Emulex Drivers for Solaris User Manual

FC and FCoE Driver Version 2.85.9.0
NIC Driver Version 4.4.243.0

Emulex, 3333 Susan Street

Costa Mesa, CA 92626

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1. Introduction

This document provides information for using the Emulex® Fibre Channel (FC) and Fibre Channel over Ethernet (FCoE) out-of-box drivers for Solaris StorEdge SAN Foundation Software (SFS), which is part of the SFS (Leadville) stack. The module name for this FC/FCoE driver is "elxfc".

This document also provides information for using the Emulex network interface card (NIC) out-of-box driver for Solaris, which operates the NIC function of the Emulex OneConnect™ universal converged network adapter (UCNA). The module name for this NIC driver is "elxnic".

Prerequisites

Audience

You should be familiar with Solaris and have access to standard system information before installing or using this driver. For the FC/FCoE driver, familiarity with Oracle Storage SFS and FC and FCoE is essential. For the NIC driver, familiarity with the Emulex OneConnect UCNA and Ethernet networking is essential.

Supported Operating Systems

One of the following operating systems must be installed:

- Solaris 10 SPARC
- Solaris 10 x64
- Solaris 11 SPARC
- Solaris 11 x64
- Solaris 11.1

Note: For the FC/FCoE (elxfc) driver, Solaris 11.1 is required; Solaris 11 is not supported. For the NIC (elxnic) driver, S10, S11, and S11.1 are supported.

See the Emulex website for the latest supported operating systems.

Adapter, Firmware, and Stack Compatibility

For adapters that are compatible with the Emulex FC/FCoE and NIC drivers, see the driver's Downloads page on the Emulex website.

For compatible firmware versions, see the Downloads page for the specific adapter.

The NIC driver supports the Solaris Ethernet stack, including NIC virtualization (Crossbow), vSwitch, and vRouter.

Known Issues

See the product release notes for the latest information.

Abbreviations

ADISC	Discover Address
APIC	advanced programmable interrupt controller
CLI	Command line interface
CNA	converged network adapter
DHCHAP	Diffie-Hellman Challenge Handshake Authentication Protocol
DR	dynamic reconfiguration
FC	Fibre Channel
FCA	Fibre Channel adapter
FCIO	FC input/output
FC-IP	Fibre Channel over IP
FCoE	Fibre Channel over Ethernet
FCTL	FC transport library
FW	firmware
Gb/s	gigabit per second
HBA	host bus adapter
HW	hardware
INTx	PCIe legacy interrupts, where “x” is variable
IOCB	Input/Output Control Block
IRM	interrupt resource management
LACP	Link Aggregation Control Protocol
lpfc	LightPulse Fibre Channel
MSI-X	message signaled interrupts – extended
MTU	maximum transmission unit
NIC	network interface card
NPIV	N_Port ID Virtualization
PCI	Peripheral Component Interconnect
PF	PCIe physical function
SFS	SAN Foundation Software
SLI	Service Level Interface
UCNA	universal converged network adapter
UMC	universal multichannel
VF	PCIe virtual function
vNIC	virtual NIC
Vport	virtual port

2. Installing and Uninstalling

Installing the Drivers for Solaris 10

FC/FCoE Out-of-Box Driver (elxfc)

To install the FC/FCoE out-of-box driver:

1. Log in as "root".
2. Download the platform-specific FC/FCoE out-of-box driver from the Emulex website to a convenient directory. The file is a regular tar file.
3. Extract the installation image from the tar file. For example:

```
cd <location of driver package>
tar xvf elxfc_kit-2.xx.x.x-s10-sparc.tar.
```

4. Install the driver kit. For example:

```
cd <location of driver package>
pkgadd -d ./
```

5. Reboot the system.

Note: The emlxdrv utility must be used to bind the HBA to the elxfc driver. For more information on the emlxdrv utility, see the latest *Emulex Solaris FCA Utilities User Manual*.

NIC Out-of-Box Driver (elxnic)

To install the NIC out-of-box driver:

1. Log in as "root".
2. Download the platform-specific NIC out-of-box driver from the Emulex website to a convenient directory. The file is a regular tar file.
3. Extract the installation image from the tar file. For example:

```
cd <location of driver package>
tar xvf elxnic_kit-4.4.xxx.x-s10-sparc.tar
```

4. Install the driver kit. For example:

```
cd <location of driver package>
pkgadd -d./
```

5. Reboot the system.

Binding a Driver to a Device-id Instance

Because the out-of-box NIC driver (elxnic) and the inbox NIC driver (oce) support the same set of device-ids, only one driver can be attached to a device-id instance. By default, the oce driver claims all the device-ids. Therefore, when installing the elxnic

driver on top of the oce driver, the elxnic driver installation fails. To reestablish the device-id to driver bindings:

1. Unbind the oce driver using the emlxdrv utility. For more information on the emlxdrv utility, see the latest *Emulex Solaris FCA Utilities User Manual*.
2. Retry the elxnic installation.

This will ensure a successful package installation and will automatically bind the NIC.

Uninstalling the Drivers for Solaris 10

FC/FCoE Driver

To uninstall the FC/FCoE out-of-box driver:

1. Log in as "root".
2. Remove the out-of-box driver by typing:

   ```
   pkgrm <OOB_pkg_name>
   ```

   For example:

   ```
   pkgrm EMLXelxfc
   ```
3. Reboot the system.

NIC Driver

To uninstall the NIC out-of-box driver:

1. Log in as "root".
2. Remove the out-of-box driver by typing:

   ```
   pkgrm <nic_pkg_name>
   ```

   For example:

   ```
   pkgrm EMLXelxnic
   ```
3. Reboot the system.

Installing the Drivers for Solaris 11

FC/FCoE Out-of-Box Driver (elxfc)

To install the FC/FCoE out-of-box driver (for S11.1):

Option 1: Remote repository installation

1. Add the repository to the publisher list. For example:

   ```
   pkg set-publisher -O http://<Emulex provided URL> emulex
   ```
2. Install the utility kit. For example:

   ```
   pkg install emlxu
   ```

or, to specify a version:

```
pkg install emlxu@<version>
```

Note: Typing "pkg uninstall emlxu" will remove the utility.

3. To install the driver, type

```
pkg install elxfc
```

4. Reboot the system after installing the driver (a system reboot is not necessary after installing the utility).

Option 2: Local installation with a p5p file

1. Download emlxu-x.x.x.x.p5p from the Emulex website to the host.
2. Install the utility kit. For example:

```
pkg install -g emlxu-x.x.x.x.p5p emlxu
```

Note: Typing "pkg uninstall emlxu" will remove the utility.

3. Download elxfc-s.s.s.s.p5p from the Emulex website to the host.
4. To install the driver, type

```
pkg install -g elxfc-x.x.x.x.p5p
```

Note: The emlxdrv utility must be used to bind the HBA to the elxfc driver. For more information on the emlxdrv utility, see the latest *Emulex Solaris FCA Utilities User Manual*.

Option 3: Scripted Installation

1. Download the p5p tar file from the Emulex website to the host.
2. Untar the archive:

```
$ tar -xvf elxfc_p5p-x.xx.x.x-s11.tar
```

3. Run the installation script:

```
$ ./elxfc_install
```

4. Reboot the system:

```
$ reboot
```

NIC Out-of-Box Driver (elxnic)

To install the NIC out-of-box driver:

1. Log in as "root".
2. Download the platform-specific NIC out-of-box driver from the Emulex website to a convenient directory. The file is a regular tar file.
3. Extract the installation image from the tar file. For example:

```
cd <location of driver package>
tar xvf elxnic_kit-4.4.168.0-s10-sparc.tar
```

4. Install the driver kit. For example:

```
cd <location of driver package>
pkgadd -d./
```

5. Reboot the system.

Binding a Driver to a Device-id Instance

Because the out-of-box NIC driver (elxnic) and the inbox NIC driver (oce) support the same set of device-ids, only one driver can be attached to a device-id instance. By default, the oce driver claims all the device-ids. Therefore, when installing the elxnic driver on top of the oce driver, the elxnic driver installation fails. To reestablish the device-id to driver bindings:

1. Unbind the oce driver using the emlxdrv utility. For more information on the emlxdrv utility, see the latest *Emulex Solaris FCA Utilities User Manual*.
2. Retry the elxnic installation.

This will ensure a successful package installation and will automatically bind the NIC.

Uninstalling the Drivers for Solaris 11

FC/FCoE Driver

To uninstall the FC/FCoE out-of-box driver:

Navigate to the installation directory. Type

```
pkg uninstall elxfc
```

To uninstall the FC/FCoE out-of-box driver using the scripted uninstall method, type

```
./emlxu_remove
```

The script is included in the downloadable p5p tar file that can be retrieved from the Emulex website. Using the scripted uninstall will also clean up the files in the installation directory.

NIC Driver

To uninstall the NIC out-of-box driver:

1. Log in as “root”.
2. Remove the out-of-box driver by typing:

   ```
   pkgrm <nic_pkg_name>
   ```

   For example:

   ```
   pkgrm EMLXelxnic
   ```

3. Reboot the system.

3. Utilities for Solaris Drivers

Emulex provides three utilities to facilitate configuring and using the Solaris drivers:

- OneCommand™ Manager application
- emlxadm utility (included in the Fibre Channel adapter (FCA) utilities)
- emlxdrv utility (included in the FCA utilities)

Note: When you install the OneCommand Manager application, also install the Solaris FCA Utilities.

OneCommand Manager Application

The OneCommand Manager application provides the functions of the emlxadm utility plus additional functions, allowing you to remotely manage multiple systems. It offers a choice of a graphical user interface and a scriptable command-line interface. It is a direct-user interface to the FC input/output (FCIO) interface provided by the Oracle StorEdge SFS. The FCIO interface provides an Oracle-common ioctl interface to the FC transport library (FCTL), which manages the FCA drivers for each FC/FCoE adapter attached to the host system. The OneCommand Manager application also directly interfaces with the Emulex network driver, allowing you to manage the NIC function of Emulex UCNAs. For more information, see the *OneCommand Manager Application User Manual*.

emlxadm Utility

The emlxadm utility changes driver parameters through a local interactive or command-line interface (CLI) mode. It can also update firmware on non-Oracle branded devices. For more information, see the *Solaris FCA Utilities User Manual*.

emlxdrv Utility

The emlxdrv utility associates the Emulex Solaris SFS out-of-box drivers and the Solaris LightPulse Fibre Channel (lpfc) driver to the various models of Emulex FC/FCoE adapters. The emlxdrv utility is used for binding (associating) the Emulex (Leadville Fibre Channel) out-of-box drivers to the various models of Emulex FC adapters. If the driver binding configuration is changed, the host system must be rebooted for the new configuration to take effect. For more information, see the *Solaris FCA Utilities User Manual*.

4. FC/FCoE Driver Configuration

The module name for the Emulex SFS FCA out-of-box driver is "elxfc". You can configure the Emulex SFS FCA driver parameters by:

- Editing the configuration file (elxfc.conf), which is described in this section.
- Using the OneCommand Manager application. For more information, see the *OneCommand Manager Application User Manual*.
- Using the Emulex FCA utilities (emlxadm and emlxdrv). For more information, see the *Solaris FCA Utilities User Manual*.

Editing the FC/FCoE Configuration File (elxfc.conf)

The configuration file contains all the parameters necessary to initialize the Emulex SFS FCA out-of-box driver.

Changing Driver Parameters

The configurable driver parameters are defined in Table 4-1, FC/FCoE Configuration File Parameters, on page 24.

To change driver parameters:

1. Open the configuration file in a text editor.
2. Change the parameters to the desired settings.
3. Save the file.
4. If the driver is already loaded, you must unload and reload the driver to implement your changes. For more information, see "Installing and Uninstalling" on page 16.

To determine the requirement for the parameter change to take effect, see the "Activation" column in Table 4-1, FC/FCoE Configuration File Parameters, on page 24.

Configuring NPIV Support

Enabling NPIV Support on Solaris 10

To enable N_Port ID Virtualization (NPIV) support in the driver:

1. Log in as "root", or "su" to root.
2. Set enable-npiv=1 in the configuration file.
3. The FC port (fp) driver parameters are updated when the Emulex emlxu utilities package (EMLXemlxu) is installed. Entries from 2–254 can be added to the /kernel/drv/fp.conf file. For example:

```
name="fp" class="fibre-channel" port=0;
name="fp" class="fibre-channel" port=1;
name="fp" class="fibre-channel" port=2;
name="fp" class="fibre-channel" port=3;
name="fp" class="fibre-channel" port=4;
```

```
name="fp" class="fibre-channel" port=5;
name="fp" class="fibre-channel" port=6;
name="fp" class="fibre-channel" port=7;
name="fp" class="fibre-channel" port=8;
name="fp" class="fibre-channel" port=9;
```

The first two lines are listed by default because ports 0 and 1 are required. The above example shows that ports 2–9 have been added to support up to ten virtual ports. The port number of each entry must increment by one in sequential order, without gaps in the number sequence. That is, you cannot have "`name="fp" class="fibre-channel" port=7;`" and then have the next line be "`name="fp" class="fibre-channel" port=10;`".

4. Reboot the system.

To create, delete, and list virtual ports after a system reboot, see the *OneCommand Manager Application User Manual*.

Enabling NPIV Support on Solaris 11

To enable NPIV support in the driver:

1. Log in as "root", or "su" to root.
2. The "enable-npiv" parameter is set to 0 by default. To enable NPIV, set enable-npiv to 1 in the configuration file.
3. See Chapter 6 of the *Solaris Express SAN Configuration and Multipathing Guide*.

NPIV Limitations

The following limitations apply to NPIV:

- There is no Fibre Channel over IP (FC-IP) support on virtual ports.
- You cannot delete a virtual port with a mounted file system.
- Due to the limitation of the Solaris SFS stack, deleting a virtual port causes that virtual port to go offline.
- The Emulex LightPulse® LP11000 and LPe11000 family of adapters can support up to 100 virtual ports.
- The Emulex LightPulse LPe12000 family of adapters can support up to 255 virtual ports.

NPIV and OS Virtualization

Solaris has several OS virtualization solutions, including Oracle VM for SPARC, Oracle VM for x86, and Solaris containers. Devices configured to be seen on an Emulex FC or Ethernet port (either a physical port or a virtual port) can be used with any of these OS virtualization solutions. Emulex strongly recommends that you consult the latest document on these technologies to learn the best use of resources related to NPIV technology.

Using VPorts with Oracle VM Server for SPARC, Solaris Containers, or Oracle VM Server for 86

To use NPIV with Oracle VM Server for SPARC (formerly Logical Domains), Solaris containers, or Oracle VM Server for x86 (formerly xVM) user domains:

1. Create virtual ports for the domains/containers to which you want to present dedicated storage.
2. Discover and attach the targets to the virtual ports.
3. Assign the target to the domain or container. The attachment runs through the virtual port that provides the path to the target.

Configuring Target Mode Support for Solaris 11

To configure target mode on Solaris 11:

1. Log in as "root", or "su" to root.
2. Set target-mode to "1" in the configuration file. You can also set individual paths to target mode:

   ```
   elxfcX-target-mode=1
   ```

   Where "X" is the specific numeric path. For example, when elxfc1-target-mode=1, then all other paths stay in initiator mode.
3. Remove the comment for this line:

   ```
   ddi-forceattach=1
   ```
4. Reboot the system.

To configure targets, see the *Oracle COMSTAR Administration* document.

FC/FCoE Configuration File Parameters

Notes

- All parameters are adapter-specific.
- All adapter-specific parameters have an elxfcX prefix, where "X" is the driver instance number. For example, setting "elxfc0-link-speed=4" makes "4 Gb/s" the link speed setting for the "0" instance of the elxfc driver.
- The OneCommand Manager application reflects the configuration file driver parameters. For more information, see the *OneCommand Manager Application User Manual*.
- If you want to override a driver parameter for a single driver-loading session, you can specify it as a parameter to the modload command. The following example is for 64-bit platforms:

  ```
  modload /kernel/drv/sparcv9/elxfc automap=0
  ```
- The "Activation" column in the following Table 4-1 shows the requirement for the parameter change to take effect. Activation requirements include adapter reset, dynamic reset (no reset is necessary), link reset, and reboot.

The following table lists the FC/FCoE configuration file parameters.

Table 4-1 FC/FCoE Configuration File Parameters

Parameter	Description	Activation
ack0	Indicates whether the adapter tries/uses ACK0 for Class 2. • 0 = The adapter only uses ACK1 when running Class 2 traffic (default). • 1 = The adapter attempts to use ACK0 when running Class 2 traffic to a device. If the device does not support ACK0, then the adapter uses ACK1.	Adapter reset
adisc-support	Sets the driver level support for the FC ADISC login I/O recovery method. • 0 = No support. Flushes active I/Os for all FCP target devices at link down. • 1 = Partial support. Flushes I/Os for non-FCP2 target devices at link down • 2 = Full support. Holds active I/Os for all devices at link down.	Dynamic
assign-alpa	**Note:** This property is only applicable if the topology is set to loop. If multiple adapter instances on the same host are on the same loop, set this property differently for each adapter. Possible values are 0x00–0x0ef. A 0x00 setting (default) means no preference.	Link reset
console-errors	Verbose mask for driver error messages to the console. Possible values are 0x0000000–0xFFFFFFFF. The default value is 0x0000000.	Dynamic
console-notices	Verbose mask for driver notice messages to the console. Possible values are 0x0000000–0xFFFFFFFF. The default value is 0x0000000.	Dynamic
console-warnings	Verbose mask for driver warning messages to the console. Possible values are 0x0000000–0xFFFFFFFF. The default value is 0x0000000.	Dynamic
cr-count	Specifies a count of I/O completions after an interrupt response is generated. The possible values are 1–255. The default value is 1. **Note:** This property is disabled if cr-delay=0.	Link reset
cr-delay	Specifies a count of milliseconds after which an interrupt response is generated if cr-count has not been satisfied. Possible values are 0–63. The default value is 0. **Note:** When cr-delay=0, the Coalesce Response parameter (cr_count) is disabled.	Link reset
enable-auth	DHCHAP support in the driver. • 0 = Disabled (default) • 1 = Enabled	Link reset
enable-npiv	NPIV support in the driver. • 0 = Disabled-remove all vports first • 1 = Enabled (requires SLI-3 and later)	Adapter reset
fct-queue-depth	Queue depth of target mode port. Possible values are 0–4096. When set to 0, it indicates that the maximum is determined by the type of HBA.	Reboot

Table 4-1 FC/FCoE Configuration File Parameters (Continued)

Parameter	Description	Activation
link-speed	Sets the link speed for initializing the FC connection. • 0 = auto-detect • 2 = 2 Gb/s • 4 = 4 Gb/s • 8 = 8 Gb/s • 16 =16 Gb/s	Link reset
linkup-delay	Sets the driver wait period (seconds) for a link up after adapter initialization. Possible values are 0–60. The default value is 10.	Adapter reset
log-errors	Verbose mask for driver error messages to the messages file. Possible values are 0x0000000–0xFFFFFFFF. The default value is 0xFFFFFFFF.	Dynamic
log-notices	Verbose mask for driver notice messages to the messages file. Possible values are 0x0000000–0xFFFFFFFF. The default value is 0xFFFFFFFF.	Dynamic
log-warnings	Verbose mask for driver warning messages to the messages file. Possible values are 0x0000000–0xFFFFFFFF. The default value is 0xFFFFFFFF.	Dynamic
max-xfer-size	This property is only used by the driver on i386 platforms. The driver does not limit transfer size on SPARC platforms. Sets the maximum SCSI transfer size in bytes per I/O. This property determines the scatter gather list buffer size. A pool of buffers is reallocated by the driver during boot. A larger transfer size requires a larger memory allocation. Possible values are 131072–1388544. The default value is 339968. • 131072–339968: small memory model range • 339969–688128: medium memory model range • 688129–1388544: medium memory model range	Reboot
network-on	IP networking support in the driver. • 0 = Disabled • 1 = Enabled (default)	Reboot
num-iocbs	The number of Input/Output Control Block (IOCB) buffers to allocate. Possible values are 128–10240. The default value is 1024.	Adapter reset
num-nodes	The number of remote FC nodes (N_Ports) the driver supports. Possible values are 0–4096. The default value is 0, which means no_limit.	Adapter reset
pci-max-read	Sets the PCI-X maximum memory read byte count. Possible values are 512, 1024, 2048,or 4096. The default value is 2048.	Adapter reset
pm-support	Power management support in the driver. • 0 = Disabled (default) • 1 = Enabled	Reboot
target-depth	Sets the remote FCP target queue depth. Possible values are 0–2048. The default value is 512. A value of 0=no_limit.	Link reset

Table 4-1 FC/FCoE Configuration File Parameters (Continued)

Parameter	Description	Activation
target-mode	**Note:** This property is applicable to Solaris 11 only. COMSTAR target mode support. • 0 = Disabled (default) • 1 = Enabled If target mode is enabled for a port, then the SFS initiator mode is disabled for that port.	Reboot
topology	Sets the topology. Set to point-to-point mode if you want to run as an N_Port. Set to loop mode if you want to run as an NL_Port. • 0 = loop, then point-to-point (default) • 2 = point-to-point only • 4 = loop only • 6 = point-to-point, then loop	Link reset
ub-bufs	Sets the number of unsolicited buffers the driver should allocate. Possible values are 40-16320. The default value is 1000.	Reboot
vport	**Note:** This property is applicable to Solaris 10 only. Virtual port registration table. The enable-npiv must be set to 1. The virtual port registration table may have any number of comma delimited entries. Each entry must be of the form: "PHYS_WWPN:VPORT_WWNN:VPORT_WWPN:VPORT_ID" Where: • PHYS_WWPN = World Wide Port Name of adapter's physical port • VPORT_WWNN = Desired World Wide Node Name of virtual port • VPORT_WWPN = Desired World Wide Port Name of virtual port • VPORT_ID = Desired virtual port ID (1 to maximum vports) For entries with the same PHYS_WWPN, VPORT_WWNN, and VPORT_WWPN, the VPORT_ID must start at 1, and increment by one sequentially, without gaps in the number sequence. The VPORT_ID=0 is reserved for the physical port. For example: vport= "10000000c9123456:28010000c9123456:20010000c9123456:1", "10000000c9123456:28020000c9123456:20020000c9123456:2", "10000000c9123457:28010000c9123457:20010000c9123457:1", "10000000c9123457:28020000c9123457:20020000c9123457:2", "10000000c9123457:28030000c9123457:20030000c9123457:3"; All entries are automatically created or removed by the OneCommand Manager application.	Link reset

Table 4-1 FC/FCoE Configuration File Parameters (Continued)

Parameter	Description	Activation
`vport-restrict-login`	Sets the virtual port's behavior when discovering targets in the SAN. • 1 = Prevents the VPort from logging into other initiator ports on the SAN. Also rejects logins from other ports in the SAN because it assumes that all ports that send a PLOGI are initiators. This is the default value. • 0 = The driver attempts to login to every port that it can access in the SAN and accept logins from all ports. **Note:** In a SAN that has other initiators, this parameter greatly reduces the driver's use of hardware resources.	Link reset

5. NIC Driver Configuration

In Solaris 10, the driver exports certain parameters that can be configured by editing the Emulex NIC out-of-box driver for Solaris configuration file (elxnic.conf). See "NIC Configuration File Parameters" on page 28, and Table 5-1, NIC Configuration File Parameters, on page 29.

In Solaris 11, while you can configure the driver using the elxnic.conf file, Emulex recommends using the dladm utility (available by default on Solaris 11 systems). For more information on using this Solaris NIC configuration utility, see the dladm(1M) man page.

Using the NIC Configuration File (elxnic.conf)

If the elxnic.conf file is not present, you can download it from the "Downloads" section of the Emulex website.

Changing Driver Parameters

The configurable driver parameters are described in Table 5-1, NIC Configuration File Parameters, on page 29.

To edit the elxnic.conf file:

1. Open the file in a text editor.
2. Change the parameters to the desired settings.
   - The syntax of single lines in the file:

     ```
     <variable> = <value>;
     ```

     For example:

     ```
     default_mtu = 9000;
     ```
   - Comment lines must start with a "#" character.
3. Save the file.
4. If the driver is already loaded, unload and reload it. Changes to the configuration file require you to unload and reload the driver. For more information, see "Installing and Uninstalling" on page 16.

NIC Configuration File Parameters

For the Solaris 10 driver, you can configure the elxnic driver parameters using either the elxnic.conf file (for driver parameters that are common to all the elxnic devices) or the ndd utility (for driver parameters that may need to be set with different values for different elxnic devices). For the Solaris 11 driver, use the dladm utility or the elxnic.conf file.

The following table lists the NIC configuration file parameters.

Table 5-1 NIC Configuration File Parameters

Parameter	Definition
`default_mtu`	Sets the default maximum transmission unit (MTU) for the driver. The possible values are 1500 and 9000. The default value is 1500.
`flow_control`	Sets the ethernet flow control. The possible values are: • 0 - Flow control disabled • 1 - Transmit only • 2 - Receive only • 3 - Both transmit and receive (default) Flow control cannot be disabled on NIC/FCoE UCNAs.
`fm_capability`	Sets the driver's device fault management capability to one of the values defined for Solaris fault management capability. The fm_capability value is a bitmap of one or more of these values: • 0x00000000 = DDI_FM_NOT_CAPABLE; A value of zero indicates that the fm_capability is disabled. • 0x00000001 = DDI_FM_EREPORT_CAPABLE • 0x00000002 = DDI_FM_ACCCHK_CAPABLE • 0x00000004 = DDI_FM_DMA_CHK_CAPABLE The default value is 0x00000007 (DDI_FM_ACCCHK_CAPABLE, DDI_FM_ACCCHK_CAPABLE, and DDI_FM_DMA_CHK_CAPABLE).
`log_level`	Sets the driver's verbosity for logs in /var/adm/messages. The log_level parameter is comprised of MOD_MASK (upper 16 bits) and SEVERITY (lower 16 bits). The MOD_MASK value is a bitmap of one or more of these values: • 0x10000 = MOD_CONFIG • 0x20000 = MOD_TX • 0x40000 = MOD_RX • 0x80000 = MOD_ISR The possible values for SEVERITY: • 0x0 = CE_CONT • 0x1 = CE_NOTE • 0x2 = CE_WARN • 0x3 = CE_PANIC • 0x4 = CE_IGNORE For details on MOD_MASK and SEVERITY, see "Setting MOD_MASK and SEVERITY" on page 70.
`max_tx_rings`	Sets the maximum number of transmit queues. The possible values are: • 1 for OCe11102 in legacy mode. • 1 to 8 for OCe11102 in advanced mode on Solaris 10. The default value is 8. • 1 to 16 for OCe11102 on Solaris 11. The default value is 8.
`rss_key_static`	Enables static RSS key generation. The possible values are 0 (disabled) or 1 (enabled). The default value is 0.

Table 5-1 NIC Configuration File Parameters (Continued)

Parameter	Definition
rx_bcopy_limit	Sets the receive buffer size threshold to use the copy mode. The possible values are any values that are less than or equal to the default_mtu value. The default value is 128. **Note:** On Solaris 11, consider changing this value to fine tune the receive performance.
rx_frag_size	Sets the size of the pre-allocated receive buffer. A higher value results in better resource utilization. The possible values are 2048, 4096, and 8192. The default value is 2048. **Note:** On Solaris 10, consider changing the value to 4096 or 8192 if the default_mtu value is 9000.
rx_max_bufs	Sets the maximum number of pre-allocated receive buffers. The possible values are 1024-8192. The default value is 2048. **Note:** On Solaris 10, consider increasing the rx_max_bufs value if the rx_drops_no_frags_q[x] increments continuously in the kstat output.
max_rings	Sets the maximum number of receive queues. Possible values are: • 1 to 5: OCe10102 and OCe11102; The default value is 5. • 1 to 16: OCe11102 native mode on Solaris 10; The default value is 8. • 1 to 16: OCe11102 native mode on Solaris 11; The default value is 8. The actual number of transmit and receive queues that are created depends on the number of vectors allocated. The actual number can be checked using the ndd(1m) command on Solaris 10 or the dladm(1M) command on Solaris 11. For more information, run “man ndd” on Solaris 10 or “man dladm” on Solaris 11. On non-IRM capable machines with FLEX10 or multi-adapter setup, some of the functions may fail to attach because of a lack of interrupts. See “Changing Interrupt Priorities” on page 33 for more information.
tx_bcopy_limit	Sets the transmit buffer size threshold to use the copy mode. The possible values are 128, 256, 512, 1024, and 2048. The default value is 512. **Note:** On Solaris 11, consider reducing this value if a “wqb pool empty” message is frequently observed. Consider increasing the value if a “wqm pool empty” message is frequently observed. For descriptions of these messages, see page 79 in Table 7-4, Log Messages for the NIC Driver for Solaris 11.
tx_intr_enable	Enables the handling of transmit completions in interrupt mode. The possible values are 0 (disabled) or 1 (enabled). The default value is 0. **Note:** Enable this parameter if you observe frequent frame loss. Also consider using this in conjunction with rx_max_bufs.

Configuring the NIC Interface

The NIC interface must be created before you can configure it. You can verify that the driver is loaded on the system and the NIC interface is created with one of the following commands:

```
dladm show-dev (Solaris 10 driver)
dladm show-phys (Solaris 11 driver)
```

Once you have determined that the NIC interface has been created, you can proceed to configure it.

To configure the NIC interface(s):

1. Plumb the interface:

   ```
   #ifconfig elxnic<X> plumb (Solaris 10 driver)
   #ifconfig net<X> plumb (Solaris 11 driver)
   ```

   Where "<X>" is the interface number.

   To see the interfaces created, run

   ```
   dladm show-link
   ```

   This command lists all the interfaces in the system.

2. Assign a static IP address:

   ```
   #ifconfig elxnic<X> <IP_Address> netmask <NetMask> up (Solaris 10 driver)
   #ifconfig net<X> <IP_Address> netmask <NetMask> up (Solaris 11 driver)
   ```

3. Edit the "/etc/hosts" file (a symlink to /etc/inet/hosts) and add the IP address and hostname that you wish to assign to the given NIC interface. See the hosts(4) man page for more information.
4. Edit the "/etc/inet/ipnodes" file and add an entry for the IP address and hostname for the given interface. The "/etc/inet/ipnodes" file is primarily for IPv6 only, but this step is necessary for the IP address change to take effect.
5. Edit the "/etc/netmasks" file and add an entry with the IP address and desired subnet mask for the given interface. See the netmasks(4) man page for more information.
6. Restart the network service. Run

   ```
   svcadm restart network/physical
   ```

   or reboot the system.

Removing the NIC Interface using elxnic

To remove the NIC interface:

1. Remove all the elxnic entries from "/etc/hosts".
2. Remove all the entries from "/etc/inet/ipnodes" that are related to elxnic interfaces.
3. Remove all the elxnic netmask entries from "/etc/netmasks".
4. Unplumb the interface, using the following command:

   ```
   ifconfig elxnic<X> down unplumb (Solaris 10 driver)
   ifconfig net<X> down unplumb(Solaris 11 driver)
   ```

   Where "<X>" is the interface number.

Alternatively, you can use the sys-unconfig(1M) utility for Solaris 10 or sysconfig(1M) utility for Solaris 11 to unconfigure a device. These utilities can delete the configurations of IP address, netmask, hostname, nfs mounts, ldap, and so on, on the host. The sys-unconfig(1M)/sysconfig(1M) utility reboots the system and clears the existing IP configuration, so you must enter all the information again, even for the

existing NICs already configured in the system. The sys-unconfig(1M)/sysconfig(1M) utility must be executed from a console. On reboot, you are presented with a set of user-interface-based data entry forms that facilitate the required change in configuration.

Multi-ring Mode and the Effect of ddi_msix_alloc_limit

Solaris 10

The elxnic driver is enabled to work in the multi-ring mode by default. To check the number of active transmit /receive (tx/rx) rings, type the following:

```
#ndd -get /dev/elxnic<X> rx_rings
#ndd -get /dev/elxnic<X> tx_rings
```

The variable "<X>" is the interface number of the elxnic driver.

The following table shows how the value of "ddi_msix_alloc_limit" affects receive traffic distribution across CPU cores for Solaris 10:

Table 5-2 Effect of "ddi_msix_alloc_limit" across CPU Cores for Solaris 10

NIC	Mode	APIC[a]	Value of ddi_msix_alloc_limit in /etc/system	CPU Cores Participating in RX Processing	Limiting Factor
OCe10102	N/A	xAPIC	Default	2	Solaris and APIC in platform
OCe10102	N/A	xAPIC	4	4	OCe10102
OCe10102	N/A	x2APIC	Default	4	OCe10102
OCe11102	Legacy	xAPIC	Default	2	Solaris and APIC in platform
OCe11102	Legacy	xAPIC	4	4	firmware and driver
OCe11102	Legacy	x2APIC	Default	4	firmware and driver
OCe11102	Advanced	xAPIC	Default	2	Solaris and APIC in platform
OCe11102	Advanced	xAPIC	8	8	firmware and driver
OCe11102	Advanced	x2APIC	Default	8	firmware and driver

a. APIC = advanced programmable interrupt controller

Solaris 11

Solaris 11 is multi-ring enabled by default. It creates eight transmit rings and eight receive rings on OCe11102 devices in advanced mode. To check the number of rx and tx rings, use "dladm show-phys -H". In Table 5-3, the number 8 in column 5 is applicable only if the number of rx rings is increased to the maximum (16).

Note: On non-IRM systems with multiple adapters, the "attach for few NIC functions" may fail because of lack of interrupt vectors allowed at the default

level. To solve the problem, use Table 5-3, Effect of "ddi_msix_alloc_limit" across CPU Cores for Solaris 11, on page 33.

The following table shows how the value of ddi_msix_alloc_limit affects receive traffic distribution across CPU cores for Solaris 11:

Table 5-3 Effect of "ddi_msix_alloc_limit" across CPU Cores for Solaris 11

NIC	Mode	APIC	Value of ddi_msix_alloc_limit in /etc/system	CPU cores participating in RX processing	Limiting Factor
OCe10102	N/A	xAPIC	Default	2	Solaris and APIC in platform
OCe10102	N/A	xAPIC	4	4	OCe10102
OCe10102	N/A	x2APIC	Default	4	OCe10102
OCe11102	Legacy	xAPIC	Default	2	Solaris and APIC in platform
OCe11102	Legacy	xAPIC	4	4	firmware and driver
OCe11102	Legacy	x2APIC	Default	4	firmware and driver
OCe11102	Advanced	xAPIC	Default	2	Solaris and APIC in platform
OCe11102	Advanced	xAPIC	8	8	firmware and driver
OCe11102	Advanced	x2APIC	Default	8	firmware and driver

Changing Interrupt Priorities

The Solaris operating system divides the available interrupts among multiple priority levels; each priority level has a maximum of 31 vectors. By default, each function has a maximum of two message signaled interrupts - extended (MSI-X) vectors. For example, with three OCe11102 adapters in FLEX10 mode, there are 24 functions, and the driver needs at least two vectors per function for a total of 48 vectors. If the MSI-X allocation fails, the driver reverts to the PCIe legacy interrupts (INTx) allocation, which results in suboptimal performance. Normally, the network drivers allocate vectors at level 6, but the requirement of 48 vectors is beyond the limit of 31, which causes issues. A solution is to assign level 6 to 12 functions and level 5 to the remaining functions so that all functions can get two MSI-X vectors for optimum performance. It is not uncommon to assign level 5 or 6 on Solaris under these conditions.

The following example shows how the interrupt-priority for a PCI function can be configured to a level 5:

1. Type

```
#  grep elxnic /etc/path_to_inst
"/pci@0,0/pci8086,340d@6/pci10df,e743@0" 0 "elxnic"
"/pci@0,0/pci8086,340d@6/pci10df,e743@0,1" 1 "elxnic"
"/pci@0,0/pci8086,3410@9/pci10df,e742@0" 2 "elxnic"
"/pci@0,0/pci8086,3410@9/pci10df,e742@0,1" 3 "elxnic"
```

```
#  grep elxnic /etc/driver_aliases
elxnic "pciex19a2,710"
```

Note: In the previous example, "/pci@n,n/pcinnnn,nnnd@n" represents the parent of the PCI function, the unit number follows the last "@ "symbol, and "pciexnnan,nnn" indicates the device name.

2. Add the following entry to /kernel/drv/elxnic.conf:

```
name= "pciex19a2,710"  parent = "/pci@0,0/pci8086,3410@9"
unit-address = "0" interrupt-priorities = 5;
```

Note: The path and unit number may vary on your system.

3. Reboot the system.

Interrupt priorities can be examined using the mdb command. For example:

```
# echo "::interrupts "| mdb -k | grep oce
```

The third column shows the interrupt priority level of the vector in the following output:

```
IRQ  Vect IPL Bus   Trg Type   CPU   Share  APIC/INT#  ISR(s)
64   0x42 5         Edg MSI-X  3     1      -          oce_isr
65   0x43 5         Edg MSI-X  0     1      -          oce_isr
```

Using the dladm Utility for Solaris 11

Configuring the NIC Interface Using dladm

To configure the interface on Solaris 11:

Use the dladm utility to configure the NIC interface and also perform a runtime update of the following driver parameter:

For example, to change the MTU in Solaris 11, unplumb the interface and run

```
$> dladm set-linkprop -p mtu=9000 <interface>
```

where "<interface>" is net<0,1,2…>.

To see the plumbed interfaces, run

```
$> ifconfig -a.
```

Tunable Parameters

Tunable parameters can be changed during runtime. On Solaris 10, the ndd command can be used to change the value of tunable parameters. On Solaris 11, these values can be changed using the dladm command. The parameters on Solaris 11 are named differently. They include a prefix of "_" to each of the parameter names. Through the dladm utility, the following tunable parameters are provided by the driver along with their usage:

log_level

```
$> dladm set-linkprop -p _log_level=<value> <interface>
```

Note: See "Setting MOD_MASK and SEVERITY" on page 70 for log_level values.

rx_bcopy_limit

```
$> dladm set-linkprop -p _rx_bcopy_limit=<value in bytes>
<interface>
```

tx_bcopy_limit

```
$> dladm set-linkprop -p _tx_bcopy_limit=<value in bytes>
<interface>
```

tx_ring_size

```
$> dladm set-linkprop -p _tx_ring_size=<values between 256 and 2048>
<interface>
```

-or-

```
$> dladm set-linkprop -p _tx_ring_size=<values less than
tx_ring_size> '<interface>
```

Private (or Unlisted) Parameters

Private (or unlisted) parameters can be set during driver attach through dladm utility and also the elxnic.conf file.

To see the value of private driver parameters using the dladm utility:

```
$> dladm show-linkprop -p <property name> <interface>
```

The driver provides the following private parameters:

- log_level
- rx_bcopy_limit
- rx_ring_size
- rx_rings
- rx_rings_per_group
- tx_bcopy_limit
- tx_reclaim_threshold
- tx_ring_size
- tx_rings_fw_version (read only)
- fw_version

Creating a Virtual NIC Using dladm

To create a virtual NIC (vNIC), use the dladm utility with the create-vnic option. For example:

```
$ dladm create-vnic -l  net0  vnic1
```

Once a vNIC is created, it can be assigned to a zone using the zonecfg utility. For example:

```
$ zonecfg -z zone1
zonecfg:zone1: No such zone configured
zonecfg:zone1> create
zonecfg:zone1> set zonepath=/export/zone1
zonecfg:zone1> create
zonecfg:zone1> add net
zonecfg:zone1> set physical=vnic1
zonecfg:zone1> set address=192.168.1.100
zonecfg:zone1> verify
zonecfg:zone1> commit
```

Up to 63 VLANs can be used with each universal multichannel (UMC) virtual channel. For information on configuring UMC, refer to the *Emulex Universal Multichannel Reference Guide*.

Considerations:

- UMC can be configured using the OCM application CLI. For more information, refer to the *OneCommand Manager Command Line Interface User Manual*.
- You cannot run Link Aggregation Control Protocol (LACP) when UMC is enabled.
- Using UMC in a hypervisor environment is not advised if the UMC interface is going to be part of the hypervisor virtual switch. This configuration may cause performance issues.

SR-IOV Configuration

Introduction

The S11 elxnic driver supports SR-IOV on a SPARC platform. The elxnic driver can also be used in the hypervisor (PF) driver and the guest (VF driver) domain. The S10 IOV driver is only supported in the guest domain (VF driver). Refer to the ldm man page for details on creating and using the logical domains.

Creating a VF on the elxnic Interface

1. Obtain the device path of elxnic instances by typing "/etc/path_to_inst file".

   For example:

   ```
   # cat /etc/path_to_inst | grep elxnic
   "/pci@400/pci@1/pci@0/pci@0/oce@0" 132 "elxnic"
   "/pci@400/pci@1/pci@0/pci@0/oce@0,1" 133 "elxnic"
   ```

2. List the Emulex IOV supported device <bus|device|fn> name by typing

   ```
   #ldm list-io -l
   ```

The following information will be returned:

```
/SYS/MB/RISER1/PCIE4/IOVNET.PF0           PF     -
[pci@400/pci@1/pci@0/pci@0/oce@0]
    maxvfs = 64
/SYS/MB/RISER1/PCIE4/IOVNET.PF1           PF     -
[pci@400/pci@1/pci@0/pci@0/ oce@0,1]
    maxvfs = 64
If maxvfs=0 is displayed, either the Emulex CNA does not support
SR-IOV, or SR-IOV is not enabled.
```

3. To create a VF, use the PF <Bus|device|fn> path that corresponds to the elxnic function:

   ```
   ldm create-vf  <pf_name>
   ```

   For example:

   ```
   ldm create-vf /SYS/MB/RISER1/PCIE4/IOVNET.PF1
   ```

Note: Refer to the ldm man page to set the VF properties. After creation of the VF, the system may prompt for a reboot; if that occurs, create the required number of VFs and then reboot.

4. Add the new VF(s) to the logical domain by typing

   ```
   ldm add-io <bus|device|vf> <ldom>
   ```

   For example:

   ```
   ldm add-io /SYS/MB/RISER1/PCIE4/IOVNET.PF0.VF1 ldom_name
   ```

6. FC/FCoE Driver Console and Log Messages

This section describes the situations, console messages, and log messages you may see from the FC/FCoE driver.

General Situations

FC Link Fails to Come Up on 8 Gb/s or 16 Gb/s Adapter

An FC link may fail to come up if the adapter attempts to connect to a device running at a speed that the adapter does not support.

- For an 8 Gb/s adapter or a 16 Gb/s adapter using 8 Gb/s optics, verify it is not attempting to connect to a 1 Gb/s device. Only 2 Gb/s, 4 Gb/s and 8 Gb/s devices are supported on these adapters.
- For a 16 Gb/s adapter using 16 Gb/s optics, verify it is not attempting to connect to a 1 Gb/s device or 2 Gb/s device. Only 4 Gb/s, 8 Gb/s, and 16 Gb/s devices are supported on this adapter.

Setting Notices, Warning, and Error Logging Levels

Table 6-1 lists the types of notices, warnings and error logging levels you may set using the appropriate FC/FCoE driver parameters.

Table 6-1 Setting Types of Console and Log Messages for the FC/FCoE Driver

elxfc Parameter	Description	lpfc Parameter
console-notices	Verbose mask for driver error messages to the console. Possible values are 0x0000000-0xFFFFFFFF. The default value is 0x0000000	log-only: when set to 0, log messages are logged to the system log file and also printed on the console. Default = Disabled
console-warnings	Verbose mask for driver notice messages to the console. Possible values are 0x0000000-0xFFFFFFFF. The default value is 0x0000000	
console-errors	Verbose mask for driver warning messages to the console. Possible values are 0x0000000-0xFFFFFFFF. The default value is 0x0000000	
log-notices	Verbose mask for driver error messages to the messages file. Possible values are 0x0000000-0xFFFFFFFF. The default value is 0xFFFFFFFF.	log-verbose: when set to non-zero, verbose messages are generated. Default = Disabled
log-warnings	Verbose mask for driver notice messages to the messages file. Possible values are 0x0000000-0xFFFFFFFF. The default value is 0xFFFFFFFF.	
log-errors	Verbose mask for driver warning messages to the messages file. Possible values are 0x0000000-0xFFFFFFFF. The default value is 0xFFFFFFFF.	

Log Message Overview

Types of Log Messages Logged in the System File

Log messages are logged to the /var/adm/messages system file. Table 6-2 lists the types of log messages that can be logged to the system file.

Table 6-2 Log Message Types for the FC/FCoE Driver

Verbose Bit	Log Message Verbose Mask	Verbose Description	Pages
0x00000001	LOG_MISC	Miscellaneous events	41–42
0x00000002	LOG_DRIVER	Driver attach and detach events	42–44
0x00000004	LOG_INIT	HBA initialization events	44–45
0x00000008	LOG_MEM	Memory management events	46–47
0x00000010	LOG_SLI	Service Level Interface (SLI) events	47–51
0x00000020	LOG_MBOX	Mailbox events	51–52
0x00000040	LOG_NODE	Node events	53–54
0x00000080	LOG_LINK	Link events	54–55
0x00000100	LOG_ELS	ELS events	55–57
0x00000200	LOG_PKT	General I/O packet events	57–59
0x00000400	LOG_FCP	FCP traffic events	59
0x00000800	LOG_FCT	FCP target mode events	60-60
0x00001000	LOG_IP	IP traffic events	61–62
0x00002000	LOG_SFS	Solaris SFS events	62–63
0x00004000	LOG_IOCTL	IOCTL events	64–64
0x00008000	LOG_FIRMWARE	Firmware download events	65–66
0x00010000	LOG_CT	Common transport events	67–68
0x00020000	LOG_FCSP	Fibre Channel Security Protocol (FCSP) events	68–70
0x00040000	LOG_FCF	Fibre Channel Fabric (FCF) events	70–71
0x007C0000	LOG_RESERVED	Reserved	-
0x00800000	LOG_FCT_DETAIL	Detailed FCT events	60
0x01000000	LOG_FCSP_DETAIL	Detailed FCSP events	69
0x02000000	LOG_NODE_DETAIL	Detailed node events	53, 53
0x04000000	LOG_IOCTL_DETAIL	Detailed IOCTL events	64, 64
0x08000000	LOG_IP_DETAIL	Detailed IP events	61
0x10000000	LOG_FIRMWARE_DETAIL	Detailed Firmware events	65
0x20000000	LOG_SFS_DETAIL	Detailed Solaris SFS events	62

Table 6-2 Log Message Types for the FC/FCoE Driver (Continued)

Verbose Bit	Log Message Verbose Mask	Verbose Description	Pages
0x40000000	LOG_MBOX_DETAIL	Detailed Mailbox events	52
0x80000000	LOG_SLI_DETAIL	Detailed HBA SLI events	51
0XFFFFFFFF	LOG_ALL_MSG	All logging on all events	-

Log Message Severity Levels

Table 6-3 lists the severity type of the FC/FCoE driver log message in the order of severity.

Table 6-3 Severity Levels of FC/FCoE Driver Log Messages

Severity Level	Description
DEBUG (Informational)	Message provides engineering debugging information.
NOTICE (Informational)	Message provides general purpose information.
WARNING	Message provides a general purpose warning.
ERROR	Message indicates that a driver error has occurred.
PANIC (Severe)	Message indicates that the driver has forced a system panic to occur.

Log Message Example

The following is an example of a log message on the system console.

```
[5.0336]elxfc0: NOTICE: 720: Link up. (8Gb, fabric)
```

The following is an example of the same message in the system message log (/var/adm/messages) file.

```
Jan 19 14:45:36 sunv240 elxfc: [ID 349649 kern.info] [5.0336]elxfc0:
NOTICE: 720: Link up. (8Gb, fabric)
```

In the above system log message:

- `Jan 19 14:45:36` – the date and time when the error or event occurred.
- `sunv240` – the name of the host machine.
- `elxfc:` – the module where the message originates. In this case, “elxfc” means that it is from Emulex SFS FCA out-of-box driver.
- `[ID 349649 kern.info]` – a Solaris-specific message ID and kernel message level. This changes from one driver message to another.
- `[5.0336]` – the driver message context tag. This may change from one driver version to another.
- `elxfc0:` – the module/instance where the message originates. In this case, “elxfc0” means that it is from Emulex SFS FCA out-of-box driver, instance of “0”. This changes from one driver instance to another.

- `NOTICE:` – identifies the driver message severity level. This may change from one driver version to another. For other severity information, see Table 6-3, Severity Levels of FC/FCoE Driver Log Messages, on page 40.
- `720:` – identifies the driver message identification number. This number does change from one driver version to another.
- `Link up.` – identifies the actual error or event message. This message does not change from one driver version to another.
- `(8 Gb/s, fabric)` – identifies additional information specific to the error or event message. This information is normally intended for technical support. This may change from one driver version to another.

Log Messages for the FC/FCoE Driver

Miscellaneous Events (Message IDs: 0001-0099)

0001 DEBUG:

```
VERBOSE_MASK: LOG_MISC (0x00000001)
DESCRIPTION: This is a general purpose informational message.
SEVERITY LEVEL: Debug
MESSAGE: None
ACTION: No action needed, informational.
```

0002 NOTICE:

```
VERBOSE_MASK: LOG_MISC (0x00000001)
DESCRIPTION: This is a general purpose informational message.
SEVERITY LEVEL: Notice
MESSAGE: None
ACTION: No action needed, informational.
```

0003 WARNING:

```
VERBOSE_MASK: LOG_MISC (0x00000001)
DESCRIPTION: This is a general purpose warning message.
SEVERITY LEVEL: Warning
MESSAGE: None
ACTION: No action needed, informational.
```

0004 ERROR:

```
VERBOSE_MASK: LOG_MISC (0x00000001)
DESCRIPTION: This is a general purpose error message.
SEVERITY LEVEL: Error
MESSAGE: None
ACTION: No action needed, informational.
```

0005 PANIC:

VERBOSE_MASK: LOG_MISC (0x00000001)

DESCRIPTION: This is a general purpose panic message.

SEVERITY LEVEL: Panic (Severe)

MESSAGE: None

ACTION: Contact your customer service representative.

0010 DEBUG: Event.

VERBOSE_MASK: LOG_MISC (0x00000001)

DESCRIPTION: This is debug information about a driver event.

SEVERITY LEVEL: Debug

MESSAGE: Event.

ACTION: No action needed, informational.

0011 DEBUG: Event queued.

VERBOSE_MASK: LOG_MISC (0x00000001)

DESCRIPTION: This indicates that a driver event is being queued.

SEVERITY LEVEL: Debug

MESSAGE: Event queued.

ACTION: No action needed, informational.

0012 DEBUG: Event dequeued.

VERBOSE_MASK: LOG_MISC (0x00000001)

DESCRIPTION: This indicates that a driver event is being dequeued.

SEVERITY LEVEL: Debug

MESSAGE: Event dequeued.

ACTION: No action needed, informational.

Driver Events (Message IDs: 0100-0199)

0100 NOTICE: Driver attach.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver is performing an attach operation.

SEVERITY LEVEL: Notice

MESSAGE: Driver attach.

ACTION: No action needed, informational.

0101 ERROR: Driver attach failed.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver was unable to attach due to some issue.

SEVERITY LEVEL: Error

MESSAGE: Driver attach failed.

ACTION: Check your hardware and software configuration. If the problem persists, report this error to your customer service representative.

0102 DEBUG: Driver attach.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver is performing a attach operation.

SEVERITY LEVEL: Debug

MESSAGE: Driver attach.

ACTION: No action needed, informational.

0110 NOTICE: Driver detach.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver is performing a detach operation.

SEVERITY LEVEL: Notice

MESSAGE: Driver detach.

ACTION: No action needed, informational.

0111 ERROR: Driver detach failed.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver was unable to detach due to some issue.

SEVERITY LEVEL: Error

MESSAGE: Driver detach failed.

ACTION: Check your hardware and software configuration. If the problem persists, report this error to your customer service representative.

0112 DEBUG: Driver detach.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver is performing a detach operation.

SEVERITY LEVEL: Debug

MESSAGE: Driver detach.

ACTION: No action needed, informational.

0120 DEBUG: Driver suspend.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver is performing a suspend operation.

SEVERITY LEVEL: Debug

MESSAGE: Driver suspend.

ACTION: No action needed, informational.

0121 ERROR: Driver suspend failed.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver was unable to suspend due to some issue.

SEVERITY LEVEL: Error

MESSAGE: Driver suspend failed.

ACTION: Check your hardware and software configuration. If the problem persists, report this error to your customer service representative.

0130 DEBUG: Driver resume.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver is performing a resume operation.

SEVERITY LEVEL: Debug

MESSAGE: Driver resume.

ACTION: No action needed, informational.

0131 ERROR: Driver resume failed.

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This indicates that the driver was unable to resume due to some issue.

SEVERITY LEVEL: Error

MESSAGE: Driver resume failed.

ACTION: Check your hardware and software configuration. If the problem persists, report this error to your customer service representative.

HBA Initialization Events (Message IDs: 0200-0299)

0200 NOTICE: Adapter initialization.

VERBOSE_MASK: LOG_INIT (0x00000004)

DESCRIPTION: This indicates that the adapter is initializing.

SEVERITY LEVEL: Notice

MESSAGE: Adapter initialization.

ACTION: No action needed, informational.

0201 ERROR: Adapter initialization failed.

VERBOSE_MASK: LOG_INIT (0x00000004)

DESCRIPTION: This indicates that an attempt to initialize the adapter has failed.

SEVERITY LEVEL: Error

MESSAGE: Adapter initialization failed.

ACTION: Check your hardware configuration. If the problem persists, report this error to your customer service representative.

0202 DEBUG: Adapter initialization.

VERBOSE_MASK: LOG_INIT (0x00000004)

DESCRIPTION: This indicates that the adapter is initializing.

SEVERITY LEVEL: Debug

MESSAGE: Adapter initialization.

ACTION: No action needed, informational.

0210 DEBUG: Adapter transition.

VERBOSE_MASK: LOG_INIT (0x00000004)

DESCRIPTION: This indicates that the adapter is changing states.

SEVERITY LEVEL: Debug

MESSAGE: Adapter transition.

ACTION: No action needed, informational.

0220 DEBUG: Adapter online.

VERBOSE_MASK: LOG_INIT (0x00000004)

DESCRIPTION: This indicates that the adapter is online and ready to communicate.

SEVERITY LEVEL: Debug

MESSAGE: Adapter online.

ACTION: No action needed, informational.

0230 DEBUG: Adapter offline.

VERBOSE_MASK: LOG_INIT (0x00000004)

DESCRIPTION: This indicates that the adapter is offline and unable to communicate.

SEVERITY LEVEL: Debug

MESSAGE: Adapter offline.

ACTION: No action needed, informational.

0231 WARNING: Adapter shutdown.

VERBOSE_MASK: LOG_INIT (0x00000004)

DESCRIPTION: This indicates that the adapter has been shutdown and will require a reboot to reinitialize.

SEVERITY LEVEL: Warning

MESSAGE: Adapter shutdown.

ACTION: Contact your customer service representative.

0240 ERROR: Adapter reset failed.

VERBOSE_MASK: LOG_INIT (0x00000004)

DESCRIPTION: This indicates that an attempt to reset the adapter has failed.

SEVERITY LEVEL: Error

MESSAGE: Adapter reset failed.

ACTION: Check your hardware configuration. If the problem persists, report this error to your customer service representative.

Memory Management Events (Message IDs: 0300-0399)

0300 DEBUG: Memory alloc.

VERBOSE_MASK: LOG_MEM (0x00000008)

DESCRIPTION: This indicates that the driver allocated system memory.

SEVERITY LEVEL: Debug

MESSAGE: Memory alloc.

ACTION: No action needed, informational.

0301 ERROR: Memory alloc failed.

VERBOSE_MASK: LOG_MEM (0x00000008)

DESCRIPTION: This indicates that the driver was unable to allocate system memory. The system is low on memory resources.

SEVERITY LEVEL: Error

MESSAGE: Memory alloc failed.

ACTION: No action needed, informational. However, if the problem persists, report this error to your system administrator.

0310 ERROR: Memory pool error.

VERBOSE_MASK: LOG_MEM (0x00000008)

DESCRIPTION: This indicates that a problem has occurred with the memory buffer pool management.

SEVERITY LEVEL: Error

MESSAGE: Memory pool error.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

0311 DEBUG: Memory pool alloc failed.

VERBOSE_MASK: LOG_MEM (0x00000008)

DESCRIPTION: This indicates that the driver was unable to allocate memory from one of its own memory pools.

SEVERITY LEVEL: Debug

MESSAGE: Memory pool alloc failed.

ACTION: If the problem occurs frequently you may be able to configure more resources for that pool. If this does not solve the problem, report these errors to customer service.

0312 DEBUG: Memory pool detail.

VERBOSE_MASK: LOG_MEM (0x00000008)

DESCRIPTION: This provides detailed information about memory bufferpool management.

SEVERITY LEVEL: Debug

MESSAGE: Memory pool detail.

ACTION: No action needed, informational.

0320 NOTICE: No unsolicited buffer available.

VERBOSE_MASK: LOG_MEM (0x00000008)

DESCRIPTION: This indicates that the driver's unsolicited buffer pool is exhausted. The I/O will be dropped and most likely retried by the remote device.

SEVERITY LEVEL: Notice

MESSAGE: No unsolicited buffer available.

ACTION: If the problem occurs frequently you may be able to configure more resources for that pool. If this does not solve the problem, report these errors to customer service.

0330 ERROR: Invalid access handle.

VERBOSE_MASK: LOG_MEM (0x00000008)

DESCRIPTION: This indicates that the driver had an invalid access handle assigned by the system.

SEVERITY LEVEL: Error

MESSAGE: Invalid access handle.

ACTION: If the problem occurs frequently, report these errors to customer service.

0331 ERROR: Invalid DMA handle.

VERBOSE_MASK: LOG_MEM (0x00000008)

DESCRIPTION: This indicates that the driver had an invalid dma handle assigned by the system.

SEVERITY LEVEL: Error

MESSAGE: Invalid DMA handle.

ACTION: If the problem occurs frequently, report these errors to customer service.

Service Level Interface Events (Message IDs: 0400-0499)

0400 DEBUG: Vital Product Data.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This provides vendor specific information about the adapter.

SEVERITY LEVEL: Debug

MESSAGE: Vital Product Data.

ACTION: No action needed, informational.

0410 DEBUG: Link atten.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that the adapter has triggered a link attention interrupt.

SEVERITY LEVEL: Debug

MESSAGE: Link atten.

ACTION: No action needed, informational.

0411 DEBUG: State change.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that the adapter has changed state.

SEVERITY LEVEL: Debug

MESSAGE: State change.

ACTION: No action needed, informational.

0412 DEBUG: Link Up atten.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that the adapter has triggered a link up attention interrupt.

SEVERITY LEVEL: Debug

MESSAGE: Link Up atten.

ACTION: No action needed, informational.

0413 DEBUG: Link Down atten.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that the adapter has triggered a link down attention interrupt.

SEVERITY LEVEL: Debug

MESSAGE: Link Down atten.

ACTION: No action needed, informational.

0420 ERROR: Adapter hardware error.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that an interrupt has occurred and the status register indicates a nonrecoverable hardware error.

SEVERITY LEVEL: Error

MESSAGE: Adapter hardware error.

ACTION: This error usually indicates a hardware problem with the adapter. Try running adapter diagnostics. Report these errors to customer service.

0421 NOTICE: Adapter temperature.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that the adapter has provided general information about the adapter's temperature.

SEVERITY LEVEL: Notice

MESSAGE: Adapter temperature.

ACTION: No action needed, informational.

0422 WARNING: Adapter temperature.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that the adapter's temperature is too hot.

SEVERITY LEVEL: Warning

MESSAGE: Adapter temperature.

ACTION: Check hardware ventilation. Reduce adapter usage. Shutdown host system.

0423 NOTICE: Adapter notice.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that the adapter has provided general information about the adapter's condition.

SEVERITY LEVEL: Notice

MESSAGE: Adapter notice.

ACTION: No action needed, informational.

0424 WARNING: Adapter warning.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that an interrupt has occurred indicating a recoverable adapter error.

SEVERITY LEVEL: Warning

MESSAGE: Adapter warning.

ACTION: This error usually indicates a hardware or firmware problem with the adapter. Check and/or update firmware levels. Report these errors to customer service.

0425 ERROR: Adapter error.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that a recoverable adapter error has occurred.

SEVERITY LEVEL: Error

MESSAGE: Adapter error.

ACTION: This error usually indicates a hardware or firmware problem with the adapter. Check and/or update firmware levels. Report these errors to customer service.

0426 NOTICE: Adapter Async Status.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that the adapter has provided general information about the adapter's async status.

SEVERITY LEVEL: Notice

MESSAGE: Adapter Async Status.

ACTION: No action needed, informational.

0430 DEBUG: Ring event.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that an SLI ring event has occurred.

SEVERITY LEVEL: Debug

MESSAGE: Ring event.

ACTION: No action needed, informational.

0431 DEBUG: Ring error.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that an SLI ring error is being reported by the adapter.

SEVERITY LEVEL: Debug

MESSAGE: Ring error.

ACTION: No action needed, informational.

0432 DEBUG: Ring reset.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that an SLI ring is being reset.

SEVERITY LEVEL: Debug

MESSAGE: Ring reset.

ACTION: No action needed, informational.

0440 DEBUG: Adapter msg.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that a message was sent to the driver from the adapter.

SEVERITY LEVEL: Debug

MESSAGE: Adapter msg.

ACTION: No action needed, informational.

0450 ERROR: IOCB invalid.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that an IOCB was received from the adapter with an illegal value. This error could indicate a driver or firmware problem.

SEVERITY LEVEL: Error

MESSAGE: IOCB invalid.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

0451 DEBUG: IOCB queue full.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that the IOCB queue is full. This will occur during normal operation.

SEVERITY LEVEL: Debug

MESSAGE: IOCB queue full.

ACTION: No action needed, informational.

0452 DEBUG: IOCB event.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that an IOCB local error event is being reported by the adapter.

SEVERITY LEVEL: Debug

MESSAGE: IOCB event.

ACTION: No action needed, informational.

0453 DEBUG: IOCB stale.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This indicates that an IOCB completed after its associated packet completed.

SEVERITY LEVEL: Debug

MESSAGE: IOCB stale.

ACTION: No action needed, informational.

0460 DEBUG: SLI.

VERBOSE_MASK: LOG_SLI_DETAIL (0x80000000)

DESCRIPTION: This provides detailed information about an SLI event.

SEVERITY LEVEL: Debug

MESSAGE: SLI detail.

ACTION: No action needed, informational.

0461 ERROR: SLI ERROR.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This error provides information about an SLI event.

SEVERITY LEVEL: Error

MESSAGE: SLI ERROR.

ACTION: No action needed, informational.

0462 DEBUG: SLI DEBUG.

VERBOSE_MASK: LOG_SLI (0x00000010)

DESCRIPTION: This provides debug information about an SLI event.

SEVERITY LEVEL: Debug

MESSAGE: SLI DEBUG.

ACTION: No action needed, informational.

Mailbox Events (Message IDs: 0500-0599)

0500 DEBUG: Mailbox event.

VERBOSE_MASK: LOG_MBOX (0x00000020)

DESCRIPTION: This indicates that a mailbox event has occurred.

SEVERITY LEVEL: Debug

MESSAGE: Mailbox event.

ACTION: No action needed, informational.

0501 DEBUG: Mailbox detail.

VERBOSE_MASK: LOG_MBOX_DETAIL (0x40000000)

DESCRIPTION: This provides detailed information about a mailbox event.

SEVERITY LEVEL: Debug

MESSAGE: Mailbox detail.

ACTION: No action needed, informational.

0510 DEBUG: Stray mailbox interrupt.

VERBOSE_MASK: LOG_MBOX (0x00000020)

DESCRIPTION: This indicates that a mailbox command completion interrupt was received and the mailbox is not valid. This error could indicate a driver or firmware problem.

SEVERITY LEVEL: Debug

MESSAGE: Stray mailbox interrupt.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

0520 DEBUG: Mailbox error.

VERBOSE_MASK: LOG_MBOX (0x00000020)

DESCRIPTION: This indicates that an unsupported or illegal mailbox command was completed. This error could indicate a driver or firmware problem.

SEVERITY LEVEL: Debug

MESSAGE: Mailbox error.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

0530 ERROR: Mailbox timeout.

VERBOSE_MASK: LOG_MBOX (0x00000020)

DESCRIPTION: The firmware did not response a mailbox command. This error could indicate a hardware or firmware problem.

SEVERITY LEVEL: Error

MESSAGE: Mailbox timeout.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

Node Events (Message IDs: 0600-0699)

0600 DEBUG: Node create.

VERBOSE_MASK: LOG_NODE (0x00000040)

DESCRIPTION: This indicates that a node has been created for a remote device.

SEVERITY LEVEL: Debug

MESSAGE: Node create.

ACTION: No action needed, informational.

0601 DEBUG: Node opened.

VERBOSE_MASK: LOG_NODE_DETAIL (0x02000000)

DESCRIPTION: This indicates that a node has been opened for I/O transport.

SEVERITY LEVEL: Debug

MESSAGE: Node opened.

ACTION: No action needed, informational.

0602 NOTICE: Node create failed.

VERBOSE_MASK: LOG_NODE (0x00000040)

DESCRIPTION: This indicates that a node create request for a remote device has failed.

SEVERITY LEVEL: Notice

MESSAGE: Node create failed.

ACTION: No action needed, informational.

0603 DEBUG: Node updated.

VERBOSE_MASK: LOG_NODE (0x00000040)

DESCRIPTION: This indicates that a node has been updated for a remote device.

SEVERITY LEVEL: Debug

MESSAGE: Node updated.

ACTION: No action needed, informational.

0610 DEBUG: Node destroy.

VERBOSE_MASK: LOG_NODE (0x00000040)

DESCRIPTION: This indicates that a node has been destroyed for a remote device.

SEVERITY LEVEL: Debug

MESSAGE: Node destroy.

ACTION: No action needed, informational.

0611 DEBUG: Node closed.

VERBOSE_MASK: LOG_NODE_DETAIL (0x02000000)

DESCRIPTION: This indicates that a node has been temporarily closed for I/O transport.

SEVERITY LEVEL: Debug

MESSAGE: Node closed.

ACTION: No action needed, informational.

0612 NOTICE: Node missing.

VERBOSE_MASK: LOG_NODE (0x00000040)

DESCRIPTION: This indicates that a FCP2 device node has been found missing.

SEVERITY LEVEL: Notice

MESSAGE: Node missing.

ACTION: No action needed, informational.

0620 DEBUG: Node not found.

VERBOSE_MASK: LOG_NODE (0x00000040)

DESCRIPTION: This indicates that there was an attempt to send an I/O pkt to an unknown device node. The driver maintains a node table entry for every device it needs to communicate with on the FC network.

SEVERITY LEVEL: Debug

MESSAGE: Node not found.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

0621 DEBUG: Node timeout.

VERBOSE_MASK: LOG_NODE (0x00000040)

DESCRIPTION: This indicates that the node timer expired; the node is ready to be opened, or it has been offline too long and needs to be flushed.

SEVERITY LEVEL: Debug

MESSAGE: Node timeout.

ACTION: No action needed, informational.

Link Events (Message IDs: 0700-0799)

0700 DEBUG: Link event.

VERBOSE_MASK: LOG_SLI (0x00000010) or LOG_LINK (0x00000080)

DESCRIPTION: This indicates that a link event has occurred.

SEVERITY LEVEL: Debug

MESSAGE: Link event.

ACTION: No action needed, informational.

0710 NOTICE: Link down.

VERBOSE_MASK: LOG_LINK (0x00000080)

DESCRIPTION: This indicates that the Fibre Channel link is down to the adapter.

SEVERITY LEVEL: Notice

MESSAGE: Link down.

ACTION: Check your network connections. If the problem persists, report this error to your system administrator.

0720 NOTICE: Link up.

VERBOSE_MASK: LOG_LINK (0x00000080)

DESCRIPTION: This indicates that the Fibre Channel link is up.

SEVERITY LEVEL: Notice

MESSAGE: Link up.

ACTION: No action needed, informational.

0721 NOTICE: NPIV Link up.

VERBOSE_MASK: LOG_LINK (0x00000080)

DESCRIPTION: This indicates that the Fibre Channel link is up for all virtual ports.

SEVERITY LEVEL: Notice

MESSAGE: NPIV Link up.

ACTION: No action needed, informational.

0730 NOTICE: Link reset.

VERBOSE_MASK: LOG_LINK (0x00000080) or LOG_SFS (0x00002000)

DESCRIPTION: This indicates that an issue has forced the Fibre Channel link to be reset.

SEVERITY LEVEL: Notice

MESSAGE: Link reset.

ACTION: No action needed, informational.

0731 ERROR: Link reset failed.

VERBOSE_MASK: LOG_LINK (0x00000080) or LOG_SFS (0x00002000)

DESCRIPTION: This indicates that an attempt to reset the Fibre Channel link has failed.

SEVERITY LEVEL: Error

MESSAGE: Link reset failed.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

ELS Events (Message IDs: 0800-0899)

0800 DEBUG: ELS sent.

VERBOSE_MASK: LOG_ELS (0x00000100)

DESCRIPTION: This indicates that an ELS command is being sent.

SEVERITY LEVEL: Debug

MESSAGE: ELS sent.

ACTION: No action needed, informational.

0801 DEBUG: ELS comp.

VERBOSE_MASK: LOG_ELS (0x00000100)

DESCRIPTION: This indicates that an ELS command completed normally.

SEVERITY LEVEL: Debug

MESSAGE: ELS comp.

ACTION: No action needed, informational.

0810 ERROR: Stray ELS completion.

VERBOSE_MASK: LOG_ELS (0x00000100)

DESCRIPTION: This indicates that an ELS command completion was received without issuing a corresponding ELS command. This error could indicate a driver or firmware problem.

SEVERITY LEVEL: Error

MESSAGE: Stray ELS completion.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

0811 DEBUG: Abnormal ELS completion.

VERBOSE_MASK: LOG_ELS (0x00000100)

DESCRIPTION: This indicates that an ELS command completed with a status error in the IOCB. It could mean the Fibre Channel device on the network is not responding or the Fibre Channel device is not an FCP target. The driver will automatically

SEVERITY LEVEL: Debug

MESSAGE: Abnormal ELS completion.

ACTION: retry this ELS command if needed. If the command is a PLOGI or PRLI, and the destination PortID is not an FCP Target, no action is needed. Otherwise, check physical connections to Fibre Channel network and the state the remote PortID is in.

0820 DEBUG: ELS rcvd.

VERBOSE_MASK: LOG_ELS (0x00000100)

DESCRIPTION: This indicates that an unsolicited ELS command was received.

SEVERITY LEVEL: Debug

MESSAGE: ELS rcvd.

ACTION: No action needed, informational.

0821 DEBUG: Unsolicited ELS dropped.

VERBOSE_MASK: LOG_ELS (0x00000100)

DESCRIPTION: This indicates that an unsolicited ELS command was received and then dropped for some reason.

SEVERITY LEVEL: Debug

MESSAGE: Unsolicited ELS dropped.

ACTION: No action needed, informational.

0822 DEBUG: ELS reply.

VERBOSE_MASK: LOG_ELS (0x00000100)

DESCRIPTION: This indicates that a reply is being sent for an unsolicited ELS command.

SEVERITY LEVEL: Debug

MESSAGE: ELS reply.

ACTION: No action needed, informational.

0830 ERROR: Invalid ELS command found.

VERBOSE_MASK: LOG_ELS (0x00000100)

DESCRIPTION: This indicates that an ELS command was found with an invalid command code.

SEVERITY LEVEL: Error

MESSAGE: Invalid ELS command found.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

General I/O Packet Events (Message IDs: 0900-0999)

0900 NOTICE: Packet abort.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an I/O packet is being aborted.

SEVERITY LEVEL: Notice

MESSAGE: Packet abort.

ACTION: No action needed, informational.

0901 WARNING: Packet abort failed.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an attempt to abort an I/O packet has failed.

SEVERITY LEVEL: Warning

MESSAGE: Packet abort failed.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

0910 DEBUG: Packet timeout.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an I/O packet has timed out and is being aborted.

SEVERITY LEVEL: Debug

MESSAGE: Packet timeout.

ACTION: No action needed, informational.

0911 DEBUG: CHANNEL watchdog.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that I/O(s) are getting stale waiting on a I/O channel tx queue.

SEVERITY LEVEL: Debug

MESSAGE: CHANNEL watchdog.

ACTION: No action needed, informational.

0912 DEBUG: TXQ watchdog.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an I/O was found missing from the transmit queue.

SEVERITY LEVEL: Debug

MESSAGE: TXQ watchdog.

ACTION: No action needed, informational.

0920 DEBUG: Packet flush.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an I/O packet is being flushed.

SEVERITY LEVEL: Debug

MESSAGE: Packet flush.

ACTION: No action needed, informational.

0921 DEBUG: Packet flushed.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an I/O packet has been flushed.

SEVERITY LEVEL: Debug

MESSAGE: Packet flushed.

ACTION: No action needed, informational.

0922 NOTICE: Packet flush timeout.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an I/O packet flush request has timed out with some I/O packets's still not completed. The driver will attempt to recover by itself.

SEVERITY LEVEL: Notice

MESSAGE: Packet flush timeout.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

0930 NOTICE: Packet transport failed.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an attempt to send an I/O packet failed. The I/O packet will be retried by the upper layer.

SEVERITY LEVEL: Notice

MESSAGE: Packet transport failed.

ACTION: No action needed, informational.

0931 ERROR: Packet transport error.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an error occurred while attempting to send an I/O packet. The I/O packet will likely be failed back to the user application.

SEVERITY LEVEL: Error

MESSAGE: Packet transport error.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

0932 DEBUG: Packet transport.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This provides additional information about a packet being sent.

SEVERITY LEVEL: Debug

MESSAGE: Packet transport.

ACTION: No action needed, informational.

0940 DEBUG: Packet completion error.

VERBOSE_MASK: LOG_PKT (0x00000200)

DESCRIPTION: This indicates that an I/O packet was completed with an error status. This can occur during normal operation.

SEVERITY LEVEL: Debug

MESSAGE: Packet completion error.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

FCP Traffic Events (Message IDs: 1000-1099)

1000 DEBUG: Stray FCP completion.

VERBOSE_MASK: LOG_FCP (0x00000400)

DESCRIPTION: This indicates that an FCP command completion was received without issuing a corresponding FCP command. This error could indicate a driver or firmware problem.

SEVERITY LEVEL: Debug

MESSAGE: Stray FCP completion.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

1001 DEBUG: FCP completion error.

VERBOSE_MASK: LOG_FCP (0x00000400)

DESCRIPTION: This indicates that an FCP command completed with an error status. These errors can occur during normal operation.

SEVERITY LEVEL: Debug

MESSAGE: FCP completion error.

ACTION: No action needed, informational.

FCP Target Mode Events (Message IDs: 1100-1199)

1100 DEBUG: FCT detail.

VERBOSE_MASK: LOG_FCT_DETAIL (0x00800000)

DESCRIPTION: This provides detailed information about the driver's FCT interface.

SEVERITY LEVEL: Debug

MESSAGE: FCT detail.

ACTION: No action needed, informational.

1110 DEBUG: FCT debug.

VERBOSE_MASK: LOG_FCT (0x00000800)

DESCRIPTION: This provides general information about the driver's FCT interface.

SEVERITY LEVEL: Debug

MESSAGE: FCT debug.

ACTION: No action needed, informational.

1120 DEBUG: FCT error.

VERBOSE_MASK: LOG_FCT (0x00000800)

DESCRIPTION: This indicates that a general error has occurred in the driver's FCT interface.

SEVERITY LEVEL: Debug

MESSAGE: FCT error.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

1130 DEBUG: FCT API.

VERBOSE_MASK:

DESCRIPTION: This provides an API trace with the driver's FCT interface.

SEVERITY LEVEL: Debug

MESSAGE: FCT API.

ACTION: No action needed, informational.

IP Traffic Events (Message IDs: 1200-1299)

1200 DEBUG: IP detail.

VERBOSE_MASK: LOG_IP_DETAIL (0x08000000)

DESCRIPTION: This provides detailed information about the driver's IP interface.

SEVERITY LEVEL: Debug

MESSAGE: IP detail.

ACTION: No action needed, informational.

1210 ERROR: Stray IP completion.

VERBOSE_MASK: LOG_IP (0x00001000)

DESCRIPTION: This indicates that an IP sequence completion was received without issuing a corresponding IP sequence. This error could indicate a driver or firmware problem.

SEVERITY LEVEL: Error

MESSAGE: Stray IP completion.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

1211 DEBUG: Abnormal IP completion.

VERBOSE_MASK: LOG_IP (0x00001000)

DESCRIPTION: This indicates that an IP sequence completed with a status error in the IOCB. It could mean the Fibre Channel device on the network is not responding.

SEVERITY LEVEL: Debug

MESSAGE: Abnormal IP completion.

ACTION: No action needed, informational. However, if the problem persists, report this error to your system administrator.

1220 DEBUG: Unsolicited IP dropped.

VERBOSE_MASK: LOG_IP (0x00001000)

DESCRIPTION: This indicates that an unsolicited IP sequence was received, but was dropped for some reason.

SEVERITY LEVEL: Debug

MESSAGE: Unsolicited IP dropped.

ACTION: No action needed, informational.

1221 DEBUG: IP recvd.

VERBOSE_MASK: LOG_IP (0x00001000)

DESCRIPTION: This indicates that an unsolicited IP sequence was received.

SEVERITY LEVEL: Debug

MESSAGE: IP recvd.

ACTION: No action needed, informational.

1230 ERROR: Invalid IP sequence found.

VERBOSE_MASK: LOG_IP (0x00001000)

DESCRIPTION: This indicates that an IP sequence was found with an invalid code.

SEVERITY LEVEL: Error

MESSAGE: Invalid IP sequence found.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

Solaris SFS Events (Message IDs: 1300-1399)

1300 DEBUG: SFS.

VERBOSE_MASK: LOG_SFS (0x00002000)

DESCRIPTION: This provides general information about the driver's SFS interface.

SEVERITY LEVEL: Debug

MESSAGE: SFS.

ACTION: No action needed, informational.

1301 DEBUG: SFS detail.

VERBOSE_MASK: LOG_SFS_DETAIL (0x20000000)

DESCRIPTION: This provides detailed information about the driver's SFS interface.

SEVERITY LEVEL: Debug

MESSAGE: SFS detail.

ACTION: No action needed, informational.

1310 WARNING: Diagnostic error.

VERBOSE_MASK: LOG_SFS (0x00002000)

DESCRIPTION: This indicates that a diagnostic request did not complete because of some issue.

SEVERITY LEVEL: Warning

MESSAGE: Diagnostic error.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

1311 DEBUG: ECHO diagnostic completed.

VERBOSE_MASK: LOG_SFS (0x00002000)

DESCRIPTION: This indicates that an ECHO diagnostic has completed.

SEVERITY LEVEL: Debug

MESSAGE: ECHO diagnostic completed.

ACTION: No action needed, informational.

1312 WARNING: ECHO diagnostic failed.

VERBOSE_MASK: LOG_SFS (0x00002000)

DESCRIPTION: This indicates that an ECHO diagnostic has failed to return a positive result. This could indicate a connectivity problem with your FC network.

SEVERITY LEVEL: Warning

MESSAGE: ECHO diagnostic failed.

ACTION: Check your network connections. If the problem persists, report this error to your system administrator.

1313 DEBUG: BIU diagnostic completed.

VERBOSE_MASK: LOG_SFS (0x00002000)

DESCRIPTION: This indicates that a BIU diagnostic has completed.

SEVERITY LEVEL: Debug

MESSAGE: BIU diagnostic completed.

ACTION: No action needed, informational.

1314 ERROR: BIU diagnostic failed.

VERBOSE_MASK: LOG_SFS (0x00002000)

DESCRIPTION: This indicates that a BIU diagnostic has failed to return a positive result. This usually caused by an adapter hardware problem.

SEVERITY LEVEL: Error

MESSAGE: BIU diagnostic failed.

ACTION: Contact your customer service representative.

1315 DEBUG: POST diagnostic completed.

VERBOSE_MASK: LOG_SFS (0x00002000)

DESCRIPTION: This indicates that a POST diagnostic has completed.

SEVERITY LEVEL: Debug

MESSAGE: POST diagnostic completed.

ACTION: No action needed, informational.

1316 ERROR: POST diagnostic failed.

VERBOSE_MASK: LOG_SFS (0x00002000)

DESCRIPTION: This indicates that a POST diagnostic has failed to return a positive result. This is usually caused by an adapter hardware problem.

SEVERITY LEVEL: Error

MESSAGE: POST diagnostic failed.

ACTION: Contact your customer service representative.

IOCTL Events (Message IDs: 1400-1499)

1400 DEBUG: IOCTL.

VERBOSE_MASK: LOG_IOCTL (0x00004000)

DESCRIPTION: This provides general information about the driver's IOCTL interface.

SEVERITY LEVEL: Debug

MESSAGE: IOCTL.

ACTION: No action needed, informational.

1401 DEBUG: IOCTL detail.

VERBOSE_MASK: LOG_IOCTL_DETAIL (0x04000000)

DESCRIPTION: This provides detailed information about the driver's IOCTL interface.

SEVERITY LEVEL: Debug

MESSAGE: IOCTL detail.

ACTION: No action needed, informational.

1410 DEBUG: DFC

VERBOSE_MASK: LOG_IOCTL (0x00004000)

DESCRIPTION: This provides general information about the driver's DFC interface.

SEVERITY LEVEL: Debug

MESSAGE: DFC

ACTION: No action needed, informational.

1411 DEBUG: DFC detail.

VERBOSE_MASK: LOG_IOCTL_DETAIL (0x04000000)

DESCRIPTION: This provides detailed information about the driver's DFC interface.

SEVERITY LEVEL: Debug

MESSAGE: DFC detail.

ACTION: No action needed, informational.

1420 DEBUG: DFC Error.

VERBOSE_MASK: LOG_IOCTL (0x00004000)

DESCRIPTION: This indicates that an error was found while processing a DFC request.

SEVERITY LEVEL: Debug

MESSAGE: DFC Error.

ACTION: No action needed, informational.

Firmware Download Events (Message IDs: 1500-1599)

1500 DEBUG: Firmware image.

VERBOSE_MASK: LOG_FIRMWARE (0x00008000)

DESCRIPTION: This provides general information about the firmware image.

SEVERITY LEVEL: Debug

MESSAGE: Firmware image.

ACTION: No action needed, informational.

1501 DEBUG: Firmware detail.

VERBOSE_MASK: LOG_FIRMWARE_DETAIL (0x10000000)

DESCRIPTION: This provides detailed information about the firmware image.

SEVERITY LEVEL: Debug

MESSAGE: Firmware detail.

ACTION: No action needed, informational.

1502 NOTICE: Firmware Library

VERBOSE_MASK: LOG_DRIVER (0x00000002)

DESCRIPTION: This shows the versions of firmware contained in the driver's library.

SEVERITY LEVEL: Notice

MESSAGE: Firmware Library

ACTION: No action needed, informational.

1510 ERROR: Bad firmware image.

VERBOSE_MASK: LOG_FIRMWARE (0x00008000)

DESCRIPTION: This indicates that a bad firmware image was provided to the download function.

SEVERITY LEVEL: Error

MESSAGE: Bad firmware image.

ACTION: Obtain the proper image file. If the problem persists, report this error to your customer service representative.

1511 ERROR: Firmware image not compatible.

VERBOSE_MASK: LOG_FIRMWARE (0x00008000)

DESCRIPTION: This indicates that the firmware image provided was not compatible with the existing hardware.

SEVERITY LEVEL: Error

MESSAGE: Firmware image not compatible.

ACTION: Obtain the proper image file. If the problem persists, report this error to your customer service representative.

1520 NOTICE: Firmware download.

VERBOSE_MASK: LOG_FIRMWARE (0x00008000)

DESCRIPTION: This indicates that an attempt to download a firmware image has occurred.

SEVERITY LEVEL: Notice

MESSAGE: Firmware download.

ACTION: No action needed, informational.

1521 NOTICE: Firmware download complete.

VERBOSE_MASK: LOG_FIRMWARE (0x00008000)

DESCRIPTION: This indicates that an attempt to download a firmware image was successful.

SEVERITY LEVEL: Notice

MESSAGE: Firmware download complete.

ACTION: No action needed, informational.

1522 ERROR: Firmware download failed.

VERBOSE_MASK: LOG_FIRMWARE (0x00008000)

DESCRIPTION: This indicates that an attempt to download a firmware image was failed.

SEVERITY LEVEL: Error

MESSAGE: Firmware download failed.

ACTION: Check your hardware configuration. If the problem persists, report this error to your customer service representative.

1523 WARNING: Firmware updated.

VERBOSE_MASK: LOG_FIRMWARE (0x00008000)

DESCRIPTION: This indicates that new firmware has been updated on the adapter.

SEVERITY LEVEL: Warning

MESSAGE: Firmware updated.

ACTION: A reboot or adapter power cycle will be required to activate the new firmware.

1530 DEBUG: Firmware dump.

VERBOSE_MASK: LOG_FIRMWARE (0x00008000)

DESCRIPTION: This indicates that a firmware core dump has occurred.

SEVERITY LEVEL: Debug

MESSAGE: Firmware dump.

ACTION: Check your hardware configuration. If the problem persists, report this error to your customer service representative.

1540 WARNING: Firmware update required.

VERBOSE_MASK: LOG_FIRMWARE (0x00008000)

DESCRIPTION: This indicates that a firmware update is required on the adapter.

SEVERITY LEVEL: Warning

MESSAGE: Firmware update required.

ACTION: The user must perform a manual adapter reset or link reset once the host environment is stable to trigger an automatic firmware download. Do not power cycle or reboot the system during the download operation.

Common Transport Events (Message IDs: 1600-1699)

1600 DEBUG: CT sent.

VERBOSE_MASK: LOG_CT (0x00010000)

DESCRIPTION: This indicates that a CT command is being sent.

SEVERITY LEVEL: Debug

MESSAGE: CT sent.

ACTION: No action needed, informational.

1601 DEBUG: CT comp.

VERBOSE_MASK: LOG_CT (0x00010000)

DESCRIPTION: This indicates that a CT command completed normally.

SEVERITY LEVEL: Debug

MESSAGE: CT comp.

ACTION: No action needed, informational.

1610 ERROR: Stray CT completion.

VERBOSE_MASK: LOG_CT (0x00010000)

DESCRIPTION: This indicates that a CT command completion was received without issuing a corresponding CT command. This error could indicate a driver or firmware problem.

SEVERITY LEVEL: Error

MESSAGE: Stray CT completion.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

1611 DEBUG: Abnormal CT completion.

VERBOSE_MASK: LOG_CT (0x00010000)

DESCRIPTION: This indicates that a CT command completed with a status error in the IOCB. It could mean the Fibre Channel device on the network is not responding. The driver will automatically retry this CT command if needed.

SEVERITY LEVEL: Debug

MESSAGE: Abnormal CT completion.

ACTION: Check physical connections to Fibre Channel network and the state the remote PortID is in.

1620 DEBUG: CT rcvd.

VERBOSE_MASK: LOG_CT (0x00010000)

DESCRIPTION: This indicates that an unsolicited CT command was received.

SEVERITY LEVEL: Debug

MESSAGE: CT rcvd.

ACTION: No action needed, informational.

1621 DEBUG: Unsolicited CT dropped.

VERBOSE_MASK: LOG_CT (0x00010000)

DESCRIPTION: This indicates that an unsolicited CT command was received and then dropped for some reason.

SEVERITY LEVEL: Debug

MESSAGE: Unsolicited CT dropped.

ACTION: No action needed, informational.

1622 DEBUG: CT reply.

VERBOSE_MASK: LOG_CT (0x00010000)

DESCRIPTION: This indicates that a reply is being sent for an unsolicited CT command.

SEVERITY LEVEL: Debug

MESSAGE: CT reply.

ACTION: No action needed, informational.

1630 ERROR: Invalid CT command found.

VERBOSE_MASK: LOG_CT (0x00010000)

DESCRIPTION: This indicates that a CT command was found with an invalid command code.

SEVERITY LEVEL: Error

MESSAGE: Invalid CT command found.

ACTION: No action needed, informational. However, if the problem persists, report this error to your customer service representative.

Fibre Channel Security Protocol (FCSP) Events (Message IDs: 1700-1799)

1700 DEBUG: FCSP

VERBOSE_MASK: LOG_FCSP (0x00020000)

DESCRIPTION: This provides general information about the driver's FCSP interface.

SEVERITY LEVEL: Debug

MESSAGE: FCSP

ACTION: No action needed, informational.

1701 DEBUG: FCSP detail.

VERBOSE_MASK: LOG_FCSP_DETAIL (0x01000000)

DESCRIPTION: This provides detailed information about the driver's FCSP interface.

SEVERITY LEVEL: Debug

MESSAGE: FCSP detail.

ACTION: No action needed, informational.

1702 DEBUG: FCSP error.

VERBOSE_MASK: LOG_FCSP (0x00020000)

DESCRIPTION: This indicates that an error was found while processing a DFC request.

SEVERITY LEVEL: Debug

MESSAGE: FCSP error.

ACTION: No action needed, informational.

1705 DEBUG: FCSP state.

VERBOSE_MASK: LOG_FCSP (0x00020000)

DESCRIPTION: This indicates that an authentication state is changing.

SEVERITY LEVEL: Debug

MESSAGE: FCSP state.

ACTION: No action needed, informational.

1706 DEBUG: FCSP event.

VERBOSE_MASK: LOG_FCSP (0x00020000)

DESCRIPTION: This indicates that an authentication event has occurred.

SEVERITY LEVEL: Debug

MESSAGE: FCSP event

ACTION: No action needed, informational.

1707 DEBUG: FCSP status.

VERBOSE_MASK: LOG_FCSP (0x00020000)

DESCRIPTION: This indicates that an authentication status is being updated.

SEVERITY LEVEL: Debug

MESSAGE: FCSP status.

ACTION: No action needed, informational.

1710 DEBUG: FCSP start.

VERBOSE_MASK: LOG_FCSP (0x00020000)

DESCRIPTION: This indicates that authentication is being started to a specific node.

SEVERITY LEVEL: Debug

MESSAGE: FCSP start.

ACTION: No action needed, informational.

1720 DEBUG: FCSP comp.

VERBOSE_MASK: LOG_FCSP (0x00020000)

DESCRIPTION: This indicates that authentication is being stopped or completed to a specific node.

SEVERITY LEVEL: Debug

MESSAGE: FCSP comp.

ACTION: No action needed, informational.

Fibre Channel Fabric (FCF) Events (Message IDs: 1800–1899)

1800 DEBUG: FCF

VERBOSE_MASK:

DESCRIPTION: This provides general information about the driver's FCF interface.

SEVERITY LEVEL: Debug

MESSAGE: FCF

ACTION: No action needed, informational.

1801 DEBUG: FCF detail.

VERBOSE_MASK:

DESCRIPTION: This provides detailed information about the driver's FCF interface.

SEVERITY LEVEL: Debug

MESSAGE: FCF detail.

ACTION: No action needed, informational.

1810 DEBUG: FCF error.

VERBOSE_MASK:

DESCRIPTION: This indicates that an error was found while processing an FCF request.

SEVERITY LEVEL: Debug

MESSAGE: FCF error.

ACTION: No action needed, informational.

1820 DEBUG: FCF state.

VERBOSE_MASK:

DESCRIPTION: This indicates that an FCF object state is changing.

SEVERITY LEVEL: Debug

MESSAGE: FCF state.

ACTION: No action needed, informational.

1830 DEBUG: FCF event.

VERBOSE_MASK:

DESCRIPTION: This indicates that an FCF event has occurred.

SEVERITY LEVEL: Debug

MESSAGE: FCF event.

ACTION: No action needed, informational.

7. NIC Driver Log Messages

This section describes the log messages you may see from the NIC driver.

Note: To reset the adapter, reboot the system; or, on DR-capable SPARC machines, use the Solaris cfgadm command for configuring system devices.

Setting MOD_MASK and SEVERITY

Log messages are generated based on the settings of the Module Mask (MOD_MASK) and the Severity Level (SEVERITY) as indicated in the log_level parameter. See the log_level parameter in Table 5-1, NIC Configuration File Parameters, on page 29.

Table 7-1 details the values and meanings of MOD_MASK in the log_level parameter.

Table 7-1 MOD_MASK Information for NIC Driver Log Messages

Name	MOD_MASK[a]	Meaning
MOD_CONFIG	0x10000	Messages in the device configuration path are logged.
MOD_TX	0x20000	Messages in the transmit data path are logged.
MOD_RX	0x40000	Messages in the receive data path are logged.
MOD_ISR	0x80000	Messages in the interrupt path are logged.

a. MOD_MASK is a bitmap of one or more of these values.

Table 7-2 details the values and meanings of SEVERITY in the log_level parameter.

Table 7-2 Severity Level Information for NIC Driver Log Messages

Name	SEVERITY Value	Meaning
CE_CONT	0x0	Continuation
CE_NOTE	0x1	Information
CE_WARN	0x2	Warning
CE_PANIC	0x3	Causes the operating system to panic
CE_IGNORE	0x4	No action

Log Messages for the NIC Driver

For Solaris 10

The following table details the log messages provided by the NIC driver for Solaris 10 operating systems.

Table 7-3 Log Messages for the NIC Driver for Solaris 10

Log Message	Recommended Action	MOD_MASK	SEVERITY
`pci_config_setup() failed with rc: <code>`	Reset or replace the adapter.	MOD_CONFIG	CE_WARN
`Device Unknown`	Driver does not have support for a particular adapter. Contact Emulex for further information.	MOD_CONFIG	CE_WARN
`PCI Initialization Failed`	Reset or replace the adapter, or move the adapter to different slot.	MOD_CONFIG	CE_WARN
`HW Initialization Failed`	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN
`Failed to setup interrupts`	Reload the driver after changing the interrupt priorities.	MOD_CONFIG	CE_WARN
`Failed to allocate Queue memory`	Increase the memory.	MOD_CONFIG	CE_WARN
`oce_rx:no frags?`	Malfunctioning hardware – Check and/or replace the SFP and/or adapter.	MOD_RX	CE_WARN
`ddi_dma_addr_bind_handle() failed rc: <code>`	Increase the memory.	MOD_CONFIG	CE_WARN
`Ring buffer allocation failed`	Increase the memory.	MOD_CONFIG	CE_WARN
`<code> POST ERROR!!`	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN
`"Insufficient Vectors"`	Reload the driver after changing the interrupt priorities.	MOD_CONFIG	CE_WARN
`EQ ring alloc failed`	Increase the memory.	MOD_CONFIG	CE_WARN
`EQ create failed rc: <code>`	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN

Table 7-3 Log Messages for the NIC Driver for Solaris 10 (Continued)

Log Message	Recommended Action	MOD_MASK	SEVERITY
CQ create failed: <code>	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN
Legacy MQ ring alloc failed	Increase the memory.	MOD_CONFIG	CE_WARN
Legacy MQ create failed rc:<code>	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN
MQ EXT ring alloc failed	Increase the memory.	MOD_CONFIG	CE_WARN
Extended MQ create failed rc:<code>	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN
WQ Buffer Pool create failed	Increase the memory.	MOD_CONFIG	CE_WARN
WQ MAP Handles Pool create failed	Increase the memory.	MOD_CONFIG	CE_WARN
WQ Packet Desc Pool create failed	Increase the memory.	MOD_CONFIG	CE_WARN
Failed to create WQ ring	Increase the memory.	MOD_CONFIG	CE_WARN
WQCQ create failed	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN
WQ create failed rc: <code>	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN
RQ bdesc alloc failed	Increase the memory.	MOD_CONFIG	CE_WARN
RQ shadow ring alloc failed	Increase the memory.	MOD_CONFIG	CE_WARN
RQ Buffer Pool create failed	Increase the memory.	MOD_CONFIG	CE_WARN
RQ ring create failed	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN
RQ create failed: <code>	Hardware error – Download the same firmware image to the adapter and reboot, and/or replace the adapter.	MOD_CONFIG	CE_WARN
OCE_INITIATE_DUMP failed	Diagnostic Dump initiation by an application failed. Retry the Dump initiation.	MOD_CONFIG	CE_WARN

Table 7-3 Log Messages for the NIC Driver for Solaris 10 (Continued)

Log Message	Recommended Action	MOD_MASK	SEVERITY
`OCE_INITIATE_DUMP failed due to recovery timeout`	Device Recovery failed after Diagnostic Dump initiation. Reboot the system.	MOD_CONFIG	CE_WARN
`OCE_INITIATE_DUMP Dump Image not present`	Diagnostic Dump image is not present. Retry the Dump initiation	MOD_CONFIG	CE_WARN
`Could not reset firmware, ERR bit set pd_ctrl:<reg>`	Firmware reset failed. Reset the system.	MOD_CONFIG	CE_WARN
`Error recovery timed out`	Hardware/Driver is not able to recover from a serious hardware error. Reset the system.	MOD_CONFIG	CE_WARN
`Error recovery failed, device is in error state`	Hardware/Driver is not able to recover from a serious hardware error. Reset the system.	MOD_CONFIG	CE_WARN

For Solaris 11

The following table details the log messages provided by the NIC driver for Solaris 11 operating systems.

Table 7-4 Log Messages for the NIC Driver for Solaris 11

Log Message	Recommended Action	MOD_MASK	Severity
`Ring buffer allocation failed < code >`	Configure the server with more memory.	MOD_CONFIG	CE_WARN
`mcast ADD/DEL failed`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`Could not retrieve num_bars`	Reset the adapter.	MOD_CONFIG	CE_WARN
`Could not get size of bar`	Reset the adapter.	MOD_CONFIG	CE_WARN
`Could not map bar`	Reset the adapter.	MOD_CONFIG	CE_WARN
`soft_reset bit asserted[1]. Reset failed`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN

Table 7-4 Log Messages for the NIC Driver for Solaris 11 (Continued)

Log Message	Recommended Action	MOD_MASK	Severity
POST ERROR	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
HW POST1 FAILED	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
Failed to allocate bmbx	Reload the driver.	MOD_CONFIG	CE_WARN
FUNCTION RESET FAILED	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
Mailbox initialization failed with <ret code>	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
Firmaware version read failed with <ret code>	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
Firmware configuration read failed with <ret code>	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN

Table 7-4 Log Messages for the NIC Driver for Solaris 11 (Continued)

Log Message	Recommended Action	MOD_MASK	Severity
MAC address read failed with <ret code>	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
VPORT_SRIOV interface creation failed rc: 0x<return> VPORT_NORMAL interface creation failed rc: 0x<return>	Upgrade the firmware to the correct version.	MOD_CONFIG	CE_WARN
Failed to get vlan list ret 0X<return> Failed to configure vlan list ret 0x<return> Failed to activate vlan list on vf	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
Failed to Setup handlers	Reload the driver.	MOD_CONFIG	CE_WARN
Hardware UE Detected	Upgrade the firmware to the correct version.	MOD_CONFIG	CE_WARN
Failed to retrieve intr types	Unload and then reload the driver.	MOD_CONFIG	CE_WARN
MSIX not available	The system continues to work with INTx.	MOD_CONFIG	CE_WARN
Could not get supported intrs	Reload the driver.	MOD_CONFIG	CE_WARN
Alloc intr failed	Reload the driver.	MOD_CONFIG	CE_WARN
Unable to get intr priority	Reload the driver.	MOD_CONFIG	CE_WARN
Failed to add interrupt handler	Reload the driver.	MOD_CONFIG	CE_WARN
Interrupts block enable failed	Reload the driver.	MOD_CONFIG	CE_WARN
Failed to enable, ret <ret code>, interrupt <int num> type <int type >, cnt <num_vectors>	Reload the driver.	MOD_CONFIG	CE_WARN
Interrupt block disable failed	Reset the adapter.	MOD_CONFIG	CE_WARN
Failed to disable the interrupts	Reset the adapter.	MOD_CONFIG	CE_WARN
mod_install failed rval	Reset the adapter.	MOD_CONFIG	CE_WARN

Table 7-4 Log Messages for the NIC Driver for Solaris 11 (Continued)

Log Message	Recommended Action	MOD_MASK	Severity
`Map PCI config failed with <ret_code>`	Reset the adapter.	MOD_CONFIG	CE_WARN
`Device Unknown`	The device is not supported by the driver.	MOD_CONFIG	CE_WARN
`PCI initialization failed`	Reset the adapter.	MOD_CONFIG	CE_WARN
`HW initialization failed with ret_code`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`Interrupt setup failed with <ret_code>`	Reload the driver.	MOD_CONFIG	CE_WARN
`Failed to init rings`	Low system resources. Reboot the system to see if the problem resolves itself. If possible add more memory.	MOD_CONFIG	CE_WARN
`kstat setup Failed with <ret_code>`	Reload the driver.	MOD_CONFIG	CE_WARN
`MAC allocation Failed`	Unload and then reload the driver.	MOD_CONFIG	CE_WARN
`MAC registration failed`	Unload and then reload the driver.	MOD_CONFIG	CE_WARN
`x pending buffers on rq <rq_address>`	Reset the system.	MOD_CONFIG	CE_WARN
`Failed to query fw config`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`Failed to get stats`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`EQ ring alloc failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN

Table 7-4 Log Messages for the NIC Driver for Solaris 11 (Continued)

Log Message	Recommended Action	MOD_MASK	Severity
`EQ create failed`	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`CQ allocation failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`CQ ring alloc failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`CQ create failed`	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`MQ ring alloc failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`MQ create failed`	Check for the faulty hardware using "fmadm faulty". If the hardware is faulty, acquit the hardware using "fmadm acquit <dev_path>" and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`Invalid q length. Must be [256, 2000]`	Set the correct queue length using dladm.	MOD_CONFIG	CE_WARN
`WQ Buffer Pool create failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`WQ MAP Handles Pool create failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`WQ Packet Desc Pool create failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN

Table 7-4 Log Messages for the NIC Driver for Solaris 11 (Continued)

Log Message	Recommended Action	MOD_MASK	Severity
`Failed to create WQ ring`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`WCCQ create failed`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`WQ create failed`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`RQ bdesc alloc failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`RQ shadow ring alloc failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`RQ ring create failed`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`RQ create failed`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`Failed to del q`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN

Table 7-4 Log Messages for the NIC Driver for Solaris 11 (Continued)

Log Message	Recommended Action	MOD_MASK	Severity
`Failed to set EQ delay`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`Failed to Configure RSS`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`MAC addition failed`	Reload the driver.	MOD_CONFIG	CE_WARN
`Could not find the MAC <mac addr>`	Provide the correct MAC address.	MOD_CONFIG	CE_WARN
`Failed to delete MAC <mac_add>`	Check for the faulty hardware using “fmadm faulty”. If the hardware is faulty, acquit the hardware using “fmadm acquit <dev_path>” and reset the adapter. If the hardware is not faulty, reset the adapter without issuing acquit.	MOD_CONFIG	CE_WARN
`oce_instance_setup: max adapters exceeded`	The driver supports a maximum of 16 adapters.	MOD_CONFIG	CE_WARN
`oce_rx:no frags?`	The system cannot receive data because the driver is low on resources. Reload the driver. If the same error recurs, reset the adapter.	MOD_RX	CE_WARN
`kstat creation failed`	Reload the driver.	MOD_CONFIG	CE_WARN
`Could not allocate stats_dbuf`	Low system resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_CONFIG	CE_WARN
`wqb pool empty`	The system cannot transmit data because the driver is low on resources. Check for a process generating heavy traffic.	MOD_TX	CE_WARN
`wqm pool empty`	The system cannot transmit data because the driver is low on resources. Check for a process generating heavy traffic.	MOD_TX	CE_WARN

Table 7-4 Log Messages for the NIC Driver for Solaris 11 (Continued)

Log Message	Recommended Action	MOD_MASK	Severity
MAP FAILED	Low System resources. Repeat the operation that generated the log. If the error log is generated again, reboot the system.	MOD_TX	CE_WARN
OCE_INITIATE_DUMP failed	Diagnostic Dump initiation by an application failed. Retry the Dump initiation.	MOD_CONFIG	CE_WARN
OCE_INITIATE_DUMP failed due to recovery timeout	Device Recovery failed after Diagnostic Dump initiation. Reboot the system.	MOD_CONFIG	CE_WARN
OCE_INITIATE_DUMP Dump Image not present	Diagnostic Dump image is not present. Retry the Dump initiation.	MOD_CONFIG	CE_WARN
Could not reset firmware, ERR bit set pd_ctrl:<reg>	Firmware reset failed. Reset the system.	MOD_CONFIG	CE_WARN
Error recovery timed out	Hardware/Driver is not able to recover from a serious hardware error. Reset the system.	MOD_CONFIG	CE_WARN
Error recovery failed/timed out	Reset the system.	MOD_CONFIG	CE_WARN