Storport Miniport Driver

Version 2.00

for Windows Server 2003

Windows Vista

User Manual

Last updated November 29, 2007

Installation

Introduction

AutoPilot Installer® for Emulex® Storport Miniport drivers provides installation options that range from a simple installation with a few mouse clicks to custom unattended installations that use predefined script files. AutoPilot Installer is included with Emulex drivers and utilities in Windows executable files that you can download from the Emulex Web site. Run the distribution executable file to extract all of the software needed for an installation, then complete the installation using AutoPilot Installer. AutoPilot Installer allows you to install a driver by any of the following methods:

Hardware-first installation. The host bus adapter (HBA) has already been installed before you download the Emulex drivers and utilities.

Software-first installation. This installation method allows you to download drivers and utilities from the Emulex Web site and to install them using AutoPilot Installer prior to the installation of any HBAs. You do not need to specify the model of the HBA you plan to install. The appropriate drivers and utilities automatically load when you install HBAs at a later time.

Unattended installation. This installation method allows you to set up AutoPilot Installer to run unattended from customized scripts. Unattended installation works for both hardware-first and software-first installations. An unattended installation:

- Enables you to set up one location that contains the distribution executable file. All of the servers install or update the driver and utilities from that location.
- Operates from the command line.
- Operates in silent mode.
- Creates an extensive report file.
- Reports any errors.

Replicated installation. This installation method allows you to preload drivers and utilities on a system. Possible applications include installing a driver and utilities in advance on a system before adding HBAs, and performing system installations that execute AutoPilot Installer in unattended mode.

Important Considerations

Changing Driver Types

- If you currently use a driver type different from the one you will install with AutoPilot Installer you will lose your customized driver parameters, persistent bindings, LUN masking and LUN mapping when you change driver types. The AutoPilot Installer default parameters will usually be the best options for the new driver type. You may want to note your current settings before you install the new driver type. After you have installed the new driver type, you can then update your customized driver parameters.

Microsoft Storport Driver Update

- See the Emulex Web site for required updates to the Microsoft Storport driver.

AutoPilot Installer Terminates with Legacy HBAs Installed

- If any Emulex LP6000 or LP7000 HBAs are installed on the server, the AutoPilot Installer installation will terminate. It will be necessary to remove the LP6000 and LP7000 HBAs in order to complete the installation.

Updating the Storport Miniport Driver Using AutoPilot Installer

- If you currently have an older version of the Storport Miniport driver (version 1.11a3 or older), use the hardware-first installation method to update your driver. Steps 1 and 2 involve installing a new HBA, therefore begin at step 3 to update the driver.
- You can also update the Storport Miniport driver by the manual installation method. If you update the Storport Miniport driver manually, install the elxplus driver prior to updating the Storport Miniport driver. See “Manually Installing or Updating the Storport Miniport Driver” on page 20 for more information.

Definitions

Driver. A host computer software component that controls the operation of peripheral controllers or HBAs attached to the host computer. Drivers manage communication and data transfer between applications and I/O devices, using HBAs as agents.

The HBAnyware® utility. This utility allows you to perform installation and configuration tasks on remote and local HBAs. See the HBAnyware Utility User Manual for more information.

The HBAnyware Security Configurator. The HBAnyware security package allows you to control which HBAnyware systems can remotely access and manage HBAs on other systems in a Fibre Channel (FC) network. See *page 10* for the installation procedure. See the HBAnyware Utility User Manual for more information.

Web Launch. A feature that allows you to start the HBAnyware utility directly from your Web browser. See the HBAnyware Utility User Manual for more information.

Storport Miniport Driver Information

Prerequisites

- One of the following operating systems:
  - Windows Server 2003 running on an x86, x64 or Itanium 64-bit platform
  - Windows Vista running on an x86 or x64 platform
- See the Emulex Web site for required updates to the Microsoft Storport driver.

Compatibility

- The Emulex Storport Miniport driver is compatible with the following FC HBAs:
  - LPe11002, LPe11000 and LPe1150 (minimum firmware version 2.50a6; version 2.70a5 is required for SLI-3 functionality)
  - LP11002, LP11000 and LP1150 (minimum firmware version 2.10a10; version 2.70a5 is required for SLI-3 functionality)

  Note: To run the driver using NPIV or SLI-3 optimization, the firmware must be version 2.72a0 or later. If an earlier version is used, the driver will run in SLI-2 mode and will not support NPIV.

  - LP10000ExDC and LP1050Ex (minimum firmware version 1.90a4)
  - LP10000DC and LP10000 (minimum firmware version 190a4)
  - LP1005DC-CM2 (minimum firmware 1.90a5)
  - LP1050 and LP1050DC (minimum firmware version 1.90a4)
  - LP9802DC, LP9802 and LP982 (minimum firmware version 1.90a4)
  - LP9402DC, LP9002DC, LP9002L, LP9000 & LP952L (minimum firmware version 3.92a2)
  - LP8000, LP8000DC and LP850
- x86 BootBIOS (minimum x86 BootBIOS version 1.70a3)
- EFIBoot Version 3.11a4 or higher (64-bit only).
- This version of the driver is compatible with version 3.3 of the HBAnyware utility. This is the version of HBAnyware that is included in the distribution executable file. Version 3.3 of the HBAnyware utility is not compatible with earlier versions of the Emulex Storport Miniport driver.

Known Issues

The following issues have been reported at the time of publication. These issues may not yet have been verified or confirmed and may apply to another product, such as hardware.

- No known issues at this time.

New in This Release

- Supports FC Security Protocol Diffie-Hellman Challenge Handshake Authentication Protocol (FC-SP DHCHAP).
- Supports dynamic LUN masking with the HBAnyware utility.
- Supports Microsoft System Center Virtual Machine Manager for Microsoft Virtual Server.

Files Included in this AutoPilot Installer

The Distribution File copies the AutoPilot Installer Files to your system. By default, these files are copied to c:\\Program Files\Emulex\AutoPilot Installer.

Table 1: AutoPilot Installer Files

Folder	Description
AutoPilot Installer	This folder contains files necessary to run the AutoPilot Installer: • APInstall.exe - Executable file for the AutoPilot Installer. • APInstall.cfg - Configuration file for the AutoPilot Installer. • FriendlyName.exe - Provides display names for installed HBAs.
ApInstaller_IA64 Folder ApInstaller_x64 Folder ApInstaller_x86 Folder	These folders contain files necessary to run the AutoPilot Installer: • APInstall.exe - Executable file for the AutoPilot Installer. • APInstall.cfg - Configuration file for the AutoPilot Installer. • SilentApInstalllExampleText.txt - Information and example script for silent installations.
Drivers Folder	This folder contains the Storport Miniport folder and files necessary to install the driver. Separate folders for each architecture (x86, x64 and Itanium 64-bit) contain these following files: • Deladjct.reg - File removes registry entries for previous value-add driver. • elxplus.inf - Installation script for value-add driver. This driver supports HBAnyware, persistent binding and LUN mapping and masking. • elxplus.sys - Value-add driver supporting persistent binding. • elxstor.pdb - Symbol file for Storport Miniport driver. • elxstor.sys - Storport Miniport driver. • FriendlyName.exe - Installation program from Windows friendly name entry. • oemsetup.inf - Driver installation script for setup program. • txtsetup.oem - Driver installation script for boot-time setup program (BootBIOS must be installed).
Utilities	This folder contains files necessary to install HBAnyware and the driver utility: The setup.exe file installs utilities and related files which include: HBAnyware HBAnyware Discovery Server
Reports	If the system generates reports, this folder is generated and the reports are placed here.

Distribution Executable File Overview

The distribution executable file self-extracts and copies the following onto your system:

- AutoPilot Installer
- Storport Miniport driver
- ElxPlus driver
- HBAnyware utility
- HBAnyware Security Configurator

After the distribution executable file runs and the files are extracted, you have two options:

- Run AutoPilot Installer immediately
- Run AutoPilot Installer later

Running the Distribution Executable File

To run the distribution executable file:

1. Download the distribution executable file from the Emulex Web site to your system.
2. Double-click the distribution executable file. A window is displayed with driver version information and Emulex contact information.
3. Click **Next** to access the Installation Folder window or click **Cancel** to close the window.
4. The default installation location is displayed. Browse to a different location, if desired. Click **Install** to continue the installation.
5. The Progress window is displayed. As each task completes, the corresponding box is automatically selected.
6. After all tasks complete, a confirmation window is displayed. The Start AutoPilot Installer box is automatically selected. To start AutoPilot Installer later, clear this box.
7. Click **Finish** to close the distribution executable file.

AutoPilot Installer

Introduction

The Emulex AutoPilot Installer wizard installs (or updates) Emulex drivers and utilities and configures HBAs, drivers and utilities.

One of the following operating systems must be installed:

- Windows Server 2003 running on an x86, x64 or Itanium 64-bit platform - See the Emulex Web site for required updates to the Microsoft Storport driver
- Windows Vista running on an x86 or x64 platform

AutoPilot Installer Features

- Command line functionality - Invokes AutoPilot Installer from the command line using customized installation scripts.
- Driver and utility updates - Installs and updates drivers and utilities.
- Multiple HBA installation capability - Installs drivers on multiple HBAs, alleviates the need to manually install the same driver on all HBAs in the system.
- Driver diagnostics - Determines whether the driver is properly operating.
- Silent installation mode - Suppresses all screen output (necessary for unattended installation).
- Management Mode Setup - Parameters in the APInstall.cfg file determine if you can manage HBAs remotely (local and others) and if you change the remote management options once the utility is installed.

Note: See “Setting Up Management Mode for Attended and Unattended Installations” on page 15 in the Unattended Installation topic for more information. Management mode parameters govern both attended and unattended installations.

Configuration Questions

Vendor-specific versions of the Emulex driver installation program may include one or more windows with questions that you must answer before continuing the installation process.

Installation Planning

Table 2 describes the types of installations that you can perform under certain conditions. Use this information to determine which method to use for your situation.

Table 2: Types of Installations

	Attended Installations		Unattended Installations	
Condition	**Hardware-First Installation**	**Software-First Installation**	**Unattended Installation**	**Replicated Installation**
No HBA in a single system		X	X	X
New HBA in a single system	X		X	X
Existing HBAs and drivers installed, updated driver available	X		X	X
Multiple systems, no HBAs installed		X	X	X
Multiple systems, new HBAs installed	X		X	X

AutoPilot Installation Procedures

Hardware-First Installation

The Distribution Executable file must have been downloaded from the Emulex Web site and extracted to a directory on your local drive.

Note: To update the Storport Miniport driver, begin the following procedure at step 2.

To perform a hardware-first installation:

1. Install a new Emulex HBA and power-on the system. If the Windows Found New Hardware wizard is displayed, click **Cancel** to exit. AutoPilot Installer performs this function.

   Note: If there are multiple HBAs in the system, the Windows Found New Hardware wizard appears for each HBA. Click **Cancel** to exit the wizard for each HBA.

2. If you have already extracted the driver and utility files, run the APInstaller.exe file. If you have not extracted the driver and utility files, run the distribution executable file (see “Running the Distribution Executable File” on page 5) and leave the Start AutoPilot Installer box selected. Click **Finish**.
3. Click **Next**. Installation continues.
4. Select a management mode. See Figure 1 for three types of host/HBA management.

5. To prevent the management mode from being changed after installation, clear the “Allow users to change management mode after installing the utility" check box.

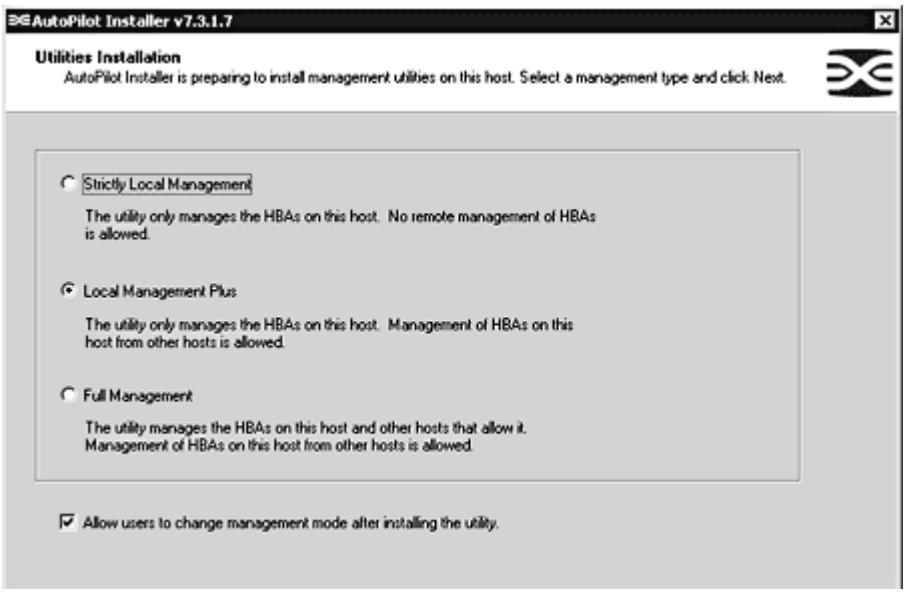

Figure 1: AutoPilot Installer Management Mode Setup

Note: The display of the AutoPilot Installer Setup window is optional and based on settings in the APInstall.cfg file. See “Setting Up Management Mode for Attended and Unattended Installations” on page 15 for more information.

6. Click **Next**. Installation automatically completes, except in the following situations:
   - If you are changing driver types, the Available Drivers window appears. This window allows you to select a new driver type. Select the driver type from the drop-down list and click **Next**.
   - If you are installing an older driver version, the Available Drivers window is displayed. Select the existing driver version from the drop-down list and click **Next**.
   - If you are installing a vendor-specific version of the Emulex driver installation program, this program may include one or more windows with questions that you must answer before continuing the installation process. In this case, answer each question and click **Next** on each window to continue.
7. View the progress of the installation. Once the installation is successful, a congratulations window appears.
8. View or print a report, if desired.
   - View Installation Report - your text editor (typically Notepad) shows a report with current HBA inventory and configuration information and task results. The text file is named in the following format: *report_MM-DD-YY-#*.txt
     - *MM* = month
     - *DD* = day
     - *YY* = year
     - # = report number
   - Print Installation Report - your default print window is displayed.
9. Click **Finish** to close AutoPilot Installer. If your system requires a reboot, you are prompted to do so when you click **Finish**.

If the Installation Fails

If the installation fails, the Diagnostics window appears. To view the reason an HBA failed, select the HBA row. The reason and suggested corrective action are displayed below the list.

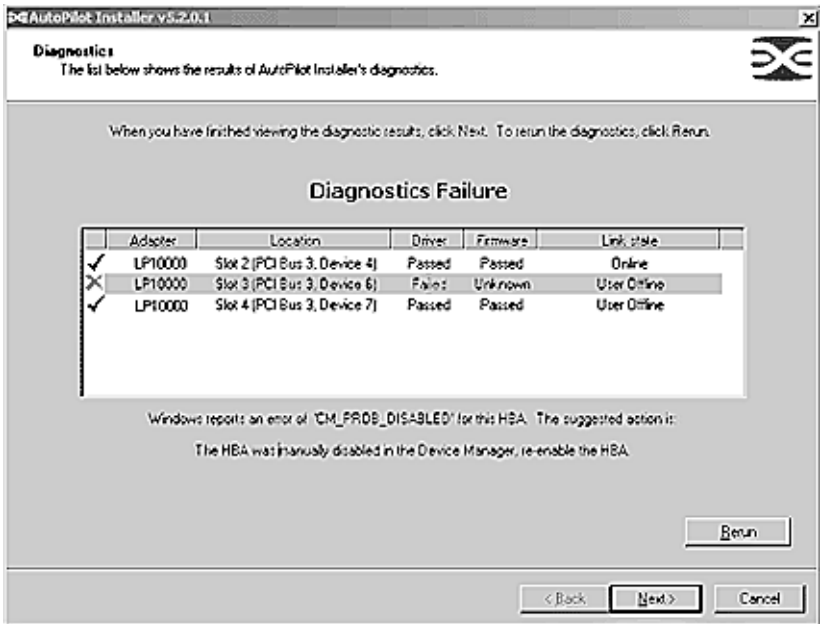

Figure 2: AutoPilot Installer, Diagnostics window

Perform the suggested corrective action and run APInstaller.exe again.

Software-First Installation

The Distribution Executable file must have been downloaded from the Emulex Web site and extracted to a directory on your local drive.

To perform a software-first installation:

1. If you have already extracted the driver and utility files, run the APInstaller.exe file.

   If you have not extracted the driver and utility files, run the distribution executable file (see page 5), and leave the Start AutoPilot Installer box selected. Click **Finish**.

   The following message appears:

Figure 3: AutoPilot Installer Warning (Software-First Installation)

2. Click **OK**.
3. A Welcome window appears.
4. Click **Next**. Installation automatically completes.

5. View the progress of the installation. Once the installation is successful, a congratulations window appears.
6. View or print a report, if desired.

   View Installation Report - your text editor (typically Notepad) displays a report with task results. The text file is named in the following format: *report_MM-DD-YY-#*.txt

   - *MM* = month
   - *DD* = day
   - *YY* = year
   - # = report number

   Print Installation Report - your default print window is displayed.
7. Click **Finish** to close AutoPilot Installer. If the system needs to reboot, you are prompted to do so when you click **Finish**.

Installing the HBAnyware Security Configurator

After the HBAnyware utility and remote server are installed on a group of systems, the HBAnyware utility can remotely access and manage the HBAs on any systems in the group. This may not be desirable because any system with remote access can perform actions such as resetting boards or downloading firmware.

The HBAnyware Security Configurator controls which HBAnyware systems can remotely access and manage HBAs on other systems in an FC network. HBAnyware security is system-based, not user-based. As a result, anyone who can access a system with HBAnyware client access to remote HBAs can manage those HBAs.

The Emulex driver and the HBAnyware utilities must be installed before you can install the HBAnyware Security Configurator.

To install the HBAnyware Security Configurator:

1. Locate the SSCsetup.exe file. The default path for this file is:

   `C:\Program Files\HBAnyware`
2. Double-click the SSCsetup.exe file. A welcome window appears.
3. Click **Next**. The Setup Status window is displayed. After setup completes, the Emulex HBAnyware Security Setup Completed window appears.
4. Click **Finish**.

Installing the HBAnyware Utility Web Launch Feature

In addition to the driver and HBAnyware utilities, the following must be installed before you can install the Web Launch feature:

- Microsoft Internet Information Services (IIS) Server is installed. See the Microsoft Web site for information on downloads and installation.
- Java Runtime Environment (JRE) is installed. See the www.java.com Web site for information on downloads and installation.

To install the HBAnyware Utility Web launch feature:

Click **Programs>Emulex >HBAnyware WebLaunch Install.** Web Launch installation begins.

Updating the HBAnyware Utility Web Launch URL

The driver, HBAnyware utilities and HBAnyware Web Launch must be installed before you can update the URL.

To change the IP address for HBAnyware Web Launch:

1. Copy WebLaunch-related files to a sub-directory called WebLaunch in the HBAnyware installation directory.
2. Click on **Programs>Emulex>HBAnyware WebLaunch Update URL**.
3. Type the URL address that you want HBAnyware Web Launch to use.

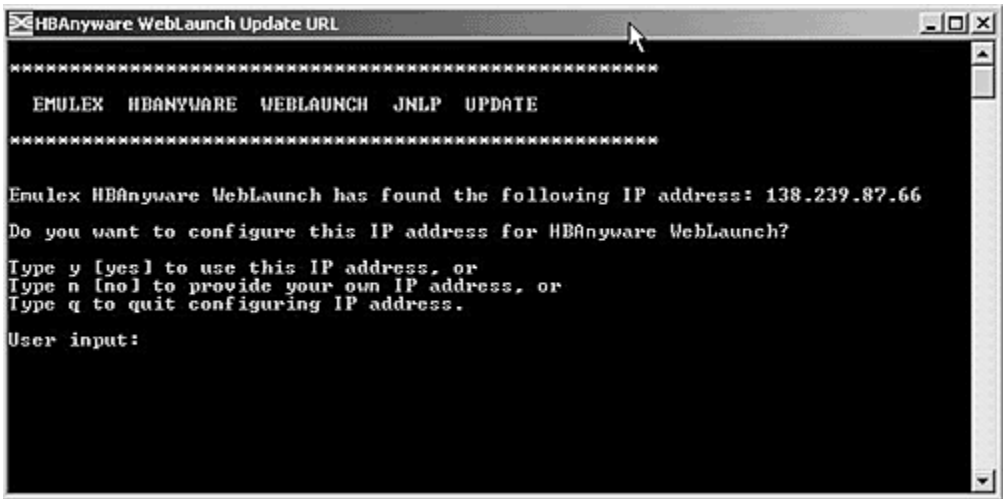

Figure 4: HBAnyware Web Launch, Update URL dialog screen

Unattended Installation

To invoke an unattended installation, the Distribution Executable file must have been downloaded from the Emulex Web site and extracted to a directory on your local drive. Unattended installation is invoked from the command line. The apinstall command uses installation and driver settings stored in a configuration file (APInstall.cfg). The default APInstall.cfg file is located in the AutoPilot Installer folder in the Emulex folder in the Program Files directory. Make a copy of the APInstall.cfg file before you make modifications. The APInstall.cfg file should be used as a starting point for scripting an unattended installation.

Mandatory configuration file changes:

- Enabling silent mode
- Setting up allowable driver types
- Setting up driver locations

Optional configuration file changes:

- Changing the utility installation location
- Setting up an automatic system restart during an unattended Installation
- Setting up the installation report title and location
- Setting up an installation without utilities
- Preventing software-first installations
- Setting up the existing driver parameter values to be retained or overwritten

- Setting up the re-installation of an existing driver version
- Setting up management mode for attended and unattended installation
- Setting up re-installation of an existing driver version

AutoPilot Configuration File Format

The APInstall.cfg file is organized into commented sections, grouped according to related commands.

- Lines that begin with a semicolon are comments. To enable sample comment lines, remove the semicolon.
- There are five main sections. Three are required and two are optional. Driver parameters must be set up in the [STORPORT.PARAMS] section. Each section begins with a heading.
  - [AUTOPILOT.ID] - This required section contains revision and label information.
  - [AUTOPILOT.CONFIG] -This required section contains settings that control and configure the AutoPilot Installer's operation.
  - [STORPORT.CONFIGURATION] - This optional section may contain questions that must be answered during the installation process. This section applies to attended installations only.
  - [STORPORT.PARAMS] - This required section can specify driver parameters. Parameters are read exactly as they are entered and are written to the registry.
  - [SYSTEM.PARAMS] - This section may be created to specify system parameters.

Mandatory Configuration File Changes

Locate the Mandatory Configuration File Changes heading in the [AUTOPILOT.CONFIG] section of the APInstall.cfg file.

Enabling Silent Mode

You may enable silent mode to run an unattended installation. To enable silent mode, remove the semicolon before:

```
;SilentInstallEnable = "TRUE"
```

Setting Up Allowable Driver Types

Two configuration file settings determine what driver types the AutoPilot Installer can install. Remove the semicolon before:

```
;win2003DriverPreference = "STORPORT"
;win2003AllowableDrivers = "STORPORT"
```

Note: These two settings must specify the same driver type. Windows Vista and Windows Server 2008 systems automatically use the Storport for the 'win2003DriverPreference' and 'win2003AllowedDrivers' parameters.

Setting Up Driver Location

In silent mode you need to specify the location of the driver to be installed. Locate the following line in the APInstall.cfg file:

```
;LocalDriverLocation = "C:\Path\toThe\Storport\Package"
```

Remove the semicolon before this line and modify this path to reflect the location of the driver. The driver location can be a local disk or a network shared drive. It can also be a relative path to the apinstall.cfg file. The location must be specific to the x86, x64 or IA64 folder to install the correct driver for the server platform.

Full path example for an x86 driver (all on one line):

```
LocalDriverLocation = “C:\Program Files\Emulex\AutoPilot
Installer\Drivers\Storport\x86”
```

Relative path example for x64 driver:

```
LocalDriverLocation = “Drivers\Storport\x64”
```

Deleting Questions in the APInstall.cfg File

A [STORPORT.CONFIGURATION] section may exist in the APInstall.cfg file. If this section does exist, it may contain a [QUESTIONS] section with vendor-specific installation questions. You must remove the entire [STORPORT.CONFIGURATION] section or comment it out for a silent installation.

Optional Configuration File Changes

Locate the Optional Configuration File Changes heading in the [AUTOPILOT.CONFIG] section of the APInstall.cfg file. This heading follows Mandatory Configuration File Changes.

Changing Utility Installation Location

AutoPilot Installer normally installs utilities from a Utilities subdirectory located in the same directory as AutoPilot Installer. To modify the location, locate the following in the APInstall.cfg file (all in one line):

```
; UtilitiesLocation = "C:\Program Files\Emulex\Autopilot
Installer\Windows\Utilities"
```

Remove the semicolon before this line and modify this directory path to specify an alternate location, such as a network shared drive.

Setting Up an Automatic System Restart During an Unattended Installation

AutoPilot Installer does not automatically perform system restarts for the following reasons:

- Restarts often require a login as part of Windows start-up process. If the system is restarted, the installation process stops until a login is performed.
- AutoPilot Installer does not know if it is safe to restart the system. Restarts while applications are active can result in the loss of data.

To configure Windows to start up without requiring a login, remove the semicolon from this line:

```
; SilentRebootEnable = "FALSE"
```

Change this parameter to true:

```
SilentRebootEnable = "TRUE"
```

Setting Up Installation Report Title and Location

You can change the Installation report name and the location to which it is written. This information must be specified in one command. In the following example x is the system drive. Remove the semicolon before:

```
; ReportLocation = "x: \autopilot\reports\installs\October16-06.txt"
```

Default File Name

This default file name format is ”report_mm-dd-yy.txt” and uses ‘mm’ for the month, ‘dd’ for the date, and ‘yy’ for the year.

Default Report Location

By default, the report is written to the system drive. In the following example x is the system drive. Your system drive may be different. You can modify this line to change the report location and/or file name.

```
" ReportLocation =  "x: \autopilot\reports\installs\October16-06.txt"
```

Note: Both the report location and file name must be specified.

Setting Up an Installation Without Utilities

You can set up the unattended installation to install the driver without installing the utilities package. The default for this setting is false which means that the utilities are automatically installed with an unattended installation. To set up an installation without utilities, remove the semicolon before:

```
; SkipUtilityInstall = "FALSE”
```

Change this parameter to true:

```
SkipUtilityInstall = "TRUE”
```

Preventing Software-First Installations

AutoPilot Installer defaults to automatically installing the driver whether or not any HBAs are discovered. Setting this parameter to true allows AutoPilot Installer to run on every server in your SAN, but only update the ones that actually have HBAs. To prevent software-first installations, remove the semicolon before:

```
; NoSoftwareFirstInstalls = "False”
```

Change this parameter to true:

```
NoSoftwareFirstInstalls = "TRUE”
```

Setting Up Existing Driver Parameters Retention or Override

The ForceRegUpdate driver parameter setting determines if existing driver parameters are retained or changed when you update the driver. This parameter defaults to false and means all existing driver parameter settings are retained. Setting the ForceRegUpdate parameter to true causes removal of all existing driver parameters from the registry and replaces them with the parameters specified in the APInstall.cfg file. The ForceRegUpdate parameter does not affect any existing persistent bindings.

To set up an installation to remove the existing driver parameters from the registry and replace them with parameters specified in the APInstall.cfg file, remove the semicolon before:

```
;ForceRegUpdate = "FALSE"
```

Note: You can also use this setting for attended installations with the AutoPilot Installer wizard if you modify the APInstall.cfg file in the AutoPilot Installer folder.

Change this parameter to true:

```
ForceRegUpdate = "TRUE"
```

Setting Up Re-Installation of an Existing Driver Version

By default, AutoPilot Installer will only update a driver if the new driver version is different from the installed driver version. If necessary, you can use the ForceDriverUpdate setting to re-install the same driver version. To force a re-installation of the same driver type and version, remove the semicolon from this line:

```
; ForceDriverUpdate = "FALSE"
```

Change this parameter to true:

```
ForceDriverUpdate = "TRUE"
```

Note: This setting can only be used for unattended installations.

Setting Up a Driver Type to Force

By default the ForceDriverTypeChange parameter is set to false. When set to false, AutoPilot Installer will only install drivers on HBAs that have no other driver installed, or whose current driver type matches that of the driver being installed.

If this parameter is changed to true, AutoPilot Installer will cause silent installations to update or install the current driver on each HBA in the system, without any regard to the current driver type. For example, you would want this option left on or set to true to silently install the Storport Miniport driver on any HBAs currently running SCSIport Miniport or FC Port drivers.

Remove the semicolon from this line:

```
;ForceDriverTypeChange = "FALSE"
```

Change this parameter to true:

```
ForceDriverTypeChange = "TRUE"
```

Setting Up Management Mode for Attended and Unattended Installations

There are three parameters that control management mode: ManagementMode, ManagmentModeChangable and HideManagementModeGUI.

ManagementMode

- Full - the utility manages the HBAs on this host and other hosts that allow it. Management of HBAs on this host from other hosts is also allowed.
- LocalOnly - the utility manages only the HBA on this host and no remote management of HBAs is allowed.
- LocalPlus - The utility manages only the HBAs on this host, however management of HBAs on this host from other hosts is allowed.

To change this parameter:

Remove the semicolon from this line:

```
;ManagementMode = "FULL"
```

Change this parameter value. Example:

```
ManagementMode = "LOCALONLY"
```

ManagementModeChangable

True allows you to change the ManagementMode from the HBAnyware Utility Management Mode window. If this parameter is set to false, you must reinstall HBAnyware to change the management mode.

To change this parameter:

Remove the semicolon from this line:

```
;ManagementModeChangable = "TRUE"
```

Change this parameter value to false:

```
ManagementModeChangable = "FALSE"
```

HideManagementModeGUI

By default, this parameter is set to false. False allows the AutoPilot Installer Utility Installation window to be displayed during utility installation. If this parameter is set to true, AutoPilot Installer reads the APInstall.cfg parameters and installs them accordingly - without the option to change how management mode is setup.

To change this parameter:

Remove the semicolon from this line:

```
;HideManagementModeGUI = "FALSE"
```

Change this parameter value to true:

```
HideManagementModeGUI = "TRUE"
```

Setting Up Driver Parameters

To change driver parameter, modify this section of the APInstall.cfg file. Locate the [STORPORT.PARAMS] section in the APInstall.cfg file. This section follows Optional Configuration File Changes. Under the [STORPORT.PARAMS] heading, list the parameters and new values for the driver to use.

For example, Driver Parameter = “LinkTimeout = 45”

See the HBAnyware Utility User Manual for a listing of driver parameters and their defaults and valid values.

Setting Up System Parameters

To change the system parameters, create a [SYSTEM.PARAMS] section in the APInstall.cfg file. Create this section in the Optional Configuration File Changes heading in the [AUTOPILOT.CONFIG] section of the APInstall.cfg file.

AutoPilot Installer Error Codes Reference Table

AutoPilot Installer sets an exit code to indicate whether an installation was successful or an error occurred. These error codes allow AutoPilot Installer to be used in scripts with error handling. AutoPilot Installer's silent mode specifically returns the following values:

Table 3: Unattended Installation Error Codes

Error Code	Hex	Description
0	0x00000000	No errors.
2399141889	0x8F000001	No appropriate driver found.
2399141890	0x8F000002	The AutoPilot configuration file is not found.
2399141891	0x8F000003	Disabled HBAs detected in the system.
2399141892	0x8F000004	The selected driver is 64-bit and this system is 32-bit.
2399141893	0x8F000005	The selected driver is 32-bit and this system is 64-bit.
2399141894	0x8F000006	Other hardware installation activity is pending. AutoPilot Installer cannot run until this is resolved.
2399141895	0x8F000007	(GUI Mode only) User cancelled execution because user did not wish to perform a software-first install.
2399141896	0x8F000008	No drivers found.
2399141897	0x8F000009	One or more HBAs failed diagnostics.
2399141904	0x8F000010	(GUI Mode only) User chose to install drivers even though a recommended QFE or Service Pack was not installed.
2399141920	0x8F000020	(GUI Mode only) User chose to stop installation because a recommended QFE or Service Pack was not installed.
2399141899	0x8F00000B	Silent mode installation did not find any drivers of the type specified in the config file.
2399141900	0x8F00000C	A silent reboot was attempted, but according to the operating system a reboot is not possible.
2399141901	0x8F00000D	(GUI Mode only) A driver package download was cancelled.
2399141902	0x8F00000E	(Non-Enterprise) No HBAs were found in the system. **Note:** To stop this error and perform a software first installation, be sure that the line "enableEnterpriseMode = "True"" is in the configuration file.
2399141903	0x8F00000F	A required QFE or Service Pack was not detected on the system.
2399141836	0x8F000030	AutoPilot Installer was not invoked from an account with Administrator-level privileges.
2399141952	0x8F000040	AutoPilot Installer has detected unsupported HBAs on the system.

Invoking AutoPilot Installer

If the configuration file has been modified and saved with its original name (APInstall.cfg) and you want to invoke the AutoPilot Installer, at the command line, type:

```
apinstall
```

If the configuration file has been modified and saved with a different name and/or the configuration file location has changed, you must specify the entire path location (using the standard drive:\directory path\filename format) and the entire name of the configuration file. In the following example, the configuration file has been renamed and relocated:

Example:

```
ApInstall g:\autopilot\mysetup\cs_apinstall.cfg
```

Batch File Example

Modifying the configuration file enables you to script the installation of a system's driver. The following example batch file assumes that you have made mandatory changes to the APInstall.cfg file, as well as any desired optional changes.

If your systems have been set up with a service that supports remote execution, then you can create a batch file to remotely update drivers for all of the systems on the storage net. If Microsoft's RCMD service was installed, for example, a batch file similar to the following would run remote execution:

```
rcmd \\server1 g:\autopilot\ApInstall
g:\autopilot\mysetup\apinstall.cfg
if errorlevel 1 goto server1ok
echo AutoPilot reported an error upgrading Server 1.
if not errorlevel 2147483650 goto unsupported
  echo Configuration file missing.
goto server1ok
 :unsupported
if not errorlevel 2147483649 goto older
echo Unsupported operating system detected.
 :older
if not errorlevel 2001 goto none
   echo The driver found is the same or older than the existing driver.
   goto server1ok
:none
if not errorlevel 1248 goto noreport
   echo No HBA found.
goto server1ok
:noreport
 if not errorlevel 110 goto nocfg
   echo Could not open installation report file.
 goto server1ok
```

```
:nocfg
 if not errorlevel 87 goto badcfg
   echo Invalid configuration file parameters.
   goto server1ok
:badcfg
   if not errorlevel 2 goto server1ok
   echo No appropriate driver found.
server1ok
rcmd \\server2 g:\autopilot\ApInstall
g:\autopilot\mysetup\apinstall.cfg
if errorlevel 1 goto server2ok
echo AutoPilot reported an error upgrading Server 2.
if not errorlevel 2147483650 goto unsupported
   echo Configuration file missing.
goto server2ok
 :unsupported
 if not errorlevel 2147483649 goto older
   echo Unsupported operating system detected.
 :older2
 if not errorlevel 2001 goto none2
   echo The driver found is the same or older than the existing driver.
   goto server2ok
:none2
 if not errorlevel 1248 goto noreport2
   echo No HBA found.
goto server2ok
:noreport
 if not errorlevel 110 goto nocfg2
   echo Could not open installation report file.
 goto server2ok
:nocfg2
 if not errorlevel 87 goto badcfg2
   echo Invalid configuration file parameters.
   goto server2ok
:badcfg2
   if not errorlevel 2 goto server2ok
   echo No appropriate driver found.
server2ok
```

Manually Installing or Updating the Storport Miniport Driver

Overview

You can install or update the Storport Miniport driver and utilities manually without using AutoPilot Installer.

The Emulex PLUS (ElxPlus) driver supports the HBAnyware utility, persistent binding and LUN mapping and masking. The ElxPlus driver must be installed before you install the Storport Miniport driver.

Removing the Adjunct Driver Registry Key

The ElxPlus driver replaces the adjunct driver that was used with Storport Miniport 11.a3 or earlier. If currently installed, the adjunct driver registry key must be removed using the deladjct.reg file before you install the ElxPlus driver. The deladjct.reg file was extracted when you ran the Distribution Executable File.

Manually Installing the Emulex PLUS (ElxPlus) Driver for the First Time

The Distribution Executable file must have been downloaded from the Emulex Web site and extracted to a directory on your local drive.

Note: Only one instance of the Emulex PLUS driver should be installed, even if you have multiple HBAs or HBA ports installed in your system.

To install the ElxPlus driver from the desktop:

1. Select **Start>Control Panel> Add Hardware**. The Add Hardware Wizard window appears. Click **Next**.
2. Select “Yes, I have already connected the hardware”. Click **Next**.
3. Select, “Add a new hardware device”. Click **Next**.
4. Select "Install the hardware that I manually select from a list (Advanced)". Click **Next**.
5. Select “Show All Devices”. Click **Next**.
6. Click **Have Disk...** Direct the Device Wizard to the location of elxplus.inf. If you have downloaded the Storport Miniport files to the default directory, the path will be:
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86 for the 32-bit driver version

   or
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64 for the x64-bit driver version

   or
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64 for the Itanium 64-bit driver version
7. Click **OK**.
8. Select "**Emulex PLUS**". Click **Next** and click **Next** again to install the driver.
9. Click **Finish**. The initial ElxPlus driver installation is complete. Continue with manual installation of the Storport Miniport Driver. See page 21 for this procedure.

Manually Updating the Emulex PLUS (ElxPlus) Driver

The Distribution Executable file must have been downloaded from the Emulex Web site and extracted to a directory on your local drive.

Note: Only one instance of the Emulex PLUS driver should be installed, even if you have multiple HBAs or HBA ports installed in your system.

To update an existing ElxPlus driver from the desktop:

1. Select **Start> Administrative Tools>Computer Management.**
2. Click **Device Manager** (left pane).
3. Click the plus sign (+) next to the Emulex PLUS class (right pane) to show the ElxPlus driver entry.
4. Right-click the ElxPlus driver entry and select **Update Driver...** from the menu.
5. Select “No, not this time”. Click **Next** on the “Welcome to the Hardware Update Wizard” window. Click **Next**.
6. Select "Install from a list or specific location (Advanced)". Click **Next**.
7. Select “Don’t Search. I will choose the driver to install”.
8. Click **Have Disk...** Direct the Device Wizard to the location of driver’s distribution kit. If you have downloaded the Storport Miniport files to the default directory, the path will be:
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86 for the 32-bit driver version

   or
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64 for the x64-bit driver version

   or
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64 for the Itanium 64-bit driver version
9. Click **OK**. Select "Emulex PLUS".
10. Click **Next** to install the driver.
11. Click **Finish**. The ElxPlus driver update is complete. Continue with manual installation of the Storport Miniport Driver.

Manually Installing or Updating the Storport Miniport Driver

To update or install the Storport Miniport driver from the desktop:

1. Select **Start>Control Panel>System**.
2. Select the Hardware tab.
3. Click **Device Manager**.
4. Open the "SCSI and RAID Controllers" item.
5. Double-click the desired Emulex HBA.

Note: The driver will affect only the selected HBA. If there are other HBAs in the system, you must repeat this process for each HBA. All DC models will be displayed in Device Manager as two HBAs, therefore each HBA must be updated.

6. Select the Driver tab.
7. Click **Update Driver.** The Update Driver wizard starts.

8. Select “No, not this time”. Click **Next** on the “Welcome to the Hardware Update Wizard” window.
9. Select “Install from a list or specific location (Advanced)". Click **Next**.
10. Select "Don't search. I will choose the driver to install". Click **Next**.

Note: Using the OEMSETUP.INF file to update Emulex's Storport Miniport driver overwrites customized driver settings. If you are upgrading from a previous installation, write down the settings. Following installation, use the HBAnyware utility to restore the pre-upgrade settings.

11. Click **Have Disk...** Direct the Device Wizard to the location of oemsetup.inf. If you have downloaded the Storport Miniport files to the default directory, the path will be:
    - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86 for the 32-bit driver version

    or
    - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64 for the x64-bit driver version

    or
    - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64 for the Itanium 64-bit driver version
12. Click **OK**. Select "Emulex LightPulse LPX000, PCI Slot X, Storport Miniport Driver" (your HBA model will be displayed here).
13. Click **Next**.
14. Click **Finish**.

The driver installation is complete. The driver should start automatically. If the HBA is connected to a FC switch, hub or data storage device, a blinking yellow light on the back of the HBA will indicate a link up condition.

Manually Installing the Driver Utilities

Running this executable installs the HBAnyware utility.

The Emulex Storport Miniport driver and the ElxPlus driver must be installed before you can manually install the driver utilities. The Distribution Executable file must have been downloaded from the Emulex Web site and extracted to a directory on your local drive. If you have downloaded the Storport Miniport files to the default directory, the path will be: C\\Program Files\Emulex\AutoPilot Installer\Utilities\.

To install the utility:

1. Run setup.exe.
2. Follow the instructions on the setup windows.
3. Click **Finish** in the last console window to exit setup. The utility installation has completed.The HBAnyware utility automatically starts running.

Uninstalling the Utility Package

To uninstall the HBAnyware utility and HBAnyware Web Launch (if it is installed):

1. Select **Start>Settings>Control Panel**. The Add/Remove Programs window appears. Select the **Install/Uninstall** tab.
2. Select the Emulex Fibre Channel item and click **Change/Remove**. Click **Next**. The utilities are removed from the system.
3. Click **Finish**. Uninstallation is complete.

Uninstalling HBAnyware Web Launch

To uninstall HBAnyware Web Launch, but leave the HBAnyware utility installed:

1. Select **Start> Programs>Emulex>HBAnyware WebLaunch Uninstall**. The following dialog screen appears:

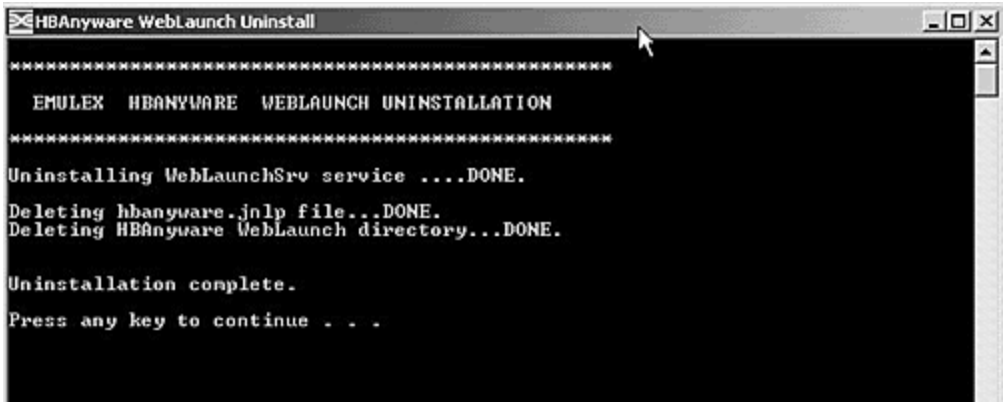

Figure 5: HBAnyware Web Launch, Uninstallation dialog screen

2. HBAnyware Web Launch is removed. Press any key to continue.

Uninstalling the Emulex Drivers

The Emulex Storport Miniport and PLUS (ElxPlus) drivers are uninstalled using the Device Manager.

The Distribution Executable file must have been downloaded from the Emulex Web site and extracted to a directory on your local drive.

To uninstall the Emulex Storport Miniport driver:

1. Select **Start>All Programs> Administrative Tools>Computer Management**.
2. Click **Device Manager**.
3. Double-click the HBA from which you want to remove the Storport Miniport driver. A device-specific console window is displayed. Select the Driver tab.
4. Click **Uninstall** and click **OK** to uninstall.

To uninstall the ElxPlus driver (uninstall the ElxPlus driver only if all HBAs and installations of Emulex miniport drivers are uninstalled):

After running Device Manager (steps 1 and 2 above):

1. Click the plus sign (+) next to the Emulex PLUS driver class.
2. Right-click the Emulex driver and click **Uninstall**.
3. Click **OK** in the Confirm Device Removal Window.

To uninstall or update an earlier version of the Storport Miniport driver (prior to version 1.20), you must remove the registry settings for the adjunct driver prior to manually installing a new driver.

To remove the adjunct driver registry settings:

1. Browse to the Storport Miniport driver version 1.20 (or later) driver kit that you downloaded and extracted.
2. Double-click on the deladjct.reg file. A Registry Editor window appears to confirm that you want to execute deladjct.reg.
3. Click **Yes**. The elxadjct key is removed from the registry.

Configuration

Introduction

The Emulex Storport Miniport driver has many options that you can modify to provide for different behavior. You can set Storport Miniport driver parameters using the HBAnyware configuration utility. See the HBAnyware User Manual for more information.

Server Performance

I/O Coalescing

I/O Coalescing is enabled and controlled by two driver parameters: CoalesceMsCnt and CoalesceRspCnt. The effect of I/O Coalescing will depend on the CPU resources available on the server. With I/O Coalescing turned on, interrupts are batched, reducing the number of interrupts and maximizing the number of commands processed with each interrupt. For heavily loaded systems, this will provide better throughput.

With I/O Coalescing turned off (the default), each I/O processes immediately, one CPU interrupt per I/O. For systems not heavily loaded, the default will provide better throughput.The following table shows recommendations based upon the number of I/Os per HBA.

Table 4: Recommended Settings for I/O Coalescing

I/Os per Second	Suggested CoalesceMsCnt	Suggested CoalesceRspCnt
I/Os < 10000	0	8
10000 < I/Os < 18000	1	8
18000 < I/Os < 26000	1	16
!/Os > 26000	1	24

CoalesceMsCnt

The CoalesceMsCnt parameter controls the maximum elapsed time in milliseconds that the HBA waits before it generates a CPU interrupt. The value range is 0 - 63 (decimal) or 0x0 - 0x3F (hex). The default is 0 and disables I/O Coalescing.

CoalesceRspCnt

The CoalesceRspCnt parameter controls the maximum number of responses to batch before an interrupt generates. If CoalesceRspCnt expires, an interrupt generates for all responses collected up to that point. With CoalesceRspCnt set to less than 2, response coalescing is disabled and an interrupt triggers for each response. The value range for CoalesceRspCnt is 1 - 255 (decimal) or 0x1 - 0xFF (hex). The default value is 8.

Note: A system restart is required to make changes to CoalesceMsCnt and/or CoalesceRspCnt.

Performance Testing

There are four driver parameters that need to be considered (and perhaps changed from the default) for better performance testing: QueueDepth, NumFcpContext, CoalesceMsCnt and CoalesceRspCnt.

Note: Parameter values recommended in this topic are for performance testing only and not for general operation.

QueueDepth

If the number of outstanding I/Os per device is expected to exceed 32, increase this parameter to a value greater than the number of expected I/Os per device, up to a maximum of 254.The QueueDepth parameter defaults to 32. If 32 is set and not a high enough value, performance degradation may occur due to Storport throttling its device queue.

NumFcpContext

If the number of outstanding I/Os per HBA is expected to exceed 512, increase this parameter to a value greater than the number of expected I/Os per HBA. Increase this value in stages: from 128 to 256 to 512 to 1024 to a maximum of 2048i. NumFcpContext limits the number of outstanding I/Os per HBA, regardless of how QueueDepth is set. The NumFcpContext defaults to 512. If NumFcpContext is too small relative to the total number of outstanding I/Os on all devices combined, performance degradation may occur due to I/O stream throttling.

CoalesceMsCnt

CoalesceMsCnt defaults to zero. If you are using a performance evaluation tool such as IOMETER and if you expect the I/O activity will be greater than 8000 I/Os per second, set CoalesceMsCnt to 1 and re initialized with an HBA reset or system reboot.

CoalesceRspCnt

CoalesceRspCnt defaults to 8. For all other values up to the maximum of 63, the HBA will not interrupt the host with a completion until either CoalesceMsCnt milliseconds has elapsed or CoalesceRspCnt responses are pending. The value of these two driver parameters reduces the number of interrupts per second which improves overall CPU utilization. However, there is a point where the number of I/Os per second is small relative to CoalesceMsCnt and this will slow down the completion process, causing performance degradation.

Performance Testing Examples

Test Scenario One

You execute IOMETER with an I/O depth of 1 I/O per device in a small-scale configuration (16 devices). In this case, the test does not exceed the HBA's performance limits and the number of I/Os per second are in the low thousands.

Recommendation: set CoalesceMsCnt to 0 (or leave the default value).

Test Scenario Two

You execute IOMETER with an I/O depth of 48 per device in a small-scale configuration (16 devices).

Recommendation: set QueueDepth to be greater than 48 (e.g. 64) and NumFcpContext to be greater than 512 (e.g. 1024).

Troubleshooting

Introduction

There are several circumstances in which your system may operate in an unexpected manner. The Troubleshooting section contains reference tables on event codes and error messages and provides information regarding unusual situations.

Event Tracing (Windows Server 2003, SP1 and later only)

Trace messages are part of the Emulex lpfc log messages.

Storage Event Tracing supports two types of events:

- FFInit (0x00000001) - events that occurred at HwFindAdapter and HwInitialize.
- FFIo (0x00000002) - events that occurred during I/O.

Storage Event Tracing supports four levels of events:

- DbgLvlErr (0x00000001) - error level
- DbGLvlWrn (0x00000002) - warning level
- DbgLvlInfo (0x00000004) - Information level
- DbgLvlInfo (0x00000008) - excessive information level

Note: To view trace messages, you must enable Event Tracing in the operating system. See your Microsoft operating system documentation for more information.

Table 5: Event Tracing Summary Table

LOG Message Definition	From	To	Reserved Through	Verbose Description
ELS	0100	0130	0199	ELS events
Discovery	0202	0262	0299	Link discovery events
Mailbox	0310	0326	0399	Mailbox events
INIT	0400	0463	0499	Initialization events
FCP	0701	0749	0799	FCP traffic history events
Link	1300	1306	1399	Link events
Tag	1400	1401	1499	
NPIV	1800	1804	1800	N_Port_ID virtualization events

Event Trace Messages

ELS Log Messages (0100 - 0130)

lpfc_mes0100: 0100: FLOGI failure - ulpStatus: x%x, ulpWord[4]:x%x

DESCRIPTION: An ELS FLOGI command that was sent to the fabric failed.
SEVERITY: Error
LOG: LOG_ELS verbose
ACTION: Check fabric connection.
SEE ALSO: lpfc_mes0110.

lpfc_mes0101: 0101: FLOGI completes successfully - NPortId: x%x, RaTov: x%x, EdTov: x%x

DESCRIPTION: An ELS FLOGI command that was sent to the fabric succeeded.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0110.

lpfc_mes0102: 0102: PLOGI completes to NPortId: x%x

DESCRIPTION: The HBA performed a PLOGI into a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0110.

lpfc_mes0103: 0103:PRLI completes to NPortId: x%x, TypeMask: x%x, Fcp2Recovery: x%x

DESCRIPTION: The HBA performed a PRLI into a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0110.

lpfc_mes0104: 0104: ADISC completes to NPortId x%x

DESCRIPTION: The HBA performed an ADISC into a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0110.

lpfc_mes0105: 0105: LOGO completes to NPortId: x%x

DESCRIPTION: The HBA performed a LOGO into a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0112: 0112: ELS command: x%x, received from NPortId: x%x

DESCRIPTION: Received the specific ELS command from a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.
REMARKS: lpfc_mes0114 and lpfc_mes0115 are also recorded for more details if the corresponding SEVERITY level is set. You can use the XRI to match the messages.

lpfc_mes0114: 0114: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its FC service parameters match this HBA. Request can be accepted.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0112.

lpfc_mes0115: 0115: Unknown ELS command: x%x, received from NPortId: x%x\n

DESCRIPTION: Received an unsupported ELS command from a remote NPORT.
SEVERITY: Error
LOG: LOG_ELS verbose
ACTION: Check remote NPORT for potential problem.
SEE ALSO: lpfc_mes0112.

lpfc_mes0128: 0128: Accepted ELS command: OpCode: x%x

DESCRIPTION: Accepted ELS command from a remote NPORT.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0129: 0129: Rejected ELS command: OpCode: x%x

DESCRIPTION: Rejected ELS command from a remote NPORT.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0130: 0130: ELS command error: ulpStatus: x%x, ulpWord[4]: x%x

DESCRIPTION: ELS command failure
SEVERITY: Error
LOG: LOG_ELS verbose
ACTION: Check remote NPORT for potential problem.

Discovery Log Messages (0202 - 0262)

lpfc_mes0202: 0202: Start Discovery: Link Down Timeout: x%x, initial PLOGICount:%d

DESCRIPTION: Device discovery/rediscovery after FLOGI, FAN or RSCN has started. TMO is the current value of the soft link time. It is used for link discovery against the LinkDownTime set in parameters. DISC CNT is number of nodes being discovered for link discovery. RSCN CNT is number of nodes being discovered for RSCN discovery. There will be value in either DISC CNT or RSCN CNT depending which discovery is being performed.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0204: 0204: Discovered SCSI Target: WWN word 0: x%x, WWN word 1: x%x, DID: x%x:, RPI: x%x

DESCRIPTION: Device discovery found SCSI target.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0214: 0214: RSCN received: Word count:%d

DESCRIPTION: Received RSCN from fabric.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0215: 0215: RSCN processed: DID: x%x

DESCRIPTION: Processed RSCN from fabric.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0225: 0225: Device Discovery completes

DESCRIPTION: This indicates successful completion of device (re)discovery after a link up.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0229: 0229: Assign SCSIId x%x to WWN word 0: x%x, WWN word 1: x%x, NPortId x%x

DESCRIPTION: The driver assigned a SCSI ID to a discovered mapped FCP target. BindType - 0: DID 1:WWNN 2:WWPN
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0230: 0230: Cannot assign SCSIId to WWN word 0: x%x, WWN word 1: x%x, NPortId x%x

DESCRIPTION: SCSI ID assignment failed for discovered target.
SEVERITY: Warning
LOG: LOG_ELS verbose
ACTION: Review system configuration.

lpfc_mes0232: 0232: Continue discovery at sequence number%d, PLOGIs remaining:%d

DESCRIPTION: NPort discovery sequence continuation.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0235: 0235: New RSCN being deferred due to RSCN in process

DESCRIPTION: An RSCN was received while processing a previous RSCN.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0236: 0236: Issuing command to name server” type: x%x

DESCRIPTION: The driver is issuing a nameserver request to the fabric. Also recorded if a GID_FT is sent.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0239 or lpfc_mes0240.

lpfc_mes0238: 0238: NameServer response DID count:%d

DESCRIPTION: Received a response from fabric name server with N DIDs.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0239: 0239: NameServer Response: next DID value: x%x

DESCRIPTION: The driver received a nameserver response. And, this message is recorded for each DID included in the response data.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0236.

lpfc_mes0240: 0240: NameServer Response Error - CmdRsp:x%x, ReasonCode: x%x, Explanation x%x

DESCRIPTION: The driver received a nameserver response containing a status error.
SEVERITY: Error
LOG: LOG_DISCOVERY verbose
ACTION: Check Fabric configuration. The driver recovers from this and continues with device discovery.
SEE ALSO: lpfc_mes0236.

lpfc_mes0256: 0256: Start node timer on NPortId: x%x, timeout value:%d

DESCRIPTION: Starting timer for disconnected target with NPort ID and timeout value.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0260: 0260: Stop node timer on NPortId: x%x, SCSIId: x%x

DESCRIPTION: Discontinuing timer for reconnected target with NPort ID and SCSI ID.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0262: 0262: Node timeout on NPortId: x%x, SCSIId: x%x

DESCRIPTION: Disconnected NPort ID, SCSI ID has failed to reconnect within timeout limit.
SEVERITY: Error
LOG: LOG_ELS verbose
ACTION: Review system configuration.

Mailbox Log Messages (0310 - 0326)

lpfc_mes0310: 0310: Mailbox command timeout - HBA unresponsive

DESCRIPTION: A Mailbox command was posted to the adapter and did not complete within 30 seconds. sync - 0: asynchronous mailbox command is issued 1: synchronous mailbox command is issued.
SEVERITY: Error
LOG: LOG_MBOX verbose
ACTION: This error could indicate a software driver or firmware problem. If no I/O is going through the adapter, reboot the system. If these problems persist, report these errors to Technical Support.

lpfc_mes0326: 0326: Reset HBA - HostStatus: x%x

DESCRIPTION: The HBA has been reset.
SEVERITY: Information
LOG: LOG_MBOX verbose
ACTION: No action needed, informational.

INIT Log Messages (0400 - 0463)

lpfc_mes0400: 0400 Initializing discovery module: OptionFlags: x%x

DESCRIPTION: Driver discovery process is being initialized with internal flags as shown.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0401: 0401: Initializing SLI module: DeviceId: x%x, NumMSI:%d

DESCRIPTION: PCI function with device id and MSI count as shown is being initialized for service level interface.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0405: Service Level Interface (SLI) 2 selected\n");

DESCRIPTION: Service Level Interface level 2 is selected.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0406: 0406: Service Level Interface (SLI) 3 selected\n");

DESCRIPTION: Service Level Interface level 3 is selected.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0436: Adapter not ready: hostStatus: x%x

DESCRIPTION: The adapter failed during powerup diagnostics after it was reset.
SEVERITY: Error
LOG: LOG_INIT verbose
ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0442: 0442: Adapter failed to init, CONFIG_PORT, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing CONFIG_PORT mailbox command.
SEVERITY: Error
LOG: LOG_INIT verbose
ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0446: 0446: Adapter failed to init, CONFIG_RING, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing CFG_RING mailbox command.
SEVERITY:
LOG: LOG_INIT verbose
ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0454: 0454: Adapter failed to init, INIT_LINK, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing INIT_LINK mailbox command.
SEVERITY: Error
LOG: LOG_INIT verbose
ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0458: 0458: Bring Adapter online

DESCRIPTION: The FC driver has received a request to bring the adapter online. This may occur when running HBAnyware.
SEVERITY: Warning
LOG: LOG_INIT verbose
ACTION: None required.

lpfc_mes0460: 0460: Bring Adapter offline

DESCRIPTION: The FC driver has received a request to bring the adapter offline. This may occur when running HBAnyware.
SEVERITY: Warning
LOG: LOG_INIT verbose
ACTION: None required.

lpfc_mes0463: 0463: Adapter firmware error: hostStatus: x%x, Info1(0xA8): x%x, Info2 (0xAC): x%x

DESCRIPTION: The firmware has interrupted the host with a firmware trap error.
SEVERITY: Error
LOG: LOG_INIT verbose
ACTION: Review HBAnyware diagnostic dump information.

FCP Log Messages (0701 - 0749)

lpfc_mes0701: 0701: Issue Abort Task Set to PathId: x%x, TargetId: x%x, Lun: x%x

DESCRIPTION: The driver has issued a task management command for the indicated SCSI device address.
SEVERITY: Warning
LOG: LOG_INIT verbose
ACTION: Review system configuration.

lpfc_mes0703: 0703: Issue LUN reset to PathId: x%x, TargetId: x%x, Lun: x%x, Did: x%x

DESCRIPTION: Storport is requesting a reset of the indicated LUN.
SEVERITY: Warning
LOG: LOG_INIT verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.

lpfc_mes0713: 0713: Issued Target Reset to PathId:%d, TargetId:%d, Did: x%x

DESCRIPTION: Storport detected that it needs to abort all I/O to a specific target. This results in login reset to the target in question.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
SEE ALSO: lpfc_mes0714.

lpfc_mes0714: 0714: Issued Bus Reset for PathId:%d

DESCRIPTION: Storport is requesting the driver to reset all targets on this HBA.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
SEE ALSO: lpfc_mes0713.

lpfc_mes0716: 0716: FCP Read Underrun, expected%d, residual%d

DESCRIPTION: FCP device provided less data than was requested.
SEVERITY: Supplement Information
LOG: LOG_FCP verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0730.

lpfc_mes0729: 0729: FCP command error: ulpStatus: x%x, ulpWord[4]: x%x, XRI: x%x, ulpWord[7]: x%x

DESCRIPTION: The specified device failed an I/O FCP command.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Check the state of the target in question.
REMARKS: lpfc_mes0730 is also recorded if it is a FCP Rsp error.

lpfc_mes0730: 0730: FCP response error: Flags: x%x, SCSI status: x%x, Residual:%d

DESCRIPTION: The FCP command failed with a response error.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Check the state of the target in question.
remark: lpfc_mes0716, lpfc_mes0734, lpfc_mes0736 or lpfc_mes0737 is also recorded for more details if the corresponding SEVERITY level is set.
SEE ALSO: lpfc_mes0729.

lpfc_mes0734: 0734: Read Check: fcp_parm: x%x, Residual x%x

DESCRIPTION: The issued FCP command returned a Read Check Error.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Check the state of the target in question.
SEE ALSO: lpfc_mes0730.

lpfc_mes0737: 0737: SCSI check condition, SenseKey x%x, ASC x%x, ASCQ x%x, SrbStatus: x%x

DESCRIPTION: The issued FCP command resulted in a Check Condition.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review SCSI error code values.
SEE ALSO: lpfc_mes0730.

0747: Target reset complete: PathId: x%x, TargetId: x%x, Did: x%x

DESCRIPTION: A target reset operation has completed.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
REMARK: See also Message 0713.

0748: Lun reset complete: PathId: x%x, TargetId: x%x, Lun: x%x

DESCRIPTION: A LUN reset operation has completed.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
REMARK: See also Message 0703.

0749: Abort task set complete: Did: x%x, SCSIId: x%x

DESCRIPTION: A task management has completed.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
REMARK: See also Message 0701.

Link Log Messages (1302 - 1306)

lpfc_mes1302: 1302: Invalid speed for this board:%d, forced link speed to auto

DESCRIPTION: The driver is re-initializing the link speed to auto-detect.
SEVERITY: Warning
LOG: LOG_LINK_EVENT verbose
ACTION: None required.

lpfc_mes1303: 1303: Link Up event: tag: x%x, link speed:%dG, topology (0 = Pt2Pt, 1 = AL):%d

DESCRIPTION: A link up event was received. It is also possible for multiple link events to be received together.
SEVERITY: Error
LOG: LOG_LINK_EVENT verbose
ACTION: If numerous link events are occurring, check physical connections to the FC network.
REMARKS: lpfc_mes1304 is recorded if Map Entries > 0 and corresponding mode and SEVERITY level is set.

lpfc_mes1305:1305: Link down even: tag x%x

DESCRIPTION: A link down event was received.
SEVERITY: Error
LOG: LOG_LINK_EVENT verbose
ACTION: If numerous link events are occurring, check physical connections to the FC network.

lpfc_mes1306: 1306: Link Down timeout

DESCRIPTION: The link was down for greater than the configuration parameter (HLinkTimeOut) seconds. All I/O associated with the devices on this link will be failed.
SEVERITY: Warning
LOG: LOG_LINK_EVENT verbose
ACTION: Check HBA cable/connection to FC network.

Tag Messages (1400 - 1401)

lpfc_mes1400 1400: Tag out of range: ContextIndex: x%x, MaxIndex: x%x, ulpCommand: x%x

DESCRIPTION: Firmware has generated an invalid response.
SEVERITY: Error
LOG: LOG_LINK_EVENT verbose
ACTION: Review hardware configuration. Contact Emulex Technical Support.

lpfc_mes1401 1401: Invalid tag: ContextIndex: x%x, ulpCommand: x%x

DESCRIPTION: Firmware has generated an invalid response.
SEVERITY: Error
LOG: LOG_LINK_EVENT verbose
ACTION: Review hardware configuration. Contact Emulex Technical Support.

NPIV Messages (1800 - 1899)

lpfc_mes1800 1800: NPIV FDISC failure VPI: x%x Error x%x Reason x%x

DESCRIPTION: Virtual Port fails on a FDISC to the switch with the error and reason listed.
SEVERITY: Error
LOG: LOG_NPIV verbose
ACTION: Check to ensure the switch supports NPIV.

lpfc_mes1801 1801: Memory allocation failure for NPIV port: x%x

DESCRIPTION: Fails to allocated the block of memory for the Virtual Port
SEVERITY: Error
LOG: LOG_NPIV verbose
ACTION: Check to ensure system has sufficient kernel memory.

lpfc_mes1802 1802: Exceeded the MAX NPIV port: x%x

DESCRIPTION: Exceeded the number of Virtual Port allows on the HBA.
SEVERITY: Error
LOG: LOG_NPIV verbose
ACTION: Reduce the number of Virtual Ports

lpfc_mes1803 1803: Virtual Port: x%x VPI:x%x successfully created

DESCRIPTION: Virtual Port ID is successfully created.
SEVERITY: Information
LOG: LOG_NPIV verbose
ACTION: None required

lpfc_mes1804 1804: Removing Virtual Port: x%x VPI:x%x

DESCRIPTION: Removing Virtual Port ID.
SEVERITY: Information
LOG: LOG_NPIV verbose
ACTION: None required

ELS Messages (1900 - 1999)

1900: x%x sends ELS_AUTH_CMD x%x with TID x%x

DESCRIPTION: An ELS_AUTH_CMD is sent.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational

1901: x%x sends ELS_AUTH_REJECT x%x x%x to x%x

DESCRIPTION: An ELS_AUTH_REJECT is sent.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational

1902: Receives x%x from x%x in state x%x

DESCRIPTION: Receives an ELS_AUTH_CMD.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational

1903: Receives ELS_AUTH_RJT x%x x%x

DESCRIPTION: Receives an ELS_AUTH_REJECT.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational

1904: Authentication ends for x%x with status x%x (%d %d)

DESCRIPTION: Authentication is done.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational

1905: Authentication policy change for local x%08x x%08x remote x%08x%08x

DESCRIPTION: Authentication policy has been changed.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational

Error Log

Viewing the Error Log

The system event log is a standard feature of Windows Server 2003.

To view the error LOG:

1. Open the Event Viewer window:
   - Click **Start>Programs>Administrative Tools>Event Viewer**

     or
   - Right-click on **My Computer**, **Manage** and **Event Viewer** in **Computer Management**.

The Event Viewer window is displayed.

2. Double-click any event with the source name ELXSTOR.
3. Examine the entry at offset 0x10 and Event ID 11.

Severity Scheme

When the Event Viewer is launched, there are three branches: Application, Security and System. All ELXSTOR error log entries are found under the System branch and all ELXSTOR error log entries have the Event Viewer severity level of "error".

- A severe error code indicates that the driver, firmware or host bus adapter (HBA) is behaving abnormally and user intervention is required to correct the problem.
- A malfunction error code indicates that there is a problem with the system, but user intervention is not required.
- A command error code indicates that an event has transpired, but does not require user intervention. An event may be problem-oriented, such as an invalid fabric command sub-type. An event may not be problem-oriented, such as exhausted retries on PLOGI or PDISC.

Related Driver Parameter: LogError

The LogError driver parameter determines the minimum severity level to enable entry of a logged error into the system.

- If set to 0 = all errors regardless of severity are logged.
- If set to 1 = severe, malfunction and command level errors are logged.
- If set to 2 = both severe and malfunction errors are logged.
- If set to 3 = only severe errors are logged.

Note: See the Configuration Section for instructions on how to set driver parameters.

Format of an Error Log Entry

An error log entry will take the form of an event.This event is described by:

- Date (date entry was logged)
- Source (elxstor)
- Time (time entry was logged)
- Category (none)
- Type (error)
- Event id (0)
- User (N/A)
- Computer (name of computer)

The relevant word from the elxstor point of view is at offset 0x10. Bits 0 - 7 of the word at offset 0x10 are the error code.

Error Codes Tables

Table 6: Severe Errors

Bits 0 -7	Interpretation
0x00	Failed to allocate PCB
0x01	Failed to allocate command ring
0x02	Failed to allocate response ring
0x03	Failed to allocate mailbox context
0x04	Read revision failed
0x05	Invalid adapter type
0x06	Invalid adapter type
0x07	Write of non-volatile parameters failed
0x08	Invalid link speed selection
0x09	Read configuration failed
0x0A	Set variable failed
0x0B	Configure port failed
0x0D	Configure ring 0 failed
0x0E	Configure ring 1 failed
0x0F	Configure ring 2 failed
0x10	Configure ring 3 failed
0x11	Initialize link failed
0x12	Port ready failed
0x13	Read revision failed
0x14	Invalid adapter type
0x15	Invalid adapter type
0x17	Set variable command failed
0x18	Configure port failed
0x19	Configure ring 0 failed

Table 6: Severe Errors (Continued)

Bits 0 -7	Interpretation
0x1A	Configure ring 1 failed
0x1B	Configure ring 2 failed
0x1C	Configure ring 3 failed
0x1E	Context pool initialization failure
0x1F	Context pool initialization failure
0x20	Context pool initialization failure
0x24	Firmware trap: fatal adapter error
0x25	Non-specific fatal adapter error (bits 8-31 will indicate type)
0x29	Recoverable adapter error: device has been auto-restarted
0x2A	Mailbox command time-out
0x2D	Invalid-Illegal response IOCB
0x2E	Invalid-response IOCB
0X2F	Invalid-response IOCB
0x30	Mailbox context allocation failure
0x34	Mailbox context allocation failure
0x35	Mailbox context allocation failure
0x37	Mailbox context allocation failure
0x3D	Mailbox context allocation failure
0x41	Mailbox context allocation failure
0x42	Mailbox context allocation failure
0x44	ELS FLOGI command context allocation failure
0x47	Mailbox context allocation failure
0x4D	Mailbox context allocation failure
0x51	Request to ADISC a non-existent node
0x52	ELS ADISC command context allocation failure
0x56	Mailbox context allocation failure
0x57	Mailbox context allocation failure
0x58	ELS LOGO command context allocation failure
0x5C	ELS PRLI command context allocation failure
0x5E	ELS RLIR command context allocation failure
0x64	Create XRI command context allocation failure
0x67	Name server command context allocation failure
0x6E	Close XRI command context allocation failure
0x6F	State change registration failure
0x70	ELS receive context allocation failure
0x72	ELS receive PLOGI context allocation failure
0x74	Mailbox context allocation failure
0x77	Mailbox context allocation failure

Table 6: Severe Errors (Continued)

Bits 0 -7	Interpretation
0x7A	ELS receive LOGO context allocation failure
0x7D	Mailbox context allocation failure
0x7E	Mailbox context allocation failure
0x7F	Mailbox context allocation failure
0x80	Mailbox context allocation failure
0x81	Mailbox context allocation failure
0x84	ELS FDISC context allocation failure
0x85	Mailbox context allocation failure
0x88	ELS PLOGI command context allocation failure
0x89	ELS RSCN registration command context allocation failure
0xA0	Port object construction failed
0xA4	Unsupported command type (command type in bits 8 - 31)
0xC0	Failed to allocate un-cached extension
0xC1	Port initialization failure
0xC2	Utility mailbox command timeout
0xC3	Fatal over-temperature condition
0xC4	Over-temperature warning condition
0xC5	Over-temperature warning condition alleviated
0xC6	Invalid response IOCB
0xC7	Initialization failed due to exceeding max driver instances (256)
0xC8	Initialization failed due to STORPORT.SYS revision level too low
0xEC	Failed to allocate authentication context

Table 7: Malfunction Errors

Bits 0 - 7	Interpretation
0x0C	Set variable failed
0x26	Spurious mailbox attention
0x31	Unrecognized mailbox completion command code
0x33	Invalid link state
0x36	Initialization command failed (status in bits 8 -31)
0x3B	Discovery error due to lack of resources (insufficient RPIs)
0x3E	Unable to create discovered node object
0x3F	Failed to issue ELS process login (PRLI) command
0x45	Retries exhausted to ELS FLOGI
0x47	Failed to issue UNREG_VPI
0x48	No exchange available for extended link service request (ELS) command
0x4C	Exhausted retries on ELS PLOGI
0x53	WWPN mismatch on ADISC response
0x54	WWNN mismatch on ADISC response

Table 7: Malfunction Errors (Continued)

Bits 0 - 7	Interpretation
0x55	Exhausted retries on ELS ADISC
0X59	Exhausted retries on ELS LOGO
0X5B	Attempted ELS PRLI non-existent node
0x5D	Exhausted retries on ELS PRLI
0x63	Attempt to issue command to fabric without a valid fabric login
0x65	Error issuing fabric command (status in bits 8 - 31)
0x66	Invalid fabric command type
0x6A	Invalid fabric command sub-type
0x6C	Name server response error (status in bits 8 - 31)
0x6D	Name server response error (status in bits 8 - 31)
0x6F	SCN registration failed
0x71	Received unsupported ELS command (type in bits 8 - 31)
0x76	Invalid format for received PRLI
0x83	Node object-allocation failure
0x9A	SCSI command error (SCSI status in bits 8 - 31)
0xA2	Generalized command context allocation failure
0xA8	Read check error (parameter in bits 8 -31)
0xAA	Node time-out (DID in bits 8 -31)

Table 8: Command Errors

Bits 0 - 7	Interpretation
0x32	Insufficient context for attention handling
0x49	ELS command error (status in bits 8 - 31)
0x4A	ELS command failure
0x90	ELS FDISC completed (NPort IDin bits 24 -31)
0x91	ELS LOGO completed (NPort ID in bits 8 - 31)
0x92	ELS LOGO received from fabric
0x93	ELS FLOGI completed (NPort ID in bits 8 -31)
0x94	ELS PLOGI completed (NPort ID in bits 8 -31)
0x95	Discovered SCSI target (NPort ID in bits 8 -31)
0x96	ELS RSCN received (count in bits 8 -15, vpi in bits 24 - 31)
0x97	Assigned SCSI address to discovered target (address in bits 8 - 31)
0x98	Name server response (count in bits 8 - 31)
0x9B	SCSI check condition (sense codes in bits 8 - 31)
0xA3	Local error on FCP command completion (status in bits 8 - 31)
0xA6	Data over-run
0xA7	Non-specific FCP error (info in bits 8 - 31)
0xA9	Local error (status in bits 8 - 31)
0xAB	Pass-through command error (status in bits 8 - 31)

Table 8: Command Errors (Continued)

Bits 0 - 7	Interpretation
0xAC	Local error on report LUN completion (status in bits 8 -31)

Table 9: Event Indications

Bits 0 - 7	Interpretation
0x21	Port re-initialization complete: now off-line
0x22	Port shutdown complete
0x23	Port re-initialization complete: now on-line
0xA5	Data under-run (residual in bits 8 - 31)
0xD0	NPIV Virtual Port creation success (Virtual Port Did in bits 8 - 31)
0xD1	NPIV Virtual Port creation failed (Virtual Port Index in bits 8 - 31)
0xD2	NPIV Virtual Port FDISC failed (Virtual Port index in bits 8 - 31)
0xD3	NPIV Virtual Port memory allocation failed (Virtual Port index in bits 8 - 31)
0xD4	Exceeded maximum Virtual Port supported (Virtual Port index in bits 8 - 31)
0xD5	NPIV Virtual Port removal (Virtual Port Did in bits 8 - 31)
0xE0	Authenticated successfully (remote Did in bits 8 - 31)
0xE1	Failed to authenticate (remote Did in bits 8 - 31)
0xE2	Authentication not supported (remote Did in bits 8 - 31)
0xE3	Authenticated ELS command timeout (remote Did in bits 8 - 31)
0xE4	Authentication transaction timeout (remote Did in bits 8 -31)
0xE5	LS_RJT other than Logical Busy received for Authentication transaction (remote Did in bits 8 - 31)
0xE6	LS_RJT Logical Busy received for Authentication transaction (remote Did in bits 8 - 31)
0xE7	Received Authentication Reject other than Restart (remote Did in bits 8 -31)
0xE8	Received Authentication Reject Restart (remote Did in bits 8 -31)
0xE9	Received Authentication Negotiate (remote Did in bits 8 -31)
0xEA	Authenticating spurious traffic (remote Did in bits 8 -31)
0xEB	Authentication policy has been changed (remote Did in bits 8 -31)