Emulex® Drivers Version 10.4 for VMware ESXi

User Manual

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Note: References to OCe11100 series products also apply to OCe11100R series products.

Table of Contents

List of Tables

1. Introduction

This product supports the Emulex® OneConnect® and LightPulse® families of adapters.

The VMware ESXi drivers support the Fibre Channel (FC), FC over Ethernet (FCoE), Ethernet (or network interface card–NIC), and Internet Small Computer System Interface (iSCSI) protocols.

This document explains how to install the VMware ESXi drivers on your system and how to configure the drivers' capabilities. Below is a partial list of configurable parameters by protocol:

- FC/FCoE
  - Adding logical unit numbers (LUNs) and targets
  - Configuring driver parameters
  - Creating an FC remote boot disk
  - Managing devices through the CIM interface
  - Working with virtual ports (VPorts)
  - Troubleshooting FC/FCoE issues
- NIC
  - Configuring NIC driver parameters
  - Improving driver performance
  - Using vmxnet emulation, including TCP segmentation offload (TSO) and jumbo frames
  - Troubleshooting NIC issues
- iSCSI
  - Configuring iSCSI driver parameters, iSCSI error handling, and link down timeout (LDTO) and extended timeout (ETO)
  - Implementing Multipath I/O (MPIO) support for non-boot and boot targets
  - Configuring iSCSI through Dynamic Host Configuration Protocol (DHCP)
  - Troubleshooting iSCSI issues

Refer to the *OneCommand Manager User Manuals* and *OneCommand Manager for VMware vCenter User Manual* for complete lists of supported technology.

ESXi Compatibility

For a list of adapters that are compatible with this driver, see the driver Downloads page on the Emulex website. For compatible firmware versions, see the Downloads page for the specific adapter.

Supported Guest Operating Systems

The Emulex driver supports the following guest operating systems:

- CentOS 5.x
- CentOS 6.x
- RHEL 5.x
- RHEL 6.x
- RHEL 7.x
- SLES 11.x
- SLES 12.x
- Windows Server 2008 R2
- Windows Server 2012
- Windows Server 2012 R2

Abbreviations

ACL	Access Control List
AL_PA	Arbitrated Loop Physical Address
API	application programming interface
ARI	alternative routing-ID interpretation
BIOS	basic input/output system
CHAP	Challenge Handshake Authentication Protocol
CLI	command line interface
CPU	central processing unit
CRC	cyclic redundancy check
DCBX	Data Center Bridging Capabilities Exchange
DCC	device control channel
DHCP	Dynamic Host Control Protocol
DID	device ID
DMA	direct memory access
ETO	extended timeout
FC	Fibre Channel
FCF	Fibre Channel over Ethernet Forwarder
FCoE	Fibre Channel over Ethernet
FCP	Fibre Channel Protocol
FDMI	Fabric-Device Management Interface
FIP	FCoE Initialization Protocol
GB	gigabyte

Gb	gigabit
GbE	gigabit Ethernet
Gbps	gigabits per second
GFC	gigabit Fibre Channel
GUI	Graphical User Interface
HBA	host bus adapter
HTTP	Hypertext Transfer Protocol
I/O	input/output
IMA	iSCSI Management API
IOCB	input/output control block
IOCTL	input/output control
IOPs	I/O operations per second
IP	Internet Protocol
IQN	iSCSI qualified name
iSCSI	Internet Small Computer System Interface
KB	Kilobyte (1024 bytes)
LACP	Link Aggregation Control Protocol
LDTO	link down timeout
LUN	logical unit number
MAC	Media Access Control
MB	megabyte
Mb	megabit
Mbps	megabits per second
MPIO	multipath I/O
MSI	message signaled interrupt
MSI-X	message signaled interrupt-extended
MTU	maximum transmission unit
NIC	network interface card
NPar	NIC partitioning
NPIV	N_Port ID Virtualization
PCI	Peripheral Component Interconnect (interface)
PCIe	Peripheral Component Interconnect Express
PF	physical function
PLOGI	port login
POST	power-on self-test
RFC	Request for Comments
RHEL	Red Hat Enterprise Linux

ROM	read-only memory
RRQ	Reinstate Recovery Qualifier
RSCN	registered state change notification
RSS	receive-side scaling
SAN	storage area network
SCSI	Small Computer System Interface
SFP	small form-factor pluggable
SLES	SUSE Linux Enterprise Server
SLI	Service Level Interface
SR-IOV	single root I/O virtualization
TCP	Transmission Control Protocol
TSO	TCP segmentation offload
UMC	Universal Multi-Channel
VF	virtual function
VGT	virtual guest tagging
VLAN	virtual local area network
VLAN ID	VLAN identifier
VM	virtual machine
VPD	vital product data
vPort	virtual port
vSwitch	virtual switch
VXLAN	Virtual extensible LAN
WLAN	wireless LAN
WWN	World Wide Name
WWNN	World Wide Node Name
WWPN	World Wide Port Name
XRI	extensible resource indicator

2. Installation

This section provides information for installing the ESXi driver for FC/FCoE, NIC, and iSCSI protocols.

ESXi 5.5 and 6.0 Overview

With the release of ESXi 5.5 (vSphere 2013) and ESXi 6.0 (vSphere 2015), VMware introduced a new driver model called "native mode". Emulex has endorsed the native mode driver model for ESXi 5.5 with the following drivers:

- For FC/FCoE functionality, the out-of-box driver is the native mode "lpfc" driver for OneConnect OCe11100-series, OCe14000-series, LPe16202/OCe15100, LPe16000-series, and LPe12000-series adapters.
- For Ethernet (NIC) functionality, the out-of-box driver for OCe11100-series, OCe14000-series, and LPe16202/OCe15100 adapters is the native mode "elxnet" driver.

Note: For iSCSI functionality on OCe11100 and OCe14000-series adapters, the out-of-box driver continues to be the vmklinux-based "be2iscsi" driver.

ESXi 5.5 and 6.0 also require changes to the installation process and tools. These changes include:

- Driver parameters migration – If you upgrade to ESXi 5.5 or 6.0, you must document the existing driver parameter values for the initial ram disk for the server being upgraded. After upgrading, you must then manually reprogram those initial ram disk values. See "Migrating Driver Parameters When Upgrading to ESXi 5.5 or 6.0" on page 13 for additional information.
- Command line tool transition – For the ESXi 5.5 release and all subsequent operating system releases, VMware is transitioning from esxcfg commands to esxcli commands. Both sets of commands are supported in the ESXi 5.5 and 6.0 release. See "ESXi Command Line Tool Transition" on page 29 for additional information.
- Native mode driver management support – With the introduction of the new native mode driver, ethtool is no longer supported. Instead, you can use either the esxcli commands or the VmkMgmtKeyVal interface to provide troubleshooting support. See "ESXi 5.5 Native Mode NIC Driver Troubleshooting Support" on page 170 and "ESXi 5.5 and 6.0 Native Mode NIC Driver Support for ethtool Commands" on page 172 for additional information.

Migrating Driver Parameters When Upgrading to ESXi 5.5 or 6.0

VMware's ESXi 5.5 and 6.0 releases have two driver models:

- vmklinux – the legacy driver model
- native mode – the new driver model

vmklinux is a Linux compatibility layer for device drivers in all ESX releases from ESX 2.x to ESXi 5.1. The vmklinux layer allows IHVs to use their Linux drivers in ESXi with only a few modifications. This consistent driver model usage along the ESXi release train ensures that upgrades automatically copy the initial ram disk driver parameters from the original operating system to the upgraded operating system. However, this is not the case for ESXi 5.5 and 6.0 systems.

VMware recommends loading the drivers by default in native mode because this is the preferred driver model for all subsequent releases. However, because native mode is different than vmklinux and because there is no native mode in prior ESXi releases, there is no driver parameter migration from vmklinux to native mode when migrating to ESXi 5.5 or 6.0.

If you install ESXi 5.5 or 6.0 over your existing ESXi system, you will notice after updating and rebooting the system that the driver parameter settings did not migrate. For example, if you set the lpfc_lun_queue_depth driver parameter to 8 on ESXi 5.1 and then update from ESXi 5.1 to ESXi 5.5, you will see the following when the driver parameters are verified after the update:

```
~ # esxcfg-module -g lpfc
Unknown module name lpfc
```

In summary, when updating an existing ESXi system to ESXi 5.5 or 6.0, you must manually set all of the driver parameter values.

Preparing to Upgrade to ESXi 5.5 or 6.0

Upgrading your server to ESXi 5.5 or 6.0 requires an additional planning step. You must evaluate the initial ram disk for the server that will be upgraded and document the existing driver parameter values. After the upgrade, you must then manually reprogram those initial ram disk values.

FC/FCoE Driver Example

The server administrator executes the following commands on the ESXi 5.1 server prior to the ESXi 5.5 or 6.0 upgrade:

```
~ # esxcfg-module -g lpfc820
lpfc820 enabled = 1 options = 'lpfc_lun_queue_depth=8'
```

After upgrading to ESXi 5.5 or 6.0, the server administrator must run the following command.

Note: The driver binary name is now the native mode Emulex FC/FCoE driver.

```
~ # esxcfg-module -s "lpfc_lun_queue_depth=8" lpfc
```

And to verify that the value has been reprogrammed, type

```
~ # esxcfg-module -g lpfc
lpfc enabled = 1 options = 'lpfc_lun_queue_depth=8'
```

After the verification is complete, reboot the server to activate the command and burn the new driver parameters into the initial ram disk.

Ethernet Driver Example

This example assumes a single OCe11100-series adapter in the host, since the max_vfs parameter receives the number of VFs for each PF.

Before upgrading to ESXi 5.5 or 6.0, you would enter the following command:

```
~ # esxcfg-module -g be2net
be2net enabled = 1 options = ‘max_vfs=2,2’
```

After upgrading to ESXi 5.5 or 6.0, when the server administrator runs this command for the out-of-box native mode Ethernet driver for the OCe11100-series adapter, there are no module parameters.

Note: The driver binary name is now elxnet for the native mode Emulex Ethernet driver for the OCe11100-series adapter.

```
~# esxcfg-module -g elxnet
elxnet enabled = 1 options = ‘’
```

The server administrator must then run the following command to set the driver module parameters:

```
~ # esxcfg-module -s max_vfs=2,2 elxnet
```

And to verify that the value has been reprogrammed, type

```
~ # esxcfg-module -g elxnet
elxnet enabled = 1 options = 'max_vfs=2,2'
```

After verification has completed, reboot the server to activate the command and burn the new driver parameters into the initial ram disk.

Installing the FC/FCoE Driver

This section provides installation information for the driver and the Emulex CIM Provider using the FC/FCoE interface on ESXi systems. Before using this product, you need a working knowledge of FC/FCoE and network storage devices.

Installing the FC/FCoE Driver and Management Software

The Emulex driver is available through the VMware support site. Refer to the VMware support website for further details.

For VMware ESXi 5.1, 5.5, and 6.0 hosts, you can manage adapters using the Emulex OneCommand® Manager application on Windows or the OneCommand Manager application for VMware vCenter application, but you must install and use the appropriate Emulex CIM Provider. See the *OneCommand Manager Application User Manual* and *OneCommand Manager Application for VMware vCenter User Manual* for instructions on installing the respective applications. The installation requires that the CIM Provider be installed. For more information on installing the CIM Provider, see the appropriate *CIM Provider Installation Guide*.

Notes

- Before installing the management application, you must install the FC/FCoE driver from the VMware website and then reboot the server.
- Before installing the FC/FCoE drivers and CIM Provider, verify that the firmware version is correct. If it is, proceed with the installation. If it is not, update the firmware using the OneCommand Manager application from a Windows server or the OneCommand Manager application for VMware vCenter, and reboot the system before proceeding with the installation.

Emulex ExpressLane™ Support

Host servers do not distinguish between lower and higher priority workloads being sent to LUNs. For flash storage deployed in mixed storage environments, the combination of data from rotating media and flash devices can cause congestion on the network and reduced performance for the flash storage devices.

ExpressLane enables special priority queuing for selected LUNs (ExpressLane LUNs). ExpressLane LUN performance is superior to that of regular LUNs. Mixed storage environments can use ExpressLane to alleviate congestion, reduce latency, and improve throughput, ensuring that key applications receive highest priority.

The following requirements must be met in order to use ExpressLane:

- ExpressLane is supported on LPe16000-series and LPe16202/OCe15100 adapters only.
- ExpressLane is supported on ESXi 5.5 or later only.
- An ExpressLane LUN must be enabled in the driver before it can be used by OneCommand Manager. Additionally, the priority value to mark each of the

ExpressLane frames must be specified to the FC/FCoE driver through the appropriate driver parameters.

- ExpressLane is not supported for LUNs attached to virtual ports.

For additional information, see the *OneCommand Manager for VMware vCenter User Manual*.

Uninstalling the FC/FCoE Driver

See the VMware Patch Download page for instructions.

Installing the NIC Driver

This section provides installation information for the NIC driver. Before using this product, you need a working knowledge of NIC and network-storage devices.

Installing the NIC Driver and Management Software

For ESXi 5.1, 5.5, and 6.0 systems, the latest Emulex NIC driver is available out-of-box. Refer to the operating system guide for installation instructions.

Notes

- Before installing the OneCommand Manager application for VMware vCenter software plug-in, you must install the NIC driver from the VMware software website.
- Before installing the driver and CIM Provider, verify that the firmware version is correct. If it is, proceed with the installation. If it is not, you must update the firmware using the OneCommand Manager application for VMware vCenter software plug-in. See the *OneCommand Manager Application for VMware vCenter User Manual* for additional information. The installation requires that the CIM Provider be installed. For more information on installing the CIM Provider, see the appropriate *CIM Provider Installation Guide*.

Uninstalling the NIC Driver

See the VMware Patch Download page for instructions.

Installing the Native Mode Ethernet Driver esxcli Plug-in for ESXi 5.5 and 6.0

This section describes the installation and usage of the esxcli plug-in for the native mode Ethernet (elxnet) driver on ESXi 5.5 and 6.0 systems.

Note: You can download the esxcli plug-in from the Emulex website.

To install the esxcli elxnet plug-in:

1. Copy the following file to /var/log/vmware/ on the ESXi host:
   `vmware-esx-elxcli-<>.vib`
2. On the ESXi host, install the vibs as follows:
   `esxcli software vib install -v /<pathname>/ vmware-esx-elxcli<>.vib`
3. Restart hostd:
   `/etc/init.d/hostd restart`
4. After the host has restarted, the elxnet namespace appears under elxnet.

   The following commands are supported:

   a. stats – the command is invoked as follows:
      `esxcli elxnet stats get -p <pci dev name>`

For example:

```
elxnet stats get -p 0000:003:00.1
```

b. regdump (fatdump) – the command is invoked as follows:

```
esxcli elxnet regdump get -f <absolute file pathname> -p <pci dev name>
```

For example:

```
esxcli elxnet regdump get -f /fat.txt -p 0000:002:00.0
```

c. debugMask (applicable for both ESXi 5.5 and 6.0) – the command is invoked as follows:

- To retrieve the debugMask:

```
esxcli elxnet dbgmask get -p <pci dev name>
```

- To set the debugMask:

```
esxcli elxnet dbgmask set -p <pci dev name> -m <Debug Mask>
```

Note: The following command can be used to get the <pci dev name> value:

```
#esxcli network nic list
```

Virtualization Support

For the best performance, you must install VMware Tools in each guest operating system. For information on installing VMware Tools in a Linux or Windows guest operating system, refer to the appropriate VMware ESXi Server documentation.

NetQueue Support

NetQueue enables support for multiple transmit and receive rings for improved performance. NetQueue is enabled by default.

- To determine whether NetQueue is enabled, run the following command from the ESXi Server console:

```
# esxcfg-advcfg -j netNetqueueEnabled
```

If it returns 'netNetqueueEnabled = FALSE', NetQueue is disabled.

- To enable NetQueue, run the following command:

```
# esxcfg-advcfg -k TRUE netNetqueueEnabled
```

Reboot the ESXi server for the change to take effect.

Receive-side Scaling (RSS)

RSS enables the ESXi 5.5 or 6.0 NIC driver to distribute incoming TCP traffic across multiple CPU cores for improved performance.

RSS is supported on OCe11100-series, OCe14000-series, LPe16202/OCe15100, and LPe16000-series adapters.

In ESXi 5.5 and 6.0, RSS can be selectively enabled for a particular vNIC in a VM. There can be VMs that require RSS and VMs that do not require RSS. This is configurable in the .vmx file. RSS is disabled by default.

In order to use RSS, the VM must be configured properly:

- The VM must have at least four cores and 4–8GB of RAM.
- The vNIC on which RSS is enabled should use VMXNET3 drivers.
- The VMXNET3 drivers should be updated to the latest version.
- The following entry should be added to the .vmx file in the datastore for each VM that requires RSS support for its traffic.

  ```
  ethernet<x>.pnicFeatures="4"
  ```

  Where <x> is the vNIC interface number on which the RSS feature is required.

  The absence of the above line for the VNIC in the .vmx file will not force the VM or ESX to use the RSS feature, even though RSS is enabled and queues are created.

RSS limitations include:

- MSI-X must be enabled.
- When Multi-Channel is enabled on OCe11100-series adapters, RSS is supported on the first functions of port 0 and port 1 only.
- The number of regular NetQueues is reduced by 1 when RSS is enabled.
- RSS is not supported on one-port OCe11100-series adapters.
- RSS is supported when the ESXi host has at least 8 CPUs for UMC or 12 CPUs for a physical NIC (the number of CPUs must be greater than or equal to the number of NetQueues plus the number of RSS queues).

Table 2-1 Available Queues for Each Adapter Model

Adapter/Mode	Number of NetQueue (including default queue)	Number of RSS Queues
OCe11100-series physical NIC	8	4
OCe11100-series UMC (function 0 or 1)	3	4
OCe11100-series UMC (functions 2–7)	3	0 (RSS is not supported)
OCe14000-series, LPe16202/OCe15100, and LPe16000-series adapters physical NIC	8	4
OCe14000-series, LPe16202/OCe15100, and LPe16000-series adapters UMC (functions 0–7)	4	4

Note: In cases where the ESXi host does not have the required number of CPUs, the number of NetQueues is reduced by the required number to support four RSS queues.

- RSS support in ESX 5.5 is limited and leaves the configuration of RSS parameters in the hardware completely to the driver. The driver configures the RSS policy in the hardware during driver initialization. The kernel will only request the driver to allocate RSS queue when an RSS–enabled vNIC (VM) starts receiving packets.

To enable RSS:

1. Run either of the following commands:

   ```
   # esxcfg-module -s rss=1 elxnet
   ```

   - Or -

   ```
   # esxcli system module parameters set -p "rss=1" -m elxnet
   ```

2. Reboot the ESXi server for the change to take effect.

To disable RSS:

1. Run either of the following commands:

   ```
   # esxcfg-module -s rss=0 elxnet
   ```

   - Or -

   ```
   # esxcli system module parameters set -p "rss=0" -m elxnet
   ```

2. Reboot the ESXi server for the change to take effect.

For ESXi 6.0 systems only, vsish can be used to view the contents of the new node created for RSS in each of the uplinks (when RSS is enabled) once the MAC filter is applied. The following information is displayed:

- the number of RSS queues in the hardware
- RSS hash key
- RSS indirection table with load factor
- RSS indirection table size

To view this information, run the following command:

```
vsish -e get /net/pNics/vmnicX/rxqueues/queues/<qid#>/rss
```

To view the CPU indirection table, run the following command:

```
vsish -e get /net/pNics/vmnicX/rxqueues/queues/<rss_qid>/rss/indTable
```

Note: This node is available only when there is at least one filter placed on the RSS queue (<qid#>). If there is no filter configured on <qid#>, the node <qid#> is not listed under /net/pNics/<vmnic#>/rxqueues/queues/.

The receive traffic on multiple RSS queues can be verified by viewing the driver statistics for receive traffic.

To view the driver statistics for receive traffic, run the following command:

```
esxcli elxnet stats get -p <<device_id>> | grep rx_compl >
```

where <device_id> can be obtained from the “esxcli network nic list” command.

Note: In normal configurations, the RSS queues will be queues with ID - 8, 9, 10, and 11. When Multi-Channel is enabled, the RSS queues will be queues with ID - 4, 5, 6, and 7.

Multiple core usage can be seen by running the "esxtop" command in the ESX shell. When there is traffic, you can see that more than one CPU is being utilized even though there is only one active VM.

How an ESXi Server Creates and Names Interfaces

The NIC driver supports a maximum of four adapters per system. For dual-channel adapters running in standard operating mode, the driver creates two interfaces (one for each physical port). The first and second interfaces are respectively named vmnic0 and vmnic1 (assuming there are no other network interfaces in your configuration). The same applies to vNIC-capable adapters if vNIC mode is disabled in the adapter BIOS (for those boards that support vNIC).

If vNIC mode is enabled in the adapter BIOS and the adapter is in NIC-only mode, the driver creates eight interfaces (four for each physical port). The interfaces are labeled vmnic0 through vmnic7 (assuming there are no other network interfaces in your configuration).

Note: If vNIC mode is enabled in the adapter BIOS and the adapter is in FCoE or iSCSI mode, the driver creates only six NIC interfaces. The other two interfaces are reserved for FCoE and iSCSI.

All vNICs are fully functional and support the same capabilities as a standard NIC. The vNICs can also be linked to a virtual switch in the same way:

```
# esxcfg-nics -l //list recognized nics
# esxcfg-vswitch -l //list available vswitches
# esxcfg-vswitch -a vSwitch0 //create vSwitch0
# esxcfg-vswitch -A VMNet0 vSwitch0 //create virtual machine
network, VMNet0 and add it to vSwitch0
# esxcfg-vswitch -L vmnic0 vSwitch0 //link vmnic0 to vSwitch0
```

The only difference being that in vNIC mode, each of the four vNICs tied to a physical port shares the port's 10GbE bandwidth.

Enabling SR-IOV

SR-IOV capability can be enabled for OneConnect OCe11100-series, OCe14000-series, and LPe16202/OCe15100 adapters if your system BIOS supports SR-IOV.

ESXi 5.5 and 6.0 have full support for configuration networking options of a virtual function that is assigned to a virtual machine with compatibility for ESXi 5.1 or later, including default VLAN Tagging, VGT, and configuring a static MAC for a virtual function using the ESXi driver.

You can also perform these configuration tasks using the vSphere Client. For more information regarding the vSphere Client, see the support section of the VMware website.

ESXi 5.5 and 6.0 have limited support for extended configuration networking options of a virtual function that is assigned to a virtual machine with compatibility for ESXi 5.5 or later.

Supported extended SR-IOV options:

- Enabling Virtual Guest Tagging (VGT)
- Enabling VLAN Switch Tagging (VST) mode

Extended SR-IOV option limitations:

- Cannot change the size of the MTU (cannot enable jumbo frames)
- Cannot accept or drop incoming frames for a new address with the MAC address change option
- Cannot enable global promiscuous mode for virtual machine network adapters

For more information regarding supported networking configurations, see the support section of the VMware website.

Note: SR-IOV cannot be enabled with other Multi-Channel technologies like UMC or vNIC.

To enable SR-IOV:

1. Enable IOV capability in the system BIOS.
2. Press <Ctrl + p> to enter the BIOS.
3. Enable SR-IOV for each port of the adapter from the BIOS.
4. If you want to use a newer driver, install the driver .vib file after booting the ESXi host.
5. To load the Ethernet driver with options to enable SR-IOV, run one of the following commands:

   ESXi 5.1

   ```
   # esxcfg-module -s max_vfs=x,y be2net
   ```

   ESXi 5.5 and 6.0

   ```
   # esxcfg-module -s max_vfs=x,y elxnet
   ```

   - Or -

   ```
   # esxcli system module parameters set -p "max_vfs=x,y" -m elxnet
   ```

   where “x” and “y” are the number of VFs to be enabled on each of the two NIC PFs. A value of 0 indicates that there are no VFs for the corresponding PF.

   Note: The driver currently supports a maximum of 30 VFs per PF for the OCe11100-series adapters, 32 VFs per PF for the LPe16202/OCe15100 adapters, 32 VFs per PF for the OCe14100-series adapters, and 63 VFs per PF for the OCe14400-series adapters.

   Note: HP Virtual Connect adapters support a maximum of 24 VFs per PF.

   For multiple adapters, use one of the following command:

   ESXi 5.1

   ```
   # esxcfg-module -s max_vfs=x1,y1,x2,y2,x3,y3 be2net
   ```

   ESXi 5.5 and 6.0

```
# esxcfg-module -s max_vfs=x1,y1,x2,y2,x3,y3 elxnet
```

- Or -

```
# esxcli system module parameters set -p
"max_vfs=x1,y1,x2,y2,x3,y3" -m elxnet
```

where:

"x1" is the number of VFs to be enabled on the first port of the first adapter

"y1" is the number of VFs to be enabled on the second port of the first adapter

"x2" is the number of VFs to be enabled on the first port of the second adapter

"y2" is the number of VFs to be enabled on the second port of the second adapter

"x3" is the number of VFs to be enabled on the first port of the third adapter

"y3" is the number of VFs to be enabled on the second port of the third adapter

Note: The command can be extended to enable more adapters.

6. Reboot the host.
7. To confirm the number of configured VFs, run the following command:
   ```
   # esxcfg-module -g be2net
   ```
8. To list the SR-IOV enabled pNICs, run the following command:
   ```
   # esxcli network sriovnic list
   ```
9. To list the status of the VFs enabled on a PF, run the following command:
   ```
   # esxcli network sriovnic vf list -n vmnic<X>
   ```
   where "vmnic<X>" is the interface corresponding to the PF.

   Note: The vSphere Client option **Configuration > Advanced Settings** also lists the VFs configured with the above command.

10. To assign a VF to a VM, right-click the VM in the vSphere Client and select **Edit Settings**. Under the **Hardware** tab, click **Add** and select **PCI Device** to attach a VF to the VM.

    Note: A maximum of six VFs can be assigned to a VM.

Configuring Emulex Universal Multi-Channel™

Emulex Universal Multi-Channel, or UMC, enables the capability to divide a 10GbE port into multiple physical functions, with flexible bandwidth capacity allocation, that appear to the operating system and network as separate physical devices.

Multi-Channel can be configured on OCe14000-series adapters through the adapter BIOS or the OneCommand Manager application.

- To configure Multi-Channel using the adapter BIOS, see the *Boot for NIC, iSCSI, FCoE, and RoCE Protocols User Manual*.
- To configure Multi-Channel using the OneCommand Manager for VMware vCenter application, see the latest *OneCommand Manager for VMware vCenter User Manual*.

Refer to the *Emulex Universal Multi-Channel Reference Guide* for additional information on Multi-Channel.

Using ARI

If Multi-Channel is enabled on an OCe14000-series network adapter, each port can be partitioned into isolated PFs (channels).You can configure up to 16 functions on a one-port OCe14400-series adapter, up to 8 functions per port on a one or two-port OCe14100-series adapter, and up to 4 functions per port on a four-port OCe14100-series adapter.

The maximum number of functions allowed on an adapter is controlled by the adapter's IPL file and the system's support for ARI.

ARI must be available to support more than eight functions on an adapter. OCe14000-series adapters automatically support ARI. However, the following requirements must be met in order to support more than eight functions on an adapter.

1. The system hardware (the motherboard and BIOS) must support ARI.
2. ARI must be enabled in the system BIOS.
3. The host or guest operating system must support ARI:
    - Windows Server 2012 and newer versions
    - RHEL 5.9 and newer versions
    - RHEL 6.4 and newer versions
    - SLES 11 SP2 and newer versions
    - ESXi 5.1 and newer versions
4. The application management tools, including the OneCommand Manager for VMware vCenter application, must support ARI.
5. ARI must be enabled in the firmware using the OneCommand Manager for VMware vCenter application.

If these conditions are not met, you may be able to configure more than eight functions, but only up to eight functions will be running and discovered after a reboot.

Configuring VLANs

VLAN filtering is supported in the hardware. To configure VLANs, create the vSwitch with the required VLAN ID and use this interface as an adapter to this vSwitch. A native VLAN can also be configured in the guest operating system in VGT mode. (For example, using vconfig in the Linux guest operating system.)

Note: You cannot run LACP if UMC is enabled.

Refer to the *Emulex Universal Multi-Channel Reference Guide* for additional information on UMC.

Default VLAN Tagging

If default VLAN tagging is configured on a VF, a VLAN ID is automatically added to and removed from every packet sent and received over the VF.

To configure a default VLAN tag:

1. Power off the VM before proceeding to the next step.
2. Edit the <vm-name>.vmx file corresponding to the VM from the vmfs Datastore under /vmfs/volumes/Datastore/<VM_DIR>/.
3. Append the following line:

   ```
   pciPassthru<X>.defaultVlan = "<vlan_id>"
   ```

   where <vlan_id> is the required VLAN ID value for the pass-through VF <X> assigned to the VM.
4. Power on the VM.

Virtual Guest Tagging

If VGT is configured, a guest operating system can configure any VLAN ID using the native VLAN configuration method in the guest operating system.

To enable VGT:

1. Configure the special VLAN ID 4095 using the steps listed in "Default VLAN Tagging" on page 24.
2. Use the native method in the guest operating system to configure the required VLAN ID (for example, vconfig in the Linux guest operating system).

Configuring a Static MAC for a VF

A MAC address is automatically configured by ESXi for each VF. This default MAC address can be modified using the following steps:

1. Power off the VM before proceeding to the next step.
2. Edit the <vm-name>.vmx file corresponding to a VM from the vmfs Datastore under /vmfs/volumes/Datastore/<VM_DIR>/.
3. To configure the MAC address "00:50:56:00:00:02" on the first VF assigned to this VM, append the following lines:

   ```
   pciPassthru0.MACAddressType = "static"
   pciPassthru0.MACAddress = "00:50:56:00:00:02"
   ```
4. Power on the VM.

Configuring NPar (Dell Only)

Notes

- This section is specific to Dell.
- SR-IOV must be disabled on the adapter BIOS if NPar is used. See the following documentation for information on disabling SR-IOV on the adapter BIOS:
  - To configure SR-IOV using the adapter BIOS, see the *Boot for NIC, iSCSI, FCoE, and RoCE Protocols User Manual*.

- To configure SR-IOV using the OneCommand Manager for VMware vCenter application, see the *OneCommand Manager for VMware vCenter User Manual*.

NPar enables the capability to divide a 10Gb port into multiple physical functions, with flexible bandwidth capacity allocation, that appear to the operating system and network as separate physical devices.

Adapter Configuration

NPar can be configured on OCe14000-series adapters through the adapter BIOS or the OneCommand Manager application.

- To configure NPar using the adapter BIOS, see the *Boot for NIC, iSCSI, FCoE, and RoCE Protocols User Manual*.
- To configure NPar using the OneCommand Manager for VMware vCenter Server, see the latest *OneCommand Manager for VMware vCenter Server User Manual*.

On the host operating system side, NPar provides up to 16 physical functions per device, if NParEP is enabled, using the standard PCI configuration space. The number of physical functions that can be mapped to a physical port depends on the adapter:

- Four-port adapter = four physical functions
- Two-port adapter = eight physical functions

Each physical function or partition is assigned a unique MAC address.

Partitions are available for virtual function assignment and for application segmentation via VLAN or IP subnets.

Adapter Requirements

- The partitions can be on separate subnets or VLANs
- Bandwidth allocation is flexible
- No operating system or BIOS changes required
- No external switch changes required
- Each partition should have standard NIC properties for stateless offload

The following items are supported on a per-partition basis:

- Per-partition statistics
- TSO required per partition
- MTU per partition
- Support for NetQueues

Using NParEP

Notes

- NParEP is available on OCe14000-series adapters only.

- SR-IOV must be enabled on the system BIOS if NParEP is used. See the documentation that accompanied your Dell server for more information.
- NParEP support is available on Dell 13G or newer systems only.

NParEP can be configured on the OCe14000 family of adapters by using the adapter BIOS utility or the OneCommand Manager for VMware vCenter application.

- To configure NParEP using the adapter BIOS utility, see the *Boot for NIC, iSCSI, FCoE, and RoCE Protocols User Manual*.
- To configure NParEP using the OneCommand Manager for VMware vCenter application, see the *OneCommand Manager for VMware vCenter User Manual*.

Configuring Network Heap Size in ESXi Server 5.1

The amount of memory allocated by default for a network heap depends on the amount of memory configured in the system. The ESXi Server network stack allocates a minimum of 64 MB to the network heap to handle network data. Additional memory is allocated to the network heap if the system is configured with more memory. If the network load requires more than 64 MB of memory, the NIC driver cannot allocate it. When this happens, the driver logs messages in the file /proc/vmware/log indicating that the alloc_skb() call failed. This impacts network performance considerably.

To read the current size of the network heap, run the following command:

```
# esxcfg-advcfg -j netPktHeapMaxSize
netPktHeapMaxSize = 0
#
```

If the default value of 64 MB is in effect, this command shows the PktHeapMaxSize as 0. If any other value is in effect, the command returns that value.

You can allocate more memory for the network heap using the esxcfg-advcfg command. For example, to set the heap size to 128 MB, run the following commands:

```
# esxcfg-advcfg -k 128 netPktHeapMaxSize
# esxcfg-advcfg -j netPktHeapMaxSize
netPktHeapMaxSize = 128
#
```

The new value takes effect after a reboot.

Obtaining Information on the Installed NIC Driver

To get information on the installed NIC driver on ESXi 5.1 systems, enter

```
esxcli software vib list | grep be2net
```

To get information on the install NIC driver on ESXi 5.5 and 6.0 systems, enter

```
esxcli software vib list | grep elxnet
```

Installing the iSCSI Driver

This section provides installation information for the Emulex iSCSI driver. Before using this product, you need a working knowledge of iSCSI and network-storage devices.

Installing the iSCSI Driver and Management Software

For ESXi 5.1, 5.5, and 6.0 systems, the Emulex iSCSI driver is available out-of-box. A direct link to the iSCSI driver available for download from VMware is provided on the Downloads page on the Emulex website.

Notes

- Before installing the OneCommand Manager for VMware vCenter Server application, you must install the iSCSI driver from the VMware software website.
- Before installing the driver and CIM Provider, verify that the firmware version is correct. If it is, proceed with the installation. If it is not, you must update the firmware using the OneCommand Manager for VMware vCenter Server application or the OneCommand Manager application on a Windows server. See the *OneCommand Manager for VMware vCenter Server User Manual* and the *OneCommand Manager Application User Manual* for additional information. The installation requires that the CIM Provider be installed. For more information on installing the CIM Provider, see the appropriate *CIM Provider Installation Guide*.
- The driver kit includes the IMA plug-in; see the documentation from VMware for information.

Updating Drivers with VMware Offline Bundle Media

VMware recommends using the offline bundle to update software on VMware ESXi 5.1, 5.5, and 6.0 platforms.

Note: For more information about the ESXi Patch Management activities, refer to the VMware website.

To update a driver with the offline bundle media:

1. Run the following command:

   ```
   esxcli software vib install --maintenance-mode -d
   <absolute_path_to_bundle>/<driver_name>-<driver-version>.zip
   ```

   where <driver_name> represents the FC/FCoE, NIC, or iSCSI driver.

   For example, to update the iSCSI driver, type the following command:

   ```
   esxcli software vib install --maintenance-mode -d
   <absolute_path_to_bundle>/esx-5.0.0-472629-be2iscsi-10.0.567.0.zip
   ```

2. Reboot the VMware ESXi Server to activate the drivers.

3. Configuration

This section provides configuration information for the ESXi driver for FC/FCoE, NIC, and iSCSI protocols.

ESXi Command Line Tool Transition

For the ESXi 5.5 release and all subsequent operating system releases, VMware is starting the transition from esxcfg commands to esxcli commands. This section describes the transition to the esxcli commands.

Note: Both sets of commands are supported in the ESXi 5.5 and 6.0 releases.

ESXi 5.1 Implementation

For ESXi 5.1, Emulex used the esxcfg series of native command line applications to mine data, but the primary application used was the esxcfg-module to set and get driver parameters.

FC/FCoE Driver Examples

For the FC/FCoE driver:

```
esxcfg-module -s "lpfc_log_verbose=0x10c3" lpfc820
```

This command could also be used to retrieve the driver parameters set.

For example:

```
esxcfg-module -g lpfc820
lpfc820 enabled = 1 options = 'lpfc_log_verbose=0x10c3'
```

Ethernet Driver Examples

For the Ethernet driver, the following commands were also used to set and retrieve driver parameters:

- To retrieve the parameters set:

  ```
  ~ # esxcfg-module -g be2net
  be2net enabled = 1 options = 'max_vfs=2,2'
  ```

- To set the module parameter that specify the number of virtual functions:

  ```
  ~ # esxcfg-module -s max_vfs=2,2 be2net
  ```

- To set the module parameter that enables or disables MSI-X:

  ```
  ~ # esxcfg-module -s msix=0 be2net
  ```

ESXi 5.5 and 6.0 Implementation

For ESXi 5.5 and 6.0, Emulex uses the esxcli version of the command sequence, which has a different command syntax.

For example:

The command syntax to list the supported parameters by a driver:

```
~ # esxcli system module parameters list -m <driver binary name>
```

The command syntax for setting a parameter to a driver module:

```
~ # esxcli system module parameters set -p <parameter_string> -m
<driver binary name>
```

FC/FCoE Driver Examples

To set extended logging for the Emulex FC/FCoE driver:

```
~ # esxcli system module parameters set -p lpfc_log_verbose=0x10c3
-m lpfc
```

To list the parameter values assigned to a driver module:

```
~ # esxcli system module parameters list -m lpfc
```

This command is the same as listing parameters. The parameter set has the "value" column completed if applicable. This command lists all instance and global parameters, which makes it necessary to watch for any altered driver parameters.

Ethernet Driver Examples

To list the module parameters supported by the elxnet driver:

```
~ # esxcli system module parameters list -m elxnet
```

To set the number of virtual functions for the Emulex elxnet driver:

```
~# esxcli system module parameters set -p max_vfs=2,2 -m elxnet
```

To verify the altered parameter value in the elxnet driver module:

```
~ # esxcli system module parameters list -m elxnet
```

To disable MSI-X support for the Emulex elxnet driver:

```
~ # esxcli system module parameters set -p msix=0 -m elxnet
```

To verify the altered parameter value in the elxnet driver module:

```
~ # esxcli system module parameters list -m elxnet
```

To enable emi_canceller for the Emulex elxnet driver:

```
~ # esxcli system module parameters set -p emi_canceller=1 -m elxnet
```

To verify the altered parameter value in the elxnet driver module:

```
~ # esxcli system module parameters list -m elxnet
```

To disable vxlan_offload for the Emulex elxnet driver:

```
~ # esxcli system module parameters set -p vxlan_offload=0 -m elxnet
```

Note: This parameter applies to OCe14000-series adapters only.

To enable RSS for the Emulex elxnet driver:

```
# esxcli system module parameters set -p rss=1 -m elxnet
```

To change the global DebugMask value of the Emulex elxnet driver:

```
# esxcli system module parameters set -p "debugMask=0x0120" -m
elxnet
```

See "NIC Informational Log Groups for ESXi 5.5 and 6.0" on page 160 for more information.

To verify the altered parameter value in the elxnet driver module:

```
~ # esxcli system module parameters list -m elxnet
```

FC/FCoE Driver Configuration

You can configure driver parameters using native ESXi tools, the Emulex OneCommand Manager application (for use in non-lockdown mode only), or the OneCommand Manager for VMware vCenter Server application (for use in both lockdown and non-lockdown modes).

This document describes how to configure parameters using native ESXi tools. For a more comprehensive description of ESXi tools, refer to VMware's public website. If you have further questions, contact a VMware technical support representative.

See the *OneCommand Manager Application User Manual* and the *OneCommand Manager Command Line Interface User Manual* for information about the OneCommand Manager application.

See the *OneCommand Manager for VMware vCenter Server User Manual* for information about the OneCommand Manager for VMware vCenter Server application.

FC/FCoE Driver Parameters Configuration Methods

Configure the driver parameters using any of the following methods:

- Permanent (global)
- Permanent (per adapter)
- Temporary (global)
- Temporary (per adapter)

The OneCommand Manager application supports all four ways to configure driver parameters. This is the preferred method of setting configuration parameters. Refer to the *OneCommand Manager Application User Manual* or the *OneCommand Manager for VMware vCenter User Manual* for more information.

The native ESXi tools only support permanent configuration methods for the driver parameters. The following section provides further information on permanent configuration methods.

Permanent FC/FCoE Configuration Methods Using Native ESXi Tools

Permanent configuration requires that the new values be saved in the ESXi environment. These changes are considered permanent because they persist across system reboots.

See "FC/FCoE Driver Configuration Parameters" on page 35 for parameter names and values. Parameter values are in both hexadecimal and decimal.

Note: For ESXi systems, the following steps must be executed from the Troubleshooting Administrative Shell environment. If your configuration does not provide access to this shell, refer to VMware's vSphere or VMware's vCenter server manual for enabling driver logging. Alternatively, refer to Emulex's *CIM Provider Installation Guide* for driver logging.

To make changes that impact all adapters in the system (global changes):

1. From the Troubleshooting Administrative Shell environment's terminal window, use one of the following commands:

   For ESXi 5.5 and 6.0 systems, type

   ```
   esxcli system module parameters set -p param1=value param2=value
   ... -m lpfc
   ```

   For ESXi 5.1 systems, type

   ```
   esxcfg-module -s "param=value param2=value..." <driver_name>
   ```

   The <driver_name> is obtained from the vmkload_mod -l call. Look for the "lpfc" prefix.

2. To reboot the server, type

   ```
   reboot
   ```

Notes

- VMware does not officially support unloading the driver via vmkload_mod -u. If you must unload the driver, contact VMware technical support.
- NPIV port creation and deletion are performed by the VMware vSphere client or Virtual Center service. Refer to the VMware documentation for more information.

Example of Permanent Global Configuration

The following example sets lun_queue_depth (the maximum number of commands that can be sent to a single LUN) to 20 (default is 30) for all Emulex adapters in your system.

1. Locate the parameter lpfc_lun_queue_depth in Table 3-1 on page 36.
2. Set the permanent value using one of the following commands:

   For ESXi 5.5 and 6.0 systems, type

   ```
   esxcli system module parameters set -p lpfc_lun_queue_depth=20 -m
   lpfc
   ```

   For ESXi 5.1 systems, type

   ```
   esxcfg-module -s lpfc_lun_queue_depth=20 -m lpfc820
   ```

3. To reboot the server, type

   ```
   reboot
   ```

   The new setting is used when the driver reloads.

To verify the setting, use one of the following commands:

For ESXi 5.5 and 6.0 systems, type

```
esxcli system module parameters list -m lpfc
```

For ESXi 5.1 systems, type

```
esxcfg-module -g lpfc820
```

Examples of Permanent Per-Adapter Configuration

The following example sets lun_queue_depth to 20 (default is 30) for adapter #1.

1. Set the adapter-specific value using one of the following commands:

   For ESXi 5.5 and 6.0 systems, type

   ```
   esxcli system module parameters set -p lpfc1_lun_queue_depth=20
   -m lpfc
   ```

   For ESXi 5.1 systems, type

   ```
   esxcfg-module -s "lpfc1_lun_queue_depth=20" lpfc820
   ```

2. To reboot the server, type

   ```
   reboot
   ```

   The new setting is used when the driver is reloaded.

To verify the setting, use one of the following commands:

For ESXi 5.5 and 6.0 systems, type

```
esxcli system module parameters list -m lpfc
```

For ESXi 5.1 systems, type

```
esxcfg-module -g lpfc820
```

The following example sets lun_queue_depth to 20 (default is 30) for adapter #1 and lun_queue_depth to 10 (default is 30) for adapter #2 on an ESXi 5.1 server.

1. Set the adapter-specific value using one of the following commands:

   For ESXi 5.5 and 6.0 systems, type

   ```
   esxcli system module parameters set -p lpfc1_lun_queue_depth=20
   -m lpfc
   ```

   For ESXi 5.1 systems, type

   ```
   esxcfg-module -s "lpfc1_lun_queue_depth=20
   lpfc2_lun_queue_depth=10" lpfc820
   ```

   Note: Type the command all on one line without a carriage return.

2. To reboot the server, type

   ```
   reboot
   ```

   The new settings are used when the driver is reloaded.

To verify the settings, use one of the following commands:

For ESXi 5.5 and 6.0 systems, type

```
esxcli system module parameters list -m lpfc
```

For ESXi 5.1 systems, type

```
esxcfg-module -g lpfc820
```

Dynamically Adding LUNs

For instructions on dynamically adding LUNs, refer to the "Using Rescan" section of the VMware SAN Configuration documentation.

Dynamically Adding Targets

VMware does not provide a native mechanism for this process. After all target/LUN configuration steps have been successfully completed, add the target to the intended fabric zone.

To get the driver to log into the target, either the target or initiator link must be bounced. If the target is configured with security ACLs, the same link bounce requirement applies after the security ACLs are corrected.

To force the ESXi server to rescan all devices:

- Run the following command:

```
esxcfg-rescan vmhbaX
```

-Or-

- From the vSphere Client, click **Configuration Tab > Storage Adapters**, and then click **Rescan All**.

FC/FCoE Driver Configuration Parameters

Table 3-1, FC/FCoE Driver Parameters, lists the FC/FCoE driver module parameters, their descriptions, and their corresponding values in previous ESXi environments and in ESXi 5.5 and 6.0 native mode.

Note: For ESXi 5.1 systems, all adapter-specific parameters must have an lpfcX_ prefix (where X is the driver instance number). For example, setting lpfc0_lun_queue_depth=20 makes 20 the default maximum number of commands that can be sent to a single logical unit (disk) for lpfc instance 0.

Dynamic parameters do not require a system reboot for changes to take effect.

Table 3-1 FC/FCoE Driver Parameters

Module Parameter	Description	ESXi 5.1 Legacy Driver Model Values	ESXi 5.5 and 6.0 OP Native Mode Driver Model Values	Comments
throttle_log_cnt	Do not exceed this number of messages logged within 'throttle_log_time'		Default (Def) = 10 Minimum (Min) = 1 Maximum (Max) = 1000	For the native mode driver. Logging mechanism intended to speed up issue diagnosis by reducing the necessity to enable driver logging.
throttle_log_ time	Do not exceed 'throttle_log_cnt' number of logs within this time limit (seconds)		Def = 1 Min = 1 Max = 1000	For the native mode driver. Works with throttle_log_cnt.
compression_log	Define how often the compression logs are written (in seconds)		Def = 300 Min = 5 Max = 86400	For the native mode driver. The driver uses this parameter to periodically write status messages to the vmkernel log. The messages provide state analysis on the paths, targets, and adapter. It differs from throttle in that throttle stops the driver from spamming the logs on a very high frequency failure.
suppress_link_ up	Suppress Link Up at initialization: 0x0 = bring up link 0x1 = do not bring up link 0x2 = never bring up link		Def = 0 Min = 0 Max = 2	For the native mode driver. Enable to assist with SAN issues during ESX boot.

Table 3-1 FC/FCoE Driver Parameters (Continued)

Module Parameter	Description	ESXi 5.1 Legacy Driver Model Values	ESXi 5.5 and 6.0 OP Native Mode Driver Model Values	Comments
max_targets	The maximum number of discovered targets allowed		Def = 256 Min = 0 Max = 4096	For the native mode driver. Driver parameter to adjust supported target count.
disable_mq	Disable MultiQueue functionality. 0 = MultiQueue is enabled (default) 1–16 = MultiQueue is disabled, also defines the number of event queue/completion queue/WQ tuples the driver allocates		Def = 0 Min = 0 Max = 8	For the native mode driver. By default, ESXi 5.1 -> ESXi 5.5 has MultiQueue support and is the default. Change reflects driver auto-configuration feature. If the value is nonzero, it should match fcp_io_channel.
lpfc_delay_discovery	Delay NPort discovery when the Clean Address bit is cleared	Def = 0 Min = 0 Max = 1	Def = 0 Min = 0 Max = 1	No changes
use_mq	Use MultiQueue Kernel API for ESXi 5.x operating systems. 0 = Disable MultiQueue 1 = Enable MultiQueue	Def = 1 Min = 0 Max = 1		Deprecated in the native mode driver Replaced with disable_mq
fcp_wq_count	Set the number of fast-path FCP work queues, if possible	Def = 8 Min = 1 Max = 31		Deprecated in the native mode driver Replaced with fcp_io_channel
fcp_eq_count	Set the number of fast-path FCP event queues, if possible	Def = 8 Min = 1 Max = 31		Deprecated in the native mode driver Replaced with fcp_io_channel
enable_fcp_priority	Enable (1) or disable (0) FCP Priority.	Def = 0 Min = 0 Max = 1	Def = 0 Min = 0 Max = 1	No changes

Table 3-1 FC/FCoE Driver Parameters (Continued)

Module Parameter	Description	ESXi 5.1 Legacy Driver Model Values	ESXi 5.5 and 6.0 OP Native Mode Driver Model Values	Comments
iocb_cnt	IOCBs allocated for extended link service, common transport, and abort sequence in 1024 increments.	Def = 1 Min = 1 Max = 5	Def = 1 Min = 1 Max = 5	No changes
sli_mode	SLI mode selector: 0 – auto 2 - SLI-2 3 - SLI-3	Def = 0 Min = 0 Max = 3		Deprecated in the native mode driver
devloss_tmo	The number of seconds the driver holds I/O waiting for a loss device to return	Def = 10 Min = 1 Max = 255	Def = 10 Min = 1 Max = 255	No changes
log_verbose	Verbose logging bit-mask	Def = 0 Min = 0 Max = 0x7fffffff	Def = 0 Min = 0 Max = 0x7fffffff	No changes
lun_queue_depth	The maximum number of FCP commands that can queue to a specific LUN. **Note:** The driver dynamically limits the runtime lun_queue_depth setting to 1/8th of the hba_queue_depth to prevent I/O starvation. An attempt to set the lun_queue_depth higher than the 1/8th setting results in a failure. The console logs and the adapter KeyVal page reflects the failure.	Def = 30 Min = 1 Max = 128	Def = 30 Min = 1 Max = 512	No changes
tgt_queue_depth	The maximum number of FCP commands queued to a specific target port	Def = 8192 Min = 10 Max = 8192	Def = 65535 Min = 10 Max = 65535	Default and maximum values increased
hba_queue_depth	The maximum number of FCP commands queued to an FC/FCoE adapter. The driver automatically adjusts hba_queue_depth to adapter capabilities. This setting may be overridden.	Def = 8192 Min = 32 Max = 8192	Def = 8192 Min = 32 Max = 8192	No changes
scan_down	Start scanning for devices from highest AL_PA to lowest	Def = 1 Min = 0 Max = 1	Def = 1 Min = 0 Max = 1	No changes

Table 3-1 FC/FCoE Driver Parameters (Continued)

Module Parameter	Description	ESXi 5.1 Legacy Driver Model Values	ESXi 5.5 and 6.0 OP Native Mode Driver Model Values	Comments
topology	Select FC topology. Valid values are: 0x0 = attempt loop mode then point-to-point 0x01 = internal loopback mode 0x02 = attempt point-to-point mode only 0x04 = attempt loop mode only 0x06 = attempt point-to-point mode then loop	Def = 0 Min = 0 Max = 6	Def = 0 Min = 0 Max = 6	No changes
link_speed	Select link speed: 0 = auto select 1 = 1 Gigabaud 2 = 2 Gigabaud 4 = 4 Gigabaud 8 = 8 Gigabaud 10 = 10 Gigabaud 16 = 16 Gigabaud	Def = 0 Min = 0 Max = 16	Def = 0 Min = 0 Max = 16	No changes
fcp_class	Select FC class of service for FCP sequences	Def = 3 Min = 2 Max = 3	Def = 3 Min = 2 Max = 3	No changes
use_adisc	Use address discovery on rediscovery to authenticate FCP devices, instead of port login.	Def = 0 Min = 0 Max = 1	Def = 0 Min = 0 Max = 1	No changes
first_burst_size	First burst size for targets that support first burst.		Def = 0 Min = 0 Max = 65536	For the native mode driver.
max_scsicmpl_time	Use SCSI command completion time to control queue depth to the device. 0 – SCSI command Completion time is not used for controlling I/O queue depth. N – I/O queue depth is controlled to limit the I/O completion time to N msecs.	Def = 0 Min = 0 Max = 60000	Def = 0 Min = 0 Max = 60000	No changes
ack0	Enable ACK0 support. Use ACK0, instead of ACK1, for class 2 acknowledgement.	Def = 0 Min = 0 Max = 1	Def = 0 Min = 0 Max = 1	No changes

Table 3-1 FC/FCoE Driver Parameters (Continued)

Module Parameter	Description	ESXi 5.1 Legacy Driver Model Values	ESXi 5.5 and 6.0 OP Native Mode Driver Model Values	Comments
fdmi_on	Enable FDMI support. 0 = disable FDMI support (default setting) 1 = enable FDMI without 60-second delay, use a subset of adapter and port attributes 3 = enable FDMI with 60-second delay, use a subset of adapter and port attributes 5 = enable FDMI without 60-second delay, use all adapter and port attributes 7 = enable FDMI with 60-second delay, use all adapter and port attributes **Notes** • Values 2, 4, and 6 are reserved. • Values 3 and 7 are for compatibility with older switches. If issues arise using values 0, 1, or 5, contact Emulex technical support. • If FDMI is not operational, use a value of 7 to introduce a delay. • A port reset or adapter reboot is required for the new setting to take effect. • The 60-second delay starts after link up. • Port attributes subset are attributes 1–6. • Adapter attributes subset are attributes 1–0xB. • All port attributes include attributes: 1–0xD, 0x101, 0x102, and 0x103. • All adapter attributes include attributes: 1–0xC. See Table 3-2, Adapter Port Attributes for fdmi_on Parameter, on page 43 for a list of the adapter port attributes. See Table 3-3, Adapter Attributes for fdmi_on Parameter, on page 43 for a list of the adapter attributes.	Def = 0 Min = 0 Max = 7	Def = 0 Min = 0 Max = 7	No changes

Table 3-1 FC/FCoE Driver Parameters (Continued)

Module Parameter	Description	ESXi 5.1 Legacy Driver Model Values	ESXi 5.5 and 6.0 OP Native Mode Driver Model Values	Comments
discovery_ threads	The maximum number of extended link service commands that can be outstanding during discovery.	Def = 32 Min = 1 Max = 64	Def = 32 Min = 1 Max = 64	No changes
max_luns	The maximum number of LUNs allowed	Def = 256 Min = 1 Max = 65535	Def = 256 Min = 1 Max = 65535	No changes
task_mgmt_tmo	Maximum time to wait for task management commands to complete.		Def = 60 Min = 5 Max = 180	For the native mode driver.
use_msi	Use preferred MSI-X interrupt mode if possible. 0 = MSI disabled (INTx mode) 1 = MSI enabled 2 = MSI-X enabled	Def = 2 Min = 0 Max = 2	Def = 2 Min = 0 Max = 2	No changes
fcf_failover_ policy	FCF Fast failover = 1 Priority failover = 2	Def = 1 Min = 1 Max = 2	Def = 1 Min = 1 Max = 2	No changes
enable_rrq	Enable Reinstate Recovery Qualifier functionality.	Def = 2 Min = 0 Max = 2 0x0: disabled, XRI/OXID use not tracked. 0x1: XRI/OXID reuse is timed with ratov, Reinstate Recovery Qualifier sent. 0x2: XRI/OXID reuse is timed with ratov, No Reinstate Recovery Qualifier sent.	Def = 2 Min = 0 Max = 2	No changes
EnableXLane	Enable ExpressLane		Def = 0 Min = 0 Max = 1	For the native mode driver.

Table 3-1 FC/FCoE Driver Parameters (Continued)

Module Parameter	Description	ESXi 5.1 Legacy Driver Model Values	ESXi 5.5 and 6.0 OP Native Mode Driver Model Values	Comments
XLanePriority	ExpressLane CS_CTL Priority. Sets the CS_CTL field in FC Header. See the switch vendor administration guide for additional information.		Def = 0x0 Min = 0x0 Max = 0x7F	For the native mode driver.
sg_seg_cnt	The maximum Scatter Gather Segment Count for DMA. The maximum data allowed in one SG element is 0x80000000.	Def = 64 Min = 64 Max = 256	Def = 64 Min = 64 Max = 4096	The maximum was increased to account for larger SCSI I/O sizes.
pci_max_read	The maximum DMA read byte count. Valid values are: 0 512 1024 2048 4096	Def = 0 Min = 0 Max = 4096		Deprecated in the native mode driver
nlp_slab_cnt	NLP Slab entries		Def = 64 Min = 32 Max = 256	For the native mode driver. Controls the size of the driver's node table. This table in turn limits the driver's ability to discover remote ports, fabric, initiator, and targets in a zone.
rb_slb_cnt	Receive Buffer slab entries		Def = 256 Min = 32 Max = 256	For the native mode driver. Controls the maximum number of Receive Buffers that will be posted to the adapter.
lpfc_max_heap_size	Maximum allowable memory consumption per server for the LPFC module.		Def = 128 MB Min = 64 MB Max = 512 MB	For the native mode driver.

Note: The values in Table 3-2 and Table 3-3 are taken from the FC-GS Fibre Channel Standard documents and are passed to the switch through Fibre Channel Common Transport (CT) commands. Adapter port attributes are provided for

each adapter port. Adapter attributes are provided once for each adapter, no matter the number of ports.

Table 3-2 Adapter Port Attributes for fdmi_on Parameter

Hexadecimal Value	Information Type
0x001	Supported FC-4 Types
0x002	Supported Speed
0x003	Current Port Speed
0x004	Maximum Frame Size
0x005	Operating System Device Name
0x006	Host Name
0x007	Node Name
0x008	Port Name
0x009	Port Symbolic Name
0x00A	Port Type
0x00B	Supported Classes of Service
0x00C	Port Fabric Name
0x00D	Port Active FC-4 Types
0x101	Port State
0x102	Number of Discovered Ports
0x103	Port Identifier

Table 3-3 Adapter Attributes for fdmi_on Parameter

Hexadecimal Value	Information Type
0x001	Node Name
0x002	Manufacturer
0x003	Serial Number
0x004	Model
0x005	Model Description
0x006	Hardware Version
0x007	Driver Version
0x008	Option ROM Version (boot code)
0x009	Firmware Version
0x00A	Operating System Name and Version
0x00B	Maximum CT Payload Length
0x00C	Node Symbolic Name

Creating an FC Remote Boot Disk

For instructions on creating an FC remote boot disk, refer to the VMware SAN Configuration documentation.

Managing Devices through the CIM Interface

VMware on the Visor-based ESXi platforms uses the CIM interface as the only standard management mechanism for device management.

Using the OneCommand Manager GUI

For VMware ESXi 5.1, 5.5, and 6.0 hosts, you can manage adapters using the OneCommand Manager application on Windows, but you must install and use the appropriate Emulex CIM Provider.

Note: For VMware ESXi 5.1, 5.5, and 6.0 hosts, if advanced adapter management capabilities are required (for example, iSCSI Management and port disable), use the OneCommand Manager application for VMware vCenter.

Using the OneCommand Manager Application for VMware vCenter

The OneCommand Manager for VMware vCenter Server application uses the standard CIM interfaces to manage the adapters and supports CIM-based device and adapter management. The OneCommand Manager for VMware vCenter Server application also supports existing adapter management functionality based on its proprietary management stack and the standard HBAAPI interface. To manage LightPulse and OneConnect adapters (including updating the firmware) on an ESXi 5.1, 5.5, or 6.0 host using the OneCommand Manager for VMware vCenter Server application, you must install the out-of-box Emulex CIM Provider on the host.

For more information on installing the OneCommand Manager for VMware vCenter Server application and enabling the CIM Provider, see the *OneCommand Manager for VMware vCenter Server User Manual*.

Installing the Emulex CIM Provider

Refer to the *CIM Provider Installation Guide* for instructions on installing the Emulex CIM provider.

Creating, Deleting, and Displaying VPorts

The Emulex driver for VMware supports NPIV by default. The only management API for creating and deleting a vPort and creating an NPIV-enabled virtual machine comes from ESXi. VPorts in the driver discover the fabric just like physical ports do, and are subject to the same SAN delays. As the number of VPorts increases, the amount of time it takes to complete remote port discovery increases. This is because the VPorts are created sequentially and each vPort executes discovery synchronously. If your

NPIV-enabled virtual machines power-on automatically, powering on could take longer than usual. This is normal for NPIV virtual machines.

The following notes apply to VPorts:

- Ensure you are using the latest recommended firmware for vPort functionality. Check the Emulex website for the latest firmware.
- Loop devices and NPIV are not supported on the same port at the same time. If you are running a loop topology and you create a vPort, the vPort's link state is offline. VMware ESX supports fabric mode only.
- You can create VPorts only on 4, 8, and 16GFC LightPulse adapters, and on OneConnect adapters. You cannot create VPorts on 1GFC or 2GFC adapters.
- The OneCommand Manager application sees all VPorts created by the driver, but the application has read-only access to them.

Configuring Virtual Volumes in ESXi 6.0

The Emulex native mode FC/FCoE driver supports the VMware Virtual Volumes feature released in ESXi 6.0 on OneConnect OCe11100-series, OCe14000-series, LPe16202/OCe15100, LPe16000-series, and LPe12000-series adapters.

For instructions on configuring Virtual Volumes, refer to the VMware and target vendor–supplied documentation.

NIC Driver Configuration

This section describes how to configure parameters for the ESXi NIC driver.

Configuring ESXi 5.5 and 6.0 NIC Driver Parameters

Table 3-4, ESXi 5.5 and 6.0 Ethernet Driver Parameters lists the Ethernet driver module parameters, their descriptions, and their corresponding values in previous ESXi environments and in ESXi 5.5 native mode.

Table 3-4 ESXi 5.5 and 6.0 Ethernet Driver Parameters

Module Parameter	Description	ESXi 5.1 Legacy Driver Model Values	ESXi 5.5 and 6.0 OP Native Mode Driver Model Values	Comments
debugMask	The DebugMask is a bit-vector (uint32) and each bit represents a group. The DebugMask value is in eight-digit hexadecimal format (for example, 0x00000101). DRIVER: 0x1 UPLINK: 0x2 QUEUE: 0x4 INTR: 0x8 MCC: 0x10 TX: 0x20 RX: 0x40 MGMT: 0x80 WORKER: 0x100 SRIOV: 0x200 EVENT: 0x400 VLAN: 0x800 VXLAN: 0x1000		Def = 0x1217 (includes DRIVER, UPLINK, MCC, QUEUE, SRIOV, and VXLAN groups)	For the native mode driver
emi_canceller	Enable or disable the EMI Canceller	Def = 0	Def = 0	No changes

Table 3-4 ESXi 5.5 and 6.0 Ethernet Driver Parameters (Continued)

Module Parameter	Description	ESXi 5.1 Legacy Driver Model Values	ESXi 5.5 and 6.0 OP Native Mode Driver Model Values	Comments
max_vfs	The number of PCI VFs to initialize. 0 = disabled 1–63 = enable this many VFs (depends on the ESXi version and adapter)	Def = 0 Min = 0 Max = 16	Def = 0 Min = 0 Max = 63 (depends on adapter)	The driver currently supports a maximum of 30 VFs per PF for the OCe11100-series adapters, 32 VFs per PF for the LPe16202/OCe15100 adapters, 32 VFs per PF for the OCe14100-series adapters, and 63 VFs per PF for the OCe14400-series adapters. **Note:** HP Virtual Connect adapters support a maximum of 24 VFs per PF.
msix	Enable or disable MSI-X		Def = 1	For the native mode driver
rss	Enable or disable RSS		Def = 0	For the native mode driver
vxlan_offload	Enable or disable vxlan_offload		Def = 1	For the native mode driver
vlan_offload	Enable or disable VLAN filtering by the hardware			Deprecated and not supported by the native mode driver

Deprecated Module Option

The vlan_offload module parameter of the previous Ethernet driver (be2net), which provided control for hardware VLAN filtering, is deprecated and is no longer supported in the elxnet driver.

New Module Options

In the elxnet driver, there are two new module parameters:

1. Enable or disable MSI-X support. The driver default is to have MSI-X enabled.
2. Enable or disable vxlan_offload support. The driver default is to have vxlan_offload enabled.

Note: The following output is for illustrative purposes only. The actual output may vary depending on the adapter installed in the system.

The server administrator must run the following command to disable MSI-X:

```
~ # esxcli system module parameters set -p msix=0 -m elxnet
```

And to verify that the value has been reprogrammed:

```
~ # esxcli system module parameters list -m elxnet
```

The server administrator must run the following command to disable vxlan_offload:

```
~ # esxcli system module parameters set -p vxlan_offload=0 -m elxnet
```

Note: This parameter applies to OCe14000-series adapters only.

And to verify that the value has been reprogrammed:

```
~ # esxcli system module parameters list -m elxnet
```

Configuring ESXi 5.1 NIC Driver Parameters

The following table lists the user-configurable NIC driver parameters for ESXi 5.1. It includes a description of the parameter and its default value.

Table 3-5 User-configurable NIC Driver Parameters

Parameter	Default Value	Description
heap_initial	32 MB	The size of the memory heap, in bytes, that should be initially allocated for the driver.
heap_max	38 MB	The maximum possible size to which the driver heap is allowed to grow.

The following command line shows how to load the driver with the initial heap size set to 40 MB:

```
# vmkload_mod be2net heap_initial=41943040
```

To configure the NIC driver to load with this value as the initial heap size after each reboot, run the following command and reboot the system:

```
# esxcfg-module -s "heap_initial=41943040" be2net
```

Performance Tuning

Using vmxnet Emulation

Using vmxnet3 or vmxnet2 as the emulation driver in guest operating systems is crucial for optimal network performance. To configure vmxnet3 as the emulation driver in guest operating systems, you must install VMware Tools in the guest operating systems. For information on installing VMware Tools in a guest operating system, refer to the appropriate VMware ESXi Server documentation.

After VMware Tools are installed, if you add a network adapter for a guest operating system, select vmxnet3 or vmxnet2 as the adapter type.

Enabling TSO

Some Emulex adapters support TSO, which is necessary to achieve optimal transmit throughput performance with low CPU utilization with the adapter. TSO is enabled by default in ESXi 5.1, 5.5, and 6.0 servers.

To view the current TSO configuration in the vSphere client:

1. Select the **Configuration** tab.
2. Under **Software**, click **Advanced Settings**.
3. Under **Net Features**, view the current value of Net.UseHwTSO.
   - If the value is 1, TSO is enabled.
   - If the value is 0, TSO is disabled.

Enabling Jumbo Frames

Enabling jumbo frames reduces CPU utilization and is a recommended practice. To use jumbo frames, you must increase the MTU size in the vSwitch and also in the guest operating system. Emulex adapters support MTU sizes between 64 bytes and 9000 bytes. For optimal performance, set the MTU size to the maximum value supported by your network environment. The desired MTU size must be configured in the vSwitch as well as the guest operating systems. Jumbo frames are not enabled by default in ESXi servers.

To configure the MTU size of a vSwitch using the vSphere client:

1. Select the **Configuration** tab.
2. Under **Hardware**, click **Networking**.
3. Under **Networking**, select **Properties**.
4. Select the vSwitch you wish to edit and click **Edit**.
5. Under **vSwitch Properties** on the General tab, set the MTU value to 9000.

To configure the MTU size of a vSwitch using the CLI, enter the following command:

```
esxcfg-vswitch -m 9000 vSwitch1
```

Setting the MTU Size for a Linux Guest Operating System

To set the MTU size in each Linux guest operating system to 9000, run the following command:

```
ifconfig eth<N> mtu 9000
```

where <N> is the number of the Ethernet interface on which you are working.

Setting the MTU Size for a Windows Guest Operating System

To set the MTU size in each Windows guest operating system:

1. Go to the **Start** menu and select **Control Panel > System**.
2. Select the **Hardware** tab and open **Device Manager**.
3. Expand the **Network Adapters** heading.
4. Right-click the appropriate NIC, and select **Properties**.

5. Select the **Advanced** tab and set the MTU value.

Using the Port Statistics Counters

You can view all of the port statistics counters maintained by the adapter's Ethernet driver for potential performance issues. Excessive drop or error counters are an indication of a bad link or defective hardware.

To view the statistics of the vmnics on the ESXi host, run the following command:

```
# vsish -e get /net/pNics/<vmnicx>/stats
```

where <vmnicx> is the corresponding interface.

To view the port statistics counters on Linux guest VMs on ESXi 5.1, run the following command:

```
# ethtool -S eth<N>
```

where eth<N> is the name of the Ethernet device you are working on (for example, eth0).

Table 3-6 contains a list of ethtool -S option port statistics counters and their descriptions.

To view the port statistics counters on ESXi 5.5 and 6.0, run the following command:

```
# esxcli network nic stats get -n vmnic0
```

Refer to Table 4-12, ESXi 5.5 and 6.0 Native Mode NIC Driver Support for ethtool Commands, on page 172 for the equivalent command to get driver priv stats.

Table 3-6 Port Statistics Counters

Ethtool Statistics Counter Name	Description
rx_packets	The number of packets received.
rx_ucast	The number of unicast packets received.
rx_bcast	The number of broadcast packets received.
rx_mcast	The number of multicast packets received.
rx_bytes	The total number of bytes received.
rx_errors	The total number of error packets received.
rx_length_errors	The number of packets received with length errors. A length error occurs if an incoming packet is undersized (less than 65 bytes) or oversized (greater than 1522/9216 bytes).
rx_over_errors	Receiver ring buffer overflow errors.
rx_crc_errors	The number of packets received with CRC errors.
rx_frame_errors	The number of packets received with a frame alignment error.
rx_fifo_errors	The number of received packets dropped when FIFO entering the packet demux block overflows, or an internal FIFO going into the main packet buffer tank (PMEM) overflows.

Table 3-6 Port Statistics Counters (Continued)

Ethtool Statistics Counter Name	Description
rx_buf_post_fail	The number of times the driver could not allocate a buffer to replenish the receive ring. If this error is frequently observed, you can increase the network heap size using the following command: `esxcfg-advcfg -j netPktHeapMaxSize` Ensure that you reboot the host.
tx_packets	The number of packets transmitted.
tx_bytes	The total number of bytes transmitted.
tx_errors	The total number of error packets transmitted.
tx_timeout_counter	The number of times that a transmit timeout occurred.
tx_rate	The total throughput transmitted from a vmnic interface in Mbps.
rx_rate	The total throughput received by a vmnic interface in Mbps.
on_die_temperature	The current temperature of the chip die in degrees Celsius.
link_down_reason	A value indicating the reason for a link being down: 0 – The link is down for an unknown reason. 1 – The link is down due to DCC. 2 – The link is down due to FIP. 3 – The link is down due to vNIC configuration. 4 – The link is down due to a receive PAUSE flood.
ints-netq-<N>	The number of interrupts on Netqueue <N>.
rx_events-netq-<N>	The number of events received on Netqueue <N>.
rx_packets-netq-<N>	The number of packets received on Netqueue <N>.
rx_bytes-netq-<N>	The number of bytes received on Netqueue <N>.
tx_events-netq-<N>	The number of events transmitted on Netqueue <N>.
tx_packets-netq-<N>	The number of packets transmitted on Netqueue <N>.
tx_bytes-netq-<N>	The number of bytes transmitted on Netqueue <N>.

VXLAN Configuration

The elxnet driver supports hardware offloads for VXLAN on the OCe14000-series adapters. These offloads are enabled by default and can be disabled using the module parameter vxlan_offload.

To view the VXLAN statistics, run the following command:

```
# esxcli elxnet stats get -p <pcidevname> | grep vxlan
```

For more information on configuring VXLAN through VMware vCloud Networking and Security Manager and VMware vSphere Distributed Switch (vDS), refer to the *VMware VXLAN Deployment Guide* available at:

http://www.vmware.com/files/pdf/techpaper/VMware-VXLAN-Deployment-Guide.pdf.

iSCSI Driver Configuration

This section describes how to configure parameters for the ESXi iSCSI driver.

Configuring iSCSI Driver Options

The following table lists the user configurable iSCSI driver options. It includes a description of the parameters, default values, and the limits within which they can be configured.

Note: If the value given for a parameter is outside the supported range (Minimum and Maximum values), then the driver will log an error in the Event Log and continue to load using the default value of the parameter.

Table 3-7 User-configurable iSCSI Driver Options

Parameter	Default Value	Minimum Value	Maximum Value	Description
LDTO	20 seconds	0 seconds	3600 seconds	Link Down Timeout (in seconds) This determines the amount of time the initiator driver will wait for the controller's physical link to become available before reporting that the LUNs are unavailable to the operating system.
ETO 30	30 seconds	0 seconds	3600 seconds	Extended Timeout (in seconds) This determines the amount of time the initiator driver will wait for the target to become available after it has lost connection to the target during an I/O operation. **Note:** If the minimum value is set between 0 - 19, the driver will assume a value of 20 internally. No modifications will be seen in the registry.
im_policy	2	0	4	Controls the rate of interrupts for the adapter. For more information, see “Interrupt Moderation Policy Settings” on page 55.
large I/O	128	128	512	Maximum transfer size in a single I/O request in kilobytes. By default, the iSCSI driver supports a maximum of 128 KB of data in a single I/O request. This option can be used to enable support for 512 KB of data in a single I/O request.
log_level	0x00		0xff	Enables the logging of debug information in system logs for a specific path, or all paths, in the driver.

The following command line shows how to configure the driver with LDTO value as 25 seconds:

```
# vmkload_mod be2iscsi ldto=25
```

To configure the ESXi Server to load the iSCSI driver with this value after each reboot, run the following commands and reboot the system:

```
# esxcfg-module -s "ldto=25" be2iscsi
# /usr/sbin/esxcfg-boot -r
# reboot
```

The im_policy (Interrupt Moderation policy) parameter configures the Emulex iSCSI driver to use different settings for Interrupt Moderation. An im_policy value of 1 achieves the highest interrupt rate, whereas the value 4 provides the least interrupt rate. The default value is 2. An im_policy of 0 turns off the Interrupt Moderation algorithm in the driver.

The large_io option can be used to modify the maximum transfer size in a single SCSI command. By default, the Emulex iSCSI driver in ESXi supports up to 128 KB and 32 Scatter Gather entries in a single SCSI command. If applications issue I/O requests that are larger than 128 KB or need more than 32 Scatter Gather entries, the request will be split into multiple requests by the driver. By specifying large_io=512; the iSCSI driver can support up to 512 KB of data and a total of 128 Scatter Gather entries in a single SCSI command.

Note: By setting the option to 512, the amount of physical memory consumed by the driver increases. Also, though intermediate values between 64 and 512 will be accepted, the memory used by the driver will be the same as what will be used for large_io=512.

To set the large_io parameter in ESXi, type the following commands:

```
esxcfg-module -s large_io=512 be2iscsi --> to set the parameter
esxcfg-module -g be2iscsi --> to view the parameter value
esxcfg-module -i be2iscsi --> to view the options
```

Even though the VMware operating system can be tuned to accept larger I/O sizes from guest operating systems, the guest operating systems will sometimes need to be tuned to create those larger I/Os. For example, a Windows Server 2008, 32-bit guest will by default have a maximum transfer size of 64 KB, even if the VMware kernel is tuned to allow 512-KB I/O transfers. You must modify the guest registry to achieve the maximum transfer rate set in the VMware kernel.

To do this, use the registry editor to add or modify the following entry to change the maximum transfer size for the Windows guest:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Symmpi\Parameters\Device\MaximumSGList
```

The formula used to calculate the proper value for MaximumSGList is:

- For a 32-bit Windows guest use the following formula:

  ```
  MaximumSGList = ((Maximum Transfer Size) / 4) + 1
  ```

- For a 64-bit Windows guest use the following formula:

  ```
  MaximumSGList = ((Maximum Transfer Size) / 8) + 1
  ```

For example: to allow a 256 KB transfer size on a 32-bit guest, this would be the formula to use: 256 / 4 = 64 + 1 = 65 (decimal) or 0x41(hexadecimal).

The maximum value allowed for MaximumSGList is 255 or 0xFF. For the particular value of 0xFF, the internal value passed to Windows is increased to 0x101, allowing support for a full 1-MB transfer (2 MB for 64-bit).

The MaximumSGList is 129 for a 512-KB transfer.

Other guest operating systems may also need to be tuned similarly. Consult the tuning guides that accompany those operating systems.

Interrupt Moderation Policy Settings

Interrupt Moderation Policy settings control the rate of interrupts for the adapter. By default, the driver implements an Interrupt Moderation scheme that is based on the I/O load and the interrupt rate. The default setting for the Interrupt Moderation Policy attempts to vary the interrupt rate between 3500 to 10000 interrupts per second. In addition, the Emulex iSCSI driver allows other configuration settings which are listed in the following table.

Table 3-8 Interrupt Moderation Policy Settings

Setting	Parameter	Description
Disabled	im_policy=0	Interrupt Moderation algorithm is turned off in the driver.
Aggressive	im_policy=1	Achieves the highest interrupt rate among all available settings.
Moderate	im_policy=2	This is the default value.
Conservative	im_policy=3	Achieves a lower interrupt rate than Moderate.
Very Conservative	im_policy=4	Achieves the minimum interrupt rate among all available settings.

While the default setting of Moderate may work for most configurations, there are instances when the setting may need to be changed. Changing the Interrupt Moderation Policy setting should be based on the initiator system configuration, the number of iSCSI targets that will be connected, the I/O load, and the throughput and latency offered by these iSCSI targets.

On systems capable of sustaining a higher interrupt rate and if the number of targets that will be connected is less (up to 8), the more Aggressive setting will result in lower latency and higher values of I/O operations per second (IOPs). But the higher interrupt rate could also result in system stalls and freezes, especially during higher queue depth values and smaller sized I/O requests.

On a configuration that involves a large number of iSCSI targets (more than 32 or 64) and higher values of queue depth, the default setting may prove to be too aggressive and the Interrupt Moderation setting may need to be changed to Conservative or Very Conservative. Though this will increase latency of an I/O request, the lower interrupt rate may allow the system to function under a high load.

iSCSI Error Handling

The goal of iSCSI error handling is to tolerate link level and target level failures up to configured timeout values so that I/O errors are not seen by the application or operating system. Error handling is triggered under the following conditions:

- Loss of immediate link to the initiator (for example, cable disconnect or port failure).

  The firmware detects and notifies the driver of a loss of the link. When this happens, the driver will queue the I/O requests internally up to a configured timeout period so that the operating system does not see I/O errors. This timeout is known as LDTO.

- Loss of connection to the target due to target or network disconnection at the target.

  If the driver has I/O requests pending with the target and the target becomes unavailable (due to target going down or failing over, or network issues at the target), the driver queues up the I/O request internally up to a configured timeout period. This timeout is known as ETO.

When the configured threshold for LDTO and ETO is reached and the initiator is still unable to connect to the target, the driver fails all I/O requests. At this point, I/O errors will be seen by the application and operating system.

Note: Following a link up, switch ports can take a long time to initialize and go to a forwarding state. Because of this, additional time should be added to the ETO and LDTO settings to eliminate I/O disruption and/or target unavailability. If the switch port is connected to a single host, then PortFast mode can be enabled on the switch port to eliminate delays in transitioning to a forwarding state.

Configuring LDTO and ETO on ESXi Server

The following table lists the default values of LDTO and ETO on ESXi Server and the limits within which they can be configured.

Table 3-9 LDTO and ETO Default Values on ESX Server

Parameter	Default Value	Minimum Value	Maximum Value
LDTO	20 seconds	0 seconds	3600 seconds
ETO 30	30 seconds	0 seconds	3600 seconds

Note: If the value of ETO is set to a number between 0 and 19, the driver will assume a value of 20 seconds internally. You will not see any modification to the registry.

LDTO and ETO values are configurable during insmod time. The ETO value specified during insmod is the default ETO value that is applied to all targets.

The following command line shows how to configure the driver with LDTO value as 25 seconds:

```
# vmkload_mod be2iscsi ldto=25
```

To configure ESXi Server to load the iSCSI driver with this value after each reboot, run the following commands and reboot the system:

```
# esxcfg-module -s "ldto=25" be2iscsi
# /usr/sbin/esxcfg-boot -r
# reboot
```

Multipath I/O Support

This section describes the installation and login processes for multipath I/O support.

Configuring and Enabling Support for ESXi MPIO on Non-boot Targets

To configure and enable support for ESXi MPIO on non-boot targets:

1. Connect your configuration for multipath.
2. Log into your targets with all paths using vSphere Client or iSCSISelect. For more information about using vSphere Client, see "Logging into Targets Using vSphere Client" on page 57. For information about using iSCSISelect, see the *Boot Manual for Emulex OneConnect Adapters* or the *Boot Manual for Emulex LightPulse Adapters*.

Configuring and Enabling Support for ESXi MPIO on Boot Targets

To configure and enable support for ESXi MPIO on boot targets:

1. Connect your configuration for multipath. Multipath can be configured before or after installation.
2. Log into your targets with all paths using vSphere Client or iSCSISelect. For more information about using vSphere Client, see "Logging into Targets Using vSphere Client" on page 57. For information about using iSCSISelect, see the *Boot Manual for Emulex OneConnect Adapters* or the *Boot Manual for Emulex LightPulse Adapters*.

Logging into Targets Using vSphere Client

To log into targets using the vSphere Client:

1. Log into the server that you would like to configure from the vSphere Client and select the **Configuration** tab.
2. In the Hardware section, select the **Storage Adapters** link.
3. Select the OneConnect host adapter in the Storage Adapters list.
4. Select the initiator port, and then click **Properties**.
5. From the iSCSI Initiator Properties screen, click the **Dynamic Discovery** tab.
6. Click **Add** to display the Add Send Target Server menu.
7. Type in the IP address of the first target portal and click **OK**.

   The initiator finds the target machines.
8. Click the **Static Discovery** tab to find all target portals.
9. Click **Close**. A dialog box indicates that a rescan is needed.

10. Click **Yes**. The configured LUNs are displayed.
11. Repeat the steps to log into the other target portal to set up MPIO.
12. To check that both paths are connected to the same LUN, follow these steps:
    a. Select the LUN and right-click.
    b. Click **Manage Paths**. Multipaths on the LUN are displayed.

Error Handling Under Multipath (MPIO) and Cluster Configurations

In an MPIO or cluster configuration, fault tolerant software is present on the system that makes the iSCSI driver error handling redundant. These configurations also require that I/O errors be reported as soon as they are detected, so the software can failover to an alternate path or an alternative node as quickly as possible.

When the iSCSI driver is run under these configurations, the error handling implemented in the iSCSI driver must be turned off by setting the default value of LDTO and ETO to 0. The changes will take effect during the next driver load.

Reading the Driver Statistics for a Specified Port

You can read the iSCSI driver's statistics for a specific port on the adapter to diagnose potential performance issues.

To read the driver statistics for a particular port, use the following command:

```
cat /proc/be2iscsi/be2iscsi<XX>/driver_stats
```

where XX is the specific port number.

Setting the Log Level

The log level setting enables the logging of debug information in system logs for a specific path, or all paths, in the driver.

Use one of the following methods to set the log level:

1. User configurable driver parameters – use either of the following commands to set the log level.

   Note: The new log level value will take effect after the next reboot.

   - `# esxcfg-module -s "log_level=0xff" be2iscsi`

   or,

   - `# vmkload_mod be2iscsi "log_level=0xff"`
2. 'log_level' proc entry setting – use the following commands to read and write values to the log_level proc entry.
   - `cat /proc/be2iscsi/log_level` – This command displays the current log level and help.
   - `echo 0xff > /proc/be2iscsi/log_level` – This command sets the log_level value in the driver to enable the desired logging.

See Table 3-10 for a list of available log level values.

Table 3-10 Log Level Values

log_level Value	Description
0x01	Enables logging in the iSCSI driver initialization and unload path.
0x02	Enables logging in the iSCSI driver I/O path.
0x04	Enables logging in the iSCSI driver error handling path.
0x08	Enables logging in the iSCSI driver configuration path, such as adding targets, deleting targets, and so on.
0x10	Enables logging in the iSCSI driver IOCTL path.

Configuring Virtual Volumes in ESXi 6.0

The Emulex vmklinux be2iscsi driver supports the VMware Virtual Volumes feature released in ESXi 6.0 on OneConnect OCe14000-series adapters.

For instructions on configuring Virtual Volumes, refer to the VMware and target vendor–supplied documentation.

4. Troubleshooting

Your system may operate in an unexpected manner in certain circumstances. This section explains many of these circumstances and offers one or more workarounds for each situation.

Troubleshooting the FC/FCoE Driver

This section provides troubleshooting information for the FC/FCoE driver.

Table 4-1, Troubleshooting the FC/FCoE Driver, on page 60, identifies some of the common situations and their potential resolutions.

Table 4-1 Troubleshooting the FC/FCoE Driver

Situation	Resolution
Port link fails to come up.	If an FC link fails to come up, verify that an 8GFC adapter is not attempting to connect to a 1GFC device. Only 2, 4, and 8GFC devices are supported on 8GFC adapters.
The Emulex driver is not loaded and all paths are down.	Use lspci to determine if the Emulex ports are being properly identified. If not, find out if the driver iso was correctly installed. You must have the correct driver for the installed adapter because the device PCI IDs are installed with the driver package. Examine the /var/log/vmkernel.log file for lpfc820 log messages indicating an error. In this case contact Emulex support.
The FC/FCoE driver fails to recognize an adapter and logs "*unknown IOCB*" messages in the system log during driver load. The adapter is running outdated firmware.	Download and install the adapter firmware that complies with the minimum supported revision (or later) listed on the Emulex website.
System panics when booted with a failed adapter installed.	Remove the failed adapter and reboot.

The FC/FCoE driver does not discover all remote ports in the configuration switch zone. Some initiators or targets may appear to be missing.	Evaluate your switch zone. Count how many entries there are and add at least seven more (to account for fabric logins). If the sum exceeds 64, you must increase the driver's node table size. The following commands increase it to 128 entries. See "FC/FCoE Driver Configuration" on page 32 for more information on this driver parameter.
	Globally:
	`esxcli system module parameters set -p â€œlpfc_nlp_slab_cnt=128â€? -m lpfc`
	Per instance:
	`esxcli system module parameters set -p â€œlpfc0_nlp_slab_cnt=128â€? -m lpfc`
	Note: A reboot is required to activate it.

FC/FCoE Driver Log Messages

Log messages have traditionally been organized into logical groups based on code functionality in the FC driver. With the introduction of the latest Emulex adapters, that grouping is modified to account for additional behaviors. The traditional grouping is maintained, but recently added messages are no longer grouped together.

The messages provided in this section are unmaskable error conditions. They are automatically added to the system console log.

You can examine the /var/log/vmkernel file.log to see any of these messages. If you have concerns, the best policy is to run a vm-support dump and contact VMware or Emulex support staff.

Log messages are organized into logical groups based on code functionality within the driver. Each group consists of a block of 100 log message numbers. Most groups require a single block of 100 message numbers, however some groups (INIT, FCP) require two blocks.

Table 4-2 lists the groups and defines the associated number ranges for ESXi 5.1 systems.

Table 4-3 lists the groups and defines the associated number ranges for ESXi 5.5 and 6.0 systems.

Table 4-2 Message Log Table for ESXi 5.1 Systems

LOG Message Verbose Mask Definition	Verbose Bit	Verbose Description
LOG_ELS	0x1	Extended link service events
LOG_DISCOVERY	0x2	Link discovery events
LOG_MBOX	0x4	Mailbox events
LOG_INIT	0x8	Initialization events
LOG_LINK_EVENT	0x10	Link events
LOG_FCP	0x40	FCP traffic history
LOG_NODE	0x80	Node table events
LOG_TEMP	0x100	Temperature sensor events
LOG_MISC	0x400	Miscellaneous and FCoE events
LOG_SLI	0x800	SLI events
LOG_FCP_ERROR	0x1000	Selective FCP events
LOG_LIBDFC	0x2000	IOCTL events
LOG_VPORT	0x4000	NPIV events
LOG_EVENT	0x10000	IOCTL event
LOG_DAEMON	0x20000	IOCTL Daemon events
LOG_FIP	0x40000	FIP event
LOG_PROC	0x80000	Procfs events

Table 4-2 Message Log Table for ESXi 5.1 Systems (Continued)

LOG Message Verbose Mask Definition	Verbose Bit	Verbose Description
LOG_FCP_UNDERRUN	0x100000	FCP underruns
LOG_TRC_NODE	0x00200000	Node Trace Events
LOG_ALL_MSG	0x7fffffff	Log all messages

Table 4-3 Message Log Table for ESXi 5.5 and 6.0 Systems

LOG Message Verbose Mask Definition	Verbose Bit	Verbose Description
LOG_ELS	0x1	Extended link service events
LOG_DISCOVERY	0x2	Link discovery events
LOG_MBOX	0x4	Mailbox events
LOG_INIT	0x8	Initialization events
LOG_LINK_EVENT	0x10	Link events
LOG_MGMT_ERROR	0x20	IODM management error logging
LOG_FCP	0x40	FCP traffic history
LOG_NODE	0x80	Node table events
LOG_TEMP	0x100	Temperature sensor events
LOG_BG	0x200	BlockGuard™ events
LOG_MISC	0x400	Miscellaneous and FCoE events
LOG_SLI	0x800	SLI events
LOG_FCP_ERROR	0x1000	Selective FCP events
LOG_LIBDFC	0x2000	IOCTL events
LOG_VPORT	0x4000	NPIV events
LOG_SECURITY	0x8000	Security events
LOG_EVENT	0x10000	IOCTL event
LOG_FIP	0x20000	FIP event
LOG_FCP_UNDER	0x40000	FCP underrun errors
LOG_KVPAGE	0x80000	KV page verbose
LOG_TASKMGMT	0x100000	Task management events
LOG_MGMT_TRACE	0x200000	IODM management trace logging
LOG_ALL_MSG	0x7fffffff	Log all messages

ESXi 5.5 and 6.0 Message Log Example

The following is an example of a LOG message on ESXi 5.5 and 6.0 systems:

```
2013-09-10T16:50:13.137Z cpu7:33329)WARNING: lpfc:
lpfc_mbx_cmpl_read_topology:3154: 1:1305 Link Down Event x12
received Data: x12 x20 x110 x0
```

In the above LOG message:

- lpfc - driver binary
- lpfc_mbx_cmpl_read_topology - function generating the log
- 1: identifies Emulex HBA1.
- 1305 identifies the LOG message number.

Notes

- If the word 'Data:' is present in a LOG message, any information to the right of 'Data:' is intended for Emulex technical support/engineering use only.
- Unless otherwise noted in the ACTION: attribute, report these errors to Emulex technical support. Emulex requests that when reporting occurrences of these error messages, you provide a tarball of all vmkernel files in /var/log.

ESXi 5.1 Message Log Example

The following is an example of a LOG message on ESXi 5.1 systems:

```
Jul 2 04:23:34 daffy kernel: lpfc 0000:03:06.0: 0:1305 Link Down
Event x2f2 received Data: x2f2 x20 x110
```

In the above LOG message:

- lpfc 0000:03:06.0: identifies the PCI location of the particular FC/FCoE HW port.
- 0: identifies Emulex HBA0.
- 1305 identifies the LOG message number.

Notes

- If the word 'Data:' is present in a LOG message, any information to the right of 'Data:' is intended for Emulex technical support/engineering use only.
- Unless otherwise noted in the ACTION: attribute, report these errors to Emulex technical support. Emulex requests that when reporting occurrences of these error messages, you provide a tarball of all vmkernel files in /var/log.

Extended Link Service Events (0100 - 0199)

elx_mes0100: FLOGI failure Status:<status>/<extended_status> TMO:<timeout>

DESCRIPTION: An extended link service FLOGI command that was sent to the fabric failed.

DATA: (1) ulpStatus, (2) ulpWord[4], (3) ulpTimeout

ACTION: This error could indicate a fabric configuration error or internal driver issue. If this issue persists, report the error to Emulex technical support.

elx_mes0111: Dropping received ELS cmd

DESCRIPTION: The driver decided to drop an extended link service response ring entry.

DATA: (1) ulpStatus, (2) ulpWord[4], (3) ulpTimeout

ACTION: This error could indicate a software driver or firmware issue. If this issue persists, report the error to Emulex technical support.

elx_mes0113: A FLOGI ELS command <elsCmd> was received from DID <did> in Loop Mode

DESCRIPTION: While in Loop Mode an unknown or unsupported extended link service command was received.

DATA: None

ACTION: Check device DID.

elx_mes0115: Unknown ELS command <elsCmd> received from N_Port <did>

DESCRIPTION: Received an unsupported extended link service command from a remote N_Port.

DATA: None

ACTION: Check remote N_Port for potential issue.

elx_mes0122 FDISC Failed (value). Fabric Detected Bad WWN

DESCRIPTION: The driver's F_Port discovery failed. The switch reported a bad WWN in the FLOGI request.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes0124 Retry illegal cmd <value> retry:<value> delay:<value>

DESCRIPTION: Port rejected extended link service command as illegal. Driver retrying.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes0125: FDISC Failed (value). Fabric out of resources

DESCRIPTION: The fabric rejected an F_Port discovery because the switch cannot support any more virtual ports.

DATA: None

ACTION: Reconfigure the switch to support more NPIV logins. If this issue persists, contact Emulex technical support.

elx_mes0126: FDISC failed (ulpStatus/ulpWord[4])\n

DESCRIPTION: The extended link service F_Port discovery command has failed.

DATA: None

ACTION: Check the port and switch configuration.

elx_mes0127: ELS timeout

DESCRIPTION: An extended link service IOCB command was posted to a ring and did not complete within ULP timeout seconds.

DATA: (1) elscmd, (2) remote_id, (3) ulpcommand, (4) ulpIoTag

ACTION: If the extended link service command is not going through the adapter, reboot the system. If this issue persists, report the error to Emulex technical support.

elx_mes0133: PLOGI: no memory for reg_login

DESCRIPTION: Memory allocation error.

DATA: (1) nlp_DID, (2) nlp_state, (3) nlp_flag, (4) nlp_rpi

ACTION: Memory allocation error. Check system resources. Unload unused modules.

elx_mes0134: PLOGI: cannot issue reg_login

DESCRIPTION: The extended link service port login mailbox command has failed.

DATA: (1) nlp_DID, (2) nlp_state, (3) nlp_flag, (4) nlp_rpi

ACTION: Check the port and switch configuration.

elx_mes0135: cannot format reg_login

DESCRIPTION: Could not allocate an RPI or DMA buffer for the mailbox command.

DATA: (1) nlp_DID, (2) nlp_state, (3) nlp_flag, (4) nlp_rpi

ACTION: None required.

elx_mes0136: PLOGI completes to N_Port <DID> completion

DESCRIPTION: A port login has completed for which there is no NDLP.

DATA: (1) ulpStatus, (2) ulpWord[4]

ACTION: None required.

elx_mes0137: No retry ELS command <ELS_CMD> to remote

DESCRIPTION:

DATA: (1) ulpStatus, (2) ulpWord[4]

ACTION: None required.

elx_mes0138: ELS rsp: Cannot issue reg_login for <DID>

DESCRIPTION: REG_LOGIN mailbox command failed.

DATA: (1) nlp_DID, (2) nlp_state, (3) nlp_flag, (4) nlp_rpi

ACTION: None required.

elx_mes0140: PLOGI Reject: invalid nname

DESCRIPTION: Invalid node WWN provided.

DATA: None

ACTION: None required.

elx_mes0141: PLOGI Reject: invalid pname

DESCRIPTION: Invalid port WWN provided.

DATA: None

ACTION: None required.

elx_mes0142: PLOGI RSP: Invalid WWN

DESCRIPTION: The port login sent to the port by a remote port had an invalid WWN.

DATA: None

ACTION: None required.

elx_mes0144: Not a valid WCQE code: <Completion Code>

DESCRIPTION: The completion queue handler detected an invalid type.

DATA: None

ACTION: None required.

elx_mes0147: Failed to allocate memory for RSCN event

DESCRIPTION: Memory could not be allocated to send the RSCN event to the management application.

DATA: None

ACTION: None required.

elx_mes0148: Failed to allocate memory for LOGO event

DESCRIPTION: Memory could not be allocated to send the N_Port logout event to the FC transport.

DATA: None

ACTION: None required.

elx_mes0154: Authentication not complete

DESCRIPTION: Memory could not be allocated to send the N_Port logout event to the FC transport.

DATA: None

ACTION: None required.

Link Discovery Events (0200 - 0299)

elx_mes0200: CONFIG_LINK bad hba state <hba_state>

DESCRIPTION: A CONFIG_LINK mailbox command completed and the driver was not in the right state.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes0203: Devloss timeout on WWPN <address> N_Port <nlp_DID>

DESCRIPTION: A remote N_Port that was discovered by the driver disappeared for more than lpfc_devloss_tmo seconds.

DATA: (1) nlp_flag, (2) nlp_state, (3) nlp_rpi

ACTION: If the device generating this message is not a target to which the adapter is connected, this error does not affect the data integrity of the I/O between the adapter and the attached storage and can be ignored.

elx_mes0206: Device discovery completion error

DESCRIPTION: This indicates that an uncorrectable error was encountered during device (re)discovery after a link up. FC devices are not accessible if this message is displayed.

DATA: None

ACTION: Reboot the system. If the issue persists, report the error to Emulex technical support. Run with verbose mode on for more details.

elx_mes0207: Device <DID> (<WWN>) sent invalid service parameters. Ignoring device.

DESCRIPTION: Invalid service parameters were received from DID. Ignoring this remote port.

DATA: DID, WWN

ACTION: Verify the remote port's configuration. If the issue persists, report the error to Emulex technical support. Run with verbose mode on for more details.

elx_mes0222: Initial FLOGI/FDISK timeout

DESCRIPTION: The driver sent the initial FLOGI or FDISK to the fabric and never got a response back.

DATA: None

ACTION: Check Fabric configuration. The driver recovers from this and continues with device discovery.

elx_mes0223: Timeout while waiting for NameServer login

DESCRIPTION: Our login request to the NameServer was not acknowledged within RATOV.

DATA: None

ACTION: Check the fabric configuration. The driver recovers from this and continues with device discovery.

elx_mes0224: NameServer Query timeout

DESCRIPTION: Node authentication timeout, node Discovery timeout. A NameServer Query to the Fabric or discovery of reported remote N_Ports is not acknowledged within R_A_TOV.

DATA: (1) fc_ns_retry, (2) fc_max_ns_retry

ACTION: Check Fabric configuration. The driver recovers from this and continues with device discovery.

elx_mes0227: Node Authentication timeout

DESCRIPTION: The driver has lost track of what N_Ports are being authenticated.

DATA: None

ACTION: None required. The driver should recover from this event.

elx_mes0228: CLEAR LA timeout

DESCRIPTION: The driver issued a CLEAR_LA that never completed.

DATA: None

ACTION: None required. The driver should recover from this event.

elx_mes0230: Unexpected timeout, hba linkstate <link_state>

DESCRIPTION: Discovery has timed out and the adapter state is not ready.

DATA: None

ACTION: None required.

elx_mes0231: RSCN timeout

DESCRIPTION: The driver has lost track of what N_Ports have RSCNs pending.

DATA: (1) fc_ns_retry, (2) lpfc_max_ns_retry

ACTION: None required. The driver should recover from this event.

elx_mes0233: Nodelist not empty

DESCRIPTION: Driver unloaded or hotplug detected a node still in use.

DATA: None

ACTION: None required.

elx_mes0237: Pending Link Event during Discovery: State <state>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0241: NameServer Rsp Error Data: <data>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0246: RegLogin failed

DESCRIPTION: The firmware returned a failure for the specified RegLogin.

DATA: (1) Did, (2) mbxStatus, (3) hbaState

ACTION: This message indicates that the firmware could not perform a RegLogin for the specified DID. A limitation on how many nodes an adapter can view may exist.

elx_mes0249: Cannot issue Register Fabric login: Err <err>

DESCRIPTION: Could not issue the fabric reg login; the err value is unique for each possible failure.

DATA: None

ACTION: None required.

elx_mes0251: NameServer login: no memory

DESCRIPTION: Could not allocate memory for the NDLP structure.

DATA: None

ACTION: None required.

elx_mes0252: Cannot issue NameServer login

DESCRIPTION: Could not issue an extended link service port login to the nameserver DID.

DATA: None

ACTION: Check the port connection and switch configuration.

elx_mes0253: Register VPI: Can't send mbox

DESCRIPTION: Could not issue the REG_LOGIN command for this vPort.

DATA: None

ACTION: None required.

elx_mes0254: Register VPI: no memory goto mbox_err_exit

DESCRIPTION: Could not allocate memory for the REG_LOGIN mailbox command.

DATA: None

ACTION: None required.

elx_mes0255: Issue FDISC: no IOCB

DESCRIPTION: All of the pre-allocated IOCBs are in use.

DATA: None

ACTION: None required.

elx_mes0256: Issue FDISC: Cannot send IOCB

DESCRIPTION: Unable to send the fabric IOCB.

DATA: None

ACTION: Check the switch configuration.

elx_mes0257: GID_FT Query error: <ulpStatus> <fc_ns_retry>

DESCRIPTION: The GID_FT common transport request for the nameserver has failed.

DATA: None

ACTION: Check the switch configuration.

elx_mes0258: Register Fabric login error: <mbxStatus>

DESCRIPTION: The REG_LOGIN for the fabric has failed.

DATA: None

ACTION: Check the port and switch configuration.

elx_mes0259: No NPIVFabric support

DESCRIPTION: The switch to which the port is connected does not support NPIV.

DATA: None

ACTION: Check the switch configuration.

elx_mes0260: Register NameServer error: <mbxStatus>

DESCRIPTION: The REG_LOGIN mailbox command has failed for the nameserver.

DATA: None

ACTION: Check the switch configuration.

elx_mes0261: Cannot Register NameServer login

DESCRIPTION: Either a memory allocation issue or an invalid parameter was sent to the REG_LOGIN.

DATA: None

ACTION: At least one message (0142 0121 0133 0134 0135) should precede this message.

elx_mes0262: No NPIV Fabric support

DESCRIPTION: The switch to which the port is connected does not support NPIV.

DATA: None

ACTION: Check the switch configuration.

elx_mes0263: Discovery Mailbox error: state: <port_state> : <sparam_mbox> <cfglink_mbox>

DESCRIPTION: Either the driver could not allocate resources or it could not send sparam_mbox or cfglink_mbox.

DATA: (1) address of sparam_mbox command, (2) address of cfglink_mbox command.

ACTION: Attempt to unload and reload the driver when it is convenient.

elx_mes0264: No NPIV Fabric support

DESCRIPTION: The switch to which the port is connected does not support NPIV.

DATA: None

ACTION: Check the switch configuration.

elx_mes0266: Issue NameServer Req <cmdcode> err <rc> Data: <fc_flag> <fc_rscn_id_cnt>

DESCRIPTION: The driver was not able to send the nameserver common transport command.

DATA: (1) VPorts fc_flag, (2) VPorts fc_rscn_id_cnt

ACTION: Check the switch and port configurations.

elx_mes0267: NameServer GFF Rsp <did> Error (<ulpStatus> <un.ulpWord[4]>) Data: <fc_flag> <fc_rscn_id_cnt>

DESCRIPTION: The nameServer GFF common transport request failed.

DATA: (1) VPorts fc_flag, (2) VPorts fc_rscn_id_cnt

ACTION: Check the switch and port configurations.

elx_mes0268: NS cmd <cmdcode> Error (<ulpStatus> <un.ulpWord[4]>)

DESCRIPTION: The nameServer common transport request failed.

DATA: None.

ACTION: Check the switch and port configurations.

elx_mes0271: Illegal State Transition: node <nlp_DID> event <evt>, state <nlp_state> Data:<nlp_rpi> <nlp_flag>

DESCRIPTION: The current node state does not have a handler for this event.

DATA: (1) nlp_rpi, (2) nlp_flag

ACTION: Verify that all targets are still visible to the SCSI mid-layer.

elx_mes0272: Illegal State Transition: node <nlp_DID> event <evt>, state <nlp_state> Data: <nlp_rpi> <nlp_flag>

DESCRIPTION: The driver is completing a port login but do not have the rcv_plogi flag set.

DATA: (1) nlp_rpi, (2) nlp_flag

ACTION: Verify that all targets are still visible to the SCSI mid-layer.

elx_mes0273: Unexpected discovery timeout,vport State <port_state>

DESCRIPTION: The discovery process has timed out.

DATA: None

ACTION: Ensure that all targets are visible.

elx_mes0282: did:<value> ndlp:<value> pusgmap:<value> refcnt<value>, ndlp->nlp_DID, (void *)ndlp, lpfc_init.c-ndlp->nlp_usg_map

DESCRIPTION: Driver clean-up has found a node that is still on the node list during driver unload or PCI hotplug removal.

DATA: None.

ACTION: None required.

elx_mes0283: Failed to allocate mbox cmd memory

DESCRIPTION: Mailbox allocation error.

DATA: None

ACTION: None required.

elx_mes0285: Allocated DMA memory size <alloclen> is less than the requested DMA memorysize <reqlen>

DESCRIPTION: Memory allocation was truncated.

DATA: None

ACTION: None required.

elx_mes0286: lpfc_nlp_state_cleanup failed to allocate statistical data buffer <nlp_DID>

DESCRIPTION: Memory allocation failed for node's statistical data.

DATA: None

ACTION: None required.

elx_mes0287: lpfc_alloc_bucket failed to allocate statistical data buffer <nlp_DID>

DESCRIPTION: Memory allocation failed for node's statistical data.

DATA: None

ACTION: None required.

elx_mes0288: Unknown FCoE event type <event_type> event tag <event_tag>

DESCRIPTION: The firmware has detected an unknown FCoE event.

DATA: None

ACTION: Check the FCoE switch configuration and the adapter DCBX mode.

elx_mes0289: Issue Register VFI failed: Err <rc>

DESCRIPTION: The driver could not register the virtual fabric index for the FCFI.

DATA: None

ACTION: Check the switch and port configurations.

elx_mes0290: The SLI4 DCBX asynchronous event is not handled yet

DESCRIPTION: The SLI-4 DCBX asynchronous event is not handled yet.

DATA: None

ACTION: None required.

elx_mes0291: Allocated DMA memory size <alloc_len> is less than the requested DMA memorysize <req_len>

DESCRIPTION: The asynchronous DCBX events are not handled in the driver.

DATA: None

ACTION: Check the switch configuration.

elx_mes0293: PM resume failed to start workerthread: error=<error>

DESCRIPTION: The PCI resume (hotplug) could not start the worker thread for the driver.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0294: PM resume Failed to enable interrupt

DESCRIPTION: The PCI resume (hotplug) could not get an interrupt vector.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0297:invalid device group <pci_dev_grp>

DESCRIPTION: While unloading the driver, the driver detect a PCI device that it should not have claimed.

DATA: None

ACTION: None required.

elx_mes0299: Invalid SLI revision <sli_rev>

DESCRIPTION: While processing a host attention or unrecoverable error, the driver detected an invalid SLI revision.

DATA: None

ACTION: None required.

Mailbox Events (0300 - 0339)

elx_mes0300: LATT: Cannot issue READ_LA: Data: <rc>

DESCRIPTION: The link attention handler could not issue a READ_LA mailbox command.

DATA: None

ACTION: None required.

elx_mes0303: Ring <ringno> handler: portRspPut <portRspPut> is bigger then rsp ring <portRspMax>

DESCRIPTION: The port rsp ring put index is larger than the size of the rsp ring.

DATA: None

ACTION: This error could indicate a software driver, firmware or hardware issue. Report these errors to Emulex technical support.

elx_mes0304: Stray mailbox interrupt, mbxCommand <mbxcommand> mbxStatus <mbxstatus>

DESCRIPTION: Received a mailbox completion interrupt and there are no outstanding mailbox commands.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0306: CONFIG_LINK mbxStatus error <mbxStatus> HBA state <hba_state>

DESCRIPTION: The driver issued a CONFIG_LINK mbox command to the adapter that failed.

DATA: None

ACTION: This error could indicate a firmware or hardware issue. Report these errors to Emulex technical support.

elx_mes0310: Mailbox command <mbxcommand> timeout

DESCRIPTION: A mailbox command was posted to the adapter and did not complete within 30 seconds.

DATA: (1) hba_state, (2) sli_flag, (3) mbox_active

ACTION: This error could indicate a software driver or firmware issue. If no I/O is going through the adapter, reboot the system. If the issue persists, report the error to Emulex technical support.

elx_mes0311 Mailbox command <value> cannot issue Data: <value> <value>

DESCRIPTION: The driver detected an HBA error and can't issue the mailbox.

DATA: (1) sli flags (2) hba flags

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes0312: Ring <ringno> handler: portRspPut <rspPutInx> is bigger then rsp ring <numRiocb>

DESCRIPTION: The IOCB command rings put pointer is ahead of the get pointer.

DATA: None

ACTION: None required.

elx_mes0315: Ring <ringno> issue: portCmdGet <local_getidx> is bigger then cmd ring <max_cmd_idx>

DESCRIPTION: The port cmd ring get index is greater than the size of cmd ring.

DATA: None

ACTION: This error could indicate a software driver, firmware or hardware issue. Report these errors to Emulex technical support.

elx_mes0317: iotag <ulp_IoTag> is out of range: max iotag <max_iotag> wd0 <wd0>

DESCRIPTION: The IoTag in the completed IOCB is out of range.

DATA: None

ACTION: This error could indicate a software driver, firmware or hardware issue. Report these errors to Emulex technical support.

elx_mes0319: READ_SPARAM mbxStatus error <mbxStatus> hba state <hba_state>

DESCRIPTION: The driver issued a READ_SPARAM mbox command to the adapter that failed.

DATA: None

ACTION: This error could indicate a firmware or hardware issue. Report these errors to Emulex technical support.

elx_mes0320: CLEAR_LA mbxStatus error <mbxStatus> hba state <hba_state>

DESCRIPTION: The driver issued a CLEAR_LA mbox command to the adapter that failed.

DATA: None

ACTION: This error could indicate a firmware or hardware issue. Report these errors to Emulex technical support.

elx_mes0323: Unknown Mailbox command <mbxCommand> Cmpl

DESCRIPTION: A unknown mailbox command completed.

DATA: None

ACTION: This error could indicate a software driver, firmware or hardware issue. Report these errors to Emulex technical support.

elx_mes0324: Config port initialization error, mbxCmd <mbxCommand> READ_NVPARM, mbxStatus <mbxStatus>

DESCRIPTION: A read nvparams mailbox command failed during port configuration.

DATA: None

ACTION: This error could indicate a software driver, firmware or hardware issue. Report these errors to Emulex technical support.

elx_mes0330: IOCB wake NOT set

DESCRIPTION: The completion handler associated with the IOCB was never called.

DATA:(1) timeout, (2) timeleft/jiffies

ACTION: This error could indicate a software driver, firmware or hardware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0332: IOCB wait issue failed, Data <value>

DESCRIPTION: Driver issued I/O failed to complete in polling mode.

DATA: (1) error value.

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes0334: Unknown IOCB command

DESCRIPTION: Received an unknown IOCB command completion.

DATA: (1) type, (2) ulpCommand, (3) ulpStatus, (4) ulpIoTag, (5) ulpContext)

ACTION: This error could indicate a software driver or firmware issue. If these issues persist, report these errors to Emulex technical support.

elx_mes0335: Unknown IOCB command

DESCRIPTION: Received an unknown IOCB command completion.

DATA: (1) ulpCommand, (2) ulpStatus, (3) ulpIoTag, (4) ulpContext)

ACTION: This error could indicate a software driver or firmware issue. If these issues persist, report these errors to Emulex technical support.

elx_mes0338: IOCB wait timeout error - no wake response Data <value> <value>

DESCRIPTION: Driver issued I/O did not get a wake signal in polling mode.

DATA: (1) wait time (2) wake value

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes0340: Adapter temperature is OK now

DESCRIPTION: Adapter temperature has reverted to normal range.

DATA: Temperature in Celsius

ACTION: No action needed, informational.

elx_mes0341: Ring <ringno> Cannot find buffer for an unsolicited iocb tag <un.ulpWord[3]>

DESCRIPTION: No additional pre-allocated buffers are available to handle unsolicited buffers.

DATA: None

ACTION: Ensure this port is not being managed by multiple ports.

elx_mes0342: Ring <ringno> Cannot find buffer for an unsolicited iocb tag <unsli3.sli3Words>

DESCRIPTION: This is a multiple IOCB unsolicited command and sufficient buffer space cannot be allocated for it.

DATA: None

ACTION: None required.

elx_mes0343: Ring <ringno> Cannot find buffer for an unsolicited iocb tag <un.ulpWord[3]>

DESCRIPTION: No additional pre-allocated buffers are available to handle unsolicited buffers.

DATA: None

ACTION: None required.

elx_mes0344: Ring <ringno> Cannot find buffer for an unsolicited iocb tag <unsli3.sli3Words[7]>

DESCRIPTION: No additional pre-allocated buffers are available to handle unsolicited buffers.

DATA: None

ACTION: None required.

elx_mes0345: Resetting board due to mailbox timeout

DESCRIPTION: A mailbox command failed to complete. The driver is resetting the port.

DATA: None

ACTION: If the mailbox command fails again, set the lpfc_log_verbose to LOG_MBOX and retry.

elx_mes0346: Ring <ring number> handler: unexpected ASYNC_STATUS evt_code <evtcode>

DESCRIPTION: The adapter received an asynchronous event that was not a temperature event.

DATA: None

ACTION: None required.

elx_mes0347: Adapter is very hot, please take corrective action. Temperature: <value> Celsius

DESCRIPTION: Adapter temperature is above normal range

DATA: Temperature in Celsius

ACTION: Shutdown and remove the adapter. Contact customer support.

elx_mes0348: NameServer login: node freed

DESCRIPTION: The enable mode failed to free up the nameserver login.

DATA: None

ACTION: None required.

elx_mes0349: rc should be MBX_SUCCESS

DESCRIPTION: The next mailbox command on the mailbox queue has failed.

DATA: None

ACTION: None required.

elx_mes0350: rc should have been MBX_BUSY

DESCRIPTION: Attempting to unregister a default RPI from an interrupt context and the mailbox state is not busy.

DATA: None

ACTION: None required.

elx_mes0352: Config MSI mailbox command failed, mbxCmd <u.mb.mbxCommand>, mbxStatus <u.mb.mbxStatus>

DESCRIPTION: The mailbox command sent to the firmware to configure the adapter to use MSI-X has failed.

DATA: None

ACTION: Ensure the hardware platform supports MSI-X.

elx_mes0359: Not a valid slow-path completion event: majorcode=<value>, minorcode=<value>

DESCRIPTION: SLI-4: The EQE is not valid.

DATA: None

ACTION: None required.

elx_mes0360: Unsupported EQ count. <entry_count>

DESCRIPTION: Cannot create an event queue of this size.

DATA: None

ACTION: None required.

elx_mes0361: Unsupported CQ count. <entry_count>

DESCRIPTION: Cannot create a completion queue of this size.

DATA: None

ACTION: None required.

elx_mes0362: Unsupported MQ count. <entry_count>

DESCRIPTION: Cannot create MQ count of this size.

DATA: None

ACTION: None required.

elx_mes0364: Invalid param

DESCRIPTION: SLI-4: The post SGL function was passed an invalid XRI.

DATA: None

ACTION: None required.

elx_mes0365: Slow-path CQ identifier <cqid> does not exist

DESCRIPTION: The Completion Queue ID passed in the Event Queue entry does not reference a valid completion queue.

DATA: None

ACTION: None required.

elx_mes0366: Not a valid fast-path completion event: majorcode=<major code hex>, minorcode=<minor code hex>

DESCRIPTION: The major or minor code in the Event Queue field is not valid.

DATA: None

ACTION: None required.

elx_mes0367: Fast-path completion queue does not exist

DESCRIPTION: The fast path completion queue referenced by the CQID does not exist.

DATA: None

ACTION: None required.

elx_mes0368: Miss-matched fast-path completion queue identifier: eqcqid=<cqid>, fcpcqid=<queue_id>

DESCRIPTION: The CQID in the event queue entry does not match the fcp_cqid that was passed into the routine.

DATA: None

ACTION: None required.

elx_mes0369: No entry from fast-path completion queue fcpcqid=<queue_id)

DESCRIPTION: No completions exist in the completion queue referenced by fcpcqid.

DATA: None

ACTION: None required.

elx_mes0370: Invalid completion queue type <type>

DESCRIPTION: The event queue entry is not for a mailbox or a work queue entry.

DATA: None

ACTION: None required.

elx_mes0371: No entry from the CQ: identifier <queue_id>, type <type>

DESCRIPTION: No completion queue event exists for this event queue entry.

DATA: None

ACTION: None required.

elx_mes0372: iotag <iotag> is out of range: max iotag (<sli.last_iotag>)

DESCRIPTION: The IOCB lookup cannot be performed because the iocb_tag is out of range.

DATA: None

ACTION: None required.

elx_mes0376: READ_REV Error. SLI Level <sli_rev> FCoE enabled <hba_flag & HBA_FCOE_SUPPORT>

DESCRIPTION: This SLI-4 only adapter setup function was called for a non-SLI-4 device.

DATA: None

ACTION: None required.

elx_mes0377: Error <rc> parsing vpd. Using defaults.

DESCRIPTION: Could not parse the VPD data, so the driver is using the default values.

DATA: None

ACTION: None required.

elx_mes0381: Error <rc> during queue setup.

DESCRIPTION: Could not set up all the queues that driver requires to exchange I/Os with the adapter.

DATA: None

ACTION: Reload the driver.

elx_mes0382: READ_SPARAM command failed status <issue status>, mbxStatus <mailbox status>

DESCRIPTION: The READ_SPARAM mailbox command has failed during initialization. The adapter has been set to error state.

DATA: None

ACTION: Take a dump with hbacmd and then try reloading the driver.

elx_mes0383: Error <error> during scsi sgl post operation

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0384: There is pending active mailbox cmd

DESCRIPTION: The mailbox commands have overlapped. This command should have been added to the mailbox queue.

DATA: None

ACTION: None required.

elx_mes0385: rc should have been MBX_BUSY

DESCRIPTION: The completion handler for REG_LOGIN detected the IMMED_UNREG flag and tried to issue the unreg_login command from an interrupt level. The mailbox status should still be busy.

DATA: None

ACTION: None required.

elx_mes0387: Failed to allocate an iocbq

DESCRIPTION: Failed to get an IOCBQ from the list of available IOCBQs.

DATA: None

ACTION: None required.

elx_mes0388: Not a valid WCQE code: <hex cqe_code>

DESCRIPTION: The event code is invalid. This event is dropped.

DATA: None

ACTION: Ensure that the adapter's firmware is current.

elx_mes0391: Error during rpi post operation

DESCRIPTION: The driver was trying to post pages to the firmware to be used to keep target login information and encountered a failure.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0393: Error <rc> during rpi post operation

DESCRIPTION: The driver was trying to post pages to the firmware to keep target login information and encountered a failure.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0394: Failed to allocate CQ_EVENT entry

DESCRIPTION: The asynchronous event handler was not able to allocate an event queue entry to which to transfer the asynchronous event.

DATA: None

ACTION: This could be a V-LINK clear from the switch or a fatal error from the firmware. Perform a dump from the OneCommand Manager application.

elx_mes0395: The mboxq allocation failed

DESCRIPTION: The asynchronous link event handler could not allocate a mailbox command to issue the READ_LA (read link attention) mailbox command.

DATA: None

ACTION: None required.

elx_mes0396: The lpfc_dmabuf allocation failed

DESCRIPTION: The asynchronous link event handler could not allocate a DMA buffer for the mailbox command to issue the READ_LA (read link attention) mailbox command.

DATA: None

ACTION: None required.

elx_mes0397: The mbuf allocation failed

DESCRIPTION: The asynchronous link event handler could not allocate DMA-able memory for the READ_LA mailbox command.

DATA: None

ACTION: None required.

elx_mes0398: Invalid link fault code: < hex link_fault>

DESCRIPTION: The attempt to read the link attention register has returned an unknown value.

DATA: None

ACTION: None required.

elx_mes0399: Invalid link attention type: <hex link_type>

DESCRIPTION: The READ_LA mailbox command has returned an invalid link type.

DATA: None

ACTION: None required.

Initialization Events (0400 - 0599)

elx_mes0400: Phys Attribute Count Exceeded, Max <value>, Actual <value>

DESCRIPTION: Too many driver configuration parameters have been set. The limit is given as Max.

DATA: (1) Maximum number (2) Actual number

ACTION: Reduce the number of actual parameters.

elx_mes0402: Cannot find virtual addr for buffer tag on ring <ringno>

DESCRIPTION: A DMA buffer is not available for this unsolicited command.

DATA: (1) tag, (2) next, (3) prev, (4) postbufq_cnt

ACTION: None required.

elx_mes0403: lpfc_nodev_tmo attribute cannot be set to <val>, allowed range is [<LPFC_MIN_DEVLOSS_TMO>, <LPFC_MAX_DEVLOSS_TMO>]

DESCRIPTION: Attempt to set the nodev timeout value is outside the range of the devloss timeout range.

DATA: None

ACTION: Set the nodev timeout between the minimum and maximum devloss timeout range.

elx_mes0404: Config Param <value> set to <value>

DESCRIPTION: Driver is setting a persistent vPort parameter to a different value.

DATA: (1) New value

ACTION: None. This message is notification only.

elx_mes0405: Config Param <value> set to <value>

DESCRIPTION: Driver is setting a persistent vPort parameter to a different value.

DATA: (1) New value

ACTION: None. This message is notification only.

elx_mes0406: Adapter maximum temperature exceeded (<temperature>), taking this port offline

DESCRIPTION: The driver has received an error for the adapter indicating that the maximum allowable temperature has been exceeded.

DATA: (1) work_hs, (2) work_status[0], (3) work_status[1]

ACTION: Ensure that the server fans are not blocked. Shut down the server if the airflow is restricted.

elx_mes0408: Cannot create debugfs root

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0409: Cannot create debugfs nodelist

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0410: Cannot find virtual addr for mapped buf on ring <ringno>

DESCRIPTION: The driver cannot find the specified buffer in its mapping table. Thus it cannot find the virtual address needed to access the data.

DATA: (1) phys, (2) next, (3) prev, (4) postbufq_cnt

ACTION: This error could indicate a software driver or firmware issue. If the issue persists report these errors to Emulex technical support.

elx_mes0411: Cannot create debugfs hbqinfo

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0412: Cannot create debugfs hba

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0413: Cannot create debugfs dumpHBASlim

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0414: Cannot create debugfs dumpHostSlim

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0415: Cannot create debugfs slow_ring trace

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0416: Cannot create debugfs slow_ring buffer

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0417: Cannot create debugfs

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0418: Cannot create debugfs disc trace buffer

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0419: Cannot create debugfs discovery trace

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0423: Vport Attribute Instance Error. Defaulting lpfc_#attr to <value>, error value <value>, allowed range is [min, max]

DESCRIPTION: A vPort attribute was set out of range. The driver reset the parameter to its default.

DATA: None

ACTION: Set the module parameter between the minimum and maximum values.

elx_mes0424: Vport Attribute Count Exceeded, Max <value>, Actual <value>

DESCRIPTION: The total number of vPort attributes set exceeded the max allowed.

DATA: None

ACTION: Reduce the number set attributes below max.

elx_mes0425: lpfc_"#attr" attribute cannot be set to <value>, allowed range is [min, max]

DESCRIPTION: Driver attribute lpfc_#attr was defined with an out-of-range value.

DATA: None

ACTION: Set the parameter between the minimum and maximum value.

elx_mes0426: lpfc_enable_auth attribute cannot be set to <value>, allowed range is [<min>, <max>]

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0427: Cannot re-enable interrupt after slot reset.

DESCRIPTION: The driver was not able to enable the interrupt after an adapter reset.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0430: PM resume Failed to enable interrupt

DESCRIPTION: The driver's power management resume function could not enable the interrupt.

DATA: None

ACTION: Perform another PM suspend and resume or adapter reset.

elx_mes0431: Failed to enable interrupt.

DESCRIPTION: The driver failed to start the interrupt.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0433: Wakeup on signal: rc=<rc>

DESCRIPTION: A signal other than the LPFC_DATA_READY was received on the worker thread.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0434: PM resume failed to start worker thread: error=<error>.

DESCRIPTION: The driver's power management resume function could not start the worker thread.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0435: Adapter failed to get Option ROM version status <rc>.

DESCRIPTION: The driver could not read the adapter's option ROM.

DATA: None

ACTION: Reset the adapter. Ensure that the adapter's firmware is current.

elx_mes0436: Adapter failed to init, timeout, status reg <status>

DESCRIPTION: The adapter failed during power-up diagnostics after it was reset.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0437: Adapter failed to init, chipset, status reg <status>

DESCRIPTION: The adapter failed during power-up diagnostics after it was reset.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0438: Adapter failed to init, chipset, status reg <status>

DESCRIPTION: The adapter failed during power-up diagnostics after it was reset.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0439: Adapter failed to init, mbxCmd <mbxCommand> READ_REV, mbxStatus <mbxStatus>

DESCRIPTION: Adapter initialization failed when issuing a READ_REV mailbox command.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0440: Adapter failed to init, READ_REV has missing revision information

DESCRIPTION: A firmware revision initialization error was detected.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. Update the firmware. If the issue persists, report the error to Emulex technical support.

elx_mes0442: Adapter failed to init, mbxCmd <mbxCommand> CONFIG_PORT, mbxStatus <mbxStatus>

DESCRIPTION: Adapter initialization failed when issuing a CONFIG_PORT mailbox command.

DATA: (1) hbainit

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0443: Adapter failed to set maximum DMA length mbxStatus <u.mb.mbxStatus>.

DESCRIPTION: Cannot set the maximum DMA length to reflect cfg_pci_max_read.

DATA: None

ACTION: Set module parameter lpfc_pci_max_read to 512, 1024, 2048, or 4096.

elx_mes0445: Firmware initialization failed.

DESCRIPTION: The driver was unable to initialize the hardware.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0446: Adapter failed to init, mbxCmd <mbxCommand> CFG_RING, mbxStatus <mbxStatus>, ring <num>

DESCRIPTION: Adapter initialization failed when issuing a CFG_RING mailbox command.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0448: Adapter failed to init, mbxCmd <mbxCommand> READ_SPARM, mbxStatus <mbxStatus>

DESCRIPTION: Adapter initialization failed when issuing a READ_SPARM mailbox command.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0449: Phys attribute Instance Error. Defaulting to lpfc_#attr to <value>. Allowed range is [min, max]

DESCRIPTION: A physical device attribute has an out-of-range value. The driver is correcting it.

DATA: (1) value written, (2) minimum value, (3) maximum value

ACTION: Write the default value.

elx_mes0450: lpfc_%attr attribute cannot be set to <value>, allowed range is [%min, %max]

DESCRIPTION: Sysfs attribute value written exceeds attribute range.

DATA: (1) attribute name, (2) value written, (3) minimum value, (3) maximum value

ACTION: Write a value within the supported range.

elx_mes0451: Failed to enable interrupt

DESCRIPTION:

DATA: None.

ACTION: None required.

elx_mes0453: Adapter failed to init, mbxCmd <mbxCommand> READ_CONFIG, mbxStatus<mbxStatus>

DESCRIPTION: Adapter initialization failed when issuing a READ_CONFIG mailbox command.

DATA: None

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0456: Adapter failed to issue ASYNCEVT_ENABLE mbox status <rc>.

DESCRIPTION: The mailbox command to enable an asynchronous event notification failed.

DATA: None

ACTION: Ensure the adapter firmware is current. Reload the driver.

elx_mes0457: Adapter Hardware Error

DESCRIPTION: The driver received an interrupt indicating a possible hardware issue.

Data: (1) status, (2) status1, (3) status2

ACTION: This error could indicate a hardware or firmware issue. If the issue persists, report the error to Emulex technical support.

elx_mes0462: Too many cmd / rsp ring entries in SLI2 SLIM Data: <values> /home/pely/svn_linux_lpfc_upstream/branches/vmware-8.2.1-ucna/kernel /lpfc/lpfc_sli.c:

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0472: Unknown PCI error state: <value>

DESCRIPTION: The PCI bus has detected an error.

DATA: (1) state value

ACTION: Driver resets the adapter and attempts recovery. If the issue persists, contact Emulex technical support.

elx_mes0474: Unable to allocate memory for issuing "MBOX_CONFIG_MSI command"

DESCRIPTION: Mailbox memory pool allocation error.

DATA: None

ACTION: None required.

elx_mes0475: Not configured for supporting MSI-X cfg_use_msi: <cfg_use_msi>.

DESCRIPTION: The lpfc_use_msi module parameter should have been set to 2.

DATA: None

ACTION: Set module parameter lpfc_use_msi=2.

elx_mes0476: HBA not supporting SLI-3 or later SLI Revision: <sli_rev>.

DESCRIPTION: The adapter does not support SLI-3 or SLI-4.

DATA: None

ACTION: This adapter does not support MSI. Set lpfc_use_msi=0.

elx_mes0479: Deferred Adapter Hardware Error

DESCRIPTION: An adapter hardware error was sent to the driver.

DATA: (1) work_hs, (2) work_status[0], (3) work_status[1]

ACTION: Perform a dump using hbacmd.

elx_mes0482: Illegal interrupt mode

DESCRIPTION: Driver could not set MSI-X, MSI or INTx interrupt modes.

DATA: None

ACTION: This could be a server issue. Reboot. If this issue persists, report these errors to Emulex technical support.

elx_mes0483: Invalid link-attention link speed: <value>, bf_get(lpfc_acqe_link_speed, acqe_link).

DESCRIPTION: The link speed reported in the link attention interrupt is invalid.

DATA: None

ACTION: Check the switch configuration.

elx_mes0492: Unable to allocate memory for issuing SLI_CONFIG_SPECIAL mailbox command

DESCRIPTION: A memory allocation fault occurred when issuing a mailbox.

DATA: None

ACTION: This could be a transient error. If this issue persists, report these errors to Emulex technical support.

elx_mes0493: SLI_CONFIG_SPECIAL mailbox failed with status <rc>.

DESCRIPTION: Mailbox command failed.

DATA: None

ACTION: Ensure the adapter's firmware is current. Unload and reload the driver.

elx_mes0494: Unable to allocate memory for issuing "SLI_FUNCTION_RESET mailbox command"

DESCRIPTION: Mailbox memory pool allocation error.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0495: SLI_FUNCTION_RESET mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>.

DESCRIPTION: Mailbox command failed.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0496: Failed allocate slow-path EQ

DESCRIPTION: The event queue for the slow path was not allocated.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0497: Failed allocate fast-path EQ

DESCRIPTION: The event queue for the fast path was not allocated.

DATA: None

ACTION: Unload and reload the driver.

elx_mes0498: Adapter failed to init, mbxCmd <cmd> INIT_LINK, mbxStatus <status>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0499: Failed allocate fast-path FCP CQ (<fcp_cqidx>).

DESCRIPTION: The completion queue event for the fast path could not be allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0500: Failed allocate slow-path mailbox CQ

DESCRIPTION: Failed to allocate slow-path mailbox completion queue.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0501: Failed allocate slow-path ELS CQ

DESCRIPTION: Failed to allocate slow-path extended link service completion queue.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0503: Failed allocate fast-path FCP

DESCRIPTION: Failed to allocate fast-path FCP.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0504: Failed allocate slow-path ELS WQ

DESCRIPTION: Failed to allocate slow-path extended link service WQ.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0505: Failed allocate slow-path MQ

DESCRIPTION: Failed to allocate slow-path MQ.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0506: Failed allocate receive HRQ

DESCRIPTION: Failed to allocate receive HRQ.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0507: Failed allocate receive DRQ

DESCRIPTION: Failed to allocate receive DRQ.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0520: Slow-path EQ not allocated

DESCRIPTION: The slow-path event queue is not allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0521: Failed setup of slow-path EQ rc = <value>

DESCRIPTION: The slow-path event queue setup failed with status rc.

DATA: (1) status code

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0522: Fast-path EQ <fcp_eqidx> not allocated

DESCRIPTION: The fast-path event queue is not allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0523: Failed setup of fast-path EQ <fcp_eqidx>, rc = <rc>

DESCRIPTION: The fast-path event queue setup failed.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0526: Fast-path FCP CQ <fcp_cqidx> not allocated

DESCRIPTION: The fast-path FCP is not allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0527: Failed setup of fast-path FCP CQ <fcp_cqidx>, rc = <rc>

DESCRIPTION: The fast-path FCP completion queue setup failed.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0528: Mailbox CQ not allocated

DESCRIPTION: The mailbox completion queue is not allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0529: Failed setup of slow-path mailbox CQ: rc = <value>

DESCRIPTION: Driver failed to setup Completion Queue. Failure code is reported.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes0530: ELS CQ not allocated

DESCRIPTION: The extended link service completion queue is not allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0531: Failed setup of slow-path ELS CQ: rc = <value>

DESCRIPTION: The extended link service completion queue is allocated, but failed initial setup.

DATA: (1) status

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0534: Fast-path FCP WQ <fcp_eqidx> not allocated

DESCRIPTION: The fast-path FCP WQ is not allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0535: Failed setup of fast-path FCP WQ <fcp_wqidx>, rc = <rc>

DESCRIPTION: The fast-path FCP WQ setup failed.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0536: Slow-path ELS WQ not allocated

DESCRIPTION: The slow-path extended link service WQ is not allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0537: Failed setup of slow-path ELS WQ: rc = <value>

DESCRIPTION: Driver failed to setup Work Queue. Failure code is reported.

DATA: (1) (2) (3)

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes0538: Slow-path MQ not allocated

DESCRIPTION: The slow-path MQ is not allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0539: Failed setup of slow-path MQ: rc = <value>

DESCRIPTION: The slow-path MQ is allocated, but failed initial setup.

DATA: (1) status

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0540: Receive Queue not allocated

DESCRIPTION: The Receive Queue is not allocated.

DATA: None

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0541: Failed setup of Receive Queue: rc = <value>

DESCRIPTION: The Receive Queue is allocated, but failed setup.

DATA: (1) status

ACTION: The driver fails to load. Contact Emulex technical support.

elx_mes0542: lpfc_create_static_vport failed to allocate mailbox memory

DESCRIPTION: Failed to allocate mailbox memory for vPort creation.

DATA: None

ACTION: Static VPorts does not load. Contact Emulex technical support.

elx_mes0543: lpfc_create_static_vport failed to allocate vport_info

DESCRIPTION: Failed to allocate VPort_info.

DATA: None

ACTION: Static VPorts does not load. Contact Emulex technical support.

elx_mes0545: lpfc_create_static_vport bad information header <value> <value>, le32_to_cpu(vport_info->signature), le32_to_cpu(vport_info->rev) & VPORT_INFO_REV_MASK);

DESCRIPTION: Invalid information header; the signature or revision is invalid.

DATA: None

ACTION: Static VPorts does not load. Contact Emulex technical support.

elx_mes0582: Error <rc> during sgl post operation

DESCRIPTION: The SGL post operation failed.

DATA: None

ACTION: None required.

elx_mes0602: Failed to allocate CQ_EVENT entry

DESCRIPTION: Failed to allocate a CQ_EVENT entry.

DATA: None

ACTION: None required.

elx_mes0603: Invalid work queue CQE subtype <subtype>

DESCRIPTION: Invalid work queue CQE.

DATA: None

ACTION: None required.

FCP Traffic History (0700 - 0799)

elx_mes0700: Bus Reset on target <i> failed

DESCRIPTION: The bus reset for the specified target failed.

DATA: None

ACTION: None required.

elx_mes0706: IOCB Abort failed - outstanding <value> failed <value>

DESCRIPTION: The driver did not recover all I/O following a reset task management command.

DATA: (1) outstanding I/O count (2) number of unrecovered I/O

ACTION: Reset call fails to. ESXi tries to recover.

elx_mes0713: SCSI layer issued Device Reset (<value>, <value>) reset status <value> flush status <value>

DESCRIPTION: A device reset has completed on (tgt, lun). Status values are displayed.

DATA: (1) tgt (2) lun (3) task mgmt status (4) flush status

ACTION: None required.

elx_mes0714: SCSI layer issued bus reset

DESCRIPTION: The SCSI layer is requesting the driver to abort all I/Os to all targets on this adapter.

DATA: (1) ret

ACTION: Check the state of the targets in question.

elx_mes0717: FCP command <value> residual underrun converted to error Data: <values>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0718: Unable to dma_map single request_buffer: <value>

DESCRIPTION: The driver could not map a single virtual address to a DMA address.

DATA: (1) DMA mapping error

ACTION: None. The driver fails the I/O back to ESXi.

elx_mes0720: FCP command <value> residual overrun error. Data: <values>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes0721: Device Reset rport failure: rdata <rdata>

DESCRIPTION: The reset of the Rport failed.

DATA: None

ACTION: None required.

elx_mes0724: I/O flush failure for context <cntx> on <tgt:lun> cnt <value>

DESCRIPTION: The I/O flush to the {LUN, TARGET, or HOST} has failed.

DATA: (1) count of unrecovered I/O

ACTION: None required. The reset is retried.

elx_mes0727: TMF <cmd> to TGT <TGT#> LUN <LUN#> failed (<ulpStatus>, <ulpWord[4]>)

DESCRIPTION: The task management function command failed.

DATA: None

ACTION: None required. The task management function command gets retried.

elx_mes0748: Abort handler timed out waiting for abort to complete:ret <status> ID <target id> LUN <lun id> snum <serial number>

DESCRIPTION: The abort handler timed out waiting for abort to complete.

DATA: None

ACTION: None required.

elx_mes0798: Device Reset rport failure: rdata <value>

DESCRIPTION: Driver failed a device reset - no rdata buffer.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

Node Table Events (0900 - 0999)

elx_mes0915: Register VPI failed: <mbxStatus>

DESCRIPTION: Could not register the VPI.

DATA: None

ACTION: None required.

Security Events (1000 - 1099)

elx_mes1000: Authentication is enabled but authentication service is not running

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1005: AUTHENTICATION_FAILURE Nport: <port>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1006: Bad Name tag in auth message

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1007: Bad Name length in auth message

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1008: Bad Number of Protocols

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1009: Bad param type

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1010: Bad Tag 1

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1011: Auth_neg no has function chosen.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1012: Auth_negotiate Bad Tag 2

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1013: Auth_negotiate no DH_group found.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1014: dhchap challenge bad name tag.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1015: dhchap challenge bad name length.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1016: dhchap challenge Hash ID not Supported.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1017: dhchap challenge could not find DH Group.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1018: dhchap challenge No Public key for non-NULL DH Group.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1021: ERROR: attempted to queue security work, when no workqueue created.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1028: Start Authentication: No buffers

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1029: Reauthentication Failure

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1031: Start Authentication: Get config failed.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1032: Start Authentication: get config timed out.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1034: Not Expecting Challenge - Rejecting Challenge.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1035: Transport ID does not math - Rejecting Challenge.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1036: Authentication transaction reject - re-auth request reason <value> exp <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1037: Authentication transaction reject - restarting authentication. reason <value> exp <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1039: Not Expecting Reply - rejecting. State <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1040: Bad Reply trans_id - rejecting. Trans_id: <value> Expecting: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1043: Authentication LS-RJT

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1045: Issue AUTH_NEG failed. Status: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1048: Issue AUTH_REJECT failed.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1049: Authentication is enabled but authentication service is nor running

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1050: Authentication mode is disabled, but is required by the fabric.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1053: Start Authentication: Security service offline.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1055: Authentication parameter is disabled, but is required by the fabric.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1056: Authentication mode is disabled, but is required by the fabric.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1057: Authentication transaction reject. reason <value> exp <value>

DESCRIPTION:

DATA: None

ACTION: None required.

Miscellaneous and FCoE Events (1200 - 1299)

elx_mes1201: Failed to allocate dfc_host

DESCRIPTION: Driver failed to allocate a DFC host and bind it to the management stack.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1209: C_CT Request error Data: <value> <value>

DESCRIPTION: IOCTL common transport response error - driver is failing the IOCTL request.

DATA: (1) response buffer flag (2) Data Size

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1210: Invalid cmd size: <cmd value> <cmdsz value> <rspsz value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1211: genreq alloc failed: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1213: FCoE cmd overflow: <off value> + <cnt value> > <cmdsz value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1214: Cannot issue FCoE cmd, SLI not active: <off value> rc = -EACCESS

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1215: Cannot issue FCoE cmd: not ready or not in maint mode <off value> <rc value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1216: FCoE IOCB failed: <off value> <rc value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1223: menlo_write: couldn't alloc genreq <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1230: Could not find buffer for FCoE cmd: <off value> <indmp value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1231: bad bpl

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1235: Could not find buffer for FCoE cmd: <off value> poff: <value> cnt: <value> mlastcnt: <value> addl: <value> addh: <value> mdsz: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1238: FCoE IOCB failed: <off value> <rc value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1240: Unable to allocate command buffer memory.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1243: Menlo command error. code=<value>.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1244: Unable to allocate response buffer memory.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1246: FCoE chip is running golden firmware. Update FCoE chip firmware immediately

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1247: FCoE chip is running diagnostic firmware. Operational use suspended.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1248: FCoE chip is running unknown firmware.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1249: Invalid FRU data found on adapter. Return adapter to Emulex for repair

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1250: Menlo command error. code=<value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1251: Menlo command error. code=<value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1252: Menlo command error. code=<value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1262: Failed to allocate dfc_host

DESCRIPTION: Could not allocate memory the dfc_host_struct.

DATA: None

ACTION: None required.

Link Events (1300 - 1399)

elx_mes1300: Link Down Event in loop back mode

DESCRIPTION: Driver received a link down event while in loopback mode - unexpected event.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1302: Invalid speed for this board: Reset link speed to auto: <value>

DESCRIPTION: Driver detected an invalid link speed. Resetting Link to Auto mode.

DATA: (1) Invalid speed detected

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1303: Link Up Event <eventTag> received Data: <value> <value> <value> <value> <value> <value> <value>

DESCRIPTION: A link up event was received. It is also possible for multiple link events to be received together.

DATA:(1) fc_eventTag, (2) granted_AL_PA, (3) UlnkSpeed, (4) alpa_map[0]

ACTION: If numerous link events are occurring, check the physical connections to the Fibre Channel network.

elx_mes1305: Link Down Event <eventTag> received Data: <value> <value> <value>

DESCRIPTION: A link down event was received.

DATA: (1) fc_eventTag, (2) hba_state, (3) fc_flag

ACTION: If numerous link events are occurring, check the physical connections to the Fibre Channel network.

elx_mes1306: Link Up Event in loop back mode<eventTag> received Data: <value> <value> <value> <value>

DESCRIPTION: Link up notification; configured for loopback.

DATA: (1) fc_eventTag, (2) granted_AL_PA, (3) UlnkSpeed, (4) alpa_map[0]

ACTION: None required.

elx_mes1308: Menlo Maint Mode Link up Event <value> rcvd Data: <value> <value> <value>

DESCRIPTION: Link up notification in Menlo maintenance mode.

DATA: (1) fc_eventTag, (2) port_state, (3) vPort fc_flag

ACTION: None required.

elx_mes1309: Link Down Event <value> received Data <value> <value> <value>

DESCRIPTION: The port generated a link down event to the host.

DATA: (1) fc_eventTag (2)port_state (3) vPort fc_flag

ACTION: None required.

elx_mes1310: Link Up Event npiv not supported in loop topology

DESCRIPTION: Loop topologies are not supported when NPIV is enabled.

DATA: None

ACTION: Put link into Fabric mode.

Port Setup Events (1400 - 1499)

elx_mes1400: Failed to initialize sgl list.

DESCRIPTION: Failed to initialize SGL list during initialization.

DATA: None

ACTION: Reboot the server. If the issue persist, contact Emulex technical support.

elx_mes1401: Failed to enable pci device.

DESCRIPTION: Failed to enable PCI device during initialization.

DATA: None

ACTION: Reboot the server. If the issue persist, contact Emulex technical support.

elx_mes1402: Failed to set up pci memory space.

DESCRIPTION: PCI initialization failed.

DATA: None

ACTION: Reboot the server. If the issue persist, contact Emulex technical support.

elx_mes1403: Failed to set up driver resource.

DESCRIPTION: Driver resource initialization failed.

DATA: None

ACTION: None required.

elx_mes1404: Failed to set up driver resource.

DESCRIPTION: Driver resource initialization failed.

DATA: None

ACTION: None required.

elx_mes1405: Failed to initialize iocb list.

DESCRIPTION: IOCB initialization failed.

DATA: None

ACTION: None required.

elx_mes1406: Failed to set up driver resource.

DESCRIPTION: Initialization failed to set up driver resource.

DATA: None

ACTION: None required.

elx_mes1407: Failed to create scsi host.

DESCRIPTION: Initialization failed to create SCSI host.

DATA: None

ACTION: None required.

elx_mes1408: Port Failed POST – portsmphr=<value>, perr=<port error>, sfi=<sfi reg>, nip=<nip reg>, ipc=<ipc reg>, scr1=<value>, scr2=<value>, hscratch=<value>, pstatus=<port status>

DESCRIPTION: The adapter's power-on self-test has failed.

DATA: None

ACTION: Make sure the adapter firmware is up to date. Contact Emulex technical support if the issue persists after system reboot.

elx_mes1410: Failed to set up pci memory space.

DESCRIPTION: Initialization failed to set up PCI memory space.

DATA: None

ACTION: None required.

elx_mes1411: Failed to set up driver resource.

DESCRIPTION: Initialization failed to set up driver resource.

DATA: None

ACTION: None required.

elx_mes1412: Failed to set up driver resource.

DESCRIPTION: Initialization failed to set up driver resource.

DATA: None

ACTION: None required.

elx_mes1413: Failed to initialize iocb list.

DESCRIPTION: Initialization failed to initialize the IOCB list.

DATA: None

ACTION: None required.

elx_mes1414: Failed to set up driver resource.

DESCRIPTION: Initialization failed to set up driver resource.

DATA: None

ACTION: None required.

elx_mes1415: Failed to create scsi host.

DESCRIPTION: Initialization failed to create SCSI host.

DATA: None

ACTION: None required.

elx_mes1416: Failed to allocate sysfs attr

DESCRIPTION: Initialization failed to sysfs attribute.

DATA: None

ACTION: None required.

elx_mes1418: Invalid HBA PCI-device group: <dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1419: Invalid HBA PCI-device group: <dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1420: Invalid HBA PCI-device group: <dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1421: Failed to set up hba

DESCRIPTION: Initialization failed to set up the adapter.

DATA: None

ACTION: None required.

elx_mes1422: Unrecoverable Error Detected during POST uerr_lo_reg=<ue lo>, uerr_hi_reg=<ue hi>

DESCRIPTION: The adapter has notified the driver that it has encountered an unrecoverable error.

DATA: None

ACTION: A dump from the OneCommand Manager application should be taken. Then, the driver should be unloaded and reloaded.

elx_mes1423: HBA Unrecoverable error: uerr_lo_reg=<ue lo>, uerr_hi_reg=<ue hi>, ue_mask_lo_reg=<ue mask lo>, ue_mask_hi_reg=<ue mask hi>

DESCRIPTION: The adapter has notified the driver that it has encountered an unrecoverable error.

DATA: None

ACTION: A dump from the OneCommand Manager application should be taken. Then, unload and reload the driver.

elx_mes1424: Invalid PCI device group: <pci_dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1425: Invalid PCI device group: <pci_dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1426: Invalid PCI device group: <pci_dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1427: Invalid PCI device group: <pci_dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1428: Invalid PCI device group: <pci_dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1429: Invalid PCI device group: <pci_dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1430: Failed to initialize sgl list.

DESCRIPTION: Failed to initialize SGL list.

DATA: None

ACTION: None required.

elx_mes1431: Invalid HBA PCI-device group: <dev_grp>

DESCRIPTION: Invalid adapter PCI-device group detected.

DATA: None

ACTION: None required.

elx_mes1432: Failed to initialize rpi headers.

DESCRIPTION: RPI headers required by the firmware failed to initialize.

DATA: None

ACTION: None required.

elx_mes1476: Failed to allocate sysfs attr.

DESCRIPTION: Failed to allocate sysfs attribute.

DATA: None

ACTION: None required.

elx_mes1477: Failed to set up hba

DESCRIPTION: Failed to set up adapter.

DATA: None

ACTION: None required.

IOCTL Events (1600 - 1699)

None.

VPort Events (1800 - 1832)

elx_mes1800: Could not issue unreg_vpi

DESCRIPTION: Driver attempt to unregister VPI failed.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1801: Create vport work array FAILED: cannot do scsi_host_get

DESCRIPTION: Driver failed to create working list of VPorts.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1802: HBQ <index>: local_hbqGetIdx <index> is > than hbqp->entry_count <count>

DESCRIPTION: An error occurred when processing queue related to an adapter in a particular slot.

DATA: (1) hbqno, (2) local_hbqGetIdx, (3) entry_count

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1803: Bad hbq tag. Data: <tag> <count>

DESCRIPTION: An error occurred when processing queue related tags for an adapter in a particular slot.

DATA: (1) tag, (2) buffer_count

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1804: Invalid asynchronous event code: <evt code>

DESCRIPTION: The asynchronous event code that the firmware passed to the driver is invalid.

DATA: None

ACTION: None required.

elx_mes1805: Adapter failed to init.Data: <command> <status> <queue num>

DESCRIPTION: An error occurred when processing queue related tags for an adapter in a particular slot.

DATA: (1) mbxCommand, (2) mbxStatus, (3) hbaqno

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1806: Mbox <command> failed. No vport.

DESCRIPTION: A mailbox command could not be communicated because there was no vPort associated with the mailbox command.

DATA: (1) mbxCommand

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1807: IOCB <value> failed. No vport

DESCRIPTION: An IOCB command could not be communicated because there was no vPort associated with the mailbox command.

DATA: (1) ulpCommand

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1808: Create VPORT failed: NPIV is not enabled: SLImode <mode>

DESCRIPTION: The driver failed to create a port because the adapter was in wrong mode or was not capable of NPIV.

DATA: (1) sli_rev

ACTION: Load the driver with NPIV enabled on an adapter that supports SLI-3.

elx_mes1809: Create VPORT failed: Max VPORTs (<vpi>) exceeded.

DESCRIPTION: The driver failed to create a port because the maximum number of port supported by the driver is exceeded.

DATA: (1) max_vpi

ACTION: No Action. The driver cannot create any more VPorts.

elx_mes1810: Create VPORT failed: Cannot get instance number.

DESCRIPTION: The driver failed to allocate resources for an adapter and could not assign an instance number.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1811: Create VPORT failed: vpi x<vpi>

DESCRIPTION: The driver failed to create a port and had to eliminate all its resources.

DATA: (1) vpi

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1812: vport_delete failed: Cannot delete physical host

DESCRIPTION: An attempt to delete a port failed because it was to delete a physical port and not a virtual port. Only VPorts on physical ports can be deleted on an NPIV system.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1813: Create VPORT failed. Cannot get sparam.

DESCRIPTION: The port could not be created because it could not be initialized possibly due to unavailable resources.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1814: Mbox <u.mb.mbxCommand> failed, no vport

DESCRIPTION: The vPort field of this mailbox command was not completed.

DATA: None

ACTION: None required.

elx_mes1815 Could not issue unreg_did (default rpis)

DESCRIPTION: Attempt to unregister RPI failed.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1818: VPort failed init, mbxCmd <mailbox command> READ_SPARM mbxStatus <mailbox status>, rc = <status>

DESCRIPTION: A pending mailbox command issued to initialize port failed.

DATA: (1) mbxCommand, (2) mbxStatus, (3) rc

ACTION: Software driver error. If this issue persists, report these issues to Emulex technical support.

elx_mes1820: Unable to select SLI-3. Not supported by adapter.

DESCRIPTION: The adapter is not capable of operating in a given mode.

DATA: None

ACTION: This is an informational message. SLI-3 mode is only available on some adapters. Do not attempt to force an adapter to run in SLI mode 3 if that adapter does not support SLI-3 mode. Adapters that do not support SLI-3 are configured to run in SLI-2 mode. Nevertheless, it is recommended to use the auto setting (0).

elx_mes1821: Create VPORT failed. Invalid WWN format

DESCRIPTION: The port could not be created due to an invalid WWNN or WWPN format.

DATA: None

ACTION: Provide a valid WWN when creating VPorts.

elx_mes1822: Invalid <name>: <xx: xx: xx: xx: xx: xx: xx: xx>

DESCRIPTION: An invalid WWN was used when creating a vPort.

DATA: (1) type_name, (2) wwn[1], (3) wwn[3], (3) wwn[5], (4) wwn[7]

ACTION: When creating a vPort you must furnish a valid WWN.

elx_mes1823: Create VPORT failed. Duplicate WWN on HBA.

DESCRIPTION: The port could not be created because it would duplicate an existing WWNN adapter address. The resources for the port had to be discarded.

DATA: None

ACTION: Provide a WWN that is unique.

elx_mes1825: Vport Created.

DESCRIPTION: This message is displayed to indicate that a port was created in the system. It is displayed at this level to ensure it is always appears at all log levels.

DATA: None

ACTION: No action, informational.

elx_mes1826: Vport Disabled.

DESCRIPTION: The port had to be disabled in the system.

DATA: None

ACTION: No action, informational.

elx_mes1827: Vport Enabled.

DESCRIPTION: The port had to be enabled after possible recovery from some errors.

DATA: None

ACTION: No action, informational.

elx_mes1828: Vport Deleted.

DESCRIPTION: A vPort was deleted.

DATA: None

ACTION: No action, informational.

elx_mes1830: Signal aborted mbxCmd <command>

DESCRIPTION: A pending mailbox command was aborted because the thread received a signal.

DATA: None

ACTION: The command is retried.

elx_mes1831: Create VPORT Interrupted.

DESCRIPTION: The port creation process was unexpectedly interrupted at a critical time and the operation was unsuccessful.

DATA: None

ACTION: The process was interrupted while creating a vPort. Retry the command.

elx_mes1832: No pending MBOX command to handle.

DESCRIPTION:

DATA: None

ACTION: None required.

Extended Link Service Events (1833 - 2800)

elx_mes1835: Vport discovery quiesce failed: state <port_state> fc_flags <fc_flag> wait msecs <jiffies_to_msecs(jiffies - start_time)>

DESCRIPTION: Could not pause discovery on this vPort.

DATA: None

ACTION: None required.

elx_mes1836: Could not issue unreg_login(all_rpis) status <rc>

DESCRIPTION: The unreg_login cannot be issued.

DATA: None

ACTION: None required.

elx_mes1837: vport_delete failed: Cannot delete static vport.

DESCRIPTION: Static VPorts cannot be deleted.

DATA: None

ACTION: None required.

elx_mes1838: Failed to INIT_VPI on vpi <vpi> status <rc>

DESCRIPTION: Failed to INIT_VPI.

DATA: None

ACTION: None required.

elx_mes1839: Create VPORT failed. vname allocation failed.

DESCRIPTION: Driver failed to allocate buffer for Virtual Machine name.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1840: Delete VPORT cannot proceed at this time due to SCSI layer busy.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes1920: Exec format error, Dropping Link state event

DESCRIPTION: No dfchba instance available for Link State event - dropping.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1923: Exec format error, Dropping rscn event

DESCRIPTION: No dfchba instance available for RSCN event - dropping.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1926: Exec format error

DESCRIPTION: No dfchba instance available for IOCTL loopback test - dropping.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1927: Exec format error, Dropping temp event

DESCRIPTION: No dfchba instance available for Temperature event - dropping.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1928: Exec format error, Dropping dump event

DESCRIPTION: No dfchba instance available for Dump event - dropping.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1929: Exec format error

DESCRIPTION: No dfchba instance available for IOCTL loopback XRI read - dropping.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1934: ENOMEM DMA coherent resource unavailable

DESCRIPTION: Driver failed to allocate a DMA buffer for an IOCTL request.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1935: Loopback test did receive any data

DESCRIPTION: Driver ran loopback test, but did not receive a response.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1936: ENOMEM Kernel resource unavailable

DESCRIPTION: Driver failed to allocate DMA buffer during loopback test.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1944: ENOMEM kernel memory resource unavailable

DESCRIPTION: Driver failed to allocate kernel buffer for timed out I/O request.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1949: ENOEXEC NULL parameter passed to function

DESCRIPTION: Driver tried to post receive buffer, but no receive buffers available.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1950: ENOMEM IOCB resource not available

DESCRIPTION: Driver could not allocate IOCBs needed to post loopback receive buffers.

DATA: (1) (2) (3)

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1951: ENOMEM MBUF resource not available

DESCRIPTION: Driver failed to get memory buffer needed for loopback test.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1952: ENOMEM DMA resource not available

DESCRIPTION: Driver failed to get DMA buffers needed for loopback test

DATA: (1) (2) (3)

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes1957: EPERM Illegal BDE count [<value>]

DESCRIPTION: Driver received too many receive buffers for loopback operation.

DATA: (1) receive buffer count

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2000: Failed to allocate mbox for READ_FCF cmd

DESCRIPTION: Failed to allocate mailbox for READ_FCF command.

DATA: None

ACTION: None required.

elx_mes2001: Unable to allocate memory for issuing SLI_CONFIG_SPECIAL mailbox command

DESCRIPTION: Unable to allocate memory for issuing the SLI_CONFIG_SPECIAL mailbox command.

DATA: None

ACTION: None required.

elx_mes2002: Error Could not grow rpi count

DESCRIPTION: An error occurred because the RPI count could not be increased.

DATA: None

ACTION: None required.

elx_mes2007: Only Limited Edition cmd Format supported <iocb.ulpCommand>

DESCRIPTION: SLI-4 only supports the Limited Edition command format.

DATA: None

ACTION: None required.

elx_mes2008: Error <rc> posting all rpi headers

DESCRIPTION: The RPI headers could not be posted to the firmware.

DATA: None

ACTION: None required.

elx_mes2009: Failed to allocate mbox for ADD_FCF cmd

DESCRIPTION: Failed to allocate mailbox for ADD_FCF command.

DATA: None

ACTION: None required.

elx_mes2010: Resume RPI Mailbox failed status <status>, mbxStatus <mbx status>.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2011: Unable to allocate memory for issuing SLI_CONFIG_SPECIAL mailbox command

DESCRIPTION: Unable to allocate memory for issuing SLI_CONFIG_SPECIAL mailbox command.

DATA: None

ACTION: None required.

elx_mes2012: Mailbox failed, mbxCmd <mbx_cmd> READ_CONFIG, mbxStatus <mbx status>.

DESCRIPTION: The READ_CONFIG mailbox command failed.

DATA: None

ACTION: None required.

elx_mes2013: Could not manually add FCF record 0, status <rc>

DESCRIPTION: Could not add FCF record to the FCF list.

DATA: None

ACTION: None required.

elx_mes2014: Invalid command <iocb.ulpCommand>

DESCRIPTION: The IOCB command is invalid.

DATA: None

ACTION: None required.

elx_mes2015: Invalid CT command <iocb.ulpCommand>

DESCRIPTION: Invalid Command-Type in the IOCB is not supported.

DATA: None

ACTION: None required.

elx_mes2017: REG_FCFI mbxStatus error <mbx status> HBA state <port_state>.

DESCRIPTION: The REG_FCFI mailbox command has failed.

DATA: None

ACTION: None required.

elx_mes2018: REG_VFI mbxStatus error <mbx status> HBA state <port_state>.

DESCRIPTION: The REG_VFI mailbox command has failed.

DATA: None

ACTION: None required.

elx_mes2022: INIT VPI Mailbox failed status <status>, mbxStatus <mbxStatus>

DESCRIPTION: The INIT VPI mailbox command has failed.

DATA: None

ACTION: None required.

elx_mes2400: Failed to allocate xri for ELS sgl

DESCRIPTION: Initialization failed to allocate XRI for the extended link service SGL.

DATA: None

ACTION: None required.

elx_mes2500: EQ_CREATE mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to create the event queue has failed.

DATA: None

ACTION: None required.

elx_mes2501: CQ_CREATE mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to create the completion queue has failed.

DATA: None

ACTION: None required.

elx_mes2502: MQ_CREATE mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to create the mailbox queue has failed.

DATA: None

ACTION: None required.

elx_mes2503: WQ_CREATE mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to create the work queue has failed.

DATA: None

ACTION: None required.

elx_mes2504: RQ_CREATE mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to create the receive queue has failed.

DATA: None

ACTION: None required.

elx_mes2505: EQ_DESTROY mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to delete the event queue has failed.

DATA: None

ACTION: None required.

elx_mes2506: CQ_DESTROY mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to delete the completion queue has failed.

DATA: None

ACTION: None required.

elx_mes2507: MQ_DESTROY mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to delete the mailbox queue has failed.

DATA: None

ACTION: None required.

elx_mes2508: WQ_DESTROY mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to delete the work queue has failed.

DATA: None

ACTION: None required.

elx_mes2509: RQ_DESTROY mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to delete the receive queue has failed.

DATA: None

ACTION: None required.

elx_mes2510: RQ_DESTROY mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to delete the receive queue has failed.

DATA: None

ACTION: None required.

elx_mes2511: POST_SGL mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to post the SGL pages to the firmware has failed.

DATA: None

ACTION: None required.

elx_mes2512: MODIFY_EQ_DELAY mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to modify the event queue delay in the firmware has failed.

DATA: None

ACTION: None required.

elx_mes2513: POST_SGL_BLOCK mailbox command failed status <shdr_status> add_status <shdr_add_status> mbx status <rc>

DESCRIPTION: The mailbox command sent to post the SGL pages to the firmware has failed.

DATA: None

ACTION: None required.

elx_mes2514: POST_RPI_HDR mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx status <rc>

DESCRIPTION: The mailbox command sent to post the RPUI header pages to the firmware has failed.

DATA: None

ACTION: None required.

elx_mes2515: ADD_FCF_RECORD mailbox failed with status <rc>

DESCRIPTION: The mailbox command to add the FCF record has failed.

DATA: None

ACTION: None required.

elx_mes2521: READ_FCF_RECORD mailbox failed with status <shdr_status> add_status <shdr_add_status>, mbx

DESCRIPTION: The READ_FCF_RECORD mailbox command has failed.

DATA: None

ACTION: None required.

elx_mes2522: Synchronous READ_FCF_RECORD mailbox failed with status <value> add_status <value>

DESCRIPTION: Driver failed to read the active FCF Record on an FCoE link - FCF may not be available.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2523: Allocated DMA memory size (<alloc_len>) is less than the requested DMA memory size (<req_len>)

DESCRIPTION: The ADD_FCF_RECORD mailbox command failed to retrieve the length required from the firmware.

DATA: None

ACTION: None required.

elx_mes2524: Failed to get the non-embedded SGE virtual address

DESCRIPTION: The READ_FCF_RECORD mailbox command could not retrieve the scatter/gather entry that was requested.

DATA: None

ACTION: None required.

elx_mes2527: Failed to allocate non-embedded SGE array.

DESCRIPTION: Failed to allocate the non-embedded scatter/gather entry array.

DATA: None

ACTION: None required.

elx_mes2528: Mailbox command <vpi> cannot issue

DESCRIPTION: The mailbox command could not be issued because the mailbox interrupt is disabled.

DATA: (1) mbxCommand, (2) sli_flag, (3) flag

ACTION: None required.

elx_mes2529: Mailbox command <vpi> cannot issue

DESCRIPTION:

DATA: (1) mbxCommand, (2) sli_flag, (3) flag

ACTION: None required.

elx_mes2530: Mailbox command <vpi> cannot issue

DESCRIPTION: The SLI layer in the driver is inactive.

DATA: (1) mb.mbxCommand, (2) sli_flag, (3) flag

ACTION: None required.

elx_mes2531: Mailbox command <cpi> cannot issue

DESCRIPTION:

DATA: (1) mb.mbxCommand, (2) sli_flag, (3) flag

ACTION: None required.

elx_mes2532: Mailbox command <vpi> (<mbxCommand>) cannot issue

DESCRIPTION: The mailbox bootstrap code detected that the SLI layer is active.

DATA: (1) sli4_mbox_opcode, (2) sli_flag, (3) MBX_POLL

ACTION: None required.

elx_mes2533: Mailbox command <vpi> (<mbxCommand>) cannot issue

DESCRIPTION:

DATA: (1) sli4_mbox_opcode, (2) sli_flag, (3) MBX_NOWAIT

ACTION: None required.

elx_mes2535: Unsupported RQ count. (<entry_count>).

DESCRIPTION: The receive queue ring can only be 512, 1024, 2048, or 4096.

DATA: None

ACTION: None required.

elx_mes2536: Unsupported RQ count. (<entry_count>).

DESCRIPTION: The receive queue ring can only be 512, 1024, 2048, or 4096.

DATA: None

ACTION: None required.

elx_mes2537: Receive Frame Truncated!

DESCRIPTION: The receive unsolicited handler detected a truncated frame.

DATA: None

ACTION: None required.

elx_mes2540: Ring <value> handler: unexpected Rctl <value> Type <value> received

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2543: Mailbox command <vpi> (<mbxCommand>) cannot issue

DESCRIPTION: The mailbox command does not have all of the fields set correctly.

DATA: (1) sli4_mbx_opcode, (2) sli_flag, (3) flag

ACTION: None required.

elx_mes2544: Mailbox command <vpi> (<mbxCommand>) cannot issue

DESCRIPTION: The adapter cannot be accessed on the PCI bus.

DATA: (1) sli4_mbx_opcode, (2) sli_flag, (3) flag

ACTION: None required.

elx_mes2546: New FCF found index <index> tag <event_tag>

DESCRIPTION: A new FCF has been found.

DATA: None

ACTION: None required.

elx_mes2547: Issue FCF scan read FCF mailbox command failed

DESCRIPTION: Could not read the FCF mailbox command from the firmware.

DATA: None

ACTION: None required.

elx_mes2548: FCF Table full count <count> tag <event_tag>

DESCRIPTION: The FCF table is full.

DATA: None

ACTION: None required.

elx_mes2549: FCF disconnected from network index <index> tag <event_tag>.

DESCRIPTION: The FCF has disconnected from the network.

DATA: None

ACTION: None required.

elx_mes2550: UNREG_FCFI mbxStatus error <u.mb.mbxStatus> HBA state <port_state>.

DESCRIPTION: The unregistered FCFI has failed.

DATA: None

ACTION: None required.

elx_mes2551: UNREG_FCFI mbox allocation failed HBA state <port_state>.

DESCRIPTION: The allocation for the UNREG_FCFI mailbox command has failed.

DATA: None

ACTION: None required.

elx_mes2552: Unregister FCFI command failed rc <rc> HBA state <port_state>.

DESCRIPTION: The unregister FCFI mailbox command has failed.

DATA: None

ACTION: None required.

elx_mes2553: lpfc_unregister_unused_fcf failed to read FCF record HBA state.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2554: Could not allocate memory for fcf record

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2555: UNREG_VFI mbxStatus error <u.mb.mbxStatus> HBA state <port_state>

DESCRIPTION: The unregister virtual fabric index mailbox command has failed.

DATA: None

ACTION: None required.

elx_mes2556: UNREG_VFI mbox allocation failed HBA state <port_state>

DESCRIPTION: Could not allocate memory for UNREG_VFI mailbox command.

DATA: None

ACTION: None required.

elx_mes2557: UNREG_VFI issue mbox failed rc <rc> HBA state <port_state>

DESCRIPTION: Could not issue the UNREG_VFI mailbox command.

DATA: None

ACTION: None required.

elx_mes2558: ADD_FCF_RECORD mailbox failed with status<shdr_status> add_status <shdr_add_status>

DESCRIPTION: The ADD_FCF_RECORD mailbox command has failed.

DATA: None

ACTION: None required.

elx_mes2560: Failed to allocate xri for scsi buffer

DESCRIPTION: Failed to allocate an XRI for the SCSI buffer.

DATA: None

ACTION: None required.

elx_mes2561: Allocated DMA memory size (<alloclen>) is less than the requested DMA memory size (<reqlen>)

DESCRIPTION: Could not get the memory required for the number of XRIs that are attempting to be posted.

DATA: None

ACTION: None required.

elx_mes2562: Failure to allocate an ELS sgl entry: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2563: Failure to allocate an ELS mbuf: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2564: POST_SGL_BLOCK mailbox command failed status <shdr_status> add_status <shdr_add_status> mbx status <rc>

DESCRIPTION: The list of XRI SGEs failed to be registered with the firmware.

DATA: None

ACTION: None required.

elx_mes2566: Failed to allocate connection table entry

DESCRIPTION: Failed to allocate connection table entry.

DATA: None

ACTION: None required.

elx_mes2567: Config region 23 has bad signature

DESCRIPTION: Configuration region 23 has an invalid signature.

DATA: None

ACTION: None required.

elx_mes2568: Config region 23 has bad version

DESCRIPTION: Configuration region 23 has an invalid version.

DATA: None

ACTION: None required.

elx_mes2572: Failed allocate memory for fast-path per-EQ handle array

DESCRIPTION: Failed to allocate memory for the fast-path per-event queue handle array.

DATA: None

ACTION: None required.

elx_mes2573: Failed allocate memory for msi-x interrupt vector entries

DESCRIPTION: Failed to allocate memory for MSI-X interrupt vector entries.

DATA: None

ACTION: None required.

elx_mes2574: Not enough EQs (<sli4_hba.max_cfg_param.max_eq>) from the pci function for supporting FCP EQs (<cfg_fcp_eq_count>)

DESCRIPTION: Failed to create the minimum fast-path event queues.

DATA: None

ACTION: None required.

elx_mes2576: Failed allocate memory for fast-path EQ record array

DESCRIPTION: Failed to allocate memory for the fast-path event queue record array.

DATA: None

ACTION: None required.

elx_mes2577: Failed allocate memory for fast-path CQ record array

DESCRIPTION: Failed to allocate memory for the fast-path completion queue record array.

DATA: None

ACTION: None required.

elx_mes2578: Failed allocate memory for fast-path WQ record array

DESCRIPTION: Failed to allocate memory for the fast-path WQ record array.

DATA: None

ACTION: None required.

elx_mes2581: Not enough WQs (<sli4_hba.max_cfg_param.max_wq>) from the pci function for supporting FCP WQs (<cfg_fcp_wq_count>)

DESCRIPTION: The driver was not configured with the minimum number of fast-path work queues.

DATA: None

ACTION: None required.

elx_mes2598: Adapter Link is disabled.

DESCRIPTION: The adapter link is disabled.

DATA: None

ACTION: None required.

elx_mes2599: Adapter failed to issue DOWN_LINK mbox command rc <rc>.

DESCRIPTION: The adapter failed to issue a DOWN_LINK mailbox command.

DATA: None

ACTION: None required.

elx_mes2600: failed to allocate mailbox memory

DESCRIPTION: Failed to allocate mailbox memory.

DATA: None

ACTION: None required.

elx_mes2605: lpfc_dump_static_vport: memory allocation failed

DESCRIPTION: Memory allocation failed.

DATA: None

ACTION: None required.

elx_mes2606: No NPIV Fabric support

DESCRIPTION: No NPIV Fabric support.

DATA: None

ACTION: None required.

elx_mes2607: Failed to allocate init_vpi mailbox

DESCRIPTION: Failed to allocate init_vpi mailbox.

DATA: None

ACTION: None required.

elx_mes2608: Failed to issue init_vpi mailbox

DESCRIPTION: Failed to issue init_vpi mailbox.

DATA: None

ACTION: None required.

elx_mes2609: Init VPI mailbox failed <u.mb.mbxStatus>

DESCRIPTION: Initialization of VPI mailbox has failed.

DATA: None

ACTION: None required.

elx_mes2610: FCF <value> reached driver's book keeping dimension: <value>.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2619: Config region 23 has bad signature

DESCRIPTION: Configuration region 23 has an invalid signature.

DATA: None

ACTION: None required.

elx_mes2620: Config region 23 has bad version

DESCRIPTION: Configuration region 23 has an invalid version.

DATA: None

ACTION: None required.

elx_mes2707: Ring <Ring#> handler: Failed to allocate iocb Rctl <fh_rctl> Type <fh_type> received

DESCRIPTION: Could not allocate an IOCB with which to associate this received frame.

DATA: None

ACTION: None required.

elx_mes2710: PCI channel disable preparing for reset

DESCRIPTION: Driver is resetting the PCI slot for this port - starting preparations.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2711: PCI channel permanent disable for failure

DESCRIPTION: Driver has detected a fatal port error - disabling PCI channel.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2712: lpfc_aer support attribute value <value> out of range, allowed values are 0|1, setting it to default value of 1

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2718: Clear Virtual Link Received for VPI <index> tag <event_tag>

DESCRIPTION: A Clear virtual link was received from the Fabric for this VPI.

DATA: None

ACTION: None required.

elx_mes2719: Invalid response length: tgt <TGT_ID> lun <LUN> cmnd <CMD> rsplen <RSPLEN>

DESCRIPTION: The response length for this FCP command is not supported.

DATA: None

ACTION: None required.

elx_mes2723 PCI channel I/O abort preparing for recovery

DESCRIPTION: Driver is preparing port PCI channel for reset/recovery after I/O error.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2726: READ_FCF_RECORD Indicates empty FCF table

DESCRIPTION: The driver requested the firmware provide a list of FCF entries to connect to and the firmware responded that the FCF table is empty.

DATA: None

ACTION: None required.

elx_mes2729: Unable to dma_map_single request_buffer: <value>

DESCRIPTION: Driver unable to map SCSI command scatter-gather buffer.

DATA: (1) dma mapping error.

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2731: Cannot find fabric controller node.

DESCRIPTION: Driver not able to find Fabric controller node in its data base.

DATA: None

ACTION: None required.

elx_mes2732: Failed to issue INIT_VPI mailbox command.

DESCRIPTION: The driver wanted to send a INIT_VPI mailbox command to initialize a vPort, but failed to send the mailbox command due to state of the adapter.

DATA: None

ACTION: None required.

elx_mes2745: Failed to allocate mbox for requesting FCF rediscover

DESCRIPTION: Driver is trying to rediscover FCF table, but failed to allocate memory needed.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2746: Requesting for FCF rediscovery failed status <value> add_status <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2747: Issue FCF scan read FCF mailbox command failed

DESCRIPTION: The driver wanted to send a read FCF record mailbox command to start fast FCF failover FCF scan, but failed to send the mailbox command due to state of the adapter.

DATA: None

ACTION: None required.

elx_mes2748 Failed to prepare for unregistering HBA's FCF record: rc=<value>

DESCRIPTION: Driver encountered an initialization error when preparing to rescan the FCF tables and needed to unregister an old FCF record.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2749 Failed to prepare for unregistering HBA's FCF record: rc=<value>

DESCRIPTION: Driver encountered an initialization error when preparing to unregister an FCF and needed to prepare the command.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2751: Adapter failed to restart, status reg <status>, FW Data: A8 <0xA8> AC <0xAC>

DESCRIPTION: The adapter has failed to restart.

DATA: None

ACTION: If the issue persists, report the error to Emulex technical support.

elx_mes2752: KILL_BOARD command failed retval <retval>

DESCRIPTION: The KILL BOARD mailbox command failed to complete.

DATA: None

ACTION: If the issue persists, report the error to Emulex technical support.

elx_mes2753: PLOGI failure DID:<DID> Status:<Status>/<Extended Status>.

DESCRIPTION: A port login to <DID> was failed either by the driver, firmware, or target. The <status> and <extended status> indicates why the port login failed.

DATA: None

ACTION: If the issue persists, report the error to Emulex technical support.

elx_mes2754: PRLI failure DID:<DID> Status:<Status>/<Extended Status>.

DESCRIPTION: A process login to <DID> failed either by the driver, firmware, or target. The <status> and <extended status> indicates why the process login failed.

DATA: None

ACTION: If the issue persists, report the error to Emulex technical support.

elx_mes2755: ADISC failure DID:<DID> Status:<Status>/<Extended Status>.

DESCRIPTION: An address discovery to <DID> failed either by the driver, firmware, or target. The <status> and <extended status> indicates why the address discovery failed.

DATA: None

ACTION: If the issue persists, report the error to Emulex technical support.

elx_mes2756: LOGO failure DID:<DID> Status:<Status>/<Extended Status>.

DESCRIPTION: An N_Port logout to <DID> failed either by the driver, firmware, or target. The <status> and <extended status> indicates why the N_Port logout failed.

DATA: None

ACTION: If the issue persists, report the error to Emulex technical support.

elx_mes2757: Protocol failure detected during processing of FCP I/O op: tgt <tgt ID> lun <LUN> cmnd <CMD> rspInfo3 <rspInfo3>

DESCRIPTION: The FCP response from a target indicated that the response length is valid, but rspInfo3 indicates that there is no Failure. This is a FCP specification violation by the target.

DATA: None

ACTION: If the issue persists, report the error to Emulex technical support.

elx_mes2758: Failed to allocate mbox for READ_FCF command.

DESCRIPTION: The driver failed to allocate memory from the mempool for issuing FCF read mailbox command during the round robin FCF bmask update.

DATA: None

ACTION: None required.

elx_mes2759: Failed to allocate memory for round robin FCF failover bmask.

DESCRIPTION: The driver failed to allocate memory for the round robin FCF failover bmask.

DATA: None

ACTION: Make sure system has enough kernel memory, might need to reload the driver after memory issue resolved.

elx_mes2762: FCF <value> reached driver's book keeping dimension: <value>

DESCRIPTION:

DATA: None

ACTION: Inform Emulex about this.

elx_mes2763: Failed to allocate mbox for READ_FCF cmd.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2765 Mailbox command READ_FCF_RECORD failed to retrieve a FCF record

DESCRIPTION: Driver failed to find an FCF record when the FCF table scan completed.

DATA:

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2772: Issue FCF rediscover mailbox command failed, failt through to FCF dead event

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2774: Issue FCF rediscover mailbox command failed, through to CVL event

DESCRIPTION:

DATA: None

ACTION: None required.

New Events

elx_mes2796: Mailbox memory allocation failed

DESCRIPTION: The driver failed to get memory resources to release an RPI.

DATA: None.

ACTION: None. The driver's heap is exhausted. A server reboot is required to fix the exhaustion. Contact Emulex technical support if the issue persists.

elx_mes2798: Unreg_vpi failed vpi <value>, mb status = <value>

DESCRIPTION: The driver attempted to unregister a virtual port index and failed. The failure status is printed.

DATA: None.

ACTION: This condition is not catastrophic, but is unexpected. If issues persist, contact Emulex technical support.

elx_mes2813: Mgmt IO is Blocked <value> - mbox cmd <value> still active.

DESCRIPTION: The HBA's management interface is marked as blocked in preparation for an online or offline state transition. All user space access to the HBA via libdfc interface will be blocked.

DATA: None.

ACTION: None. Notification of a run-state change only.

elx_mes2822: IOCB failed <value> iotag <value> xri <value>

DESCRIPTION: The driver is attempting to drain an internal queue and failed. The failure reason and some state variables are written to the console.

DATA: None

ACTION: None required. This should be a transient condition. If not, contact Emulex technical support.

elx_mes2823: txq empty and txq_cnt is <value>

DESCRIPTION: The driver has detected a discrepancy between the elements queued to the txq and the counter tracking the number or items.

DATA: None

ACTION: None required. The driver has nothing to do except correct the counter - the txq is empty.

elx_mes2824: Cannot re-enable interrupt after slot reset.

DESCRIPTION: The driver failed to re-enable interrupts following a PCI slot reset command.

DATA: None

ACTION: A system reboot may be required to fully recover. Contact Emulex technical support if issues persist.

elx_mes2825: Unknown PCI error state: <value>

DESCRIPTION: The driver writes this message to the console if the PCI subsystem has detected an error on an Emulex port and called the driver. The driver reacts by resetting the port.

DATA: None

ACTION: None required. The driver resets the device in an attempt to recover. Contact Emulex technical support if issues persist.

elx_mes2826: PCI channel disable preparing for reset

DESCRIPTION: The driver writes this message to the console if it is preparing the port for a reset operation.

DATA: None

ACTION: None required. This message is notification of a corrective measure. Contact Emulex technical support if issues persist.

elx_mes2827: PCI channel permanent disable for failure

DESCRIPTION: The driver writes this message to the console if a recovery mechanism has failed and the driver wants to mark the port with a permanent failure.

DATA: None

ACTION: A system reboot may correct the failure. If not, contact Emulex technical support.

elx_mes2828: PCI channel I/O abort preparing for recovery

DESCRIPTION: The driver writes this message to the console when it is preparing the port for a recovery operation.

DATA: None

ACTION: None required. This is a notification message for the recovery action.

elx_mes2831: FLOGI response with cleared Fabric bit fcf_index <value> Switch Name <value> Fabric Name <value>

DESCRIPTION: When the driver completed a FLOGI, the common service parameters did not indicate an FPort or NPort remote node. The driver treats this as an error.

DATA: None

ACTION: Validate the external cable connection and FPort/Nport configuration. Contact Emulex technical support if issues persist.

elx_mes2856: Config Port Security Crypto Error: <value>, pmb->u.mb.un.varCfgPort.sec_err

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2858: FLOGI failure Status:<value>/<value> TMO:<value>

DESCRIPTION: The driver issued a FLOGI, but never received any completion with the timeout period. The driver is marking the FLOGI as failed and stops discovery.

DATA: None

ACTION: Check your Fabric to ensure it is operating correctly. Contact Emulex technical support if issues persist.

elx_mes2860: SLI authentication is required for INIT_LINK but has not been done yet

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2862: FCF (<value>) matches property of in-use FCF (<value>)

DESCRIPTION: The driver has found an FCF record that matches the properties of the current FCF record, except for the VLAN ID and Index. The driver will attempt to use this FCF.

DATA: None

ACTION: None required. The driver is in its FCF discovery phase and is trying to recover a match to its in-use FCF.

elx_mes2863: New FCF (<value>) matches property of in-use FCF (<value>)

DESCRIPTION: The driver has found a new FCF record that matches the properties of the current FCF record, but the record instance numbers do not match.

DATA: None

ACTION: None required. The driver is in its FCF discovery phase and is trying to recover a match to its in-use FCF.

elx_mes2877: FCP XRI exchange busy wait time: <value> seconds

DESCRIPTION: An FCP exchange cannot be released - no port completion. Driver is waiting.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2878: ELS XRI exchange busy wait time: <value> seconds

DESCRIPTION: An extended link service exchange cannot be released - no port completion. Driver is waiting.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2881: RRQ failure DID:<value> Status:<value>/<value>

DESCRIPTION: Driver Reinstate Recovery Qualifier request failed - driver write target DID and status values.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2882: RRQ completes to NPort <value> with no ndlp. Data: <value> <value> <value>

DESCRIPTION: Driver completes a Reinstate Recovery Qualifier, but there is no node association.

DATA: (1) Status (2) Reason (3) IoTag

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2884: Vport array allocation failed

DESCRIPTION: Driver could not create a buffer list of VPorts.

DATA: None

ACTION: Software driver error. If this issue persists, report these errors to Emulex technical support.

elx_mes2885: Port Status Event: port status reg <value>, port smphr reg <value>, error 1=<value>, error 2=<value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2886: HBA Error Attention on unsupported if type <value>.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2887: Reset Needed: Attempting Port Recovery

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2888: Unrecoverable port error following POST: port status reg <value>, port smphr reg <value>, error 1=<value>, error 2=<value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2889: Port Overtemperature event, taking port

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2890: Port error detected during port reset: wait_tmo: <value>, port status reg <value>, error 1=<value>, error 2=<value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2891: Init VFI mailbox failed <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2892: Failed to allocate init_vfi mailbox

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2893: Failed to issue init_vfi mailbox

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2894: SLI_INTF reg contents invalid sli_intf reg <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2895: Non FC link Event detected.(<value>)

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2897: The mboxq allocation failed

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2898: The lpfc_dmabuf allocation failed

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2899: The mbuf allocation failed

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2919: Failed to release resource extents for type <value> - Status <value> Add'l Status <value>. Resource memory not released.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2920: Failed to alloc Resource IDs rc = <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2925: Failed to issue CT ABTS RSP <value> on xri <value>, Data <value>

DESCRIPTION: The driver attempted and failed to issue a response to an unsolicited abort sequence from the SAN.

DATA: None

ACTION: None required.

elx_mes2929: Resource Extent Opcode <value> is unsupported

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2930: Failed to get resource extents Status <value> Add'l Status <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2936: Could not find Vport mapped to vpi <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2945: SLI_CONFIG(mse) rd, ext_buf_cnt(<value>) out of range(<value>)

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2946: SLI_CONFIG(hbd) rd, ext_buf_cnt(<value>) out of range(<value>)

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2950: Failed SLI_CONFIG(hbd) rd (<value>)

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2953: SLI_CONFIG(mse) wr, ext_buf_cnt(<value>) out of range(<value>)

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2954: SLI_CONFIG(hbd) wr to interface type:<value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes2999: Unsupported SLI4 Parameters Extents and RPI headers enabled.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3008: No available Resource Extents for resource type <value>: Count: <value>, Size <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3010: Run link diag test mailbox failed with mbx_status <value> status <value>, add_status <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3029: SLI_CONFIG(hbd) rd to interface type:<value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3042: Failed SLI_CONFIG(hbd) wr (<value>)

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3045: SLI_CONFIG(hbd) wr, ext_buf_cnt(<value>) out of range(<value>)

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3061: Last IDX <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3069: Clearing FCP rules

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3070: lpc_clr_ndlps_pri: fcp_priority sz = <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3071: no memory for priority rules

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3084: Allocated DMA memory size (<value>) is less than the requested DMA memory size (<value>)

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3089: Failed to allocate queues

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3103: Adapter Link is disabled.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3104: Adapter failed to issue

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3105: failed to allocate mailbox memory

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3112: lpfc_link_speed attribute cannot be set to <value>. Speed is not supported in loop mode.

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3113: Loop mode not supported at speed <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3125: Not receiving unsolicited event

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3141: Loopback mode: <value> not supported

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3142: Failed loopback test issue iocb: <value> iocb_stat: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3143: Port Down: Firmware Restarted

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3144: Port Down: Debug Dump

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3145: Port Down: Provisioning

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3147: Fast-path EQs not allocated

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3148: Fast-path FCP CQ array not allocated

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3149: Fast-path FCP WQ array not allocated

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3150: No privilege to perform the requested access: <value>

DESCRIPTION: Driver lacks privilege for requested action.

DATA: Requested action

ACTION: Contact Emulex technical support.

elx_mes3151: PCI bus read access failure: <value>

DESCRIPTION: A read to the adapter's PCI registers failed.

DATA: Contents read from requested register.

ACTION: Contact Emulex technical support.

elx_mes3152: Unrecoverable error, bring the port offline

DESCRIPTION: Unable to recover the adapter port post hardware error. Taking the port offline.

DATA: None

ACTION: Contact Emulex technical support.

elx_mes3153: Fail to perform the requested access: <value>

DESCRIPTION: Driver failed to execute the requested management action.

DATA: Register action.

ACTION: Contact Emulex technical support.

elx_mes3154: BLS ABORT RSP failed, data <value/value>

DESCRIPTION: Driver issued BLS ABORT Response failed to complete.

DATA: I/O status and I/O reason

ACTION: Contact Emulex technical support.

elx_mes3161: Failure to post els sgl to port.

DESCRIPTION: Driver failed to port scatter gather list to the adapter.

DATA: None

ACTION: Contact Emulex technical support.

elx_mes3172: SCSI layer issued Host Reset Data: <value>

DESCRIPTION: SCSI layer issued a host reset request to the driver.

DATA: Reset result

ACTION: Contact Emulex technical support.

elx_mes3175: Failed to enable interrupt

DESCRIPTION: The driver failed to get interrupts re-enabled after an adapter reset.

DATA: None

ACTION: Contact Emulex technical support.

elx_mes3176: Misconfigured Physical Port - Port Name <value>

DESCRIPTION: The driver has detected an unknown firmware name.

DATA: Detected firmware name

ACTION: Contact Emulex technical support.

elx_mes3177: Nport <value>, DID <value> in wrong state for discovery to start. Failing request Data <value>

DESCRIPTION: The driver is trying to restart SAN discovery and detected an NPort is in the wrong initial state.

DATA: NPort ID, FCID, NPort state

ACTION: Reset link. If this fails, contact Emulex technical support.

elx_mes3249: Unable to allocate memory for QUERY_FW_CFG mailbox command

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3250: QUERY_FW_CFG mailbox failed with status <value> add_status <value>, mbx status <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3252: WQ doorbell offset not supported

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3262: RQ doorbell format not supported

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3263: WQ failed to memmap pci barset: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3265: WQ doorbell format not supported: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3269: RQ failed to memmap pci barset: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3270: RQ doorbell format not supported: <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3279: Invalid provisioning of rpi

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3280: Invalid provisioning of vpi

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3281: Invalid provisioning of xri

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3282: Invalid provisioning of vfi

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3300: In-use FCF modified, perform FCF rediscovery

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3303: Failed to obtain vport vpi

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3317: HBA not functional: IP Reset Failed after <value> retries, try: echo fw_reset > board_mode

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes3321: Recovered mailbox <value>

DESCRIPTION:

DATA: None

ACTION: None required.

elx_mes9000: Allocated DMA memory size (<value>) is less than the requested DMA memory size (<value>)

DESCRIPTION:

DATA: None

ACTION: None required.

Troubleshooting the NIC Driver

This section provides troubleshooting information for the NIC driver. Be sure to check the readme.txt file located on CD1 for other troubleshooting issues.

Table 4-4, Troubleshooting the NIC Driver, on page 156 provides troubleshooting information for the NIC driver.

Table 4-4 Troubleshooting the NIC Driver

Issue	Resolution

1) When there is a great deal of network traffic in some VMs, a few VMs appear to have lost network connectivity.
2) Several "alloc_skb() failed" messages appear in the log file: /proc/vmware/log
	This could be due to low configured value for netPktHeapMaxSize. Try increasing it to a higher value. To read the current value, run:
	`# esxcfg-advcfg -j netPktHeapMaxSize`
	(A value of 0 indicates default - 64 MB) To increase the size to (for example, 128 MB), run:
	`# esxcfg-advcfg -k 128 netPktHeapMaxSize`
	(netPktHeapMaxSize can also be configured through VI Client using **Configuration** > **Advanced Settings** > **VMKernel.**)
	After configuring the size, reboot the system.

Unable to ping from one VM to another VM.	The NIC driver creates two vmnic interfaces, one for each port. If these interfaces are configured as uplinks in two separate vSwitches, the VMs in each of these switches are in separate networks with no network path between them. Thus, pinging between the VMs in the two groups fails. If you want all these VMs in the same network, configure them as teaming uplinks to one vSwitch option. Each of the vmnics, vmnic1 to vmnic16, must be configured in a separate vSwitch. In this configuration, there is no network path between the vSwitches and pinging between these VMs does not work.
When inserting or removing a 1Gb SFP-RJ45 module on an adapter without RJ45 copper cables attached, the operating system indicates link up or down status. When inserting or removing copper cables attached to a switch to the module, link up or down events are not reported to the operating system.	No solution to this issue exists as the link status is not reported due to a PHY limitation on the card.
Flow control setting is not stored per port after rebooting the system.	With flow control, there is no persistence across reboot. It always starts with both RX and TX on. For persistence, run a config command from an RC file at reboot.

NIC Event/Error Logging for ESXi 5.1

Retrieving ESXi Server NIC Error Log Codes

For ESXi Server systems, the NIC driver generates error codes to the /var/log/vmkernel log file. The vmkernel log file is an ASCII text file that can be viewed and searched with a text editor such as vim. The vmkernel log file is automatically rotated as it gets larger, and the rotated log files are named vmkernel.x, where x is an integer.

To search the log file for error messages, at the command prompt, type:

```
#cd /var/log
#less vmkernel
```

For example, you might see the following message:

```
Sep 9 19:48:04 esx-server vmkernel: WARNING: Found a OneConnect card
in Gen 1 x8 PCI-e slot. Should be in Gen 2, x8 slot for best
performance.
```

ESXi Server NIC Event Log Entries

Table 4-5, ESXi Server NIC Event Log Entries, on page 157 provides a list of ESXi Server network event log error messages. It includes the severity of the error, the message displayed, and the message description. When reporting a problem with the adapter to Emulex, check the message log (/proc/vmware/log) and report any of these entries that may be present.

Note: In Table 4-5, <D>, <DD>, or <DDD> in the 'Message Displayed' column refers to decimal values that appear in the error messages.

Table 4-5 ESXi Server NIC Event Log Entries

Severity	Displayed Message	Description
Error	`OneConnect POST failed`	Power-on self-test of the adapter failed. This indicates either a hardware or a firmware problem. Try rebooting the system after a reset.
Error	`OneConnect initialization failed`	Either the initialization of the adapter or the allocation of some resource for initializing the driver failed. In most cases, this message is accompanied by another more specific error message. Try rebooting the system after a power cycling. If the problem persists, this could indicate a hardware problem or corrupted firmware.
Error	`RSS cannot be supported on this interface as SRIOV is enabled in the BIOS`	RSS cannot be enabled when SR-IOV is enabled in the system BIOS.

Table 4-5 ESXi Server NIC Event Log Entries (Continued)

Severity	Displayed Message	Description
Error	`RSS cannot be supported on this interface as VFs are created`	On LPe16202/OCe15100 and LPe16000-series adapters, RSS is not supported when VFs are already created on the interface.
Error	`RSS cannot be supported when msix is disabled`	MSI-X must be enabled in order to enable RSS.
Error	`RSS is not supported on this interface`	RSS is not supported on this interface.
Error	`RSS cannot be supported on 1G interface`	RSS cannot be enabled on 1GbE interfaces.
Error	`RSS cannot be supported as the host does not have minimum required CPUs.`	The host currently does not have enough CPUs to enable RSS. The host must have at least four cores and 4–8GB of RAM.
Warning	`Using INTx interrupts. NetQueues feature will be disabled`	The driver could not allocate MSIx vector for interrupt. The driver may continue to work, but the performance may be impacted.
Warning	`WARNING: Found a OneConnect card in Gen <D> x<D> PCI-e slot. Should be in Gen 2, x8 slot for best performance`	The adapter is an x8, Gen2 PCIe device. For best performance, the adapter should be installed in a Gen2 PCIe slot 8 or 16 channels wide. The driver displays this warning if it finds the device in a slower or narrower PCIe slot. The device continues to work with reduced performance.
Warning	`Command to get pause frame settings failed`	The firmware command to get PAUSE settings failed.
Warning	`Command to set pause frame settings failed`	The firmware command to change PAUSE settings failed.
Warning	`Command to apply MAC address filter failed`	The driver could not set the MAC address filter on the hardware. The device continues to work. A performance impact may occur.
Warning	`Command to delete MAC address filter failed`	The firmware command to delete a MAC address filter failed. The device should continue to work.
Warning	`Unable to get Firmware Version`	The command to get the firmware revision number failed. The version number is not shown. The device will continue to work.

Table 4-5 ESXi Server NIC Event Log Entries (Continued)

Severity	Displayed Message	Description
Warning	`Did not receive completions for all TX requests`	While the driver was unloading, some outstanding transmit requests were found. This is an indication that the hardware is not functioning properly.
Warning	`Failed to register char device`	Could not create the char device used for certain management functions. The driver will continue to work. You may not be able to use HBACMD to interact with the device.
Warning	`alloc_skb failed. Try increasing netPktHeapMaxSize`	Could not allocate the skb structure to send a frame received from the network to the operating system. This is a transient failure that can be ignored. If this message appears continually, you may need to allocate more memory to the network heap. For example, to increase the heap size to 128MB, run: # esxcfg-advcfg -k 128 netPktHeapMaxSize
Warning	`Invalid MTU requested. MTU must be between 64 and 9000 bytes.`	Invalid MTU size in MTU configuration IOCTL. The MTU will not be changed.
Warning	`Invalid vlan priority labeled. Must be 0 - 7`	A request to set a VLAN priority tag was made with an invalid value.
Warning	`Failed to allocate memory for pass through command`	The memory allocation for a pass through command failed. The driver will continue to function. The configuration utility that issued the pass through IOCTL will fail.
Warning	`Pass through command failed. opcode <DDD>, status 0x<XXX>`	The pass through firmware command with the indicated opcode failed. The driver should continue to function. The configuration utility that issued the pass through IOCTL will fail.
Warning	`Command to modify EQ delay failed`	The firmware command to change the event queue delay failed. The driver will continue to function. Adaptive interrupt coalescing does not function correctly.
Warning	`Unqualified SFP+ module detected on Port <adapter port number> from <vendor name> part number: <vendor part number>`	The specified port has an unqualified SFP+ module inserted into it.

NIC Adapter Firmware Error

The following POST message appears if you have loaded firmware on the adapter that the controller does not support:

```
POST Error : Firmware halted. This firmware does not support this
controller.
```

NIC Informational Log Groups for ESXi 5.5 and 6.0

The elxnet driver informational logs for ESXi 5.5 and 6.0 are categorized into groups. You can enable or suppress logs of a specific group by setting or clearing the corresponding bit on DebugMask. The DebugMask is a bit-vector (uint32) and each bit represents a group.

Table 4-6, NIC Informational Log Groups for ESXi 5.5 and 6.0, on page 160 lists the elxnet driver informational log categories.

Table 4-6 NIC Informational Log Groups for ESXi 5.5 and 6.0

Hexadecimal Value	Description
0x1	DRIVER
0x2	UPLINK
0x4	QUEUE
0x8	INTR
0x10	MCC
0x20	TX
0x40	RX
0x80	MGMT
0x100	WORKER
0x200	SRIOV
0x400	EVENT
0x800	VLAN
0x1000	VXLAN

The default enabled groups include DRIVER, UPLINK, MCC, QUEUE, SRIOV, and VXLAN.

Log groups reduce informational log clutter at the default log level and aid in debugging by enabling or disabling group logs. Warning and error logs are always logged, regardless of the debug mask. See Table 4-5, ESXi Server NIC Event Log Entries, on page 157 for more information on the warning and error logs.

The debug masks control which groups are enabled or disabled, and they are not meant to be a replacement of the log level adjustments supported by vsish. The vmkernel log levels control the verbosity of logs at each group. For example, level 0 results in less logging and level 4 results in more verbose logs.

There are two ways to modify the debug mask, with the ModuleParam debugMask command or the esxcli-Plugin dbgmask command.

ModuleParam debugMask

Note: You must reload (or reboot) the driver after modifying the debugMask module parameter.

This is a global debugMask command; therefore, the same value applies to all Emulex NIC PFs.

Use either of these commands:

```
esxcfg-module -s "debugMask=0x0120" elxnet
```

- Or -

```
esxcli system module parameters set -p "debugMask=0x0120" -m elxnet
```

esxcli-Plugin

Note: A driver reload (or reboot) is not required after modifying the dbgmask parameter.

This is per-PF debugMask command; therefore, the value applies to a specific Emulex NIC PF (PF with SBDF is specified with "-p").

Command to Get:

```
esxcli elxnet dbgmask get -p 0000:03:00.1
```

Command to Set:

```
esxcli elxnet dbgmask set -p 0000:03:00.1 0x000000ff
```

Troubleshooting the iSCSI Driver

This section provides troubleshooting information for the FC/FCoE driver.

Table 4-7, Troubleshooting the iSCSI Driver, on page 162 provides information on troubleshooting the iSCSI driver.

Table 4-7 Troubleshooting the iSCSI Driver

Issue	Resolution
Mutual CHAP authentication cannot be configured with the vSphere client.	One-way CHAP is the only authentication method that can be configured with the vSphere Client. In order to set Mutual CHAP authentication, you must use iSCSISelect.
IPV6 support is not available in vSphere client for hardware iSCSI adapters.	In order to set the IPv6 address, you must use iSCSISelect.

Retrieving iSCSI Error Log Codes

The iSCSI driver generates error codes to the /var/log/vmkernel log file. The vmkernel log file is an ASCII text file that can be viewed and searched with a text editor such as vim. The vmkernel log file is automatically rotated as it gets larger, and the rotated log files are named vmkernel.x, where x is an integer.

To search the log file for error messages, at the command prompt type:

```
#cd /var/log
#vim vmkernel.log
```

For example, you may see the following message:

```
Sep 9 19:48:04 esx-server vmkernel: OneConnect iSCSI Driver: The
be2iscsi driver received a Task Management Function that is not
supported and rejected this request. The error log entry immediately
following this entry will indicate the TMF function code that was
rejected.
```

iSCSI Error Log Code Entries

The following is a brief description of the error log codes generated by the iSCSI driver. It includes the message displayed, the meaning of the message, and the recommended resolution.

Table 4-8 iSCSI Error Log Code Entries

Severity	Message	Recommended Resolution
Error	The be2iscsi driver failed to load because initialization failed during a power management boot-up.	This failure may be due to the firmware not being present or running currently. This failure may also indicate a hardware problem.
Error	The be2iscsi driver was unable to map one or more PCI Base Address Register and hence failed to load.	This failure may indicate a low memory condition or a hardware error.

Table 4-8 iSCSI Error Log Code Entries (Continued)

Severity	Message	Recommended Resolution
Error	The be2iscsi driver ignored a configuration entry since the entry was invalid.	Check the registry configuration for any recent entries added for driver parameters. The invalid entry must be removed or corrected.
Error	The be2iscsi driver failed to load due to memory allocation failure.	This failure occurred due to a failed memory allocation in the driver. Check low memory conditions.
Error	The be2iscsi driver failed to load because initialization failed during normal boot-up.	This failure may be due to the firmware not being present or running currently. This failure may also indicate a hardware problem.
Error	An internal API failed in be2iscsi driver during initialization.	This failure may indicate a low memory condition.
Error	An Unrecoverable Error was detected by the be2iscsi driver. Following this error log entry, the next 3 entries will indicate the error codes.	This may be due to hardware errors or due to unhandled exceptions in the hardware or firmware.
Error	The be2iscsi driver failed an IOCTL request since the number of scatter gather elements required for the IOCTL buffer exceeded the adapter's firmware limit. Following this error log entry, the next entry will indicate the IOCTL opcode and the payload length requested.	This error may indicate an incorrect configuration option for the iSCSI driver. It may also indicate a low memory condition.
Error	The be2iscsi driver detected an error during offloading the iSCSI connection. The operation will be retried again. Following this error log entry, the next entry will indicate the session handle and the firmware error code.	This may indicate a target is in error or may point to transient network connectivity issues. It may also indicate a firmware error.
Error	The be2iscsi driver did not receive an iSCSI command window update up to 25 seconds during I/O operations. Following this error log entry, the next entry will indicate the session handle where this error occurred. The be2iscsi driver will trigger a session recovery on the session and continue.	Check for any errors reported at the target. The iSCSI initiator is only supported with certified targets. Check for the latest software at the target vendor's website. Check for the latest software at the Emulex website. If the above fails, contact Emulex technical support.
Warning	The be2iscsi driver received an invalid iSCSI Command Sequence Number update from the target. Following this error log entry, the next three entries will indicate the session handle and the iSCSI parameters - MaxCmdSN and ExpCmdSN respectively.	Check for any errors reported at the target. The iSCSI initiator is only supported with certified targets. Check for the latest software at the target vendor's website. Check for the latest software at the Emulex website. If the above fails, contact Emulex technical support.

Table 4-8 iSCSI Error Log Code Entries (Continued)

Severity	Message	Recommended Resolution
Error	The be2iscsi driver ignored a configuration entry since the entry was invalid.	Check the registry configuration for any recent entries added for driver parameters. The invalid entry must be removed or corrected.
Error	The be2iscsi driver failed to load due to memory allocation failure.	This failure occurred due to a failed memory allocation in the driver. Check low memory conditions.
Error	The be2iscsi driver failed to load because initialization failed during normal boot-up.	This failure may be due to the firmware not being present or running currently. This failure may also indicate a hardware problem.
Error	An internal API failed in be2iscsi driver during initialization.	This failure may indicate a low memory condition.
Error	An Unrecoverable Error was detected by the be2iscsi driver. Following this error log entry, the next 3 entries will indicate the error codes.	This may be due to hardware errors or due to unhandled exceptions in the hardware or firmware.
Error	The be2iscsi driver failed an IOCTL request since the number of scatter gather elements required for the IOCTL buffer exceeded the adapter's firmware limit. Following this error log entry, the next entry will indicate the IOCTL opcode and the payload length requested.	This error may indicate an incorrect configuration option for the iSCSI driver. It may also indicate a low memory condition.
Error	The be2iscsi driver detected an error during offloading the iSCSI connection. The operation will be retried again. Following this error log entry, the next entry will indicate the session handle and the firmware error code.	This may indicate a target is in error or may point to transient network connectivity issues. It may also indicate a firmware error.
Error	The be2iscsi driver did not receive an iSCSI command window update up to 25 seconds during I/O operations. Following this error log entry, the next entry will indicate the session handle where this error occurred. The be2iscsi driver will trigger a session recovery on the session and continue.	Check for any errors reported at the target. The iSCSI initiator is only supported with certified targets. Check for the latest software at the target vendor's website. Check for the latest software at the Emulex website. If the above fails, contact Emulex technical support.
Warning	The be2iscsi driver received an invalid iSCSI Command Sequence Number update from the target. Following this error log entry, the next three entries will indicate the session handle and the iSCSI parameters - MaxCmdSN and ExpCmdSN respectively.	Check for any errors reported at the target. The iSCSI initiator is only supported with certified targets. Check for the latest software at the target vendor's website. Check for the latest software at the Emulex website. If the above fails, contact Emulex technical support.

Table 4-8 iSCSI Error Log Code Entries (Continued)

Severity	Message	Recommended Resolution
Error	The be2iscsi driver ignored a configuration entry since the entry was invalid.	Check the registry configuration for any recent entries added for driver parameters. The invalid entry must be removed or corrected.
Error	The be2iscsi driver failed to load due to memory allocation failure.	This failure occurred due to a failed memory allocation in the driver. Check low memory conditions.
Error	The be2iscsi driver failed to load because initialization failed during normal boot-up.	This failure may be due to the firmware not being present or running currently. This failure may also indicate a hardware problem.
Error	An internal API failed in be2iscsi driver during initialization.	This failure may indicate a low memory condition.
Error	An Unrecoverable Error was detected by the be2iscsi driver. Following this error log entry, the next 3 entries will indicate the error codes.	This may be due to hardware errors or due to unhandled exceptions in the hardware or firmware.
Error	The be2iscsi driver failed an IOCTL request since the number of scatter gather elements required for the IOCTL buffer exceeded the adapter's firmware limit. Following this error log entry, the next entry will indicate the IOCTL opcode and the payload length requested.	This error may indicate an incorrect configuration option for the iSCSI driver. It may also indicate a low memory condition.
Error	The be2iscsi driver detected an error during offloading the iSCSI connection. The operation will be retried again. Following this error log entry, the next entry will indicate the session handle and the firmware error code.	This may indicate a target is in error or may point to transient network connectivity issues. It may also indicate a firmware error.
Error	The be2iscsi driver did not receive an iSCSI command window update up to 25 seconds during I/O operations. Following this error log entry, the next entry will indicate the session handle where this error occurred. The be2iscsi driver will trigger a session recovery on the session and continue.	Check for any errors reported at the target. The iSCSI initiator is only supported with certified targets. Check for the latest software at the target vendor's website. Check for the latest software at the Emulex website. If the above fails, contact Emulex technical support.
Warning	The be2iscsi driver received an invalid iSCSI Command Sequence Number update from the target. Following this error log entry, the next three entries will indicate the session handle and the iSCSI parameters - MaxCmdSN and ExpCmdSN respectively.	Check for any errors reported at the target. The iSCSI initiator is only supported with certified targets. Check for the latest software at the target vendor's website. Check for the latest software at the Emulex website. If the above fails, contact Emulex technical support.

Table 4-8 iSCSI Error Log Code Entries (Continued)

Severity	Message	Recommended Resolution
Warning	A connection to the target was lost for a period exceeding the Extended Timeout (ETO). The error log entry immediately following this entry will indicate the session ID of the target that lost the connection. Event log entries from the disk subsystem indicating that the drives were lost will exist. If any I/Os were in progress, the system may see I/O errors or failures.	Check the connection to the target or the state of the target device. If the target is made available, any sessions that existed previously will be reestablished and the devices will be available for I/O.
Warning	The be2iscsi driver received a Task Management Function that is not supported and rejected this request. The error log entry immediately following this entry will indicate the task management function code that was rejected.	The operating system version is not supported.
Warning	The be2iscsi driver received a Task Management Function Abort request for an I/O request that is not present with the driver.	This message may indicate a slow connection to the target. Check network connectivity to the target for any errors.
Error	The be2iscsi driver encountered a mismatched version of the firmware running on the board. This error may be followed by more error codes 0x31840001 or 0x31880001 indicating that the be2iscsi driver failed to load.	This failure indicates that the driver version that is running on the system does not match the version of the firmware flashed on the board. Fix this by installing the desired version.
Error	The be2iscsi driver detected a failure in the hardware during initialization. This error may be followed by more error codes 0x31840001 or 0x31880001 indicating that the be2iscsi driver failed to load.	This failure indicates that the hardware has not been initialized or is malfunctioning. This may also indicate that the firmware is not running correctly.
Warning	Both Port 0 and Port 1 links were down for a period exceeding the Link Down Timeout (LDTO). If the initiator has connection to the target, there will be event log entries from the disk subsystem indicating that the drives were lost. If any I/Os were in progress, the system may see I/O errors or failures.	Check the links to the adapter. If the link is reestablished, any sessions that existed previously will be reestablished and the devices will be available for I/O.
Warning	Both Port 0 and Port 1 links are down.	Check the links to the adapter.

Additional iSCSI Driver Messages

The following iSCSI error messages are returned if you specify illegal options when loading the driver:

Table 4-9 Additional iSCSI Driver Messages

Message
"be2iscsi <*PCI_DEVICE_LOCATION*>: WARNING: dic value = %d out of range. Valid range is 0 - 1. Using default value = 1"
"be2iscsi <*PCI_DEVICE_LOCATION*>: WARNING: eto value = %d out of range. Valid range is 0 - 3600. Using default value = 30"
"be2iscsi <*PCI_DEVICE_LOCATION*>: WARNING: ldto value = %d out of range. Valid range is 0 - 3600. Using default value = 20"
"be2iscsi <*PCI_DEVICE_LOCATION*>: WARNING: ios_per_ctrl value = %d out of range. Valid range is 1 - 512. Using default value = 512"
"be2iscsi <*PCI_DEVICE_LOCATION*>: WARNING: max_io_size value = %d out of range. Valid range is 4 - 512 (KByte). Using default value = 128"
"be2iscsi <*PCI_DEVICE_LOCATION*>: WARNING: tmf_reset value= %d out of range. Valid range is 1 - 3. Using default value= 1"

Note: For the <PCI_DEVICE_LOCATION>, the driver returns a value in the following format – 0000:00:00.0 (for example, 0000:05:00.4).

%d represents a signed integer outside of the valid range. The driver returns a number in the Warning message.

Any other messages will be returned in the following form:

```
"be2iscsi <PCI_DEVICE_LOCATION>: FUNCTION_NAME:LINE:MESSAGE"
```

where the <PCI_DEVICE_LOCATION> is a value returned by the driver in the following format – 0000:00:00.0.

For example:

```
"be2iscsi 0000:05:00.4: 1088: kmalloc failed."
```

You will be requested to find the function <FUNCTION_NAME> at line <LINE> in the source.

Description of Mandatory and Optional Parameters

The following table describes the parameters used in the data string for option 43.

Table 4-10 Data String Parameters for Option 43

Parameter	Description	Field Type
<TargetIP>	Replace it with a valid IPv4 address in dotted decimal notation.	Mandatory
<TargetTCPPort>	Replace it with a decimal number ranging from 1 to 65535 (inclusive). The default TCP port 3260 is assumed, if not specified.	Optional

Table 4-10 Data String Parameters for Option 43 (Continued)

Parameter	Description	Field Type
<LUN>	It is hexadecimal representation of Logical Unit number of the boot device. If not provided, LUN 0 is assumed to be the boot LUN. It is an eight-byte number which should be specified as a hexadecimal number consisting of 16 digits, with an appropriate number of 0's padded to the left, if required.	Optional
<TargetName>	Replace it with a valid iSCSI target IQN name of up to 223 characters.	Mandatory
<InitiatorName>	Replace it with a valid iSCSI IQN name of up to 223 characters. If not provided the default Initiator name (generated by the adapter based on the board's MAC address) will be used.	Optional
<HeaderDigest>	Replace it with either "E" or "D". • "E" denotes header digest is enabled • "D" denotes that it is disabled.	Optional
<DataDigest>	Replace it with either "E" or "D". • "E" denotes data digest is enabled and • "D" denotes that it is disabled. If not provided it is assumed that Data Digest is disabled by default.	Optional
<AuthenticationType>	If applicable replace it with "D", "E" or "M". • "D" denotes authentication is disabled, • "E" denotes that one-way CHAP is enabled - the username and secret to be used for oneway CHAP must be specified by non-DHCP means • "M" denotes that MutualCHAP is enabled - user name and passwords required for mutual CHAP authentication must be specified by non-DHCP means. If not specified, this field defaults to authentication disabled.	Optional

Examples

The following is an example of Default Initiator name and Data Digest Settings:

```
iscsi:"192.168.0.2":"3261":"000000000000000E":"iqn.2009-4.com:12345
67890"::"E"::"E"
```

where the following is:

Target IP address: 192.168.0.2

Target TCP port: 3261

Target boot LUN: 0x0E

Target IQN name: iqn.2009-04.com:1234567890

Initiator name: Not specified. Use the Initiator name already configured. Use the default name if none was configured.

Header Digest: Enabled

Data digest: Not specified. Assume disabled.

Authentication Type: 1-way CHAP.

The following is an example of Default TCP Port and Mutual CHAP Settings:

```
iscsi:"192.168.0.2"::"000000000000000E":"iqn.2009-4.com:1234567890"
::"E":"D":"M"
```

where the following is:

Target IP address: 192.168.0.2

Target TCP port: Use default from RFC 3720 (3260)

Target boot LUN: 0x0E

Target IQN name: iqn.2009-04.com:1234567890

Initiator name: Not specified. Use the Initiator name already configured. Use the default name if none was configured.

Header Digest: Enabled

Data digest: Data Digest disabled

Authentication Type: Mutual CHAP

ESXi 5.5 Native Mode NIC Driver Troubleshooting Support

Table 4-11 lists the troubleshooting support provided by the earlier vmklinux driver in terms of the proc interface and the equivalent support provided by the native mode NIC driver through either the esxcli plug-in or the VmkMgmtKeyVal interface.

Table 4-11 ESXi 5.5 Native Mode NIC Driver Troubleshooting Support

Troubleshooting Items from Earlier vmklinux Driver using the proc Interface	Description	ESXi 5.5 Native Mode Driver Support (VmkMgmtKeyVal interface)	ESXi 5.5 Native Mode Driver Support (esxcli plug-in)	Usage in ESXi 5.5 Native Mode Driver

csr_read	Read the 32-bit register value from the CSR space at the offset set through the "csr_read" file	✓		`#/usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -i "vmnic0-KeyValue/emulex" -k "CsrRead" -s "<offset = 0x2d90>"`
				`#/usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -i "vmnic0-KeyValue/emulex" -k "CsrRead" -g`
				`Key 'CsrRead': CSR Offset:0x2d90 ==> 0x126`

csr_write	Set the CSR space offset for "csr_write"	✓		`#/usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -i "vmnic0-KeyValue/emulex" -k "CsrWrite" -s "<offset = 0x2d90> <value = 3>"`
drvr_stat	Read the driver statistics		✓	Available in custom esxcli plug-in in the asynchronous driver: `esxcli elxnet stats get -p <pci dev name>`
eth_ring	Get the various Ethernet ring properties			Not implemented
misc_stat	Read the miscellaneous counters, format them with description. These counters are clear on read.		Partially implemented	Error stats available in a custom esxcli plug-in in the asynchronous driver: `esxcli elxnet stats get -p <pci dev name>`

Table 4-11 ESXi 5.5 Native Mode NIC Driver Troubleshooting Support (Continued)

Troubleshooting Items from Earlier vmklinux Driver using the proc Interface	Description	ESXi 5.5 Native Mode Driver Support (VmkMgmtKeyVal interface)	ESXi 5.5 Native Mode Driver Support (esxcli plug-in)	Usage in ESXi 5.5 Native Mode Driver
pci_read	Read the 32-bit register value from the PCI space at the offset set through the “pci_read” file	✓		`#/usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -i "vmnic0-KeyValue/emulex" -k "PciRead" -s "<offset = 0x1f0>"` `#/usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -i "vmnic0-KeyValue/emulex" -k "PciRead" -g`
pci_write	Set the PCI space offset for “pci_write”	✓		`#/usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -i "vmnic0-KeyValue/emulex" -k "PciWrite" -s "<offset>"`
port_stat	Read the counters for port 0 and port 1 and formats them with descriptions. These counters are clear-on-read.		Partially implemented	From vsish node /net/pNics/vmnicXX/stats. Also available in a custom esxcli plug-in in the asynchronous driver: `esxcli elxnet stats get -p <pci dev name>`
vlan_stat	Get the driver-specific VLAN status		Not implemented	Not relevant since the driver does not use VLAN filtering

ESXi 5.5 and 6.0 Native Mode NIC Driver Support for ethtool Commands

Table 4-12 lists the ethtool support provided by the earlier vmklinux driver and the equivalent support provided through the esxcli and vsish commands.

Table 4-12 ESXi 5.5 and 6.0 Native Mode NIC Driver Support for ethtool Commands

ethtool Command	Description	vmklinux Driver Support (VmkMgmtKeyVal interface)	ESXi 5.5 and 6.0 Native Mode Driver Support (esxcli/ vsish command)
ethtool -a|--show-pause DEVNAME	Show pause options	✓	✓ (esxcli network nic get -n vmnic0)

ethtool -A|--pause DEVNAME	Set pause options	✓	✓
			To enable RX/TX pause:
			`vsish -e set /net/pNics/vmnic1/firmware/pauseParams < autonegsupport> <txpauseenabled> <rxpauseenabled>`
			
			`Enable:`
			`vsish -e set /net/pNics/vmnic1/firmware/pauseParams 0 1 1`
			
			`Disable:`
			`vsish -e set /net/pNics/vmnic1/firmware/pauseParams 0 0 0`

ethtool -c|--show-coalesce DEVNAME	Show coalesce options	✓	✓ (esxcli network nic coalesce get -n vmnicX)
ethtool -C|--coalesce DEVNAME	Set coalesce options	✓	✓ (esxcli network nic coalesce set -n vmnicX)
ethtool -g|--show-ring DEVNAME	Query RX/TX ring parameters	✓	esxcli does not support it
ethtool -G|--set-ring DEVNAME	Set RX/TX ring parameters	Not implemented	esxcli does not support it
ethtool -k|--show-offload DEVNAME	Get protocol offload information	✓	✓ (esxcli network nic sg/tso/cso get)

Table 4-12 ESXi 5.5 and 6.0 Native Mode NIC Driver Support for ethtool Commands (Continued)

ethtool Command	Description	vmklinux Driver Support (VmkMgmtKeyVal interface)	ESXi 5.5 and 6.0 Native Mode Driver Support (esxcli/ vsish command)

ethtool -K|--offload DEVNAME	Set protocol offload	Not implemented	Not implemented (esxcli network nic sg/tso/cso set -n vmnicX)
			Supported using:
			`vsish:vsish -e get /net/pNics/vmic<>/ hwCapabilities`
			`vsish -e set /net/pNics/vmnic0/ hwCapabilities/<CAP> <1/0>`

ethtool -i|--driver DEVNAME	Show driver information	✓	✓ (esxcli network nic info get)
ethtool -d|--register-dump DEVNAME	Dump device registers	✓	✓ (esxcli elxnet regdump get -p <pcidevname> -f <filepath>)
ethtool -e|--eeprom-dump DEVNAME	Dump device EEPROM	✓	Not implemented (esxcli network nic eeprom dump -n vmnicX)
ethtool -E|--change-eeprom DEVNAME	Change bytes in device EEPROM	Not implemented	Not implemented (esxcli network nic eeprom change -n vmnicX)
ethtool -r|--negotiate DEVNAME	Restart N-WAY negotiation	Not implemented	Not implemented (esxcli network nic negotiate restart -n vmnicX)
ethtool -p|--identify DEVNAME	Show visible port identification (for example, blinking)	✓	esxcli does not support it
ethtool -t|--test DEVNAME	Execute adapter self test	Not implemented	Not implemented (esxcli network nic selftest run -n vmnicX)
ethtool -S|--statistics DEVNAME	Show adapter statistics	✓	✓ (esxcli network nic stats get) The standard esxcli statistics only expose a limited set of statistic counters. More extensive statistics are available through the esxcli plug-in available in the asynchronous driver: `esxcli elxnet stats get -p <pci dev name>`

Appendix A. Configuring iSCSI Through DHCP

This section provides information for configuring the iSCSI driver using DHCP.

Recommendations

If you are using a DHCP server to obtain an IP address for your iSCSI initiator, Emulex recommends that you set up a reservation. A reservation assigns a specific IP address based on the MAC address of your iSCSI function. If you do not reserve an IP address through DHCP, then you must set the lease length for the iSCSI initiator IP address to unlimited. This prevents the IP address lease from expiring.

Vendor-Specific Option 43

The following section describes the format for the data returned in DHCP vendor-specific option 43. The method and format for specifying the Vendor ID is outside the scope of this document and is not included here. The initiator offers this Vendor ID to the DHCP server to retrieve data in the format described in the following section.

Format of Vendor-Specific Option 43

The data returned in DHCP vendor-specific option 43 uses the following format:

```
'iscsi:'<TargetIP>':'<TargetTCPPort>':'<LUN>':'<TargetName>':'<Init
iatorName>':'<HeaderDigest>':'<DataDigest>':'<AuthenticationType>
```

The guidelines for creating the data string include:

- Strings shown in quotes are part of the syntax and are therefore mandatory.
- Fields enclosed in angular brackets (including the angular brackets) should be replaced with their corresponding values. Some of these fields are optional and may be skipped.
- If an optional field is skipped, a colon must be used as a placeholder to indicate the default value for that field.
- If specified, the value of each parameter should be enclosed in double quotes.

All options are case sensitive.