

POWER Channel E-Plex™ Software Configuration Guide

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CONTRIBUTORS

Written by Carlin Otto

Illustrated by Dan Young and Carlin Otto

Production by Lorrie Williams

Engineering contributions by John Carlson and Vernon Schryver

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Contents

Introduction ix

Audience ix

Related Documentation ix

Style Conventions x

Product Support xi

1. About the E-Plex Configuration 1

Identifying E-Plex Interface Numbers 1

 Locating the Hardware 1

 Assigning Network Interfaces to the Hardware 2

 Some Considerations 4

 Guidelines for Adding, Removing, and Moving Boards 6

Planning to Configure Your E-Plex Network Interfaces 8

 The System Notebook 8

 A Map of the Configuration Tasks 13

 The Default Configuration 14

2. E-Plex Configuration 17

Network Interface Configuration 17

 The */etc/hosts* File 18

 The *netif.options* File 19

 The *ifconfig-#.options* File 22

E-Plex Driver Configuration 23

Routing Configuration 24

- 3. E-Plex Error Messages 27**
 - Overview 27
 - Error Messages 29
 - Downloading New Firmware 41

- Index 43**

Figures

- Figure 1-1** Sample of a System Notebook: Networking Pages 9
- Figure 1-2** Sample of a System Notebook: E-Plex Pages 10
- Figure 2-1** Example of a System With Multiple Ethernet Networks 25
- Figure 3-1** Error Message Formats in the */var/adm/SYSLOG* File 28

Tables

Table 1-1	Number Assignments for E-Plex Network Interfaces	3
Table 1-2	Consequences of Adding, Removing, or Moving an E-Plex Board	4
Table 1-3	How to Configure Network Parameters	13
Table 1-4	Default Network Interface Operational Parameters	15

Introduction

The POWER Channel E-Plex™ product is a network interface controller board (hardware) and driver (software) providing data communication through multiple 10Base-T Ethernet network connections (ports). The product provides connectivity for CHALLENGE™ and POWER CHALLENGE™ L and XL, and Onyx™ and POWER Onyx™ platforms.

The E-Plex hardware must be installed by a Silicon Graphics system support engineer (SSE) or other person trained by Silicon Graphics® following the *POWER Channel E-Plex Installation Instructions*.

Installation and configuration of the software can be done by customers or SSEs.

Audience

This document is written for network administrators, SSEs, and other people who are familiar with IRIX™ networking. The document assumes basic knowledge of IRIX, Ethernet, and the IP protocol (commonly referred to as TCP/IP).

Related Documentation

The following documents are useful for installing and configuring the E-Plex product:

- The *POWER Channel E-Plex Installation Instructions* (shipped, in a sealed envelope, with each E-Plex board) contains complete details for hardware installation. The seal on the envelope must not be broken by anyone except the SSE.

- The *IRIX Advanced Site and Server Administration Guide* (included as an online IRIS InSight™ document), provides operating system and network interface configuration and troubleshooting instructions.
- The online *POWER Channel E-Plex Release Notes* and the *POWER Channel E-Plex Software Configuration Guide* provide software installation instructions.
- The online *POWER Channel E-Plex Software Configuration Guide* (this document that you are currently reading) provides software configuration instructions.

Style Conventions

This guide uses the following stylistic conventions:

`screen display`

Indicates system output, such as responses to commands that you see on the screen. Code samples, screen displays, and file contents also appear in this font.

user input

Indicates exact text that you must enter at a command line, such as commands, options, and arguments to commands.

variable

Indicates generic, place-holding variable names. Can indicate a user input variable, where you must replace the variable with text that you select.

<xx>

Indicates keys on the keyboard that you press; for example, press **<Enter>** means press only the key labeled **Enter**.

physical label

Indicates a label for a piece of hardware (for example, a pin, a wire, a port).

command

Designates command and utility names.

filename

Indicates filenames and filename suffixes.

[]

Encloses optional command arguments.

...

Denotes omitted material or indicates that the preceding optional items may appear more than once in succession.

Product Support

Silicon Graphics, Inc., provides a comprehensive product support and maintenance program for its products. If you are in the United States of America or Canada and would like support for your Silicon Graphics-supported products, contact the Technical Assistance Center at 1-800-800-4SGI. If you are outside the above-mentioned areas, contact the Silicon Graphics subsidiary or authorized distributor in your country.

About the E-Plex Configuration

This chapter provides information that you need to configure the E-Plex product.

The E-Plex configuration tasks are divided into the following areas:

1. Learn about and prepare for the configuration by reading the information in this chapter (Chapter 1):
 - Determine the names and identification numbers automatically assigned to the E-Plex network interfaces.
 - Plan your system's configuration.
2. Configure each E-Plex network interface, as described in Chapter 2.
3. Configure the E-Plex driver (optional), as described in Chapter 2.
4. Configure the routing software (optional), as described in Chapter 2.

Identifying E-Plex Interface Numbers

This section describes how IRIX assigns identification numbers (for example, *ep0*, *ep17*) to the E-Plex network interfaces. You need to know this information to configure the E-Plex network interfaces.

Locating the Hardware

During startup, the operating system searches for E-Plex boards (attached to mezzanine positions on IO4 boards) in the order shown below. When the operating system locates a board, it adds the board to its hardware inventory.

1. Main IO4 board, lower mezzanine position (adapter 5)

2. Main IO4 board, upper mezzanine position (adapter 6)
3. Second IO4 board, lower mezzanine position (adapter 5)
4. Second IO4 board, upper mezzanine position (adapter 6)
5. Third IO4 board, lower mezzanine position (adapter 5)
6. Third IO4 board, upper mezzanine position (adapter 6)
7. Fourth IO4 board, lower mezzanine position (adapter 5)
8. Fourth IO4 board, upper mezzanine position (adapter 6)

Once the hardware is installed, you can display the contents of the hardware inventory with the *hinv* command, as shown below. The E-Plex boards are listed in the order in which they are found.

```
% /sbin/hinv
...
I/O board, Ebus slot#: IO4 revision x
...
E-Plex Ethernet controller: ep0-ep7, slot#, adapter#, version xx
E-Plex Ethernet controller: ep10-ep17, slot#, adapter#, version xx
...
```

where *ep#-ep#* indicates the network interfaces serviced by the E-Plex board, *slot#* indicates the EBus slot in which the IO4 board resides, *adapter#* indicates the mezzanine position on the IO4 board where the E-Plex board is attached, and *version xx* indicates the version of firmware currently downloaded onto the board.

Assigning Network Interfaces to the Hardware

Once all the E-Plex hardware has been located, the operating system starts the E-Plex driver. The E-Plex driver then uses the information summarized in Table 1-1 to assign network interface numbers to the E-Plex boards in the hardware inventory. For each E-Plex board, the driver assigns a set of eight consecutive numbers.

Table 1-1 Number Assignments for E-Plex Network Interfaces

Order in Which Boards Are Found	Network Interfaces Serviced by E-Plex Board	Panel Plate Label	Assigned Interface
First E-Plex board	ep0 to ep7	ep_0	<i>ep0</i>
		ep_1	<i>ep1</i>
	
		ep_7	<i>ep7</i>
Second E-Plex board	ep10 to ep17	ep_0	<i>ep10</i>
	
		ep_7	<i>ep17</i>
Third E-Plex board*	ep20 to ep27	ep_0	<i>ep20</i>
	
		ep_7	<i>ep27</i>
Fourth E-Plex board*	ep30 to ep37	ep_0	<i>ep30</i>
	
		ep_7	<i>ep37</i>

* Configurations for more than two E-Plex boards are not supported in all releases.

The network interface names and numbers (for example, *ep0* or *ep1*) cannot be changed or configured. The naming/numbering scheme is embedded in the E-Plex software.

The last two columns of Table 1-1 summarize how to match the labeling on the IO panel plates to the network interfaces. The first port on each E-Plex IO panel plate, labeled **ep_0**, is assigned the first number within the assigned set of numbers; the second port, labeled **ep_1** on the IO panel plate, is assigned the next number in the set; and so on. For example, the network interfaces serviced by a second E-Plex board start with *ep10* (serviced by the port labeled **ep_0** on the IO panel plate) and end with *ep17* (serviced by the port labeled **ep_7** on the IO panel plate).

Some Considerations

Adding, removing, or moving E-Plex boards may affect the interface numbering on other (previously installed) E-Plex boards, possibly resulting in broadcast storms on the attached networks. When the interface numbering changes, the IP address used on a port changes, so that the address in use does not match the network's real address. Table 1-2 summarizes the consequences of different actions, and describes remedies for the problems.

Table 1-2 Consequences of Adding, Removing, or Moving an E-Plex Board

Action	Consequence	Remedy
Add a board	<p>Network interfaces on E-Plex boards downstream from the new board become dysfunctional.</p> <p>Example: A second E-Plex board is installed upstream from the first. Network interfaces <i>ep0</i> to <i>ep7</i> are assigned to the new board during the next reboot, and the IP address associated with the original board are used for the new board.</p>	<p>Move the external Ethernet cables that are attached to each original board's IO panels to the upstream neighboring board's IO panel plates. Or, alternatively, edit the configuration files so that the lines for the interfaces on the original board reflect the new automatically-assigned interface. Also, add eight entries for the new board.</p> <p>Example: (1) Move old cables to new board, and attach new networks to old board. Or (2) Edit the <i>netif.options</i> and <i>/etc/hosts</i> files. Make the existing board's <i>netif.options</i> entries into second board entries: change <i>if2name=ep0</i> to <i>if2name=ep10</i>, <i>if3name=ep1</i> to <i>if3name=ep11</i>, etcetera. In the <i>hosts</i> file, rename the existing board's entries: change <i>ep0-mars</i> to <i>ep10-mars</i>, etcetera. In addition, add entries for the new first board to both files: add <i>if10name=ep0</i>, <i>if11name=ep1</i>, etcetera to <i>netif.options</i> and add <i>ep0-mars</i>, <i>ep1-mars</i>, etcetera to the <i>hosts</i> file.</p>

Table 1-2 (continued) Consequences of Adding, Removing, or Moving an

Action	Consequence	Remedy
Move a board	<p>If the move changes the relative positioning of the installed E-Plex boards, all E-Plex network interfaces downstream from the moved board's new location become dysfunctional.</p> <p>Example: Move second board into a slot upstream from first board, so second board becomes the first board. Network interfaces <i>ep0</i> to <i>ep7</i> are assigned to the new first board, and interfaces <i>ep10</i> to <i>ep17</i> are used with the old first board.</p>	<p>For all boards downstream from the moved board's new location, move the external Ethernet cables to new E-Plex ports. Attach each network to the port (interface) that is now assigned the network's original <i>ep#</i>. Or, alternatively, edit the configuration files so that the lines for the E-Plex interfaces reflect the new automatically-assigned numbers.</p> <p>Example: (1) Exchange cables between the two boards. Or (2) Edit the <i>netif.options</i> and <i>/etc/hosts</i> files. Make the second board's entries into first board entries: in <i>netif.options</i>, change <i>if10name=ep10</i> to <i>if10name=ep0</i>, <i>if11name=ep11</i> to <i>if11name=ep1</i>, etcetera, and in <i>hosts</i>, change <i>ep10-mars</i> to <i>ep0-mars</i>, etcetera. Make the old first board's entries into second board entries: in <i>netif.options</i>, change <i>if2name=ep0</i> to <i>if2name=ep10</i>, <i>if3name=ep1</i> to <i>if3name=ep11</i>, etcetera, and in <i>hosts</i>, change <i>ep10-mars</i> to <i>ep0-mars</i>, etcetera.</p>

Table 1-2 (continued) Consequences of Adding, Removing, or Moving an

Action	Consequence	Remedy
Remove a board, or a board is not found during startup	The interfaces that used to be serviced by the missing board are assigned to the next downstream E-Plex board. This shifting occurs on all boards downstream from the missing board.	Remove all entries in configuration files that describe the removed board. Also, edit all lines and rename configuration files for interfaces on remaining downstream E-Plex boards to reflect the new automatically-assigned numbers.
	Example: Remove first board in a system with two E-Plex boards.	Example: In <i>netif.options</i> , remove the removed board's eight double-line entries (<i>if2name=ep0 / if2addr=xx</i> through <i>if9name=ep7 / if9addr=xx</i>). Remove associated <i>ifconfig-#.options</i> files: <i>ifconfig-2.options</i> , <i>ifconfig-3.options</i> , etcetera. In the <i>hosts</i> file, remove the board's eight entries. In <i>netif.options</i> , make the second board's entries into first board entries: change <i>if10name=ep10</i> to <i>if2name=ep0</i> , <i>if11name=ep11</i> to <i>if3name=ep1</i> , etcetera. Rename associated <i>ifconfig-#.options</i> files: <i>ifconfig-10.options</i> to <i>ifconfig-2.options</i> , <i>ifconfig-11.options</i> to <i>ifconfig-3.options</i> , etcetera. In the <i>hosts</i> file, rename <i>ep10-mars</i> to <i>ep0-mars</i> , etcetera.

Guidelines for Adding, Removing, and Moving Boards

To minimize problems, it is recommended that you follow these guidelines when adding, removing, or moving E-Plex boards:

1. In general, install mezzanine boards onto IO4 boards in the same order in which the boards are probed during start up, as described in "Locating the Hardware."
2. Install additional E-Plex boards downstream from currently installed E-Plex boards.

3. If you move an E-Plex board, avoid changing its position relative to other E-Plex boards. For example, if a board is located between two other E-Plex boards, try to move it to a slot that is still between the other two boards. If this is not possible, move one of the other boards also in order to maintain the relative positions.
4. If you need to replace an E-Plex board, as long as the Ethernet connections on other E-Plex boards are working, do not power off the system until you have the replacement board ready to install. Once you power off the system, if the operating system does not find a board during startup, the configuration of all the existing network interfaces changes.
5. If you plan to remove an E-Plex board, use your system notebook to replan your network connection name and interface numbering scheme. (This procedure is described in “Planning to Configure Your E-Plex Network Interfaces.”) Before powering off the system, use your notes to perform these tasks:
 - Remove or comment out eight lines in the */etc/hosts* file. The pertinent lines are those with IP addresses for Ethernet networks to which the system is no longer connected.
 - If the board to be removed is upstream from other E-Plex boards, it may be necessary to edit other entries in the */etc/hosts* file. The pertinent entries are those for which the network interface number will change after the board is removed. For example, if you are removing the first board in a two-board configuration on a system named *mars*, rename *ep10-mars* to *ep0-mars*, *ep11-mars* to *ep1-mars*, and so on.
 - If the board to be removed is upstream from other E-Plex boards, edit the */etc/config/netif.options* file. For example, in a two-board configuration, change the *if#addr=* entries for *ep0* through *ep7*, and remove (or comment out) the lines for *ep10* through *ep17*.
 - Remove the */etc/config/ifconfig-#.options* files for Ethernets that will no longer be connected to the system. For example, if you are removing the first board in a two-board configuration, you may need to remove *ifconfig-2.options* (which, in this example, configures *ep0*), *ifconfig-3.options* (which configures *ep1*), and so on, up to *ifconfig-9.options*.

- If the board to be removed is upstream from other E-Plex boards, rename all *ifconfig-#.options* files for networks that are served by boards downstream from the board that is to be removed. For example, if you are removing the first board in a two-board configuration, you may need to rename *ifconfig-10.options* (which, in this example, configures *ep10*) to *ifconfig-2.options* (which configures *ep0*), *ifconfig-11.options* to *ifconfig-3.options*, and so on.

Planning to Configure Your E-Plex Network Interfaces

A system with multiple network connections can be difficult to configure and maintain. Before starting the E-Plex configuration tasks, Silicon Graphics recommends that you plan your system's network configuration. You can use a system notebook, as illustrated in Figure 1-1 and Figure 1-2, to plan and also, keep a record of, your configuration. Maintaining a system notebook is very useful:

- It prevents confusion and mistakes. Planning all the network configurations and writing the information down before starting the configuration tasks, helps prevent confusion and mistakes.
- Ensures the availability of the information at all times. Configuration information is frequently needed during system maintenance. However, once a system is powered off or running from the miniroot, the system's configuration information is inaccessible.

The System Notebook

A system notebook is a written record of all the configuration information for your system's network connections. This section illustrates sample pages from a notebook. The information that needs to be kept in the system notebook is illustrated in Figure 1-1 and Figure 1-2.

- Figure 1-1 illustrates general networking and operating system parameters that affect all network interfaces on the system.
- Figure 1-2 illustrates the parameters that affect individual network interfaces.

Note: Sample system notebook pages (not filled in) for E-Plex and standard network interfaces are provided on page 11 and page 12. You can photocopy these pages to create a system notebook.

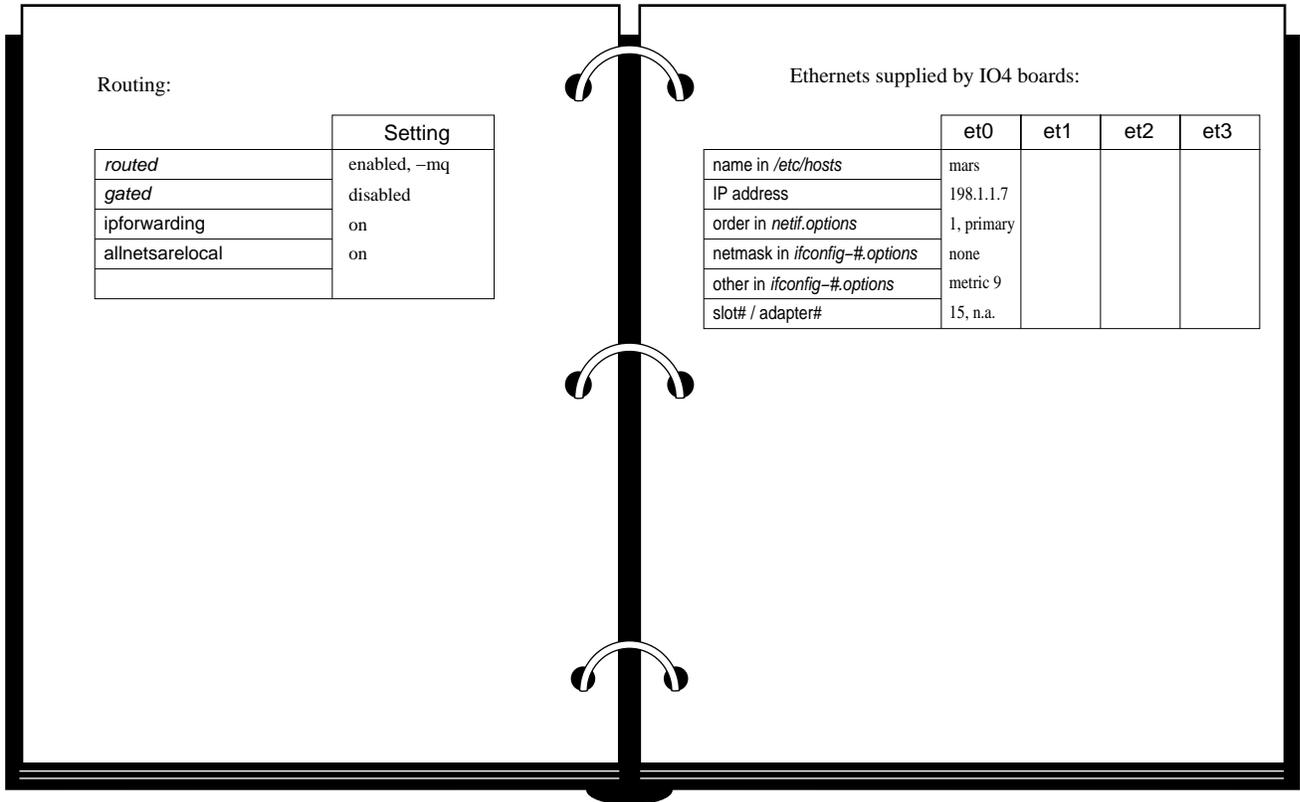


Figure 1-1 Sample of a System Notebook: Networking Pages

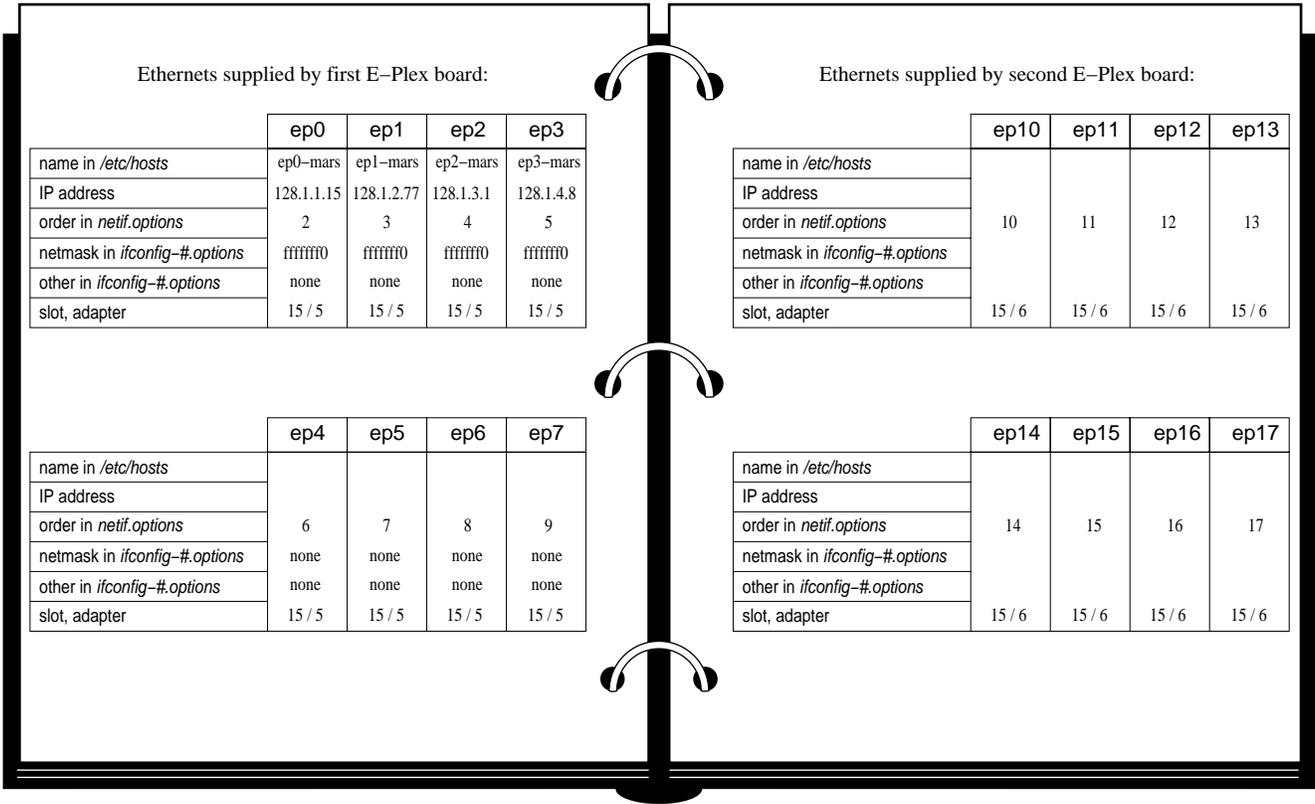


Figure 1-2 Sample of a System Notebook: E-Plex Pages

Ethernets supplied by IO4 boards:

	et0	et1	et2	et3
name in <i>/etc/hosts</i>				
IP address				
order in <i>netif.options</i>				
netmask in <i>ifconfig-#.options</i>				
other in <i>ifconfig-#.options</i>				
slot, adapter				

Ethernets supplied by _____ E-Plex board:

	ep__	ep__	ep__	ep__
name in <i>/etc/hosts</i>				
IP address in <i>/etc/hosts</i>				
order in <i>netif.options</i>				
netmask in <i>ifconfig-#.options</i>				
other in <i>ifconfig-#.options</i>				
slot, adapter				

	ep__	ep__	ep__	ep__
name in <i>/etc/hosts</i>				
IP address in <i>/etc/hosts</i>				
order in <i>netif.options</i>				
netmask in <i>ifconfig-#.options</i>				
other in <i>ifconfig-#.options</i>				
slot, adapter				

A Map of the Configuration Tasks

Once you have planned and written your system's network configuration into the system notebook, make a list of the specific configuration tasks you need to do. Table 1-3 lists the items that you may need to configure, and summarizes how each parameter is configured. The table also indicates which parameters you absolutely must configure because there is no default (R), which are optional (O), and which are automatically given a default setting that you may change, if you desire (DO).

Table 1-3 How to Configure Network Parameters

Network Configuration Item	Required / Optional (location for instructions)	How to Configure
Network connection name	R (page 18)	Edit <i>/etc/hosts</i> file
IP address	R (page 18)	Edit <i>/etc/hosts</i> file
Mapping of name/address to network interface	R (page 19)	Edit <i>/etc/config/netif.options</i> file
Order (defines primary network)	R (page 19)	Edit <i>/etc/config/netif.options</i> file
Netmask (also called subnet mask)*	DO (page 22)	Edit <i>/etc/config/ifconfig-#.options</i> file
ARP, route metric, and broadcast address*	DO (page 22)	Edit <i>/etc/config/ifconfig-#.options</i> file
Routing daemon (<i>routed</i>)*	DO (page 24)	Enable with <i>/etc/config/routed</i> file. Configure by editing <i>/etc/config/routed.options</i> file

Table 1-3 (continued) How to Configure Network Parameters

Network Configuration Item	Required / Optional (location for instructions)	How to Configure
Gateway daemon (<i>gated</i>) *	O (page 24)	Enable with <i>/etc/config/gated</i> file. Configure by editing <i>/etc/config/gated.conf</i> file.
Ethernet, TCP, UDP, ICMP, and IP protocol handling (for example, <i>ipforwarding</i> , MTU sizes, and <i>allnetsarelocal</i>) *	DO (see the <i>IRIX Advanced Site and Server Admin. Guide</i>)	Edit <i>/var/sysgen/master.d/bsd</i> file.

* The operating system automatically configures these parameters with default settings. The section "The Default Configuration" describes the default settings.

The Default Configuration

Some of the network configuration is done automatically by the operating system, in which case a default setting is configured. Other network configuration items are not configured by the operating system, and must be configured by you. This section describes the items that are configured automatically with default settings (which you may alter, if desired), and the items that you must configure.

Network interface configuration can be divided into the following general areas:

- Assigning a network connection name and IP address for each E-Plex interface.

There is no default configuration for this configuration task, so this task must be done for all network interfaces. The section entitled "The */etc/hosts* File" describes how to do this task.

- Mapping the name or address to the network interface.

There is no default mapping for E-Plex network interfaces in either the *network* script or the *netif.options* file. The *netif.options* file must be edited for all E-Plex network interfaces. The section entitled “The netif.options File” describes how to do this task.

- Configuring the number of network interfaces on the system.

The *network* script automatically configures network interfaces up to the number specified by the `if_num` variable in the *network* file. The section entitled “The netif.options File” describes how to increase the number of interfaces.

- Configuring operational parameters for each network interface.

The *network* script automatically configures E-Plex network interfaces with the settings described in Table 1-4. The section entitled “The ifconfig-#.options File” describes how to change the default operational settings.

- Configuring general routing (and gateway) functionality that affects all network interfaces.

The operating system automatically starts and configures the routing daemon (*routed*) whenever two or more network interfaces are on a system. The default configuration is to have the routing daemon advertise all its routes on all its interfaces. The section entitled “Routing Configuration” describes how to change the default settings.

- Configuring general protocol handling (for ipforwarding, Ethernet, TCP, UDP, ICMP, and IP) that affects all network interfaces that use these protocols.

The */var/sysgen/master.d/bsd* file automatically configures these items with defaults. See the section on kernel tuning in the *IRIX Advanced Site and Server Administration Guide* for instructions on altering the settings

Table 1-4 Default Network Interface Operational Parameters

Parameter	Default	Description
netmask	No subnets. (That is, the bits in the network portion of the Internet address are set to 1; the bits in the host portion of the Internet address are set to 0. For class A addresses, 0xFF000000. For class B addresses, 0xFFFF0000. For class C, 0xFFFFF000.)	Value used to create two or more subnetworks from a single Internet address, by increasing the number of bits used as the network portion and decreasing the number of bits used as the host portion. When creating the mask, assign 1 to each network bit and 0 to each host bit.
broadcast address	For the Internet address family, the host portion of the IP address is set to 1s. (For class B addresses, x.x.255.255. For class C addresses, x.x.x.255.)	Address used by this interface for contacting all stations on the local area network.
route metric	0	Hop count value advertised by the routing daemon (<i>routed</i>) to other routers. Higher numbers make the route less desirable and less likely to be selected as a route. Settings range from 0 (most favorable) to 15 (least favorable, infinite/unreachable).
arp	Address Resolution Protocol is enabled and used by the interface.	Address Resolution Protocol (ARP) translates IP addresses to link-layer (hardware) addresses. When this parameter is disabled, interface does not use ARP.
debug	Disabled.	When debugging is enabled, a wider variety of error messages are displayed.

E-Plex Configuration

This chapter explains the procedures for configuring the E-Plex driver and the upper-layer IP protocol stacks that use the Ethernet network connections. The configuration must be done after installation of the E-Plex software, and should be done before installation of the board.

Note: It is recommended that the E-Plex software be installed and configured before the hardware is installed. Performing the tasks in this recommended order saves time (one less reboot is required) and allows the E-Plex connections to function with the first power-on to the E-Plex hardware.

Network Interface Configuration

This section describes the steps for configuring E-Plex network interfaces (that is, *ep0*, *ep1*, and so on). None of the E-Plex network interfaces are configured automatically during startup (by *lboot* and the */etc/init.d/network* script) until the configuration tasks described in this section are performed.

The following files must be edited before an IP application can send or receive over an E-Plex interface and its associated physical port:

- */etc/hosts*
- */etc/config/netif.options*

Editing the */etc/config/ifconfig-#.options* file for each network interface is optional.

The `/etc/hosts` File

In the local `/etc/hosts` (network information) file, add one line for each E-Plex network interface (one for each port).¹ For each installed E-Plex board, create eight entries. Each line specifies the IP address and the network connection name² by which the interface is known.

Below is an example of 16 entries that could be used for the first two E-Plex boards installed on a machine called *mars*. In this example, network connection names include the automatic network interface numbering, as well as the system's hostname. Inclusion of the network interface within the network connection name is not required; however, it makes it much easier to match system status displays (for example, *netstat* and *ifconfig* information) with the names used on command lines, such as *ping* and *rlogin*.

```
x.x.x.x ep0-mars.engr.cmpy.com ep0-mars
x.x.x.x ep1-mars.engr.cmpy.com ep1-mars
x.x.x.x ep2-mars.engr.cmpy.com ep2-mars
x.x.x.x ep3-mars.engr.cmpy.com ep3-mars
x.x.x.x ep4-mars.engr.cmpy.com ep4-mars
x.x.x.x ep5-mars.engr.cmpy.com ep5-mars
x.x.x.x ep6-mars.engr.cmpy.com ep6-mars
x.x.x.x ep7-mars.engr.cmpy.com ep7-mars

x.x.x.x ep10-mars.engr.cmpy.com ep10-mars
x.x.x.x ep11-mars.engr.cmpy.com ep11-mars
x.x.x.x ep12-mars.engr.cmpy.com ep12-mars
x.x.x.x ep13-mars.engr.cmpy.com ep13-mars
x.x.x.x ep14-mars.engr.cmpy.com ep14-mars
x.x.x.x ep15-mars.engr.cmpy.com ep15-mars
x.x.x.x ep16-mars.engr.cmpy.com ep16-mars
x.x.x.x ep17-mars.engr.cmpy.com ep17-mars
```

where *x.x.x.x* is the IP address, in dotted decimal notation.

¹ The online InSight document *IRIX Advanced Site and Server Administration Guide* describes this file in more detail.

² A network connection name is a name (entered in the `/etc/hosts` file) by which a system is known. By convention, the network connection name for the primary interface is the same as a system's hostname. Non-primary network connection names, for ease in identification, usually include the system's hostname.

Note: You may need to add the same entries to other network information databases on other systems on the different networks. For example, you may need to add these entries to an NIS server's database, or you may need to update the */etc/hosts* file on every host.

The *netif.options* File

In the */etc/config/netif.options* file, set the total number of interfaces on the system, and add a pair of lines for each E-Plex network interface.¹

Specifying the Total Number of Interfaces on the System

Follow these instructions to specify the total number of network interfaces that the system automatically configures after each reboot. If you do not specify this item, the system configures only the number of interfaces indicated in the */etc/init.d/network* script.

1. Count the total number of network interfaces that this system will have. To display the interfaces that are currently installed, use the following command line, where each displayed line represents one interface:

```
% /usr/etc/netstat -i
et0 1500 x.x.x.x name 30222888 719 193086 0 75246
lo0 8304 loopback localhost 56855 0 56855 0 0
```

Note: Remember that each E-Plex board adds eight interfaces.

2. Verify that the system will automatically configure all of the interfaces it will have. You can verify the current number with these command lines:

```
% grep if_num= /etc/config/netif.options
: if_num=8
<If the located string is commented out with a preceding
colon, as illustrated here, or if no matching string is
found, use the command below>
```

¹ The online InSight document *IRIX Advanced Site and Server Administration Guide* describes this file in more detail.

```
% grep if_num= /etc/init.d/network
if_num=9
```

If the displayed (non-commented out) number is equal to or greater than the number of network connections (interfaces) installed on the system, you do not need to do anything. For example, when the setting is `if_num=9` (the default), the system automatically handles the standard Ethernet (*et0*) and all the connections on one E-Plex board (*ep0-ep7*).

If the displayed number is less than the number of network connections (interfaces) on the system, continue to the next step.

3. Add a line to the *netif.options* file that specifies the total number of network interfaces, using the format used in the *network* file (as illustrated in step 2). The numeral on the right-hand side of the equal sign is decimal. For example, a system with one IO4 board (with its single Ethernet connection), two FDDI network connections, and one E-Plex board (with its eight Ethernet connections), needs the following line, in order to automatically configure 11 network interfaces:

```
#this line specifies the total number of interfaces
if_num=11
```

Configuring Each Interface

The E-Plex network interfaces that can be added to the *netif.options* file are listed in Table 1-1. Before editing this file, determine the exact names for the network interfaces that will be automatically assigned on this system. (See “Identifying E-Plex Interface Numbers” for details.)

For the E-Plex network interface called *ep0*, add these lines:

```
if#name=ep0
if#addr=name
```

where the pound sign (#) is replaced with any numeral, except 0, and *name* is replaced with either the host name or IP address from the */etc/hosts* file. When the pound sign (#) is replaced with 1, these lines configure the system’s primary network interface, which normally is reserved for the system’s default Ethernet interface (for example, *et0*).

For an E-Plex network interface called *ep32*, add these lines:

```
if#name=ep32
if#addr=name
```

where *name* is replaced with a name or IP address from the */etc/hosts* file and the pound sign (#) is replaced with any numeral except 0.

Note: For the configuration to complete successfully, the *if_num* variable must be equal to or larger than the numeral used in the *if#name* entry. See “Specifying the Total Number of Interfaces on the System” for details.

Here is an example of a *netif.options* file for a system that has one E-Plex board and two other interfaces:

```
# These two lines configure a primary FDDI interface
if1name=ipg0
if1addr=$HOSTNAME

# These two lines configure the default Ethernet
# on the IO4 board
if2name=et0
if2addr=gate-$HOSTNAME

# The following lines configure the Ethernets on the
# first E-Plex board located during startup
if3name=ep0
if3addr=ep0-$HOSTNAME

if4name=ep1
if4addr=ep1-$HOSTNAME

if5name=ep2
if5addr=ep2-$HOSTNAME

if6name=ep3
if6addr=ep3-$HOSTNAME

if7name=ep4
if7addr=ep4-$HOSTNAME

if8name=ep5
if8addr=ep5-$HOSTNAME

if9name=ep6
if9addr=ep6-$HOSTNAME

if10name=ep7
if10addr=ep7-$HOSTNAME
```

```
#this line specifies the total number of interfaces
if_num=10
```

The *ifconfig-#.options* File

If you want to configure nondefault operational parameters for any of the network interfaces, edit or create a file called *ifconfig-#.options* in the */etc/config* directory.¹ The pound sign (#) in the filename must match the ordinal number used for that interface in the *netif.options* file (not the number in the network interface's name). For example, for an interface configured in the *netif.options* file as `if2name=ep#`, you create a file called *ifconfig-2.options*, and for `if38name=ep#`, you create a file called *ifconfig-38.options*. Within each file you can configure one or more of the parameters described in Table 1-4.

Note: This file is optional. If the file does not exist, the operational parameters for the network interface are automatically configured with the defaults described in Table 1-4. If the file exists, but specifies settings for only some of the parameters, the system configures the unmentioned parameters with default settings.

Below are some examples of text that can be placed within *ifconfig-#.options* files:

- To specify a subnet mask for the interface, use the following text:

```
netmask 0x#####
```

where ##### is the 32-bit mask in hexadecimal notation. The standard network portion and the locally designated subnet bits must be set to ones; the bits designated locally as host bits should be set to zeros. For example, `0xFFFFFC00` is a subnet mask for a Class B address with 16 bits of standard network address, 6 bits of locally designated subnet, and 10 bits for host addresses.

- To specify a route metric higher than 0, thus making the route less desirable to routing services (and thus less likely to be selected as an

¹ The online InSight document *IRIX Advanced Site and Server Administration Guide* describes this file in more detail.

intermediate hop enroute to other remote locations), use the following text:

```
metric #
```

where # is in the range 0 (lowest, makes route very desirable) to 15 (highest, makes route undesirable).

- To enable use of the IP address resolution protocol (ARP), use these characters:

```
arp
```

- To disable ARP, use these characters:

```
-arp
```

- To enable debugging, use these characters:

```
debug
```

This line is an example of a file that enables ARP, sets a route metric, specifies a netmask, and disables debugging:

```
arp metric 2 netmask 0xFFFFFFFF80 -debug
```

Note: Instead of creating *ifconfig-#.options* files, the operational parameters can be set by creating a script that repeatedly invokes the *ifconfig* command to change the default settings on each network interface. See the reference (man) page for *ifconfig* for more details.

E-Plex Driver Configuration

To configure the driver, edit the */var/sysgen/master.d/if_ep* file. Complete instructions for the configurable parameters are provided within the file.

Note: Driver configuration is optional, since all configurable items are set to defaults.

Routing Configuration

The E-Plex product and the IRIX operating system provide network and supercomputing services. Routing (that is, IP or Internet routing provided by *routed* and *gated*) is a standard feature of the IRIX operating system. It is automatically enabled on any system with two or more network interfaces.

Routing, however, may not be the main purpose for a system. In general, Silicon Graphics recommends that you consider purchasing dedicated routing equipment to handle a site's internetwork routing requirements. Using dedicated routers may be more cost-effective and can reserve the server or supercomputer's resources for other, more important compute-oriented tasks. Off-loading internetwork routing to specialized equipment is especially cost-effective when a server or supercomputer is connected to many networks, as illustrated in Figure 2-1, in which case routing inadvertently can consume a significant amount of the system's resources.

The configurations in this section describe a couple of strategies for ensuring that your valuable, multi-networked CHALLENGE or Onyx system does not become a well-known router for your site. At the same time, these configurations ensure that *routed* continues to maintain the local routing table that makes it possible for the system to communicate efficiently with remote systems.

Note: The reference pages for *routed* and *gated* supply more complete descriptions of routing functionality.

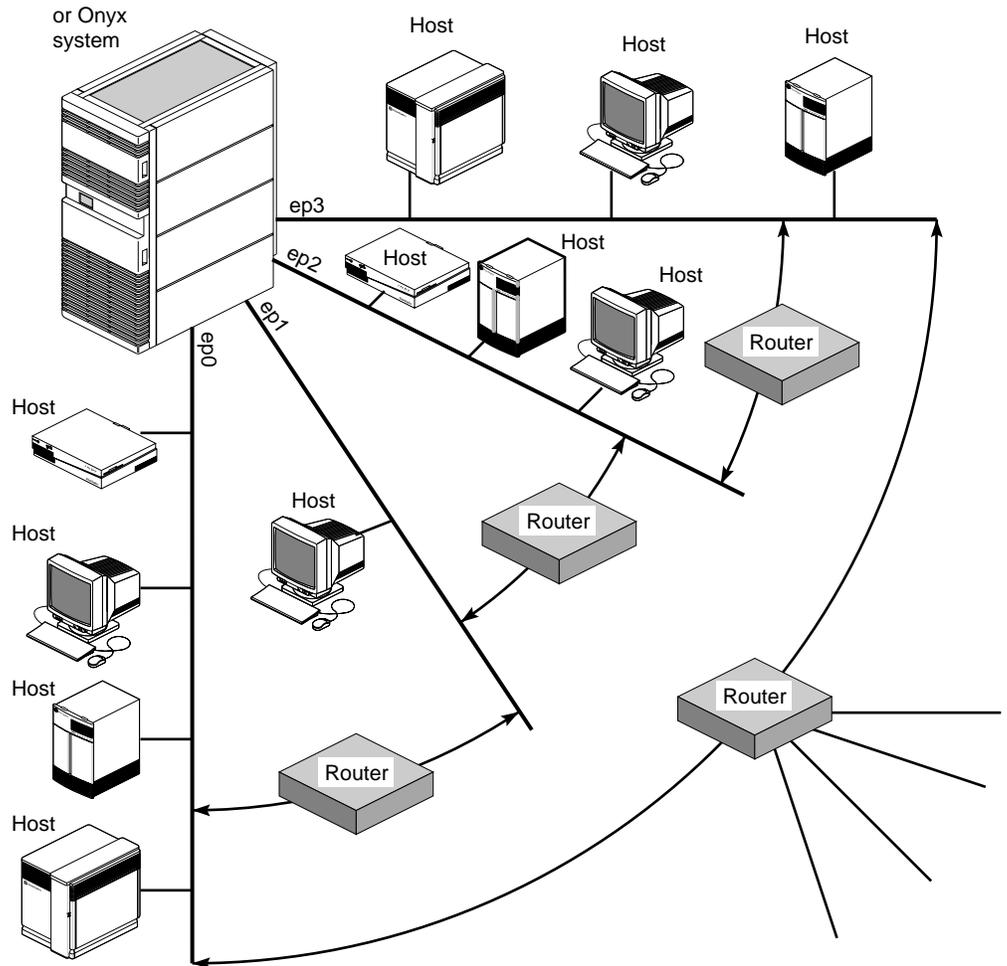


Figure 2-1 Example of a System With Multiple Ethernet Networks

If the site uses *routed*, the */etc/config/routed.options* file should be edited, or, if the file is missing, created, so that it contains one of the following lines of text:

- To suppress advertisement of all routing information (both the host's presence on each network and its network routes) on all the system's network interfaces, place this text in the file:

```
-q
```

- To cause the system to advertise its own presence (that is, its host route) on its primary network interface only, and to suppress advertisement of all other interfaces (routes), place this text in the file:

```
-qm
```

If the site uses *gated*, the */etc/config/gated.conf* file should be edited, or, if the file is missing, it should be created, so that it contains one of the following sets of text:

- To suppress advertisement of all routing information on all the network interfaces on a server, place this text in the file:

```
RIP quiet  
HELLO quiet  
EGP no
```

- To cause the server to advertise on its primary network interface, and to suppress all other advertisement, place this text in the file:

```
RIP yes  
noripoutinterface ###.  
noripoutinterface ###.  
<one line for each suppressed interface>
```

where *###.* is the IP address in dotted decimal notation for each *ep#* interface for which advertising is suppressed.

E-Plex Error Messages

This chapter provides an alphabetical listing of the error messages displayed by the E-Plex driver and utilities. The list contains only messages that are unique to E-Plex. Standard system error messages, even when caused by the E-Plex code, are not included.

Overview

With each error message is a discussion of the problems the message may indicate. The list contains only messages that indicate an error or problem; it does not contain informational messages that occur during normal operation.

Messages are alphabetized according to the following rules:

- Each message is alphabetized by the numerals (0–9) and letters (a–z) of the message’s text. Numerals precede letters. (Figure 3-1 illustrates the text of an error message.)
- Symbols (for example, - or %) and blank spaces are shown in the text of the message, but are ignored in alphabetization. For example, the message `ep_open` appears after `epnet`, and `ep ver` appears after `epconf`.
- Capitalization is not considered in alphabetization.
- When an error message includes an item that the software specifies differently (fills in) for each instance of the message, this item is displayed in italic font and labeled with a generic name (for example, *filename*). The generic names are skipped for alphabetization purposes. For example, the error message `goofy not responding` is located under *hostname* not responding among the “n” listings. Common generic names used in this listing include *hostname*,

interfacename, portID, version#, userentry, systemmessage, digit, filename, and hexnumeral.

Note: If you cannot find an error message in the listing, identify potential fill-in words, then look up the message without those words. For example, if you see “NoName is not a valid entry” and do not find it among the “N” entries, search under the “I” entries for “userentry is not a valid entry”.

E-Plex error messages are written into the file */var/adm/SYSLOG* or displayed at the terminal in the console window; some messages appear in both places. Within the *SYSLOG* file, each message is preceded by the date and time, the host name, the name of the process that created the message, and the text of the message, as illustrated in Figure 3-1. Only the text of the error message is included in the alphabetic list that follows.

May 10 05:12:03	goofy	epfirm: ep6:	invalid address
May 11 13:15:11	goofy	unix: ep0 slot 3 adapter 5:	Missed frame
date and time	host name	creator	text of error message

Figure 3-1 Error Message Formats in the */var/adm/SYSLOG* File

Note: The list of error messages in this chapter covers only those unique to E-Plex. Standard system error messages, even when caused by the E-Plex code, are not covered.

Error Messages

```
bad B2H sernum=hex !=hex at hex op=# port=# val=hex
```

While processing a command from a board, the driver encountered an unrecoverable error. The *ep#* specified in the creator portion of the message (not shown in the message text above) points to the problematic board. For example, *ep0* indicates there is a problem with the board that services network interface *ep0*. The values for *sernum*, *op*, *port*, and *val* identify the failed command. This error message may indicate a problem with the firmware.

To solve this problem, use the *epfirm* command to download new firmware, as explained in the section “Downloading New Firmware.” If the problem persists, call Silicon Graphics’ Technical Assistance Center.

```
MACAddress bad checksum
```

The MAC address for the port serviced by the network interface displayed in the creator portion of the message (not shown in the message text above) failed to checksum correctly. The hardware’s MAC address for that port may be corrupted.

Contact Silicon Graphics’ Technical Assistance Center.

```
bad firmware checksum
```

While bringing the board into operation (after a reset), the driver found that the firmware currently loaded into the board’s EEPROM is corrupted. The *ep#* specified in the message points to the problematic board. For example, *ep0* indicates a problem with the board that services network interface *ep0*.

To solve this problem, use the *epfirm* command to download new firmware to the board, as explained in the section “Downloading New Firmware.” If this does not solve the problem, use *inst* to remove the E-Plex software, then reinstall the product from CD-ROM. Follow the installation with a rebuild of the operating system (*autoconfig*), then a reboot.

`bad GIO ID address`

While starting the board (after a system reboot), the driver found that the GIO Bus base address for the board was invalid. The bad address is displayed in hexadecimal format. This message indicates a problem with the board.

Call Silicon Graphics' Technical Assistance Center.

`bad MAC address #####`

The specified 6-byte Ethernet (that is, medium access control or MAC) address retrieved from the port that services the specified network interface is invalid. Unlike in the "failed MAC address" message, the creator portion of this message (not shown in the message text above) identifies the specific port that failed.

Call Silicon Graphics' Technical Assistance Center.

`bad MAC address checksum`

The Ethernet (that is, medium access control or MAC) address retrieved from the Ethernet port that services the specified network interface is corrupted. Unlike in the "failed MAC address" message, this message does identify the specific port that failed.

Call Silicon Graphics' Technical Assistance Center.

`bad output checksum offset`

While preparing a TCP or UDP packet for transmission, the driver discovered that the header was malformed. This does not indicate a problem with the E-Plex hardware or software. It indicates a problem with an upper-layer software module.

bad probe

During startup, the driver was unable to read information from (probe) the board. This indicates a problem with the hardware.

Reboot the system. If the problem persists, call Silicon Graphics' Technical Assistance Center.

bind ep#: *reason*

A *bind* system call failed. The *reason* is any of those described by the *intro(2)* reference page. This indicates a problem with the operating system. Nothing is wrong with the E-Plex subsystem.

board asleep at *line* with *cmd* not *cmd* after *cmd* at *line*

The board has not processed a command for a long enough time that the driver believes the board to be frozen or nonfunctional. The specified *cmd* and *line* values identify information that is useful for SGI personnel to determine what has recently been happening on the board. The *ep#* specified in the creator portion of the message (not shown in the message text above) points to the problematic board. For example, *ep0* indicates a problem with the board that services network interface *ep0*. This message does not necessarily indicate a serious problem; however, it is an indication that something may be wrong. Search the *SYSLOG* file for other error messages about this board or its ports.

count byte count mismatches

The *count* indicates the number of times that the packet byte count has been incorrect for transmissions over the network interface indicated in the creator portion of the message (not shown in the message text above). This message indicates a problem with the hardware.

Call the Silicon Graphics' Technical Assistance Center.

EINVAL

An upper-layer application (for example, *ifconfig* or *epfirm*) returns this error message (indicating an invalid value) when the E-Plex driver has failed to successfully complete a requested operation due to an invalid or unrecognized value. In most cases, the upper-layer application also displays more specific information about the problem.

EIO

An upper-layer application (for example, *ifconfig* or *epfirm*) returns this error message (indicating an IO error) when the E-Plex driver has failed to successfully complete a requested operation due to a problem with the E-Plex board. In most cases, the upper-layer application also displays more specific information about the problem.

EPERM

An upper layer application (for example, *ifconfig* or *epfirm*) returns this error message when the E-Plex driver has failed to successfully complete a requested operation due to access permission problems. You must be logged in as superuser (root).

count excessive deferrals

The *count* indicates the number of times transmission was deferred excessively on the network interface indicated in the creator portion of the message (not shown in the message text above). Deferrals are caused by collisions on the Ethernet, and result in the current transmission being aborted, but the board keeps trying. This message does not indicate a problem with the E-Plex hardware or software. It does, however, indicate a problem with the network.

extra board

The board installed at the location indicated in the creator portion (not shown in the message text above) of the displayed error message exceeds to the maximum number of E-Plex boards allowed in a system.

Have your authorized service person (SSE) remove the extra board.

failed to allocate interrupt

While starting the board (after a reboot), the driver was unable to set the board-to-host interrupt. This indicates a problem with the board.

Reboot the system. If the problem persists, call Silicon Graphics' Technical Assistance Center.

failed to get MAC address

The driver was unable to retrieve one of the eight Ethernet (that is, medium access control, or MAC) addresses on the board. The *ep#* specified in the creator portion of the message (not shown in the message text above) points to the problematic board. For example, a display of *ep0* indicates there is a problem with the board that services network interface *ep0*. This message does not identify the specific port where the failure occurred; it only indicates a problem with at least one of the addresses on the board. Some of the Ethernet connections on the board may be functional, while others are not.

Call Silicon Graphics' Technical Assistance Center.

failed to reset

The driver attempted to reset the board, but the board did not respond. The *ep#* specified in the message points to the problematic board. For example, *ep0* indicates there is a problem with the board that services network interfaces *ep0* to *ep7*.

To solve this, power cycle the system, which also power cycles and resets the board. Use *ping* over any of the networks connected to the questionable board to verify the board's functionality. If the error message continues to be displayed, call Silicon Graphics' Technical Assistance Center.

```
failed to start ep#: reason
```

The *ioctl* call for the command `SIOC_EP_SIGNAL` failed to start the E-Plex board indicated. The *reason* is any of those described by the *intro(2)* reference page. Either the E-Plex driver is not running or the E-Plex hardware is not responding.

Use the *versions* command to verify that the E-Plex software is installed. Use the *netstat -in* command to verify that the driver is running. If the E-Plex driver is installed and running, reboot the system to give the operating system an opportunity to power cycle the board. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

```
failure epb->epb_in_XXX_num > 0
```

While processing a frame received from the network, the board ran out of buffers. The *xxx* indicates whether the buffers were big or small. In response, the driver has reset the board. The *ep#* specified in the creator portion of the message (not shown in the message text above) points to the problematic board. For example, *ep0* indicates a problem with the board that services network interfaces *ep0* to *ep7*.

If the problem persists after the driver automatically resets the board, use the *epfirm* utility, as explained in the section "Downloading New Firmware," to download new firmware onto the board. If this does not solve the problem, call Silicon Graphics' Technical Assistance Center.

```
count FIFO overruns
```

The *count* is an approximation for the number of frames dropped due to the receive FIFO not emptying fast enough. The problem occurred on the network interface indicated in the creator portion of the message (not shown

in the message text above). This message indicates a problem with the E-Plex hardware.

Call Silicon Graphics' Technical Assistance Center.

count FIFO underruns

The *count* indicates the number of times the transmit FIFO was not kept full enough, causing a frame to be aborted. The problem occurred on the network interface indicated in the creator portion of the message (not shown in the message text above). This message indicates a problem with the E-Plex hardware.

Call Silicon Graphics' Technical Assistance Center.

firmware too old or new

While bringing the board into operation (after a reset), the driver found that the version of firmware currently loaded into the board's EEPROM is not compatible with the driver. The firmware is either an earlier or a later version. The *ep#* specified in the message points to the problematic board. For example, *ep0* indicates a problem with the board that services network interfaces *ep0* to *ep7*.

To solve this problem, use the *epfirm* command to download new firmware, as explained in the section "Downloading New Firmware." If this does not solve the problem, the E-Plex software files are inconsistent (that is, the files are from two or more releases). Use *inst* to remove the E-Plex software, then reinstall the product from CD-ROM. Follow the reinstallation by rebuilding the operating system (*autoconfig*), then rebooting.

impossible output checksum

While preparing a packet for transmission, the driver encountered an unsupported transport protocol. The packet has been aborted. This message indicates an incompatible upper-layer application. There is no problem with the E-Plex hardware or software.

```
invalid B2H at address sernum=hex op=# port=# val=hex
```

While processing a command from a board, the driver encountered an unrecoverable error. The *ep#* specified in the creator portion of the message (not shown in the message text above) points to the problematic board. For example, *ep0* indicates there is a problem with the board that services network interface *ep0*. The values for *sernum*, *op*, *port*, and *val* identify the command. This error message may indicate a problem with the firmware.

To solve this problem, use the *epfirm* command to download new firmware, as explained in the section “Downloading New Firmware.” If the problem persists, call Silicon Graphics’ Technical Assistance Center.

```
invalid interface unit number userentry
```

The number (argument) entered on the command line for the *epfirm* command specified an E-Plex board number that is not currently valid. Valid entries are *ep0* for the first E-Plex board in a system, *ep10* for the second, and so on. Invoke the command again, taking care to type correctly. If the error occurs again, use the *hinw* command to verify that the board was located during the last startup. If the board is not listed, reboot the system to give the operating system an opportunity to probe for the board.

If the board is installed, but cannot be located during the reboot, either too many E-Plex boards are installed or the board is dysfunctional. Contact Silicon Graphics’ Technical Assistance Center.

```
count late collisions
```

The *count* indicates the number of times the transmitter for the indicated network interface has not received Ethernet protocol acknowledgments for transmitted frames. This does not indicate a problem with the E-Plex hardware or software. In fact, the unacknowledged data has been retransmitted. This message does, however, indicate a problem with the network.

missing

During startup, the E-Plex driver did not locate any E-Plex board. Either no E-Plex board is installed or there is a problem with the board. If an E-Plex board is installed or if you want to have one installed, contact your service engineer. If the problem persists after reinstallation, call Silicon Graphics' Technical Assistance Center.

If you do not want E-Plex installed on this system, you may remove the driver from the operating system by rebooting the system and answering **yes** to the question Automatically rebuild the operating system?

no carrier: check Ethernet cable

The cable attached to the hardware port for the indicated network interface is not connected, loosely connected, or faulty. This message does not indicate a problem with the E-Plex board or software.

no LINK: check Ethernet cable

The cable for the hardware port servicing the indicated network interface is not connected, loosely connected, or faulty. The problem can be at either end of the cable. For example, the problem may be with the cable connection at the hub. This message does not indicate any problem with the E-Plex board or software.

no memory

While starting the board (after a power cycle or reboot), the driver was unable to allocate memory for use with this board. There is no problem with the E-Plex hardware or software. This message indicates that there is a problem with allocation of resources for the operating system on this machine.

count packets too long

The indicated network interface has received incoming Ethernet frames that exceed the maximum allowed length (that is, maximum transmission unit, MTU). The *count* indicates the number of frames that were too large. This message does not indicate any problem with the E-Plex board or software. It indicates that there is a node on the network that is transmitting nonconforming Ethernet frames.

present

This is not an error message. It indicates that the board at the indicated slot and adapter location has been found during startup.

SIOC_EP_EXEC ep#: *reason*

The *ioctl* call for the command SIOC_EP_EXEC failed. The E-Plex board servicing the indicated interface did not respond. The *reason* is any of those described by the *intro(2)* reference page. Either the E-Plex driver is not running or the E-Plex hardware is not responding.

Use the *versions* command to verify that the E-Plex software is installed. Use the *netstat -in* command to verify that the driver is running. If the E-Plex driver is installed and running, reboot the system to give the operating system an opportunity to power cycle the board. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

SIOC_EP_FET ep#: *reason*

The *ioctl* call for the command SIOC_EP_FET failed. The E-Plex board servicing the indicated interface did not respond. The *reason* is any of those described by the *intro(2)* reference page. Either the E-Plex driver is not running or the E-Plex hardware is not responding.

Use the *versions* command to verify that the E-Plex software is installed. Use the *netstat -in* command to verify that the driver is running. If the E-Plex driver is installed and running, reboot the system to give the operating system an opportunity to power cycle the board. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

`SIOC_EP_SIGNAL ep#: reason`

The `ioctl` call for the command `SIOC_EP_SIGNAL` failed to start the E-Plex board indicated. The *reason* is any of those described by the *intro(2)* reference page. Either the E-Plex driver is not running or the E-Plex hardware is not responding.

Use the *versions* command to verify that the E-Plex software is installed. Use the `netstat -in` command to verify that the driver is running. If the E-Plex driver is installed and running, reboot the system to give the operating system an opportunity to power cycle the board. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

`SIOC_EP_STO ep#: reason`

The `ioctl` call for the command `SIOC_EP_STO` failed. The E-Plex board servicing the indicated interface did not respond. The *reason* is any of those described by the *intro(2)* reference page. Either the E-Plex driver is not running or the E-Plex hardware is not responding.

Use the *versions* command to verify that the E-Plex software is installed. Use the `netstat -in` command to verify that the driver is running. If the E-Plex driver is installed and running, reboot the system to give the operating system an opportunity to power cycle the board. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

`SIOC_EP_VERS ep#: reason`

The `ioctl` call for the command `SIOC_EP_VERS` failed. The E-Plex board servicing the indicated interface did not respond. The *reason* is any of those described by the *intro(2)* reference page. Either the E-Plex driver is not running or the E-Plex hardware is not responding.

Use the *versions* command to verify that the E-Plex software is installed. Use the `netstat -in` command to verify that the driver is running. If the E-Plex driver is installed and running, reboot the system to give the operating system an opportunity to power cycle the board. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

`SIOCGIFFLAGS ep#: reason`

The *ioctl* call for the command `SIOCGIFFLAGS` failed. The E-Plex board servicing the indicated interface did not respond. The *reason* is any of those described by the *intro(2)* reference page. Either the E-Plex driver is not running or the E-Plex hardware is not responding.

Use the *versions* command to verify that the E-Plex software is installed. Use the *netstat -in* command to verify that the driver is running. If the E-Plex driver is installed and running, reboot the system to give the operating system an opportunity to power cycle the board. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

`SIOCSIFFLAGS ep#: reason`

The *ioctl* call for the command `SIOCSIFFLAGS` failed. The E-Plex board servicing the indicated interface did not respond. The *reason* is any of those described by the *intro(2)* man page. Either the E-Plex driver is not running or the E-Plex hardware is not responding.

Use the *versions* command to verify that the E-Plex software is installed. Use the *netstat -in* command to verify that the driver is running. If the E-Plex driver is installed and running, reboot the system to give the operating system an opportunity to power cycle the board. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

`socket ep#: reason`

A *socket* system call failed. The *reason* is any of those described by the *intro(2)* reference page. This indicates a problem with the operating system. Nothing is wrong with the E-Plex subsystem.

`count transmission errors`

The *count* indicates the number of outgoing frames for which a problem was encountered during transmission on the network interface that is indicated in the creator portion of the message (not shown in the message text above).

This message indicates a problem with the hardware. Call the Silicon Graphics' Technical Assistance Center.

```
unrecognized interface: userentry
```

The user's command line entry (argument) for the *epfirm* command was a set of characters that do not name an E-Plex board. Valid entries are *ep0* for the first E-Plex board in a system, *ep10* for the second, and so on. Invoke the command again, taking care to type correctly. If the error occurs again, use the *hinv* command to verify that the board was located during the last startup. If the board is not listed, reboot the system to give the operating system an opportunity to probe for the board.

```
WARNING: Writing board EEPROM.  
Do not reset the system until finished
```

This is not an error message. This message is displayed during the time that the E-Plex software is downloading firmware to the board indicated. The board is identified by the name of the first interface it services. For example, an *ep0* indicates downloading to the first board in the system.

Downloading New Firmware

Use the commands below to download new firmware onto a specific E-Plex board when an error message indicates that this step is required:

```
% /usr/sbin/versions eplex  
<verify that the software version displayed here is  
compatible with the installed E-Plex boards.  
If the version is not correct or if E-Plex is not installed,  
install E-Plex software before proceeding.>  
% /sbin/su  
Password: thepassword  
# /usr/etc/epfirm board  
#/usr/etc/ifconfig ep# up  
#/usr/etc/ifconfig ep# up
```

where *board* is replaced with the name of the first network interface on the board (for example, *ep0* selects the first board in a system and *ep10* selects the second board), and the *ep#* variables are replaced with the network interfaces serviced by the board (for example, *ep0* to *ep7*).

Note: The *epfirm* command automatically brings each interface on the board down before downloading the firmware.

Index

A

- adding a board, 4, 6
- Address Resolution Protocol. See ARP.
- ARP
 - configuration, 23
 - default configuration, 16

B

- board location process, 1
- broadcast address, default setting, 16

C

- configuration
 - default. See under network interface.
 - of driver. See under how to.
 - of network interfaces. See under how to.
 - tasks, 13, 14
- configuration files
 - /etc/hosts*. See under files.
 - if_ep*. See under files.
 - ifconfig-#.options*. See under files.
 - netif.options*. See under files.
- customer support, xi

D

- driver configuration, 23

E

- epfirm*, see */usr/etc/epfirm*
- error messages
 - alphabetization rules, 27
 - format, 28
 - log file, 28

F

- files
 - error message log file, 28
 - /etc/config/gated.conf*, 26
 - /etc/config/ifconfig-#.options*, 22
 - /etc/config/netif.options*, 14, 19
 - /etc/config/routed.options*, 26
 - /etc/hosts*, 18
 - /etc/init.d/network*, 15
 - log messages, 28
 - /var/adm/SYSLOG*, 28
 - /var/sysgen/master.d/bsd*, 15
 - /var/sysgen/master.d/if_ep*, 23
- firmware, 41

G

gated, 26
gated.conf file. See under files.

H

hardware inventory, 1
hosts file. See under files.
how to
 assign a name, 18
 assign an IP address, 18
 configure a netmask, 22
 configure network interfaces, 17-23
 configure operational parameters, 22
 configure routing, 24-26
 configure the driver, 23
 determine network interface number assignment,
 2
 download firmware, 41
 match labels on panel plates to network
 interfaces, 3
 plan for network interface configuration, 8
 reconfigure software when a board is removed, 7

I

if_ep file. See under files.
ifconfig-#.options file. See under files.
IO panel plates, 3
IP address assignment, 18

L

log file. See under files.

M

moving a board, 4, 7

N

netif.options file. See under files.
netmask
 configuration, 22
 default setting, 15
network connection name
 assignment, 18
 configuration, 18
 definition, 18
network interface
 configuration, 17-23
 configuration tasks, 13, 14
 default configuration, 14-16
 number assignment, 2
 why the assignment might change, 4
notebook. See system notebook.
numbering of network interfaces, 2

O

operational parameters
 configuration, 22
 default settings, 15
 list of, 15

P

planning for network configuration, 8
product support, xi

R

removing a board, 4, 7

route metric

configuration, 22

default setting, 16

routed, 26

routed.options file. See under files.

routing configuration. See under how to.

S

Silicon Graphics customer support, xi

software installation, x

subnetwork mask. See netmask.

SYSLOG file. See under files.

system notebook

example, 10

sample page, 11, 12

T

technical assistance center, xi

U

/usr/etc/epfirm, 41

V

/var/adm/SYSLOG file, 28

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