes these sections:

- "Configuring Mainframe for TCP/IP Interface and Tape Emulation Using IOCP Macros" on page 68
- "Configuring Mainframe for TCP/IP Interface and Tape Emulation Using HCD" on page 72
- "Configuring the TCP.PROFILE.TCPIP Data Set" on page 89
- "Registering the Missing Interrupt Handler (MIH)" on page 89

Configuring Mainframe for TCP/IP Interface and Tape Emulation Using IOCP Macros

The Enterprise Systems Interface TCP/IP interface or tape emulation software is designed to behave exactly like an IBM 3172 or 3490 controller configured with a single pair of 3172 or 3490 devices, respectively. This appendix includes a brief description of the parameters necessary to SYSGEN a 3172 or 3490 device on the mainframe.

Following is an example of an IOCP definition for a 3172 control unit.

```
CHPID       PATH=((7)),
            TYPE=CNC

CNTLUNIT    CUNUMBR=0730
            PATH=(7),
            CUADD=0,
            UNITADD=((00,016)),
            UNIT=3172

IODEVICE    ADDRESS=(730,016),
            CUNUMBR=(0730),
            STADET=N,
            UNITADD=00,
            UNIT=3172
```

Following is an example of an IOCP definition for a 3490 control unit.

```
CHPID         PATH=((7)),
              TYPE=CNC

CNTLUNIT      CUNUMBR=0830
              PATH=(7),
              CUADD=1,
              UNITADD=((00,016)),
              UNIT=3490

IODEVICE      ADDRESS=(830,016),
              CUNUMBR=(0830),
              STADET=N,
              UNITADD=00,
              UNIT=3490
```

Defining IOCP Macros for Configuring the Mainframe

The IOCP contains three macros:

- CHPID
- CNTLUNIT
- IODEVICE

This section provides a limited explanation of how the parameters must be set in each of these three macros for use with the Sun Enterprise Systems Interface board.

CHPID

The CHPID macro describes the channel path.

```
CHPID         PATH=chpid number
              TYPE=CNC
              [SWITCH=number]
```

- *chpid number* is a two-digit hexadecimal number that is used as the channel path identifier.
- CNC specifies that the channel is a mainframe-to-ESCON control unit channel.
- SWITCH is required only when using a director. The *number* specifies an arbitrary number for the director to which the channel path is assigned.

CNTLUNIT

The CNTLUNIT macro defines the control unit and its device addresses.

```
CNTLUNIT        CUNUMBR=cunumber
                PATH=chpid
                LINK=link address
                CUADD=logical address
                UNITADD=(address,number)
                UNIT=3172 or 3490
```

- *cunumber* specifies the unique hexadecimal number that is assigned to the control unit.
- *chpid* specifies the channel path that the control unit is attached to.
- LINK is required only when the control unit is attached to a director.
- *link address* specifies the link address of the control unit.
- *logical address* specifies the logical control unit image associated with the units. This value can be any hexadecimal digit between 0 and F. The suggested value is 0. If the CUADD parameter is absent, the default is 0.

Note – The value of CUaddr in the channel configuration file (chan.conf) must match this CUADD value. See "Identifying Control Unit Addressing Parameters" in Chapter 4 (TCP/IP interface) or Chapter 5 (tape emulation).

- *address* specifies the unit addresses for the devices on the logical control unit image. The *address* can be any hexadecimal number from 00 to FF.

Note – This value corresponds to the first_devaddr field in the chan.conf file. See "Identifying Control Unit Addressing Parameters" in Chapter 4 (TCP/IP interface) or Chapter 5 (tape emulation).

- *number* specifies the number of units (devices) for the logical control unit image:
  - For 3172 devices, the *number* can be any even (not odd) decimal number from 2 to 256.
  - For 3490 devices, the *number* can be any decimal number from 1 to 256.
- UNIT describes the control unit type, which is 3172 for the TCP/IP interface or 3490 for tape emulation.

IODEVICE

The `IODEVICE` is similar to the `CNTLUNIT` macro, in that it describes the type of control unit and its devices. The `IODEVICE` and `CNTLUNIT` macros go together to define a control unit for the OS to use. The `CNTLUNIT` macro defines the control unit, and the `IODEVICE` macro maps that `CNTLUNIT` into the OS.

```
IODEVICE ADDRESS=(address,number),
         UNITADD=00,
         CUNUMBR=(cunumbr),
         UNIT=3172 or 3490
```

- `ADDRESS` specifies the unique device numbers to be associated with the devices.
  - If the `UNITADD` parameter is *not* specified, then the last two digits of the *address* field and the *number* field must specify a range of unit addresses that are included in the range specified by the *address* and *number* fields in the `UNITADD` parameter of the `CNTLUNIT` macro.
  - If the `UNITADD` parameter *is* specified, then *address* can be any legal value for device numbers, while *number* must not exceed the *number* field in the `UNITADD` parameter of the `CNTLUNIT` macro.
- `UNITADD` is *optional*. It is necessary *only* if the *address* field in the `ADDRESS` parameter does *not* match the *address* field in the `UNITADD` parameter of the `CNTLUNIT` macro.

Note – If this field is used, it determines the base device address, or first device address, which corresponds to the `first_devaddr` field in the `chan.conf` file. See "Identifying Control Unit Addressing Parameters" in Chapter 4 (TCP/IP interface) or Chapter 5 (tape emulation).

- *cunumbr* specifies the control unit, which the devices are attached to. It is the same value as *cunumbr* in the `CNTLUNIT` macro.
- `UNIT` describes the control unit type, which is `3172` for the TCP/IP interface and `3490` for tape emulation.

Configuring Mainframe for TCP/IP Interface and Tape Emulation Using HCD

This section describes how to use the HCD to configure the mainframe to use the 3172 and 3490 control devices.

Mapping IOCP Macros to HCD

This section maps the IOCP macro keywords to their corresponding fields in the HCD. This mapping applies to both the TCP/IP interface and tape emulation software.

IOCP Keyword	HCD Equivalent
CHPID	Add channel path
PATH	Channel path ID
TYPE	Channel path type
SWITCH	Entry switch ID
CNTLUNIT	Add control unit
CUNUMBR	Control unit number
PATH	Channel path ID
LINK	Link address
CUADD	Logical address
UNITADD	Unit address, number of units
UNIT	Control unit type
IODEVICE	Add device
ADDRESS	Device number, number of devices
CUNUMBR	Connected to control units
UNIT	Device type

Defining Devices Using HCD

The following instructions and examples show how to define a 3172 (TCP/IP interface) device. The process for defining a 3490 (tape emulation) device is the same.

▼ To Define a 3172 Device Using HCD

1. **Start HCD on the mainframe.**

2. **Type 1 to define configuration data.**

3. **Type the name of the appropriate Input-Output Definition File (IODF), for example 'SYS0.IODF13.WORK'.**

4. **Press Enter.**

   The mainframe console displays the following example:

   ```
   ==================================================================
                          OS/390 Release 5 HCD
   Command ===>_____

                      Hardware Configuration

   Select one of the following.

   1_   1.  Define, modify, or view configuration data
        2.  Activate or process configuration data
        3.  Print or compare configuration data
        4.  Create or view graphical configuration report
        5.  Migrate configuration data
        6.  Maintain I/O definition files
        7.  Query supported hardware and installed UIMs
        8.  Getting started with this dialog
        9.  What's new in this release

   For options 1 to 5, specify the name of the IODF to be used.

   I/O definition file . . . 'SYS0.IODF13.WORK'              +
   ==================================================================
   ```

5. **Type 4 to display and define control units.**

6. Press Enter.

The mainframe console displays the following example:

```
======================================================================
                      OS/390 Release 5 HCD
----------- Define, Modify, or View Configuration Data ------

Select type of objects to define, modify, or view data.

4_  1. Operating system configurations
          consoles
          system-defined generics
          EDTs
            esoterics
            user-modified generics
     2. Switches
          ports
          switch configurations
            port matrix
     3. Processors
          partitions
          channel paths
     4. Control units
     5. I/O devices

F1=Help    F2=Split   F3=Exit    F9=Swap    F12=Cancel
_____
======================================================================
```

7. **Press F11 to add a control unit.**

The mainframe console displays the following example:

```
========================================================================
                     Control Unit List                   Row 1 of 17

Command ===> _____Scroll ===> CSR

Select one or more control units, then press Enter. To add, use F11.

/ CU    Type +         Serial-# + Description
_ 0000 3174            _____ EMIF    IBM 3174 (000)
_ 0040 3174            _____ EMIF    IBM 3174 (040)
_ 0060 3174            _____ EMIF    IBM 3174 (060)
_ 0320 3990            _____ EMIF    Internal Mirrored DASD (320)
_ 0500 OSA             _____ EMIF    Open Systems Adapter (500)
_ 0520 3172            _____ INQ     IBM 3172 (520)
_ 0580 3490            _____ EMIF    580 3490 Tape (580)
_ 05C0 SCTC            _____ BNCH    SCTC
_ 05C1 SCTC            _____ DHPG    SCTC
_ 05C2 SCTC            _____ INQ     SCTC
_ 05D0 SCTC            _____ BNCH    SCTC
_ 05D1 SCTC            _____ DHPG    SCTC
_ 05D2 SCTC            _____ INQ     SCTC
_ 0960 3274            _____ INQ     SUN IRCA-8A (960)
_ 097E CTC             _____ INQ     SUN IRCA-8A (97E)
_ 7000 3990            _____ EMIF    SUN A7000 DSP1 (7000)
_ 7080 3990            _____ EMIF    SUN A7000 DSP2 (7100)
***************************** Bottom of data *********************
========================================================================
```

8. **Type the control unit number, control unit type, and control unit description.**

9. **Press Enter.**

The mainframe console displays the following example:

```
======================================================================
                    Control Unit List
Command ===> _____Scroll ===> CSR

/ CU   Type +          Serial-# + Description

----------------------- Add Control Unit -----------------------

Specify or revise the following values.

Control unit number  . . . . E4A0  +

Control unit type  . . . . . 3172_____  +

Serial number  . . . . . . . _____

Description  . . . . . . . . SUN Crossroads PCI 3172 (E4A0)___

Connected to switches  . . . __  __  __  __  __  __  __  __  +

Ports  . . . . . . . . . . . __  __  __  __  __  __  __  __  +

If connected to a switch, select whether to have CHPIDs/link
addresses, and unit address range proposed.

Auto-assign  . . . . . . . . 2   1.  Yes
                                 2.  No

F1=Help    F2=Split    F3=Exit    F4=Prompt    F5=Reset    F9=Swap
F12=Cancel
======================================================================
```

10. **Type an s next to the processor assignment for this control unit.**

11. **Press Enter.**

   The mainframe console displays the following example:

```
================================================================================
_____Select Processor / Control Unit_____
                                                   Row 1 of 1 More:     >
Command ===> _____Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : EFFF     Control unit type . . . : 3172

              Log. Addr. -------Channel Path ID . Link Address + -------

/ Proc. ID Att. (CUADD) +  1---- 2---- 3---- 4---- 5---- 6---- 7---- 8----

s SUN2003         __          _____ _____ _____ _____ _____ _____ _____ _____

*************************** Bottom of data ***************************



F1=Help        F2=Split      F3=Exit        F4=Prompt        F5=Reset
F6=Previous    F7=Backward   F8=Forward     F9=Swap          F12=Cancel
F20=Right      F22=Command

_____

_ 7000 3990              _____ EMIF    SUN A7000 DSP1 (7000)
_ 7080 3990              _____ EMIF    SUN A7000 DSP2 (7100)
*************************** Bottom of data ***************************
================================================================================
```

12. **Type the channel path ID, the unit address, the number of units, and the logical address (CUADD).**

13. **Press Enter.**

The mainframe console displays the following example:

```
================================================================================
_____Select Processor / Control Unit_____

_____Add Control Unit_____


Specify or revise the following values.

Control unit number . . . : EA40      Type . . . : 3172
Processor ID . . . . . : SUN2003      Sun Microsystems - Menlo Park

Channel path IDs . . . . 44    __   __   __   __   __   __   __   +
Link address . . . . . .  __    __   __   __   __   __   __   __   +

Unit address . . . . . . 00    __   __   __   __   __   __   __   +
Number of units  . . . . 016   ___  ___  ___  ___  ___  ___  ___

Logical address  . . . . 0    + (same as CUADD)

Protocol . . . . . . . . __    + (D,S or S4)
I/O concurrency level  . 2    + (1, 2 or 3)


F1=Help    F2=Split    F3=Exit    F4=Prompt    F5=Reset    F9=Swap
F12=Cancel

_____
*************************** Bottom of data ****************************
================================================================================
```

14. **Press Enter.**

    The mainframe console displays the following example:

```
================================================================================
_____Select Processor / Control Unit_____
                                                     Row 1 of 1 More:     >
Command ===> _____Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : EA40     Control unit type . . . : 3172


            Log. Addr. -------Channel Path ID . Link Address + -------
/ Proc. ID Att. (CUADD) +  1---- 2---- 3---- 4---- 5---- 6---- 7---- 8----
_ SUN2003  Yes  0          44    _____ _____ _____ _____ _____ _____ _____
*************************** Bottom of data ***************************



F1=Help        F2=Split      F3=Exit       F4=Prompt       F5=Reset
F6=Previous    F7=Backward   F8=Forward    F9=Swap         F12=Cancel
F20=Right      F22=Command
_____
_ 7000 3990                  _____ EMIF    SUN A7000 DSP1 (7000)
_ 7080 3990                  _____ EMIF    SUN A7000 DSP2 (7100)
*************************** Bottom of data ***************************
================================================================================
```

The new control unit number E4A0, type 3172, is now in the Control Unit List.

15. **Type an s next to the new control unit to assign devices.**

16. **Press Enter.**

The mainframe console displays the following example:

```
=======================================================================
                    Control Unit List                      Row 1 of 18

Command ===> _____Scroll ===> CSR

Select one or more control units, then press Enter. To add, use F11.

/ CU    Type +          Serial-# + Description
_ 0000 3174             _____ EMIF    IBM 3174 (000)
_ 0040 3174             _____ EMIF    IBM 3174 (040)
_ 0060 3174             _____ EMIF    IBM 3174 (060)
_ 0320 3990             _____ EMIF    Internal Mirrored DASD (320)
_ 0500 OSA              _____ EMIF    Open Systems Adapter (500)
_ 0520 3172             _____ INQ     IBM 3172 (520)
_ 0580 3490             _____ EMIF    580 3490 Tape (580)
_ 05C0 SCTC             _____ BNCH    SCTC
_ 05C1 SCTC             _____ DHPG    SCTC
_ 05C2 SCTC             _____ INQ     SCTC
_ 05D0 SCTC             _____ BNCH    SCTC
_ 05D1 SCTC             _____ DHPG    SCTC
_ 05D2 SCTC             _____ INQ     SCTC
_ 0960 3274             _____ INQ     SUN IRCA-8A (960)
_ 097E CTC              _____ INQ     SUN IRCA-8A (97E)
_ 7000 3990             _____ EMIF    SUN A7000 DSP1 (7000)
_ 7080 3990             _____ EMIF    SUN A7000 DSP2 (7100)
s E4A0 3172             _____ DHPG    SUN Crossroads PCI 3172 (E4A0)
***************************** Bottom of data
=======================================================================
```

17. Press F11 to add devices.

The mainframe console displays the following example:

```
================================================================================
                               I/O Device List
Command ===> _____Scroll ===> CSR

Select one or more devices, then press Enter. To add, use F11.


Control unit number . . : F000    Control unit type . . . : 3172


-------Device---------- --#-- --------Control Unit Numbers +--------------
/ Number Type +        PR OS 1--- 2--- 3--- 4--- 5--- 6--- 7--- 8--- Base
**************************** Bottom of data ****************************
================================================================================
```

18. Type the starting device number, the number of consecutive devices, and the device type.

19. Press Enter.

The mainframe console displays the following example:

```
================================================================================
_____Add Device_____


Specify or revise the following values.

Device number  . . . . . . . . E4A0  (0000 - FFFF)
Number of devices  . . . . . . 16__
Device type  . . . . . . . . . 3172_____  +

Serial number  . . . . . . . . _____
Description  . . . . . . . . . _____

Volume serial number . . . . . _____  (for DASD

Connected to CUs . . E4A0  ____  ____  ____  ____  ____  ____  ____  +


F1=Help    F2=Split   F3=Exit   F4=Prompt   F5=Reset   F9=Swap
F12=Cancel
_____
================================================================================
```

20. **Type an s next to the processor assignment for these devices.**

21. **Press Enter.**

The mainframe console displays the following example:

```
===============================================================================
_____Device / Processor Definition_____
                                                                    Row 1 of 1
Command ===> _____Scroll ===> CSR

Select processors to change device/processor definitions, then press Enter.

Device number  . . : F000          Number of devices  . : 16
Device type  . . . : 3172

                                Preferred Explicit Device
/ Processor ID   UA +  Time-Out  STADET  CHPID +  Candidate List
s SUN2003        __      No        Yes     __        No
*************************** Bottom of data ****************************

F1=Help        F2=Split      F3=Exit        F4=Prompt        F5=Reset
F6=Previous    F7=Backward   F8=Forward     F9=Swap          F12=Cancel
F22=Command
_____
===============================================================================
```

22. Press Enter.

The mainframe console displays the following example:

```
==============================================================================
_____Device / Processor Definition_____

---------------------- Define Device / Processor ----------------------


Specify or revise the following values.


Device number  . : E4A0          Number of devices . . . . : 16
Device type  . . : 3172
Processor ID . . : SUN2003       Sun Microsystems - Menlo Park

Unit address . . . . . . . . . . 00  + (Only necessary when different from the
                                       last 2 digits of device number)
Time-Out . . . . . . . . . . . . No  (Yes or No)
STADET . . . . . . . . . . . . . Yes (Yes or No)

Preferred CHPID  . . . . . . . . __  +
Explicit device candidate list . No (Yes or No)


 F1=Help     F2=Split    F3=Exit     F4=Prompt   F5=Reset    F9=Swap
F12=Cancel
_____
F22=Command
_____
==============================================================================
```

23. Press Enter.

The mainframe console displays the following example:

```
================================================================================
_____Device / Processor Definition_____
                                                                    Row 1 of 1
Command ===> _____Scroll ===> CSR

Select processors to change device/processor definitions, then press Enter.

Device number  . . : F000           Number of devices  . : 16
Device type  . . . : 3172

                                    Preferred Explicit Device
/ Processor ID   UA +  Time-Out  STADET  CHPID +   Candidate List
_ SUN2003        00    No        Yes       __        No
*************************** Bottom of data ****************************

F1=Help        F2=Split      F3=Exit       F4=Prompt        F5=Reset
F6=Previous    F7=Backward   F8=Forward    F9=Swap          F12=Cancel
F22=Command
_____
================================================================================
```

24. Type an s next to the operating system configuration for these devices.

25. Press Enter.

The mainframe console displays the following example:

```
===========================================================================
------------- Define Device to Operating System Configuration ------------
                                                             Row 1 of 1
Command ===> _____Scroll ===> CSR

Select OSs to connect or disconnect devices, then press Enter.

Device number  . . : F000          Number of devices  . : 16
Device type  . . . : 3172

/ Config. ID   Type     Description                      Defined
s SUN          MVS      SUN MVS Configuration
*************************** Bottom of data ****************************




F1=Help        F2=Split       F3=Exit        F4=Prompt       F5=Reset
F6=Previous    F7=Backward    F8=Forward     F9=Swap         F12=Cancel
F22=Command
_____
===========================================================================
```

26. Press Enter.

The mainframe console displays the following example:

```
============================================================================
------------- Define Device to Operating System Configuration ------------

------------------- Define Device Parameters / Features ----------------
                                                                 Row 1 of 3
Command ===> _____Scroll ===> CSR

Specify or revise the values below.

Configuration ID . : SUN         SUN MVS Configuration
Device number  . . : E4A0        Number of devices  : 16
Device type  . . . : 3172

Parameter/
Feature      Value    P Req.  Description
OFFLINE      No               Device considered online or offline at IPL
DYNAMIC      Yes              Device has been defined to be dynamic
LOCANY       No               UCB can reside in 31 bit storage
*************************** Bottom of data ***************************



F1=Help        F2=Split       F3=Exit        F4=Prompt       F5=Reset
F7=Backward    F8=Forward     F9=Swap         F12=Cancel     F22=Command
_____
============================================================================
```

27. **Press Enter.**

The mainframe console displays the following example:

```
============================================================================
------------- Define Device to Operating System Configuration ------------

------------------- Define Device Parameters / Features -----------------
                                                             Row 1 of 3
Command ===> _____Scroll ===> CSR


Specify Yes to assign or No to unassign. To view devices already assigned
to esoteric, select and press Enter.

Configuration ID . : SUN          SUN MVS Configuration
Device number  . . : F000         Number of devices  : 16
Device type  . . . : 3172         Generic  . . . . . : 3172

/ EDT.Esoteric  Assigned  Starting Number Number of Devices
_ 00.SYSDA      No        ____            ____
_ 00.TAPE       No        ____            ____
_ 00.VIO        No        ____            ____
*************************** Bottom of data ***************************


F1=Help       F2=Split     F3=Exit       F4=Prompt      F5=Reset
F6=Previous   F7=Backward  F8=Forward    F9=Swap        F12=Cancel
F22=Command
_____
============================================================================
```

28. **Verify the list of new devices.**

29. Press F3 to exit.

The mainframe console displays the following example:

```
================================================================================
                             I/O Device List        Row 1 of 16 More:  >
Command ===> _____Scroll ===> CSR

Select one or more devices, then press Enter. To add, use F11.


Control unit number . . : F000     Control unit type . . . : 3172

-------Device--------- --#-- --------Control unit type .:3172
/ Number Type +        PR OS 1--- 2--- 3--- 4--- 5--- 6--- 7--- 8--- Base
_ E4A0   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4A1   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4A2   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4A3   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4A4   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4A5   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4A6   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4A7   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4A8   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4A9   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4AA   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4AB   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4AC   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4AD   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4AE   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
_ E4AF   3172          1     E4A0 ____ ____ ____ ____ ____ ____ ____
**************************** Bottom of data ****************************
================================================================================
```

Configuring the TCP.PROFILE.TCPIP Data Set

Following is an example of control statements you need to add to the MVS TCPIP.POFILE.TCPIP data set for the 3172 device. For more information, refer to *IBM TCP/IP for MVS, Customization and Administration Guide*, Version 3.1, SC31-7134-03.

```
;      Defines the device name SNB0 to LCS device address 730-731.
DEVICE SNB0   LCS   730-731
;
;      Defines the link as Ethernet. ETHERor802.3 is replaced by
;      FDDI if the link is to an FDDI network.
LINK SUN8B0 ETHERor802.3 0 SNB0
;
;      Specifies the mainframe's IP address
HOME
129.212.49.49  SUN8B0
;
;      Defines the network IP address 129.212.
;      Maximum packet size 1500 for Ethernet, 4352 for FDDI
GATEWAY
129.212.49.200   =   SUN8B0   1500   HOST
;
;      Sun TCPIP
DEFAULTNET 129.212.49.200 SUN8B0   1500   0
;      Starts the MVS stack
START SNB0
```

Registering the Missing Interrupt Handler (MIH)

All 3172 units have both an even (read) and odd (write) device. For every 3172 device pair, the even-numbered device must have the MIH disabled. The 3172 maintains an outstanding *read* on the even-numbered device to allow the IBM to read from the 3172 whenever incoming TCP/IP packets are received. To prevent the IBM *read* from timing out, which stops the flow of traffic, disable the MVS missing interrupt handler for these devices.

You can either disable the MIH temporarily by using the SETIOS command to change the running system dynamically, or you can disable the MIH so the change will stay in effect during subsequent IPLs by changing a parameter value in the parmlib member IECIOSxx.

If the Sun Enterprise Systems Interface TCP/IP interface software is to be used before the next IPL, the MIH can be temporarily disabled, but will not remain for subsequent IPLs. To temporarily disable the MIH, issue this command from the MVS console.

```
setios mih,dev=(730-731),TIME-00:
```

If you change the parameter value of the parmlib member IECIOSxx, the change will require an initial program load (IPL) to take effect and will stay in effect across subsequent IPLs. To do this, modify member IECIOS*XX* in the SYS1.PARMLIB data set with this command.
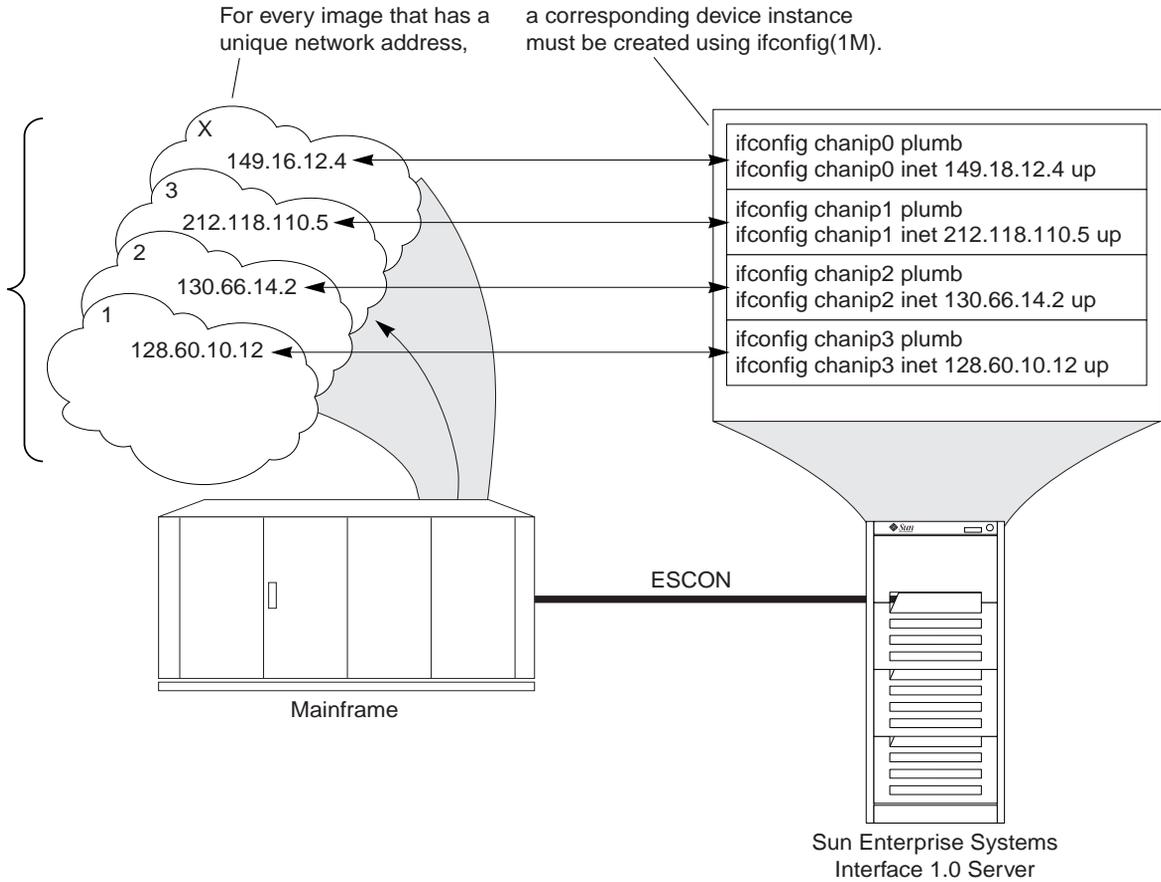
```
MIH DEV=(730-731),TIME=00:00
```

Configuring Multiple Images

In FIGURE E-1, each image is defined in a separate partition on the MVS mainframe. Each image is assigned a unique network address. For example, if image 1 has a class C address of 128.60.10.12, then the `chanip0` interface will have a class C subnet address of 128.60.10.*X*, where *X* is a unique host address on the 128.60.10 network.

Each partitioned image on the mainframe has its own unique network address assigned. Therefore, you need to set up a corresponding interface instance using `ifconfig`(1M) in the Sun Solaris operating environment. You can use up to 10 network interface instances per Sun Enterprise Systems Interface board, such as `chanip0, chanip1...chanip10`.

For every image that has a unique network address,

a corresponding device instance must be created using ifconfig(1M).

X
149.16.12.4

3
212.118.110.5

2
130.66.14.2

1
128.60.10.12

ifconfig chanip0 plumb
ifconfig chanip0 inet 149.18.12.4 up

ifconfig chanip1 plumb
ifconfig chanip1 inet 212.118.110.5 up

ifconfig chanip2 plumb
ifconfig chanip2 inet 130.66.14.2 up

ifconfig chanip3 plumb
ifconfig chanip3 inet 128.60.10.12 up

ESCON

Mainframe

◆ Sun

Sun Enterprise Systems
Interface 1.0 Server

FIGURE E-1   Illustration of a Multiple Image Configuration

Configuring Multiple Sun ESI Boards

This appendix contains a sample configuration of multiple Sun Enterprise Systems Interface boards providing network access to the MVS mainframe. The example in FIGURE F-1 is based on the following assumptions:

1. The mainframe is not being used as a router between subnets attached to TCP/IP interface software gateways A and B in FIGURE F-1. As a result, client A cannot communicate with client B through the Sun ESI 1.0 network.

2. Only the packets addressed specifically to the MVS system will be sent across the channel using the TCP/IP interface software.

3. FIGURE F-1 uses simple IP routing only. There are no dynamic routers available, such as RIP or RouteD.

4. The existence of subnets beyond gateways A and B shown in FIGURE F-1 are not addressed.
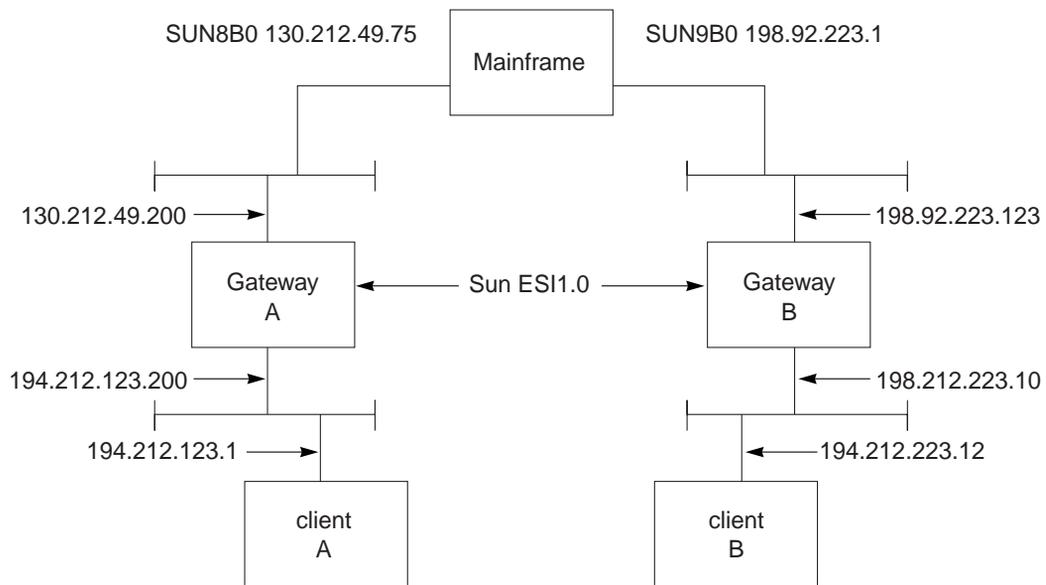
FIGURE F-1   Example of IBM TCP/IP Data Set Addressing

Using JCL Scripts for Tape Emulation Software

This appendix contains examples of upload and download Job Control Language scripts for the mainframe when you are using tape emulation software.

The first example is an upload JCL script. In this example, the data set USER1.TAPE.E5A0 is deleted if it already exists, and then recreated for the upload. The 3490 tape device is using device address 0xE5A0. The file transfer is a fixed block, nonlabeled tape, using a block size and logical record size of 32760 bytes. The volume label is arbitrary.

```
//USER01    JOB (ACCOUNT),'USER',MSGLEVEL=(1.1),MSGCLASS=X,CLASS=A    JOB08690
//STEP1     EXEC PGM=IEFBR14
//SYSUT2    DD DSN=USER1.TAPE.E5A0,DISP=(MOD,DELETE,DELETE),
//          UNIT=3390,SPACE=(CYL,(0,0),RLSE)
//STEP1     EXEC PGM=IEBGENER
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD DUMMY
//SYSUT2    DD DSN=USER1.TAPE.E5A0,DISP=(CATLG,DELETE),
//          UNIT=3390,SPACE=(CYL,(10,10),RLSE),
//          DCB=(RECFM=FB,BLKSIZE=32760,LRECL=32760)
//SYSUT1    DD DISP=OLD,UNIT=/E5A0,LABEL=(1,NL),VOL=SER=VOL000,
//          DCB=(RECFM=FB,BLKSIZE=32760,LRECL=32760)
/*
```

The second example is a download JCL script. In this example, the file
USER1.TAPE.E5A0 is sent to the 3490 tape emulation device at device address
0xE5A0. The file transfer is a fixed block, nonlabeled tape, using a block size and
logical record size of 32760 bytes. The volume label is arbitrary.

```
//USER01    JOB (ACCOUNT),'USER',MSGLEVEL=(1,1),MSGCLASS=X,CLASS=A
//STEP1     EXEC PGM=IEBGENER
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD DUMMY
//SYSUT1    DD DSN=USER1.TAPE.E5A0,DISP=OLD
//SYSUT2    DD DISP=(NEW,KEEP,KEEP),UNIT=/E5A0,LABEL=(1,NL),
//          VOL=SER=VOL000,
//          DCB=(RECFM=FB,BLKSIZE=32760,LRECL=32760)
//
```