EMS Hardware Monitors User's Guide

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About This Manual

This guide is intended for use by system administrators and others involved in managing HP-UX system hardware resources. It describes the installation and use of (EMS) Hardware Monitors—an important tool in managing the operation and health of system hardware resources.

The book is organized as follows:

- Chapter 1, “Introduction,” provides a foundation for understanding what the hardware monitors are and how they work. This material will help you use the hardware event monitors efficiently.
- Chapter 2, “Installing and Using Monitors,” describes the procedures for creating and managing monitoring requests.
- Chapter 3, “Detailed Description,” gives a detailed picture of the components involved in hardware monitoring, their interaction, and the files involved.
- Chapter 4, “Using the Peripheral Status Monitor,”covers the Peripheral Status Monitor (PSM), which serves as the interface between the event-driven hardware event monitors and MC/ServiceGuard.
- Chapter 5, “Hardware Monitor Configuration Files,” describes how to control the operation of hardware monitors by modifying the configuration files.
- Chapter 6, “Special Procedures,” describes monitor-specific tasks.

NOTE The information previously contained in the chapter titled “Monitor Data Sheets,” has been moved to the Web at `http://docs.hp.com/hpux/onlinedocs/diag/ems/emd_summ.htm`.

An HP-UX man page is available for each monitor. To access the man page, type:
man *monitorname*
where *monitorname* is the executable file listed in the data sheet.

Typographical Conventions

This guide uses the following typographical conventions:

NOTE Notes contain important information.

CAUTION Caution messages indicate procedures which, if not observed, could result in damage to your equipment or loss of your data.

WARNING **Warning messages indicate procedures or practices which, if not observed, could result in personal injury.**

Supporting Documentation

The following documentation contains information related to the installation and use of the hardware event monitors:

- *Support Plus: Diagnostics User's Guide* - provides information on installing the EMS Hardware Monitors

- *Managing MC/ServiceGuard* (B3936-90024) - provides information on creating package dependencies for hardware resources
- *Using EMS HA Monitors* (B5735-90001) - provides detailed information on using EMS to create monitoring requests.

  Note: This manual pertains to High Availability (HA) Monitors rather than to the EMS Hardware Monitors.

Related Web sites

The following Web sites provide information on hardware monitoring.

- `http://docs.hp.com/en/diag.html`—the online library for information about EMS Hardware Monitors
- `http://docs.hp.com/en/onlinedocs/diag/ems/emd_summ.htm`—Data sheets for the hardware event monitors

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1 Introduction

This chapter introduces the EMS Hardware Monitors. The topics discussed in this chapter include the following:

- What is hardware monitoring?
- How does hardware monitoring work?
- Benefits of hardware monitoring
- Products supported by hardware monitoring
- Tips for hardware monitoring
- Hardware monitoring terms

NOTE **Do I Really Need to Read This Chapter?**

Although it is not essential that you read this material before using the hardware monitors, it will help you understand how monitoring works, which in turn should help you use it effectively. New users are strongly encouraged to read through the general overview material before proceeding to Chapter 2, “Installing and Using Monitors”.

Hardware Monitoring Overview

What is Hardware Monitoring?

Hardware monitoring is the process of watching a hardware resource (such as a disk) for the occurrence of any unusual activity, called an event. When an event occurs, it is reported using a variety of notification methods (such as email). Event detection and notification are all handled automatically with minimal involvement on your part.

To achieve a high level of system reliability and availability, it is essential that you know when any system resource is experiencing a problem. Hardware monitoring gives you the ability to detect problems with your system hardware resources. By providing immediate detection and notification, hardware monitoring allows you to quickly identify and correct problems—often before they impact system operation.

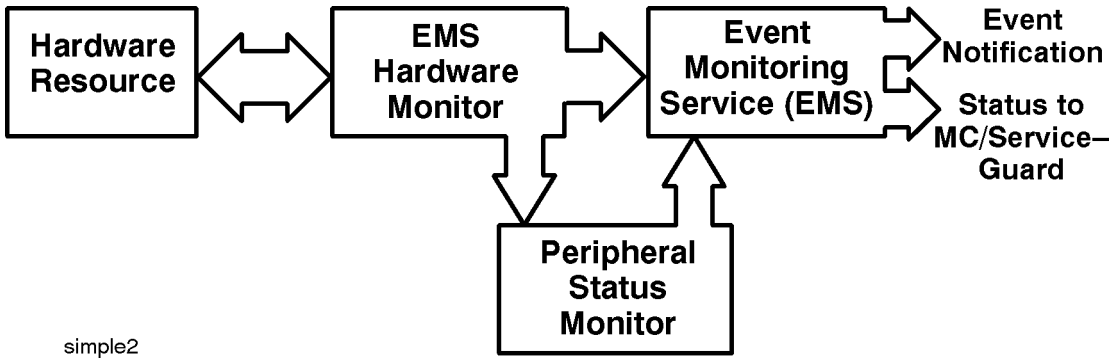
Another important feature of hardware monitoring is its integration with applications responsible for maintaining system availability, such as MC/ServiceGuard. It is vital that these applications be alerted to hardware problems immediately so they can take the necessary action to avoid system interruption. Hardware monitoring is easily integrated with MC/ServiceGuard, and the necessary notification methods are provided for communication with other applications such as HP OpenView.

Hardware monitoring is designed to provide a high level of protection against system hardware failure with minimal impact on system performance. By using hardware monitoring, you can virtually eliminate undetected hardware failures that could interrupt system operation or cause data loss.

How Does Hardware Monitoring Work?

The following figure shows the basic components involved in hardware monitoring.

Figure 1-1 Components Involved in Hardware Monitoring



The typical hardware monitoring process works as follows:

1. While monitoring its hardware resources, the hardware event monitor detects some type of abnormal behavior on one of the resources.
2. The hardware event monitor creates the appropriate event message, which includes suggested corrective action, and passes it to the Event Monitoring Service (EMS).
3. EMS sends the event message to the system administrator using the notification method specified in the monitoring request.
4. The system administrator (or Hewlett-Packard service provider) receives the messages, corrects the problem, and returns the hardware to its normal operating condition.
5. If the PSM has been properly configured, events are also processed by the PSM. The PSM changes the device status to DOWN if the event is serious enough. The change in device status is passed to EMS, which in turn alerts MC/ServiceGuard. The DOWN status will cause MC/ServiceGuard to failover any package associated with the failed hardware resource.

NOTE **The Difference Between Hardware Event Monitoring and Hardware Status Monitoring**

Hardware event monitoring is the detection of events experienced by a hardware resource. It is the task of the EMS Hardware Monitors to detect hardware events. Events are temporary in the sense that the monitor detects them but does not remember them. Of course the event itself may not be temporary—a failed disk will likely remain failed until it is replaced.

Hardware status monitoring is an extension of event monitoring that converts an event to a change in device status. This conversion, performed by the PSM, provides a mechanism for remembering the occurrence of an event by storing the resultant status. This persistence provides compatibility with applications such as MC/ServiceGuard, which require a change in device status to manage high availability packages.

Benefits of Hardware Monitoring

Hardware monitoring provides the following benefits:

- Reduces system downtime by detecting hardware failures when they occur, allowing you to quickly identify and correct problems.
- Integrates with MC/ServiceGuard and other applications responsible for maintaining system availability. These applications can now add many hardware resources to the components they monitor.
- Minimizes the time required to isolate and repair failures through detailed messages describing what the problem is and how to fix it.
- Includes a default monitoring configuration that offers immediate protection for your system hardware without any intervention on your part after monitoring is enabled.
- Provides a common tool for monitoring a wide variety of system hardware resources.
- Offers a variety of notification methods to alert you when a problem occurs. You no longer need to check the system console to determine if something has gone wrong.
- Requires minimal maintenance once installed and configured. New hardware resources added to the system are automatically included in the monitoring structure.

Products Supported by Hardware Monitors

EMS Hardware Monitors are provided for a wide range of system hardware resources. The following list identifies the types of hardware supported by monitors at the time of publication. A detailed list of the specific hardware products supported by each hardware monitor is included in `http://docs.hp.com/en/diag/` - the online library for information about EMS Hardware Monitors (look for “Supported Products” under EMS Hardware Monitors).

- HP disk arrays, including AutoRAID Disk Arrays and High Availability Disk Arrays
- HP disk devices, including CD-ROM drives and MO drives
- HP SCSI tape devices, including many DLT libraries and autochangers
- HP Fibre Channel SCSI Multiplexer
- HP Fibre Channel Adapters
- HP Fibre Channel Adapter (A5158)
- High Availability Storage Systems
- HP Fibre Channel Arbitrated Loop Hubs
- HP Fibre Channel Switch
- System memory
- Core hardware
- Low Priority Machine Checks (LPMCs)
- HP-UX kernel resources
- HP Fibre Channel disk array FC60
- SCSI1, SCSI2, SCSI3 interface cards
- System information
- HP UPSs (Uninterruptible Power Systems)
- Devices supported by HP device management software (Remote Monitor)

NOTE **Will new products be supported?**

Hewlett-Packard's strategy is to provide monitoring for all critical system hardware resources, including new products. For the latest information on what products are supported by EMS Hardware Monitors, visit the hardware monitoring web pages available at `www.docs.hp.com/en/diag/` - the online library for information about EMS Hardware Monitors (look for "Supported Products" under EMS Hardware Monitors).

Tips for Hardware Monitoring

Here are some tips for using hardware monitoring.

- ✓ **Keep hardware monitoring enabled to protect your system from undetected failures.** Hardware monitoring is an important tool for maintaining high-availability on your system. In a high-availability environment, the failure of a hardware resource makes the system vulnerable to another failure. Until the failed hardware is repaired, the backup hardware resource represents a single-point of failure. Without hardware monitoring you may not be aware of the failure. But if you are using hardware monitoring, you are alerted to the failure. This allows you to repair the failure and restore high-availability as quickly as possible.
- ✓ **Integrate the PSM into your MC/ServiceGuard strategy.** An important feature of hardware monitoring is its ability to communicate with applications responsible for maintaining system availability, such as MC/ServiceGuard. The PSM allows you to integrate hardware monitoring into MC/ServiceGuard. The PSM gives you the ability to failover a package based on an event detected by hardware monitoring. If you are using MC/ServiceGuard, you should consider using the PSM to include your system hardware resources in the MC/ServiceGuard strategy. In addition, the necessary notification methods are provided for communicating with network management application such as HP OpenView.
- ✓ **Utilize the many notification methods available.** The notification methods provided by hardware monitoring provide a great deal of flexibility in designing a strategy to keep you informed of how well your system hardware is working. The default monitoring configuration was selected to provide a variety of notification for all supported hardware resources. As you become familiar with hardware monitoring, you may want to customize the monitoring to meet your individual requirements.
- ✓ **Use e-mail and/or text file notification methods for all your requests.** Both of these methods, which are included in the default monitoring, receive the entire content of the message so you can read it immediately. Methods such as console and syslog alert you to the occurrence of an event but do not deliver the entire message. You are required to retrieve the message using the `resdata` utility, which requires an additional step.
- ✓ **Use the `All monitors' option when creating a monitoring request.** This option enables monitoring request to all monitors. It ensures any new class of hardware resource added to your system is automatically monitored. This means that new hardware is protected from undetected hardware failure with no effort on your part.
- ✓ **Easily replicate your hardware monitoring on all your systems.** Once you have implemented a hardware monitoring strategy on one of your systems, you can replicate that same monitoring on other systems. Simply copy all of the hardware monitor configuration files to each system that will use the same monitoring. The monitor configuration files are found at `/var/stm/config/tools/monitor`. Of course, you must have installed hardware event monitoring on each system before you copy the configuration files to it. Be sure to enable monitoring on all systems.

Hardware Monitoring Terms

The following terms are used throughout this guide. Understanding them is important when learning how the hardware event monitors work and how to use them effectively.

Table 1-1 Hardware Monitoring Terms

Term	Definition
Asynchronous event detection	The ability to detect an event at the time it occurs. When an event occurs the monitor is immediately aware of it. This method provides quicker notification response than polling.
Default monitoring request	The default monitoring configuration created when the EMS Hardware Monitors are installed. The default requests ensure that a complete level of protection is automatically provided for all supported hardware resources.
Event Monitoring Service (EMS)	The application framework used for monitoring system resources on HP-UX 10.20 and 11.x. EMS Hardware Monitors use the EMS framework for reporting events and creating PSM monitoring requests. The EMS framework is also used by EMS High Availability Monitors.
EMS Hardware Monitors	The monitors described in this manual. They monitor hardware resources such as I/O devices (disk arrays, tape drives, etc.), interface cards, and memory. They are distributed on the Support Plus Media and are managed with the Hardware Monitoring Request Manager (monconfig).
EMS High Availability (HA) Monitors	These monitors are different from EMS Hardware Monitors and are not described in this manual. They monitor disk resources, cluster resources, network resources and system resources. They are designed for a high availability environment and are available at additional cost. For more information, refer to *Using EMS HA Monitors*, which is available at `http://docs.hp.com/en/ha.html`.
Event severity level	Each event that occurs within the hardware is assigned a severity level, which reflects the impact the event may have on system operation. The severity levels provide the mechanism for directing event notification. For example, you may choose a notification method for critical events that will alert you immediately to their occurrence, and direct less important events to a log file for examination at your convenience. Also, when used with MC/ServiceGuard to determine failover criteria, severe and critical events cause failover.
Hardware event	Any unusual or notable activity experienced by a hardware resource. For example, a disk drive that is not responding, or a tape drive that does not have a tape loaded. When any such activity occurs, the occurrence is reported as an event to the event monitor.

Table 1-1 Hardware Monitoring Terms (Continued)

Term	Definition
Hardware event monitor	A monitor daemon that gathers information on the operational status of hardware resources. Each monitor is responsible for watching a specific group or type of hardware resources. For example, the tape monitor handles all tape devices on the system. The monitor may use polling or asynchronous event detection for tracking events. Unlike a status monitor, an event monitor does not "remember" the occurrence of an event. It simply detects and reports the event. An event can be converted into a more permanent status condition using the PSM.
Hardware resource	A hardware device used in system operation. Resources supported by hardware monitoring include mass storage devices such as disks and tapes, connectivity devices such as hubs and multiplexors, and device adapters.
MC/ServiceGuard	Hewlett-Packard's application for creating and managing High Availability clusters of HP 9000 Series 800 computers. A High Availability computer system allows application services to continue in spite of a hardware or software failure. Hardware monitoring integrates with MC/ServiceGuard to ensure that hardware problems are detected and reported immediately, allowing MC/ServiceGuard to take the necessary action to maintain system availability. MC/ServiceGuard is available at additional cost
Monitoring request	A group of settings that define how events for a specific monitor are handled by EMS. A monitoring request identifies the severity levels of interest and the type of notification method to use when an event occurs. A monitoring request is applied to each hardware device (or instance) supported by the monitor. Monitoring requests are created for hardware events using the Hardware Monitoring Request Manager. Monitoring requests are created for changes in hardware status using the EMS GUI.
Multiple-view	As of the HP-UX 11.00/10.20 June 2000 release (IPR 0006), certain monitors will allow event reporting to be tailored for different targets (clients). This "multiple-view" ("Predictive-enabled") feature will be added to all hardware monitors in future releases. Previously, hardware monitors generated events the same way for all targets. The problem is that different targets, such as HP Support Applications, may have different requirements for events.

Table 1-1 Hardware Monitoring Terms (Continued)

Term	Definition
Peripheral Status Monitor (PSM)	Included with the hardware event monitors, the PSM is a monitor daemon that acts as a hardware status monitor by converting events to changes in hardware resource status. This provides compatibility with MC/ServiceGuard, which uses changes in status to manage cluster resources. Through the EMS GUI, the PSM is also used to create hardware status monitoring requests.
Polling	The process of connecting to a hardware resource at regular intervals to determine its status. Any events that occur between polling intervals will not be detected until the next poll, unless the monitor supports asynchronous event monitoring.
Predictive-enabled	See “multiple-view.” This feature enables hardware monitors to work with HP Support Applications.
Resource instance	A specific hardware device. The resource instance is the last element of the resource path and is typically the hardware path to the resource (e.g., 10_12_5.0.0), but it may also be a product ID as in the case of AutoRAID disk arrays. There may be multiple instances for a monitor, each one representing a unique hardware device for which the monitor is responsible.
Resource path	Hardware event monitors are organized into classes (and subclasses) for creating monitoring requests. These classes identify the unique path to each hardware resource supported by the monitor. Two similar resource paths exist for each hardware resource—an event path used for creating event monitoring requests, and a status path used for creating PSM monitoring requests.

2 Installing and Using Monitors

This chapter instructs you how to use the EMS Hardware Monitors to manage your hardware resources. The topics discussed in this chapter include:

- An overview of the steps involved
- Installing EMS Hardware Monitors
- Adding and managing monitor requests
- Disabling and enabling EMS Hardware Monitors

NOTE You don't need to completely understand the terms and concepts to begin protecting your system with EMS Hardware Monitors by following the procedures in this chapter. If a term or concept puzzles you, refer to Chapter 1, “Introduction,” or to Chapter 3, “Detailed Description.”

The Steps Involved

The steps involved in installing and configuring hardware monitoring are shown in Figure 2-1 on page 27. Each step is described in detail in this chapter on the page indicated. Installation of Support Tools is necessary if you have Diagnostic/IPR Media release earlier than the June 1999 release only. With HP-UX 11i, the Support Tools are automatically installed when the OS is installed.

Step 1: Install the Support Tools from the most current copy of Support Plus Media you can find. You can also download this package over the Web. See “Installing EMS Hardware Monitors”. This step is necessary if you have Diagnostic/IPR Media release earlier than the June 1999 release only.

Step 2: Examine the list of supported products to see if any of your devices has special requirements in order to be monitored. For example, if monitoring FC-AL hubs, edit the file: `/var/stm/config/tools/monitor/dm_fc_hub`. See “Fibre Channel Arbitrated Loop Hub Monitor”.

Step 3: Enable hardware event monitoring. See “Enabling Hardware Event Monitoring”. This step is necessary if you have Diagnostic/IPR Media release earlier than the June 1999 release only.

Step 4: Determine whether default monitoring requests are adequate. See “Viewing Current Monitoring Requests”.

Step 5: Add or modify monitoring requests as necessary. See “Adding a Monitoring Request” and “Modifying Monitoring Requests”.

Step 6: If desired, verify monitor operation (recommended, but optional). See “Verifying Hardware Event Monitoring”.

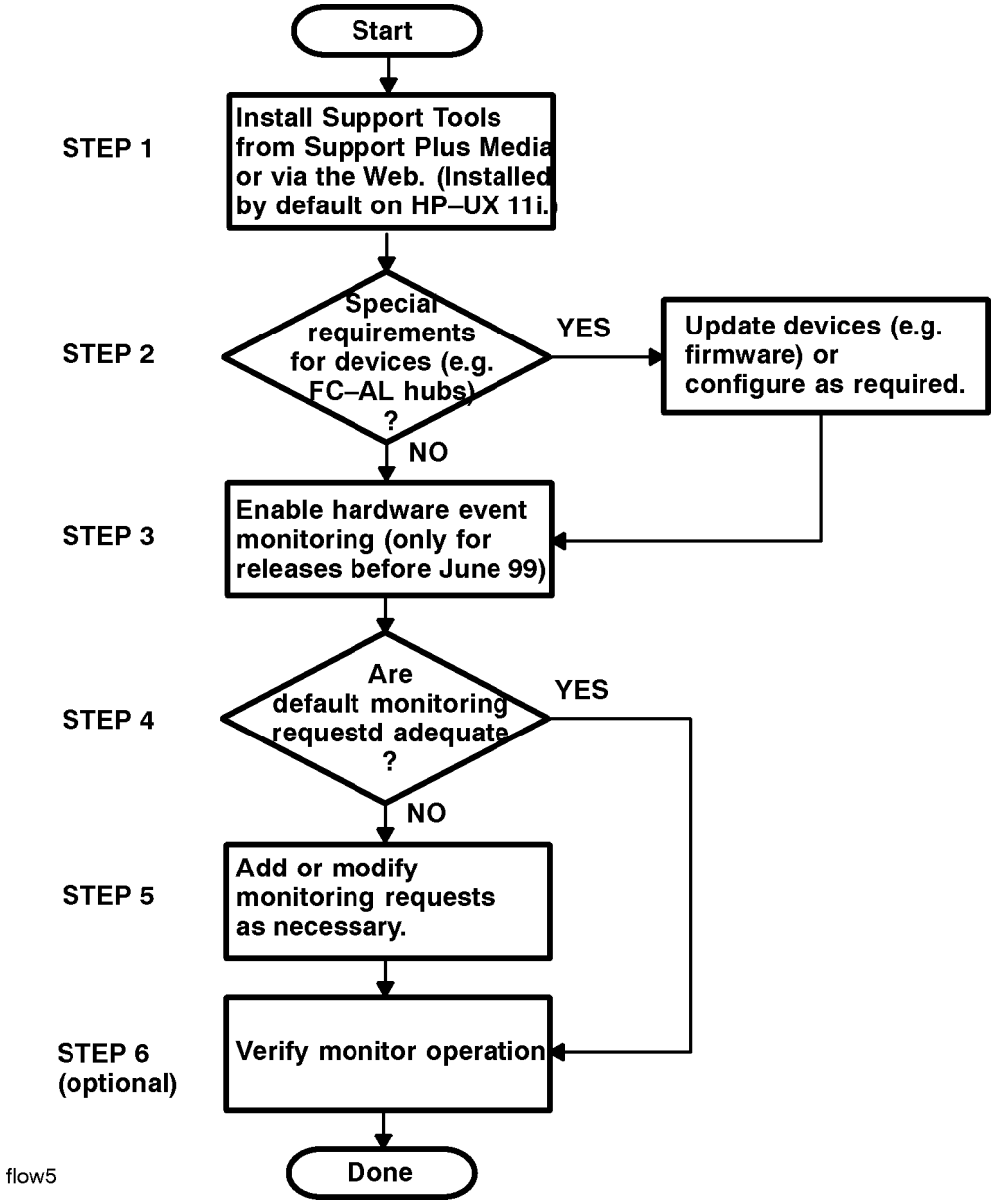
NOTE **How Long Will it Take to Get Hardware Monitoring Working? (For Diagnostic/IPR Media released earlier than the June 1999 release only.)**

You can get hardware monitoring installed and working in minutes. Once the software is installed, you simply need to run the Hardware Monitoring Request Manager and enable monitoring. The default hardware monitoring configuration should meet your monitoring requirements without any changes or modifications. If you find that the default monitoring should be customized, you can always return later and add or modify monitoring requests as needed.

NOTE **If I'm Already Using EMS HA Monitors, Can I Also Use the EMS GUI to Manage Hardware Monitoring?**

For the most part, no. Hardware event monitoring is managed using the Hardware Monitoring Request Manager, which serves the same function the EMS GUI serves for the EMS HA monitors. The only portion of hardware monitoring that is managed using the EMS GUI is status monitoring done using the PSM described in Chapter 4, “Using the Peripheral Status Monitor.”

Figure 2-1 The Steps for Installing and Configuring Hardware Monitoring



Installing EMS Hardware Monitors

The EMS Hardware Monitors software is distributed with the Support Tools (diagnostics). All the necessary files for hardware monitoring are installed automatically when the Support Tools are installed. There are several different ways that the Support Tools are installed:

- The Support Plus Media: installing the OnlineDiag depot from the Support Plus Media using `swinstall`.
- HP Software Depot website: downloading the “Support Tools for the HP 9000” in the “Enhancement Releases” product category, then using `swinstall` to install the OnlineDiag depot.
- Automatic: with HP-UX 11i, the Support Tools are automatically installed from the OE CD-ROM when the operating system is installed.

Complete instructions for installing STM are contained in Chapter 5 of the *Support Plus: Diagnostics User's Guide*.

The following software components are installed for hardware monitoring:

- All hardware event monitors
- Monitor configuration files
- Monitoring Request Manager
- EMS framework, including the EMS graphical interface

All EMS Hardware Monitors on the CD-ROM will be installed on your system, but only those that support hardware resources you are using will be active. If you add a new hardware resource to your system that uses an installed monitor, the monitor will be launched when the system is restarted or following the execution of the IOSCAN utility (which performs a real/hard ioscan).

NOTE Reinstalling or upgrading the STM software will erase the current PSM configuration. Any MC/ServiceGuard package dependencies or EMS monitoring requests you have created with the PSM will be lost. Before reinstalling the STM software, record the current PSM configuration so you can easily recreate it after the software has been installed. Or you can comment out the PSM dependencies in the ServiceGuard configuration files, then re-enable them after the STM software has been installed.

IOSCAN Utility

When you execute the IOSCAN utility, a “real/hard” ioscan is performed. The utility performs a scan of your system hardware, gathering the most-current information.

Conversely, ‘ioscan -k’ is used by hardware monitors and diagnostics to obtain their information about configured devices. The data returned by ‘ioscan -k’ is only as accurate as the last system reboot, or when a “real/hard” ioscan is executed. This means that if a device or component is added to / removed from the system, a “real/hard” ioscan should be executed in order to ensure an updated IOSCAN table in the kernel for use by the hardware monitors and diagnostics. Otherwise, the hardware monitors and diagnostics will operate on a stale, inaccurate picture of the system’s configuration.

Supported System Configuration

To use the hardware event monitors, your system must meet the following requirements:

- HP 9000 Series 700 or 800 Computer
- HP-UX 10.20 or 11.x (Hardware event monitoring is not currently available on the special high security systems, HP-UX 10.26 (TOS) and HP-UX 11.04 (VVOS).
- Support Plus Media, the more current the better. The hardware event monitors were first distributed in the HP-UX 10.20/11.00 February 1999 release (IPR 9902). Before the September 1999 release, the Support Plus Media was called the Diagnostic/IPR Media.

  Rather than use the Support Plus Media, you can download the Support Tools (including STM and the hardware event monitors) over the Web. See Chapter 5 of the *Support Plus: Diagnostics User's Guide* for more information
- If you are using MC/ServiceGuard (optional), you must have version A.10.11 on HP-UX 10.20, or version A.11.04 for HP-UX 11.x.

Removing EMS Hardware Monitors

The hardware monitoring software can be removed using the `swremove` utility. Run `swremove` and select the `OnlineDiag` bundle. This will remove the hardware monitoring software components and the STM software components.

Checking for Special Requirements

Some devices have special requirements in order to be monitored. Examine the tables of supported products below to see if any of your devices have special requirements.

Table 2-1 Disk Arrays

Product	Model/Product Number	Special Requirements
HP AutoRAID Disk Array Supported by: AutoRAID Disk Array Monitor	12H 12	Requires the following ARMServer versions: HP-UX 10.XX (PHCO_23261); HP-UX 11.00 (PHCO_23262); HP-UX 11.11 (Patch PHCO_23263)
HP High Availability Disk Array Supported by: High-Availability Disk Array Monitor	30/FC 20 10	None
HP Fast/Wide SCSI Disk Array Supported by: Fast/Wide SCSI Disk Array Monitor	C243XHA	None
HP Fibre Channel High Availability Disk Array (Model 60/FC) Supported by Disk Array FC60 Monitor	HP SureStore E Disk Array FC60	HP-UX 10.20 (PHCO_26822); HP-UX 11.00 (PHCO_26823); HP-UX 11.11 (PHCO_26824)
HP Storage Works Modular SAN array 1000 Supported by: HP Storage Works Modular SAN array 1000 Monitor	HP Storage Works Modular SAN array 1000	None

Table 2-2 Disk Products

Product	Model/Product Number	Special Requirements
All disks bound to the sdisk and disc30 drivers and not under the control of another event monitor (such as a disk array monitor). Hitachi XP128, XP256, XP512 and XP1024 drives and EMC Symetrix drives are not supported, since these drives have their own monitoring. Supported by: Disk Monitor	NA	None

Important: HP Storage Works SDLT 160/320 GB Tape Drive and the HP Ultrium 460 External Tape Drive are not supported by the Online Diagnostics product. Some STM tools may function but these tools are not supported. The diagnostics tools and utilities that support these devices are HP Storage Works Library and Tape Tools (L&TT). These tools can be downloaded free of cost from the web site `http://www.hp.com/support/tapetools`.

This monitor should be disabled while taking a backup since EMS polling can interfere with the backup process.

Tape products are monitored on releases prior to HP-UX 11i v2 May 2005 only. However, they are not monitored in the current release.

Table 2-3 Tape Products (monitored by SCSI Tape Devices Monitor)

Product	Model/Product Number	Special Requirements
DDS-2 Autoloader	A3400A	None
DDS-3 Autoloader	A3716A	None
DDS-4 Autoloader	C6370A, C6371A	March 00 Release
DLT4000 4/48 Library; HP-UX; Differential SCSI	A3544A	None
DLT4000 2/48 Library; HP-UX; Differential SCSI	A3545A	None
DLT4000 2/28 Library; HP-UX; Differential SCSI	A3546A	None
DLT 4000 and 7000; 2/28; Drives Differential; Robotics SE/Diff	A4850A	None
DLT 4000 & 7000; 4/48: Drives Differential; Robotics SE/Diff	A4855A	None

Table 2-3 Tape Products (monitored by SCSI Tape Devices Monitor) (Continued)

Product	Model/Product Number	Special Requirements
DLT 4000 and 7000; 15 slot; Deskside/Rack; Differential	A4851A	None
DLT 4000 and 7000; 588 slot; Drives Diff; Robotics SE	A4845A	None
DLT 4000 and 7000; 100 slot; Drives Diff; Robotics SE	A4846A	None
DLT 4000 and 7000; 30 slot; Differential	A4853A	None
DLT7000 8-slot Library	A5501A	March 00 Release
DLT8000 8-slot Library	A1375A	March 00 Release
DLT8000 20-slot Library	A5583A,A5584A, A4680AZ, A4680AHP, A4681AHP	March 00 Release
DLT8000 40-slot Library	A5585A, A5586A, A4682AZ, A4682AHP, A4683AHP	March 00 Release
DLT8000 60-slot Library	A5587A, A5588A, A4684AZ, A4684AHP, A4685AHP	March 00 Release
DLT8000 100-slot Library	A4665A, A4666A	June 00 Release
DLT8000 120-slot Library	A4667A, A4668A	June 00 Release
DLT8000 140-slot Library	A4669A, A4670A	June 00 Release
DLT8000 700-slot Library	A5597A	March 00 Release
DLT8000 180-slot Library	A5617A	March 00 Release

In addition to the above products, the SCSI Tape Devices Monitor supports all SCSI tape resources bound to the PCI tape driver.

SCSI tape resources bound to tape2 - NIO (HP-PB) tape driver and stape - GSC (HSC) tape driver are not supported on HP-UX 11i v2 May 2005 release.

The SCSI tape devices monitor also supports the following tape libraries and autoloaders:
DDS-2 Autoloader
DDS-3 Autoloader
DLT 4000 & 7000; HP Surestore Tape Library Model 2/28
DLT 4000 & 7000; HP Surestore Tape Library Model 4/48
DLT 4000 & 7000; 588 slot; Drives Diff; Robotics SE

DLT 4000 & 7000; 100 slot; Drives Diff; Robotics SE
DLT 4000 & 7000; 30 slot; Differential

As of the March 2000 release (IPR0003), the monitor also supports the following devices:
DDS-4 Autoloader
DLT7000 HP Surestore Tape Autoloader Model 1/9
DLT8000 HP Surestore Tape Autoloader Model 1/9
DLT 8000 HP Surestore Tape Library Model 2/20
DLT8000 HP Surestore Tape Library Model 4/40
DLT8000 HP Surestore Tape Library Model 6/60
DLT8000 HP Surestore Tape Library Model 20/700
DLT8000 HP Surestore Tape Library Model 10/180

As of the June 2000 release (IPR0006), the monitor also supports the following devices:
DLT8000 100-slot, 120-slot, 140-slot Library

As of the September 2000 release (IPR0009), the monitor also supports the following devices:
Ultrium HP Surestore Tape Library Model 20/700
Ultrium HP Surestore Tape Library Model 10/180

As of the September 2002 release (HWE0209), the monitor also supports the following devices:
Ultrium 20, 40, 60, 100, 120, and 140-slot Library
Ultrium HP Surestore Tape Autoloader Model 1/9

Table 2-4 High Availability Storage Systems

Product	Model/Product Number	Special Requirements
HP High Availability Storage System Supported by: High-Availability Storage System Monitor	1010D	None
HP Surestore E Disk System Supported by: High-Availability Storage System Monitor	SC10	None
HP Surestore Disk System Supported by: High-Availability Storage System Monitor	2300	None
HP Surestore Disk System Supported by: High-Availability Storage System Monitor	2405	None

Table 2-5 Fibre Channel SCSI Multiplexers

Product	Model/Product Number	Special Requirements
HP Fibre Channel SCSI Multiplexer Supported by: Fibre Channel SCSI Multiplexer Monitor	A3308A	Firmware version 3840

Table 2-6 Fibre Channel Adapters

Product	Model/Product Number	Special Requirements
HP Fibre Mass Storage Channel Adapters Supported by: Fibre Channel Mass Storage Channel Adapter	A3404A A3591A A3636A A3740A	The following driver revisions are required: B.10.20 TFC plus Dart40; B.11.00 release IPR9808 (Rocklin version)

Fibre Channel Mass Storage Channel Adapter
 	
Supported by: A5158A Fibre Channel Mass Storage Channel Adapter (dm_TL_adapter)
	A5158A
	A6684A
	A6795A
		B.11.00 Tachlite driver (td) Dart 48
		
		B.11.00 release IPR 0003 or later
		
		B.10.20 release June 2001 or later
		
		Please see the following web sites for current product updates/information and the latest information on the driver and STM versions required for the Fibre Channel host bus adapters:
		For product support information:
		`http://itrc.hp.com`
		For documentation:
		`http://docs.hp.com`

Table 2-7 Fibre Channel Arbitrated Loop (FC-AL) Hub

Product	Model/Product Number	Special Requirements
HP Fibre Channel Arbitrated Loop Hubs Supported by: Fibre Channel Arbitrated Loop Hub Monitor	A3724A A4839A	The FC-AL Hub monitor requires: Device Firmware revisions: • Device Agent Firmware revision 2.14 or greater • Hub Controller Firmware revision 3.06 or greater Firmware and installation instructions are available at `http://www.software.hp.com` C++ runtime support patches: • 10.20 PHSS_22354 (has a dependency: PHSS_17225) • 11.00 PHSS_32574 Before using the hub monitor, edit the monitor configuration file (/var/stm/config/tools/monitor/dm_fc_hub.cfg) to indicate what hubs will be monitored. See “Fibre Channel Arbitrated Loop Hub Monitor” on page 128.

Table 2-8 Fibre Channel Switch

Product	Model/Product Number	Special Requirements
HP Fibre Channel Switch Supported by: Fibre Channel Switch Monitor	A5223A A5224A A5625A A7347A	The FC Switch monitor requires: C++ runtime support patches: • 10.20 PHSS_22354 (has a dependency: PHSS_17225) • 11.00 PHSS_32574 Before using the switch monitor, edit the monitor configuration file (/var/stm/config/tools/monitor/dm_fc_sw.cfg) to indicate what switches will be monitored. See “Fibre Channel Arbitrated Loop Hub Monitor” on page 128.

Table 2-9 Memory

Product	Model/Product Number	Special Requirements
All system memory on PA-RISC systems. Supported by: PA Memory Monitor	NA	None
Itanium Memory Monitor: monitor for all system memory on Itanium systems. Supported by: Itanium Memory Monitor	NA	HP-UX 11.22 OS or later

Table 2-10 System

Product	Model/Product Number	Special Requirements
A monitor designed to monitor all system chassis logs. Supported by: Chassis Code Monitor	Superdome S-Class	For HP-UX 11.11 OS only. The chassis code logging daemon (cclogd) must be up and running.
Core hardware (hardware within the SPU cabinet). For example, resources associated with intake temperature. On some systems, other hardware resources such as power supplies are monitored. Supported by: Core Hardware Monitor	NA	HP-UX 11.x
Corrected Machine Checks (CMCs) experienced by Itanium-based systems. Supported by: CMC Monitor	NA	HP-UX 11.20 or later
Corrected Platform Error (CPE) Monitor for all Itanium-based systems. Supported by: Itanium Core Hardware Monitor	NA	HP-UX 11.23 OS or later
Core hardware on PA-RISC and Itanium systems. For example, resources associated with temperature or power supply. Supported by: Itanium Core Hardware Monitor	NA	HP-UX 11.20 or later

Table 2-10 System (Continued)

Product	Model/Product Number	Special Requirements
Low Priority Machine Checks (LPMCs) Supported by: LPMC Monitor	NA	HP-UX 11.x
IPMI Forward Progress Log Monitor monitors IPMI FPL log entries on the system. Supported by: IPMI Forward Progress Log Monitor	NA	All HP-UX IPF systems running HP-UX 11.23 or later. All HP-UX PA systems running HP-UX 11.23 or later. The ia64_corehw monitor must be running.
HP-UX Kernel Resources Supported by: Kernel Resource Monitor	Hardware: HP9000 (/V) S700 and S800 Software: HP-UX 11.0 (B.11.0), both 32 bit and 64 bit	HP-UX 11.x. Requires configuration through SAM.
System Status Supported by: System Status Monitor	NA	None

Table 2-11 Interface Cards

Product	Model/Product Number	Special Requirements
SCSI1, SCSI2, & SCSI3 interface cards. Supported by: SCSI123 Monitor	NA	None

Table 2-12 Others

Product	Model/Product Number	Special Requirements
iSCSI Subsystem HP-UX software solution for iSCSI protocol. Supported by: iSCSI Subsystem Monitor	NA	HP-UX 11.23, Patch PHSS_30457 for IA 11.23 (11.23) Codename: iHOP For product support information: `http://itrc.hp.com` For documentation: `http://docs.hp.com`.
All devices managed by HP device management software. Current plans are for many different types of devices to be supported, including disk drives, disk arrays, disk jbods, tape drives, tape libraries, FC hubs, switches and bridges. Supported by: Remote Monitor	As of July 13, 2000: HP A6188A storage array HP A6189A storage array HP A6218A storage array As of January 2003: HP A6189B storage array	HP-UX 11xx, Sept. 2000 or later TCP/IP port 2818 must be available.
HP UPSs (Uninterruptible Power Systems): Supported by: UPS Monitor	HP Power Trust A2941A (600 VA) A2994A (1300 VA) A2996B (1.3kVA) A2997B (1.8kVA) A2998B (3.0kVA) A3589B (5.5kVA) HP Power TrustII A1353A (2.0kVA, 120V) A1354A (2.0kVA, 240V) A1356A (3.0kVA, 240V) Explorer UPS	The HP-UX monitoring daemon, ups_mond, which is shipped on all Series 800 systems (but not on S700 systems)

Using Hardware Monitoring Requests

Monitoring requests are used to implement your strategy for monitoring hardware resources. The Hardware Monitoring Request Manager is the tool you use to create and manage hardware event monitoring requests. The following procedures describe how to use the Hardware Monitoring Request Manager to perform the tasks involved in managing monitoring requests for all hardware event monitors.

What Is a Monitoring Request?

A monitoring request is the mechanism by which you manage how hardware event notification takes place. EMS uses a monitoring request to determine what events should be reported, and what notification method should be used to report them.

In building a monitoring request, you define the components that comprise the monitoring request. See Figure 2-2 on page 40.

When building a request you must make the following decisions:

- **WHAT hardware should be monitored?** This is defined by selecting the monitor responsible for the hardware resources you want to monitor. You can select multiple monitors for each monitoring request, which gives you the ability to use a single request for a variety of hardware.
- **WHAT events should be reported?** Although the monitor can detect all hardware events, you can limit the events that are reported. This is done by specifying the severity level(s) and an arithmetic operator. Each severity level is assigned a numeric value to work with the operator (e.g., CRITICAL=5). Together these settings determine which events to report. For example, you may be interested in all events greater than or equal to Major Warning (>=MAJOR WARNING).
- **HOW will notification be sent?** You must select the notification method you want to use when an event occurs. You may want to use several notification methods, but each method will require its own monitoring request.

Some Monitoring Request Examples

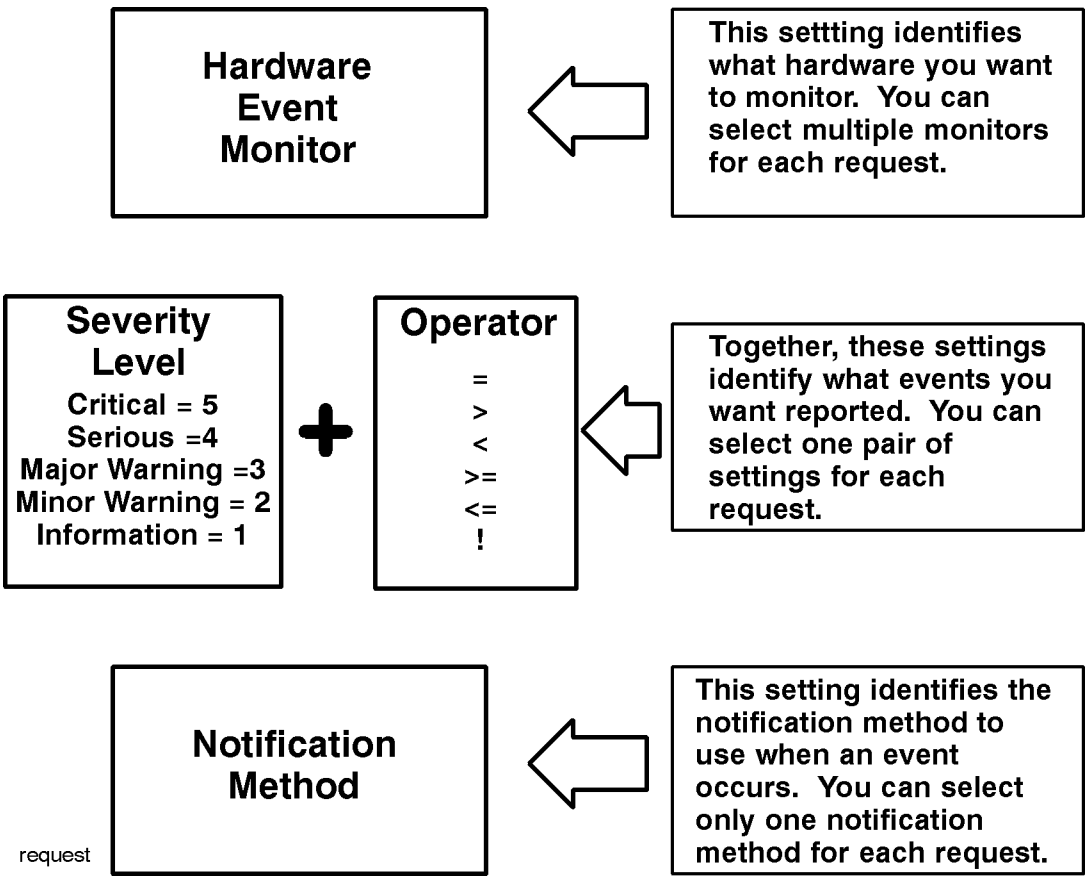
The following monitoring request applies to all monitors. It sends all events with a severity greater than or equal to MAJOR WARNING to an email address of `sysad@hp.com`:

```
Send events generated by all monitors
with severity >= MAJOR WARNING to EMAIL sysad@hp.com
```

The following monitoring request sends information events for all monitors to a text log:

```
Send events generated by all monitors
with severity = INFORMATION to TEXTLOG /var/opt/resmon/log/information.log
```

Figure 2-2 Building a Monitoring Request



Running the Monitoring Request Manager

NOTE You must be logged on as root to run the Monitoring Request Manager.

To run the Monitoring Request Manager, type:

```
/etc/opt/resmon/lbin/monconfig
```

The opening screen indicates if monitoring is currently enabled or disabled. Since the June 1999 release, monitoring is enabled by default.

The opening screen looks like this:

```
=========================================================
==========      Event Monitoring Service     ============
==========     Monitoring Request Manager    ============
=========================================================
                                                 INDICATES
EVENT MONITORING IS CURRENTLY ENABLED      <== MONITORING
                                                 STATUS
=========================================================
======   Monitoring Request Manager Main Menu   ========
=========================================================
Select:
 (S)how current monitoring requests configured via monconfig
 (C)heck detailed monitoring status
 (L)ist descriptions of available monitor
 (A)dd a monitoring request               <== MAIN MENU
 (D)elete a monitoring request                SELECTION
 (M)odify an existing monitoring request      OPTIONS
 (E)nable Monitoring
 (K)ill (disable) monitoring
 (H)elp
 (Q)uit
Enter selection: [s]
```

Enabling Hardware Event Monitoring

Hardware event monitoring must be enabled to protect your system from undetected hardware failures. All hardware monitoring requests are ignored while monitoring is disabled. Once monitoring has been enabled, all hardware event monitors and their associated monitoring requests will become operational.

NOTE As of the June 1999 release, the hardware event monitors are automatically enabled when the Support Tools bundle containing STM and the monitors is installed.

NOTE **Are There Any Fibre Channel Arbitrated Loop Hubs or Fibre Channel Switches You Want to Monitor?**

An EMS Hardware Monitor is included for FC-AL hubs and FC switches. However, unlike the other hardware monitors, these monitors require some initial configuration before they will function. To ensure that your FC-AL hubs or FC switches are monitored, you should perform the initial configuration before enabling monitoring. For information on performing the initial configuration, refer to “Fibre Channel Arbitrated Loop Hub Monitor”, and “Fibre Channel Switch Monitor” in Chapter 6, “Special Procedures.” When you have configured these monitors. return here and continue with the procedure to enable monitoring.

To enable hardware event monitoring (only necessary for February and April 1999 releases):

1. Run the Hardware Monitoring Request Manager by typing:

   ```
   /etc/opt/resmon/lbin/monconfig
   ```

2. From the main menu selection prompt, enter **E**

Hardware event monitoring is now enabled. The default monitoring requests shown in Table 2-13 on page 43 will be used to monitor your hardware. If these settings are adequate, you are done. If you want to add or modify the monitoring you can do so using the Monitoring Request Manager.

Default Monitoring Requests

A set of default monitoring requests are created for each hardware event monitor. These default requests provide a complete level of monitoring and protection for the hardware resources under the control of the monitor. The default monitoring requests listed in Table 2-13 on page 43 are used for all hardware event monitors.

NOTE **When to Modify the Default Monitoring Requests**

You can use the default monitoring requests provided and achieve a complete level of protection. However, the default monitoring requests provide a limited number of notification options. By modifying or adding new monitoring requests, you gain greater control over what notification methods are used to alert you when events occur. You can add new notification methods or remove those that may not be required. Creating custom monitoring requests also allows you to manage which severity levels you want reported.

Table 2-13 Default Monitoring Requests for Each Monitor

Severity Levels	Notification Method
All	TEXTLOG File: `/var/opt/resmon/log/event.log`
Serious, Critical. As of IPR 9904 Major Warning	SYSLOG
Serious, Critical. As of IPR 9904 Major Warning	CONSOLE. Note: As of the June 1999 release, messages are no longer sent to the console by default.
Serious, Critical. As of IPR 9904 Major Warning	EMAIL address: root

Listing Monitor Descriptions

One of the first steps in managing monitoring requests is selecting the proper monitor for the hardware resource. You must know what hardware resources each monitor is responsible for to ensure that you select the proper monitor. Listing the descriptions of the available monitors will show you what hardware resources each monitor supports.

To list the descriptions of available monitors:

1. Run the Hardware Monitoring Request Manager by entering:

   `/etc/opt/resmon/lbin/monconfig`

2. From the main menu selection prompt, enter **`L`**

A complete list of the available monitors and the hardware type each monitor supports is displayed. Identify the name of the desired monitor and then proceed with the monitoring request task.

NOTE For a detailed list of the specific products each monitor supports, refer to the Diagnostics website at:

`http://docs.hp.com/en/diag/`

Under “EMS Hardware Monitors,” click on “Supported Products” and “Data Sheets.” You can also refer to the man page for the particular monitor; for example, “man_disk_em”.

Viewing Current Monitoring Requests

Before adding or modifying monitoring requests, you should examine the current monitoring requests. These include the default monitoring requests created during system startup. By examining the current requests, you can determine what additional requests may be needed to implement your monitoring and notification strategy.

The option to Show Monitoring Requests displays all the monitoring requests that have been created using the Hardware Monitoring Request Manager, even requests that are inactive. See “Checking Detailed Monitoring Status” on page 54, for information on viewing only active monitoring requests.

To view (or show) the current monitoring requests:

1. Run the Hardware Monitoring Request Manager by entering:

   /etc/opt/resmon/lbin/monconfig

2. From the main menu selection prompt, enter **s**

A list of all the current monitoring requests configured for the hardware event monitors is displayed. The display will be similar to the following screen, which shows the default monitoring requests.

```
============================================================
==========    Current Monitoring Requests    ===============
============================================================

EVENT MONITORING IS CURRENTLY ENABLED

The current monitor configuration is:
1) Send events generated by all monitors
   with severity >= INFORMATION to TEXTLOG / var/opt/resmon/log/event.log
2) Send events generated by all monitors
   with severity >= MAJOR WARNING to SYSLOG
3) Send events generated by all monitors
   with severity >= MAJOR WARNING to EMAIL root
Hit <enter> to continue...
```

Adding a Monitoring Request

Adding a monitoring request is a convenient way to add another notification method for a monitor. Each new notification method requires its own monitoring request.

Monitoring requests can only be added at the monitor level, which creates an identical request for all instances of the hardware resources supported by the monitor. Monitoring requests cannot be added for a specific hardware instance. An "`A(ll)`" option allows you to add a monitoring request for all monitors in one operation.

NOTE Using the "All monitors" option when creating a request has the benefit of applying the request to a new class of supported hardware resource that you may add to your system. This ensures that the new hardware is automatically included in your monitoring strategy.

To add a monitoring request:

1. Run the Hardware Monitoring Request Manager by typing:

   `/etc/opt/resmon/lbin/monconfig`

2. From the main menu selection prompt, enter **`A`**.
3. At the Monitors selection prompt, enter the number assigned to the monitor for which you are creating a request. The numbers for the monitors are listed on the screen. You can enter multiple numbers separated by commas, or you can enter "`a`" to create a request for all monitors.
4. At the Criteria Threshold prompt, enter the number for the desired severity level. See Table 2-15 on page 48.
5. At the Criteria Operator prompt, enter the number for the desired operator. See Table 2-14 on page 47.
6. At the Notification Method prompt, enter the number for the desired method. See Table 2-14 on page 47. If the notification method you selected requires you to input additional information, do so when promoted.
7. At the User Comment prompt, enter any comments about this monitoring request that you desire. This text will be sent with events which match this monitoring request. This feature is NEW, as of the June 2000 release.
8. At the Client Configuration File prompt, enter (C)lear to use the default client configuration file, or enter A(dd) to specify the name of a specific client configuration file for this request. This file allows you to enable/disable events, set thresholding criteria and severity levels for events on a per-client basis (for example, for HP Support Applications). Adding a client configuration file at this prompt does not create or edit the file; it merely sets up the monitoring request to use the file. Unless you have a specific client that requires a client configuration file, choose (C)lear (the default). This feature is NEW, as of the June 2000 release. It is only valid for monitors that are Multiple-View (Predictive-Enabled).
9. Save the request when prompted.

Repeat the above steps for each new monitoring request.

NOTE **Are monitoring requests automatically applied to new hardware resources?**

Because monitoring requests are created at the monitor level and not at the hardware instance level, a new hardware resource added to the system inherits the same monitoring requests assigned to other hardware of the same type. This ensures that new hardware is automatically

added to the monitoring configuration. When you restart the system or execute the IOSCAN utility (thus performing a real/hard IOSCAN), the new hardware will be included in event monitoring.

If you add a new class of supported hardware resource to your system, any monitoring requests that apply to All monitors are used for the new hardware, ensuring that your hardware is protected immediately from undetected failure.

For hardware monitoring to recognize new devices, the new devices must be properly added and configured, so that they are recognized by the kernel (ioscan -k must see them).

Table 2-14 Monitoring Requests Configuration Settings

Setting	Description
Criteria Thresholds	This value identifies the severity level used in conjunction with the criteria operator to generate an event message. See Table 2-15 on page 48, for an explanation of severity levels.
Criteria Operators	This value identifies the arithmetic operator used with the criteria threshold to control what events are reported. Valid operators are: < (less than) <= (less than or equal to) > (greater than) >= (greater than or equal than) ! (not equal to) Operators treat each severity level as a numeric value assigned as follows: Critical = 5 Serious = 4 Major warning = 3 Minor warning = 2 Informational = 1 The criteria operators allow you to direct events of several severity levels using the same notification method. For example, to direct both Serious and Critical events using the same method, you would use a condition of >= Serious.

Table 2-14 Monitoring Requests Configuration Settings (Continued)

Setting	Description
Notification Method	The following notification methods are available. EMAIL* - sends notification to the specified email address TEXTLOG* - sends notification to specified file SNMP - sends notification using SNMP traps CONSOLE - sends notification to the system console TCP - sends notification to the specified target host and port UDP - sends notification to the specified target host and port OPC - sends notification to OpenView ITO applications (available only on systems with OpenView installed). SYSLOG - sends notification to the system log Only one notification method can be selected for each monitor request, consequently you will need to create multiple requests to direct event notification to different targets. * These are the only methods that deliver the entire content of the event message. The remaining methods alert you to the occurrence of an event, but require you to retrieve the complete message content using `resdata` explained later in this chapter.

Table 2-15 Event Severity Levels

Event Severity Level	Description	MC/ServiceGuard Response
Critical	An event that will or has already caused data loss, system down time, or other loss of service. System operation will be impacted and normal use of the hardware should not continue until the problem is corrected. Immediate action is required to correct the problem.	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL occur.
Serious	An event that may cause data loss, system down time, or other loss of service if left uncorrected. System operation and normal use of the hardware may be impacted. The problem should be repaired as soon as possible.	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL occur.
Major Warning	An event that could escalate to a Serious condition if not corrected. System operation should not be impacted and normal use of the hardware can continue. The problem should be repaired at a convenient time.	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL NOT occur.

Table 2-15 Event Severity Levels (Continued)

Event Severity Level	Description	MC/ServiceGuard Response
Minor Warning	An event that will not likely escalate to a more severe condition if let uncorrected. System operation will not be interrupted and normal use of the hardware can continue. The problem can be repaired at a convenient time.	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL NOT occur.
Information	An event that occurs as part of the normal operation of the hardware. No action is required.	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL NOT occur.

Example of Adding a Monitoring Request

The following example illustrates the process of adding a monitoring request. In this example a request is added that will send all CRITICAL events detected by the AutoRAID disk array monitor to an email address of admin@hp.com.

```
=====================================================================
===========      Monitoring Configuration Main Menu   =============
=====================================================================
Select:
   (S)how current monitoring requests configured via monconfig
   (C)heck detailed monitoring status
   (L)ist descriptions of available monitors
   (A)dd a monitoring request
   (D)elete a monitoring request
   (M)odify an existing monitoring request
   (E)nable Monitoring
   (K)ill (disable) monitoring
   (H)elp
   (Q)uit
Enter selection: [s] a                          <== SELECT ADD OPTION

=============================================================================
=====================     Add Monitoring Request      =======================
=============================================================================

Start of edit configuration:

A monitoring request consists of:
  A list of monitors to which it applies
  A severity range (A relational expression and a severity. For example,
  %< "MAJOR WARNING" means events with a severity "INFORMATION" and
  "MINOR WARNING")
  A notification method
Please answer the following questions to specify a monitoring request.

Monitors to which this configuration can apply:
   1) /storage/events/disk_arrays/AutoRAID
   2) /storage/events/disks/default
   3) /adapters/events/FC_adapter
   4) /connectivity/events/multiplexors/FC_SCSI_mux
   5) /storage/events/enclosures/ses_enclosure
   6) /storage/events/tapes/SCSI_tape
   7) /storage/events/disk_arrays/FW_SCSI
   8) /storage/events/disk_arrays/High_Availability
   Enter monitor numbers separated by commas
   {or (A)ll monitors, (Q)uit, (H)elp} [a] 1   <== SELECT AUTORAID MONITOR

Criteria Thresholds:
   1) Informational     2) Minor Warning     3) Major Warning
   4) Serious     5) Critical
   Enter selection {or (Q)uit,(H)elp} [4] 5           <==  SELECT ONLY
                                                           CRITICAL EVENTS
Criteria Operator:
   1) %<     2) %<=    3) >    4) >=    5) =    6) !
   Enter selection {or (Q)uit,(H)elp} [4] 5           <==  (=CRITICAL)

Notification Method:
   1) UDP       2) TCP       3) OPC      4) SNMP
   5) TEXTLOG   6) SYSLOG    7) EMAIL    8) CONSOLE
   Enter selection {or (Q)uit,(H)elp} [7]             <== SELECT EMAIL
                                                          ADDRESS FOR
```

```
   Enter Email Address: [root] admin@hp.com               admin@hp.com


User Comment:
   (C)lear   (A)dd
   Enter selection {or (Q)uit,(H)elp} [c] a          <== ADD COMMENT
   Enter comment:  []   This is a test message.          IF DESIRED

Client Configuration File:
   (C)lear   (A)dd
   Use Clear to use the default file.
   Enter selection {or (Q)uit,(H)elp} [c] c          <== SPECIFY CLCFG FILE
                                                         IF DESIRED (USUALLY
                                                         CHOOSE DEFAULT)

New entry:
      Send events generated by all monitors
        /storage/events/disk_arrays/AutoRAID         <== NEW MONITORING
      with severity = CRITICAL to EMAIL admin@hp.com     REQUEST
      with comment:
        This is a test message
     Are you sure you want to keep these changes?
    {(Y)es,(N)o,(H)elp} [n] y
```

Modifying Monitoring Requests

Modifying an existing monitoring request is a convenient way to alter one of the settings used in the request. Simply select a monitoring request and then change the desired setting. All other aspects of the request remain unchanged.

To modify a monitoring request:

1. Run the Hardware Monitoring Request Manager by typing:

   ```
   /etc/opt/resmon/lbin/monconfig
   ```

2. From the main menu selection prompt, enter **M**

   All current monitoring requests are displayed.

3. From the list of current monitoring requests, enter the number of the request you want to modify.
4. As you are prompted for each monitoring request setting, change the settings to achieve the desired results.
5. Save the request when prompted.

Verifying Hardware Event Monitoring

Once you have created the monitoring requests you need for your system, you may want to verify that they are working as you expect. The most effective way of verifying hardware event monitoring is to simulate a hardware failure or event. Depending on the hardware, you can do this by removing a disk from an array, unplugging a cable, turning off the hardware resource, using known defective media, etc.

The simulated fault should generate event messages using all the notification methods you have specified. If it does not, check the monitoring requests and make sure they are configured properly.

Checking Detailed Monitoring Status

This option lets you view the detailed information for all active monitoring requests. This information is organized by resource instance, and lists all the monitoring requests currently applied to each instance.

Unlike the option to Show Monitoring Requests which displays all the monitoring requests that have been created using the Hardware Monitoring Request Manager, the detailed status displays only the requests that are currently active. For example, you can create a monitoring request for a monitor that is inactive, but it will not be displayed in the detailed list.

A monitor that is not active will be identified with a status of NOT MONITORING. Any monitor that does not have any resources to monitor will be inactive.

NOTE **Where Did the TCP Requests Come From?**

You may notice that most resources have a TCP monitoring request that you did not create. This request is created automatically by the Peripheral Status Monitor (PSM) to allow it to gather event information from each monitor.

The following sample is representative of the types of entries displayed for detailed monitoring status.

```
For /storage/events/disks/default/10_12_5.2.0:
Events >= 1 (INFORMATION) Goto TEXTLOG; file=/var/opt/resmon/log/event.log
Events >= 4 (MAJOR WARNING) Goto SYSLOG
Events >= 4 (MAJOR WARNING) Goto EMAIL; addr=root
Events =  5 (CRITICAL) Goto TCP; host=hpbs1266.boi.hp.com port=53327

For /adapters/events/FC_adapter/8_12.8:
Events >= 1 (INFORMATION) Goto TEXTLOG; file=/var/opt/resmon/log/event.log
Events >= 4 (MAJOR WARNING) Goto SYSLOG
Events >= 4 (MAJOR WARNING) Goto EMAIL; addr=root

>/connectivity/events/multiplexors/FC_SCSI_mux ... NOT MONITORING.
(Possibly there is no hardware to monitor.)

>/system/events/memory ... OK.
For /system/events/memory/49:
Events >= 1 (INFORMATION) Goto TEXTLOG; file=/var/opt/resmon/log/event.log
Events >= 4 (MAJOR WARNING) Goto SYSLOG
Events >= 4 (MAJOR WARNING) Goto EMAIL; addr=root
Events >= 4 (MAJOR WARNING) Goto TCP; host=hpbs1266.boi.hp.com port=53327
```

Retrieving and Interpreting Event Messages

Event messages generated by hardware monitoring can be delivered using a variety of notification methods. To simplify receiving event messages you may want to use the email and/or textfile notification methods. Both of these methods, which are included in the default monitoring, receive the entire content of the message so you can read it immediately.

Methods such as console, syslog, and SNMP alert you to the occurrence of an event but do not deliver the entire message. You are required to retrieve it using the `resdata` utility. For these methods, the event notification will include a message similar to the following:

```
Execute the following command to obtain event details: /opt/resmon/bin/resdata
-R 392036357 -r /storage/events/tapes/SCSI_tape/10_12_5.0.0 -n 392036353 -a
```

It is important that you execute the command exactly as indicated, including the two critical number fields that are indexes for the `resdata` entries.

Sample Event Message

The following is a portion of a sample event message.

```
> Event Monitoring Service Event Notification %<

Notification Time: Wed Sep  9 10:48:30 1998

hpbs8684 sent Event Monitor notification information:

/storage/events/disks/default/10_4_4.0.0 is >= 1.
Its current value is CRITICAL(5).

Event data from monitor:

Event Time : Wed Sep  9 10:48:30 1998
Hostname : hpbs8684.boi.hp.com      IP Address  : 15.62.120.25
Event Id : 0x0035f6b15e00000000      Monitor     : disk_em
Event #  : 100037                   Event Class : I/O
Severity : CRITICAL

Disk at hardware path 10/4/4.0.0 : Media failure
Associated OS error log entry id(s):
      0000000000000000000

Description of Error:

     The device was unsuccessful in reading data for the current I/O request
     due to an error on the medium. The data could not be recovered. The
     request was likely processed in a way which could cause damage to or loss
     of data.

Probable Cause / Recommended Action:

     The medium in the device is flawed. If the medium is removable, replace
     the medium with a fresh one. Alternatively, if the medium is not
     removable, the device has experienced a hardware failure.
     Repair or replace the device, as necessary.

=-+=-+-=-+-=-+=-+=-+-=-+-=-+=-+=-+-=-+-=-+=-+=-+-=-+-=-+=-+=-+-=-+-=
```

Deleting Monitoring Requests

You may want to delete any monitor requests for a hardware resource that has been removed from your system. Only requests created exclusively for the missing resource should be deleted.

CAUTION Use careful consideration before deleting monitoring requests or you may make your system vulnerable to undetected hardware failures. This is particularly true for the default monitoring requests, which provide protection for all the supported hardware resources on your system.

To delete a monitoring request:

1. Run the Hardware Monitoring Request Manager by typing:

   `/etc/opt/resmon/lbin/monconfig`

2. From the main menu selection prompt, enter **`D`**

   All current monitoring requests are displayed.

3. From the list of current monitoring requests, enter the number assigned to the request you want to delete.
4. Delete the request when prompted to do so.

Disabling Hardware Event Monitoring

You can disable hardware event monitoring if desired. However, all EMS Hardware Monitors will be disabled. You cannot disable a specific monitor. While monitoring is disabled, all monitoring requests are disabled. The monitoring requests are retained and become operational when monitoring is re-enabled.

CAUTION Use careful consideration before disabling hardware event monitoring. Be aware that ALL hardware monitoring will be disabled. While monitoring is disabled, your hardware resources are vulnerable to undetected failures.

Disabling monitoring will impact MC/ServiceGuard if package dependencies have been created for the hardware event monitors.

To disable hardware event monitoring:

1. Run the Hardware Monitoring Request Manager by typing:

   `/etc/opt/resmon/lbin/monconfig`

2. From the main menu selection prompt, enter **`K`**.
3. Confirm disabling when prompted to do so. When you are ready to re-enable hardware event monitoring, see “Enabling Hardware Event Monitoring”.

3 Detailed Description

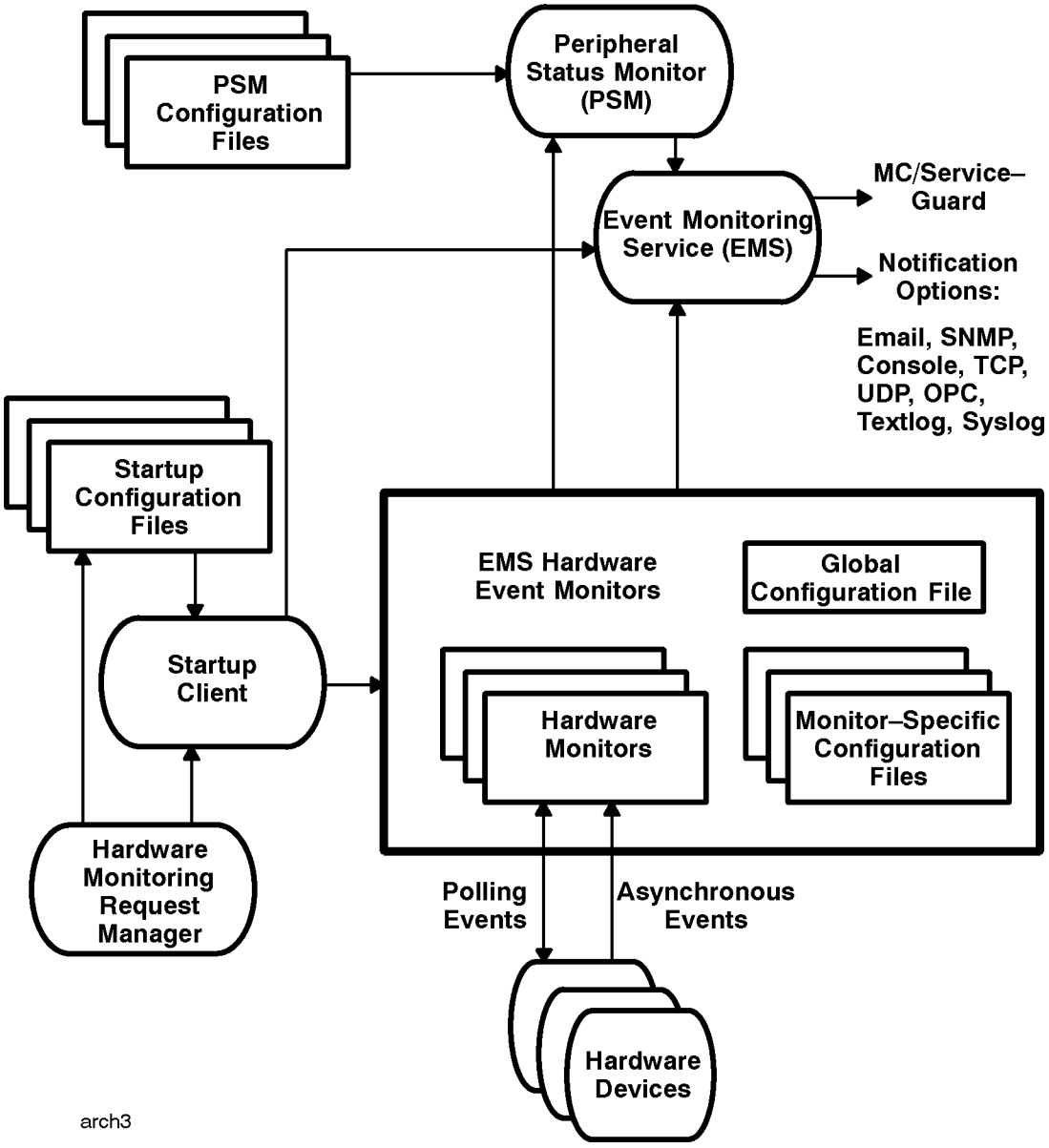
This chapter describes EMS Hardware Monitors in detail. The topics discussed in this chapter include:

- Hardware monitoring architecture.
- Hardware monitoring request manager.
- EMS hardware event monitor.
- Polling or asynchronous?
- Startup client.
- Peripheral status monitor.
- Event monitoring service (EMS).
- File locations.
- Startup process (in detail).
- Asynchronous event detection (in detail).
- Event polling (in detail).

The Detailed Picture of Hardware Monitoring

The following figure shows the major components involved in hardware monitoring and the communication paths between them.

Figure 3-1 Hardware Monitoring Architecture



Components from Three Different Applications

Hardware event monitoring involves components from three different applications:

- Event Monitoring System (EMS) provides the framework for event notification. EMS was originally developed to support system monitoring, but the existing framework is used to manage hardware event monitoring as well.
- Hardware event monitoring components include the event monitor, associated configuration files, and the hardware monitoring request manager.
- Support Tools Manager provides the low-level error handling components that are also used for recording and viewing system errors.

Hardware Monitoring Request Manager

Hardware event monitoring requests are created and managed using the **Hardware Monitoring Request Manager** program. This tool allows you to easily create monitoring requests for all the hardware event monitors running on your system. The Hardware Monitoring Request Manager uses all the notification methods supported by Event Monitoring Service (EMS), giving you the ability to create a consistent notification strategy for both system resources and hardware resources. The Hardware Monitoring Request Manager is also used to enable or disable hardware monitoring.

Once created, all hardware event monitoring requests are handled by EMS, which uses the request settings to determine how an event should be reported.

EMS Hardware Event Monitor

The **EMS hardware event monitor** is the key component in the event monitoring architecture. An event monitor is a daemon process, running in the background continuously. The event monitor watches all instances of the hardware resources it supports, waiting for the occurrence of any failures or other unusual events. The monitor may use polling, asynchronous event detection, or both.

When an event occurs, the monitor alerts EMS and passes it the appropriate event message. The event monitor also tells the PSM about the event. If the event is serious enough the PSM will change the status of the hardware to DOWN.

Two configuration files control the operation of each hardware event monitor:

- **Global monitor configuration file**. The settings defined in this file are used for all hardware event monitors, unless overridden by a monitor-specific file.
- **Monitor-specific configuration file**. Each monitor includes its own configuration file with optimized settings. The settings defined in the monitor-specific file override corresponding settings defined in the global configuration file.

NOTE The settings defined by the monitor-specific configuration file have been carefully selected to meet the needs of most users. It is possible to alter these settings, but it is not recommended unless you fully understand the implications of doing so. For information on modifying the monitor-specific configuration files, see Chapter 5, “Hardware Monitor Configuration Files.”

NOTE As of the June 2000 release, several of the hardware monitors have been converted to be “multiple-view” (Predictive-enabled). These monitors use a different file for configuration, the Client Configuration File.

Polling or Asynchronous?

Hardware event monitors employ two methods of tracking events: polling and asynchronous event detection. A monitor may use one or both of the methods to detect events.

Using polling, a monitor checks the status of its hardware resources at regular intervals, typically 60 minutes. Any unusual condition reported by the hardware will trigger an event by the monitor. The polling interval is selected to provide reasonable detection without impacting system performance. The main disadvantage of polling is that an event will not be detected until the next time the resource is polled, which makes the system vulnerable to another hardware failure.

Asynchronous detection allows a monitor to detect an event when it occurs, usually during an I/O to the device. An event typically results in a log entry made by the hardware device driver. The monitor detects the log entry and initiates the event notification. Asynchronous event monitoring allows immediate notification and response to a critical situation.

Startup Client

The **startup** client launches and configures the hardware event monitors each time the system is started, or following the execution of the IOSCAN utility (thus performing a real/hard ioscan). The startup client starts each monitor and configures its hardware resources using a set of default monitoring requests.

Each monitor has its own **startup configuration file**, which contains the default monitoring requests and any customized requests created using the Hardware Monitoring Request Manager. During system startup, following the execution of the IOSCAN utility (thus performing a real/hard ioscan), or when managing requests using the Hardware Monitoring Request Manager, the startup client reads each configuration file and creates the monitoring requests defined by the entries in the file. The Hardware Monitoring Request Manager updates the contents of the startup configuration file when you add or modify monitoring requests.

Peripheral Status Monitor (PSM)

The sole purpose of the **peripheral status monitor** (PSM) is to convert events detected by a hardware event monitor to changes in hardware resource status. This conversion is required for use with MC/ServiceGuard in controlling package failover. When an event occurs, the PSM determines if it is serious enough to warrant a change in hardware resource status to DOWN. If it is, the PSM alerts EMS, which then informs MC/ServiceGuard.

More information about the PSM is included in Chapter 4, “Using the Peripheral Status Monitor.”

Event Monitoring Service (EMS)

The **event monitoring service** (EMS) provides the framework within which hardware monitoring takes place. EMS manages the monitoring requests created for each monitor. When an event occurs, the associated monitor alerts EMS and passes it an event message. EMS then uses the monitoring request to determine how (or if) the event message should be delivered. EMS manages all hardware event notification.

EMS also provides the graphical interface for creating and managing PSM monitoring requests. Like event monitoring requests, all PSM monitoring requests are managed by EMS.

Other system monitors are available for EMS at additional cost. For more information on EMS and available monitors, see *Using EMS HA Monitors* (B5735-90001).

File Locations

The following table lists the locations of the files involved in hardware monitoring.

Table 3-1 File Locations

Directories and Files	Description
/usr/sbin/stm/uut/bin/tools/monitor/monitor_name	Monitor executable files.
/var/stm/config/tools/monitor/Global.cfg	Default monitor configuration file.
/var/stm/config/tools/monitor/monitor_name.cfg	Monitor-specific configuration files.
/var/stm/config/tools/monitor/default_monitor_name.clcfg	Monitor client configuration file. Only for hardware monitors converted to multiple-view (Predictive-enabled). New as of June 2000 release.
/var/stm/config/tools/monitor/monitor_name.sapcfg	Monitor startup configuration files.
/var/stm/config/tools/monitor/monitor_name.psmcfg	PSM configuration files.
/etc/opt/resmon/lbin/monconfig	Hardware Monitoring Request Manager file
/etc/opt/resmon/lbin/startcfg_client	Startup client file
/etc/opt/resmon/lbin/set_fixed	PSM set_fixed utility file
/etc/opt/resmon/dictionary/monitor_name.dict	Monitor dictionary files

In the above table, *monitor_name* is the name of a particular monitor such as armmon.

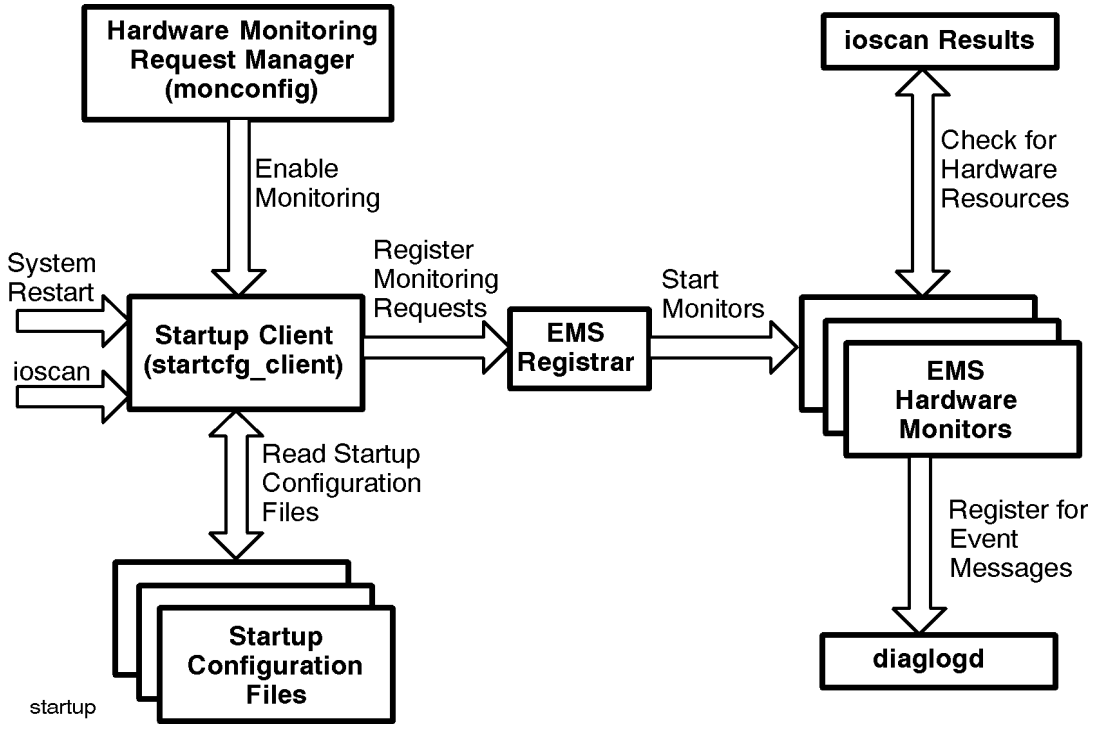
Startup Process (in Detail)

The following steps describe the process used to start the hardware monitoring. The startup process is illustrated in Figure 3-2 on page 65.

The startup process is managed by the startup client (`startcfg_client`). The startup client is run when the system is restarted, following the execution of the IOSCAN utility (performing a real/hard ioscan), when the enable monitoring command is executed from the Hardware Monitoring Request Manager, or when monconfig changes the monitor requests.

1. When the system is restarted, following the execution of the IOSCAN utility (performing a real/hard ioscan), or when the enable monitoring command is executed, the Hardware Monitoring Request Manager (`monconfig`) calls the start up client (`startcfg_client`).
2. The startup client reads the contents of a monitor startup configuration file and registers the monitoring requests contained in the file with the EMS registrar. This causes the associated monitor to start running. If monitoring is already enabled, the startup client unregisters all current monitoring requests, then reads the content of the startup configuration files and registers the requests again.
3. The monitor examines the IOSCAN (ioscan -k) results table to determine if there are any hardware resources on the system that it is responsible for monitoring. If it finds such resources, the monitor continues to run. If it does not find any resources, the monitor stops.
4. If the monitor supports asynchronous event detection, it registers with `diaglogd`, indicating what types of errors the monitor wants to receive. The monitor may specify a product description, product number, or driver name.
5. The startup client then repeats the process for all monitor startup configuration files.

Figure 3-2 Monitoring Startup Process



Disabling Monitoring

Hardware monitoring can be disabled using the Hardware Monitoring Request Manager. Disabling monitoring disables all EMS Hardware Monitors. Individual monitors cannot be disabled using the Hardware Monitoring Request Manager.

When monitoring is disabled all existing monitoring requests are unregistered, and then a `kill -2` command is issued to stop all monitors.

Asynchronous Event Detection (in Detail)

The following steps describe the process involved in asynchronous event detection. The asynchronous detection is illustrated in Figure 3-3 on page 68.

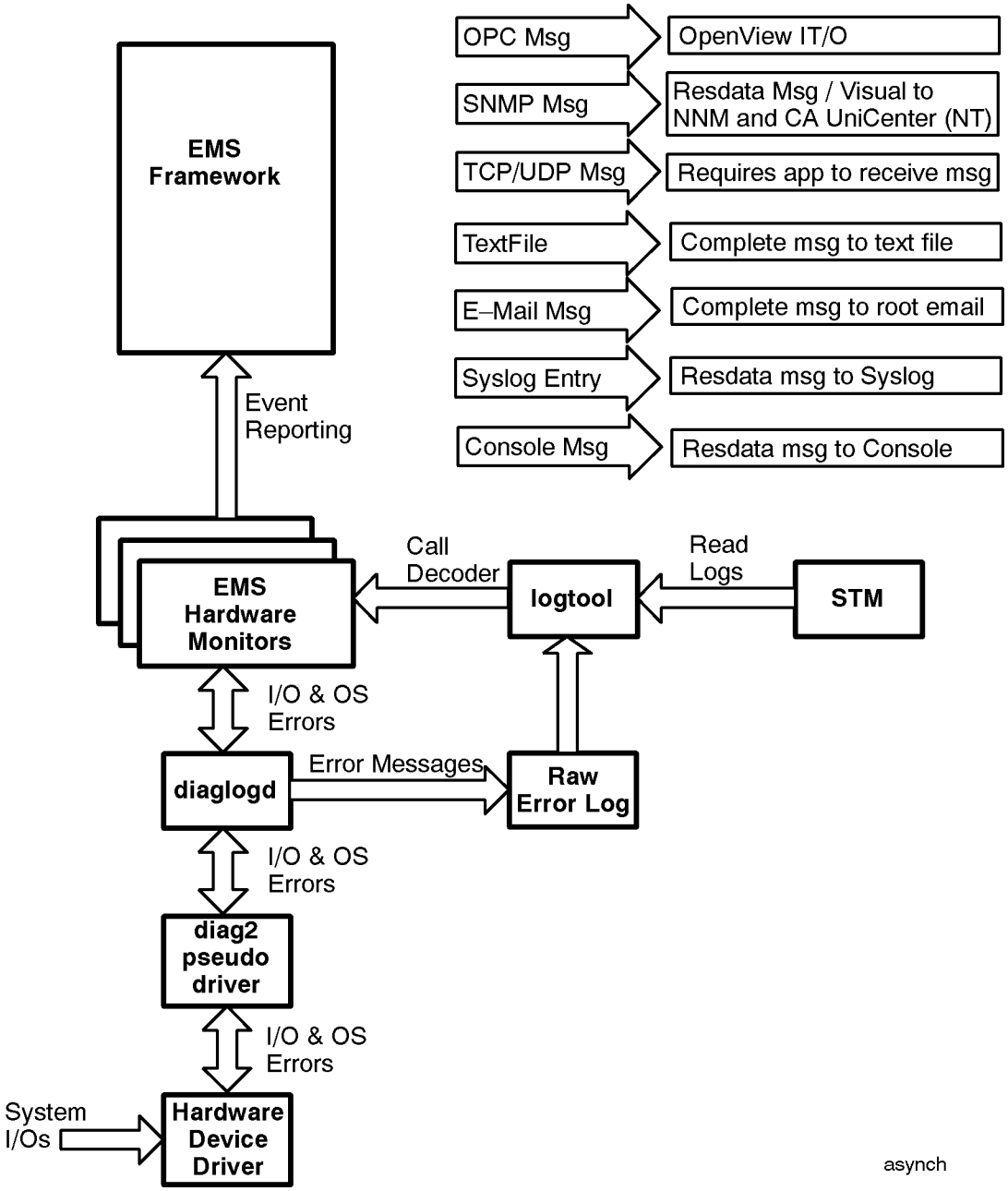
1. A device driver detects an error during an I/O with the device.
2. The device driver passes the error information, including SCSI sense data, to the `diag2` pseudo driver, which adds information indicating the instance of the driver logging the error to the message header. The error message is then passed to the `diaglogd` daemon used by STM to monitor recoverable errors.
3. `Diaglogd` uses the instance information to retrieve hardware path, product type, product name, and driver name information from the message header. This information is used to determine which monitor, if any, the information should be passed to. The error message is also written to the raw error log (`/var/stm/logs/os/log#.raw.cur`).

   During startup, each asynchronous monitor registered with `diaglogd`, indicating what types of errors the monitor wants to receive. The monitor may specify a product description, product number, or driver name. If a monitor is registered to receive the error, the message is passed to it.
4. The monitor decodes the error to determine if an event should be reported. If an event should be reported, the monitor passes the event message to Event Monitoring Service (EMS).
5. EMS uses the current monitoring requests for the monitor to determine what action to take. Based on the requests, the event is reported using the specified notification method(s).

Event Decoding

In addition to monitoring hardware, many of the EMS hardware monitors also act as message decoders for `logtool`, which is used to read the contents of the raw error log. If the error uses an EMS hardware monitor as the decoder, `logtool` launches a new instance of the monitor to perform the decoding. In this way all events that have occurred on the device, including those IGNORED by the monitor, can be viewed.

Figure 3-3 Asynchronous Event Detection Process



Event Polling (in Detail)

The following is the process used for gathering event information using polling. The polling process is illustrated in Figure 3-4 on page 70.

1. At the interval defined by the polling value in the monitor configuration file, the monitor communicates with all the devices it is currently monitoring. The monitor sends pass-thru commands to all SCSI devices, and uses the appropriate protocol for other types of devices. The exact type and sequence of communication used during a polling operation is monitor-specific.
2. Each device responds to the message from the monitor by returning data indicating its status. The information returned in response to polling is not entered in the raw error log.
3. The monitor interprets the information from the device to determine if an event should be reported. If an event should be reported, the monitor passes the event message to EMS.
4. EMS uses the current monitoring requests for the monitor to determine what action to take. Based on the requests, the event is reported using the specified notification method(s).

FC-AL Hub and FC Switch Polling Processes

Unlike the other EMS hardware monitors, the FC-AL hub monitor and FC switch monitor use SNMP to gather information from the hubs or switches they are monitoring. Using the hub or switch IP addresses defined in the hub or switch configuration files, the monitor polls the devices at the defined polling interval (60 minutes by default) using SNMP.

The reporting of events is handled in the same way as all other monitors. Event information gathered by the hub and switch monitors does not get written to the raw error log, and the hub and switch monitors do not act as a decoder for `logtool`.

PA Memory Monitor Polling

The memory monitor polling process uses different components to retrieve event information. The memory monitor polling process is illustrated in Figure 3-5 on page 71.

1. At regular intervals (default 60 minutes) the `memlogd` daemon polls the memory hardware.
2. If a single-bit error is detected, `memlogd` uses the values from the memory configuration file to determine the severity of the error, and then passes the appropriate event message to the memory monitor.

   The error is also logged in memlog, which can read using `logtool`. All decoding of memory error messages is performed by `memlogd`.
3. The memory monitor determines if the event should be reported. If the event should be reported, the monitor passes the event message to Event Monitoring Service (EMS).
4. EMS uses the current monitoring requests for the memory monitor to determine what action to take. Based on the requests, the event is reported using the specified notification method(s).

Figure 3-4 Monitoring Polling Process

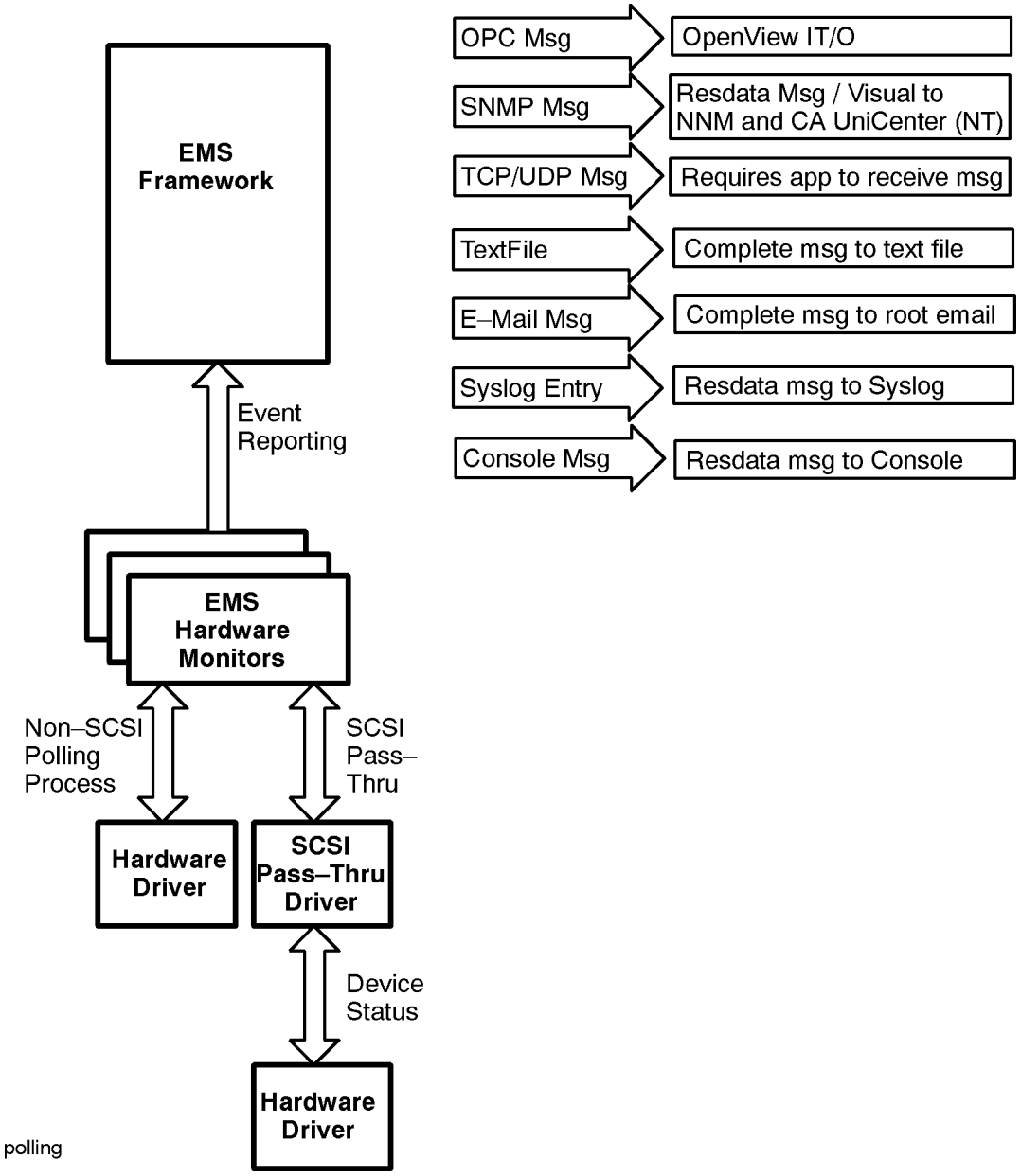
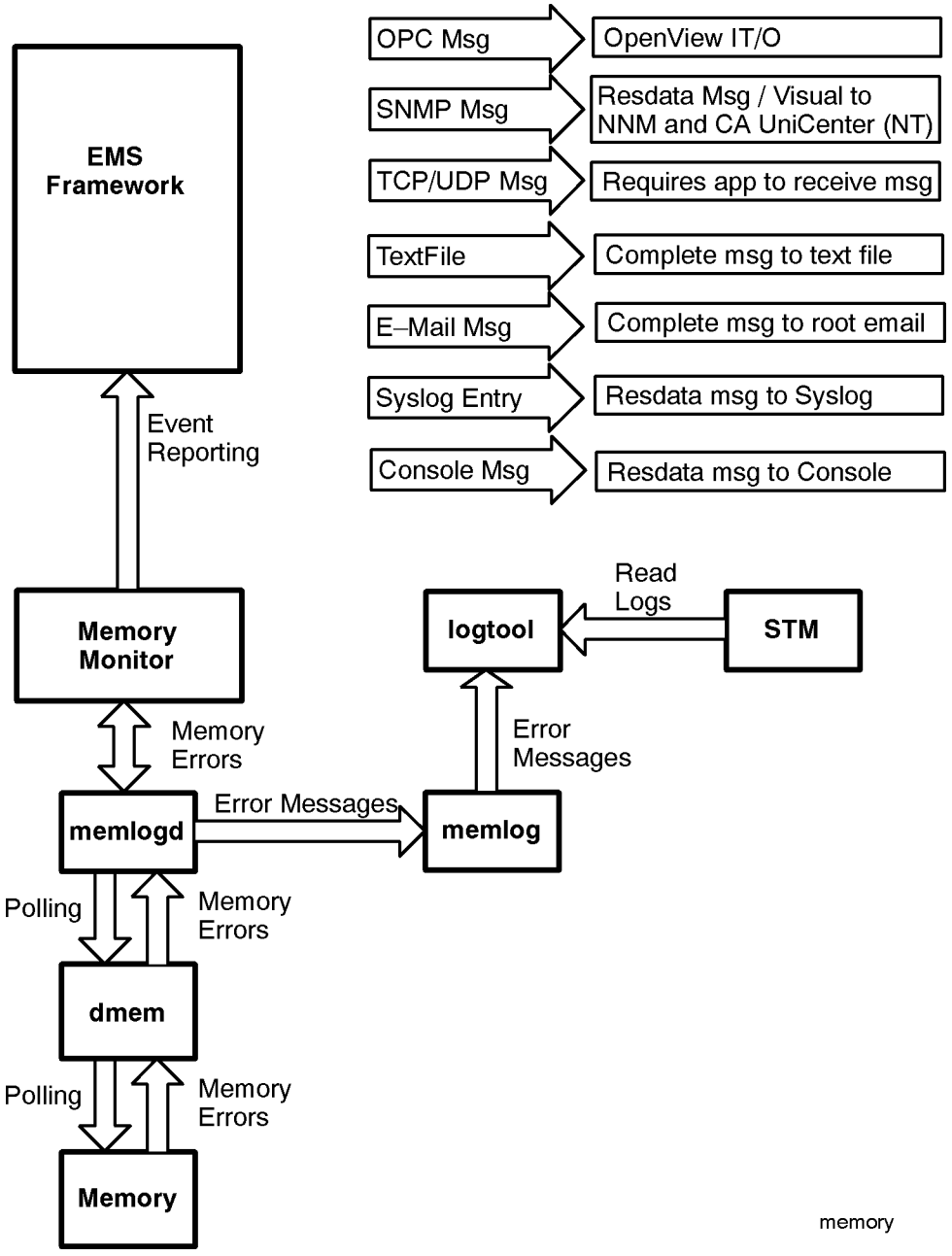


Figure 3-5 Memory Monitor Polling Process



4 Using the Peripheral Status Monitor

This chapter describes the Peripheral Status Monitor, which converts hardware events to status information for use by MC/ServiceGuard. The topics in this chapter include:

- An overview of the PSM
- How to configure MC/ServiceGuard package dependencies with the PSM
- How to create EMS monitoring requests for the PSM

Peripheral Status Monitor Overview

The primary function of the Peripheral Status Monitor, or PSM, is to convert hardware events into changes in device status. These changes in status can then be used by MC/ServiceGuard to control package failover.

The information in Chapter 2, “Installing and Using Monitors,” described how to configure your system to detect hardware events using the Monitoring Request Manager. In this chapter you will learn how to use the PSM to convert these events into changes in device status using the EMS GUI, which is accessed through SAM.

NOTE **Can I Use the PSM Without MC/ServiceGuard?**

Even if you are not using MC/ServiceGuard, you can still use the PSM to create hardware status monitoring requests using EMS. This allows you to get notification for changes in hardware resource status, much as you can for other EMS monitors. If you create a PSM monitoring request, when a hardware event occurs you may be alerted twice—once for the event itself and again if the event caused the status of the resource to change to DOWN.

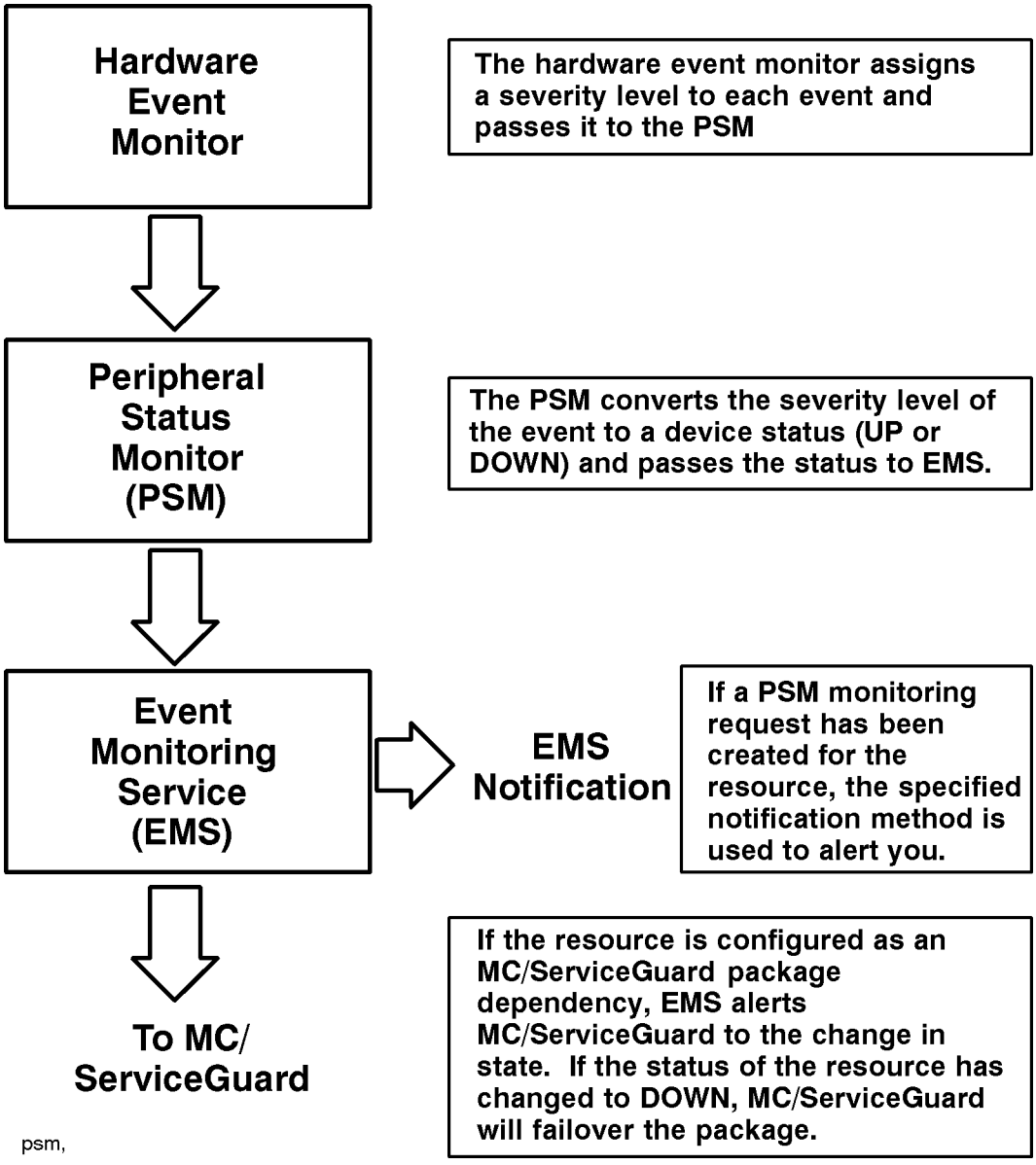
How Does the PSM Work?

The PSM converts hardware events detected by the EMS Hardware Monitors to “UP” or “DOWN” status, which is used by MC/ServiceGuard in controlling package failover. Figure 4-1 on page 76 illustrates how the PSM works with the other components of hardware monitoring.

Because hardware event monitors detect and report the occurrence of events rather that resource status, a method is required to alert MC/ServiceGuard when a hardware resource has a status that may impact data availability. The PSM provides this functionality, serving as the interface between the hardware event monitors and MC/ServiceGuard.

Some monitors can determine when a problem has been corrected and the hardware is functioning properly. These monitors automatically alert the PSM when the hardware is fixed, and the PSM will return the state of the hardware to UP. Other monitors do not have the capability of determining when the hardware problem is corrected. With these monitors it will be necessary for the user to use the `set_fixed` utility to manually return the operational state to UP.

Figure 4-1 Peripheral Status Monitor



psm,

PSM Components

The PSM comprises the following components, which are installed along with the hardware event monitors. Each component has its own man page containing detailed information about its operation.

- `psmctd` - the Peripheral Status Client/Target daemon used to monitor the state of hardware resources.
- `psmmon` - the utility used to monitor the state of resources recognized by the psmctd daemon.
- `set_fixed` - the utility used to manually change the status of a hardware resource from DOWN to UP. Used only for monitors that do not the have capability to perform this operation automatically.

PSM States

The PSM can assume the three status conditions shown in the following table. These are the values you can use to define a monitoring request.

Table 4-1 PSM Status

Condition	Interpretation
Up	The hardware is operating normally.
Down	An event has occurred that indicates a failure with the hardware.
Unknown	Cannot determine the state of the hardware. This state is treated as DOWN by the PSM.

PSM Resource Paths

Selecting a hardware resource for PSM monitoring requires the selection of the correct resource path. The resource class path is the means by which EMS identifies system resources. Resources are divided into classes and subclasses based on their type or function. For example, the resource classes for PSM monitoring include adapters, connectivity, and storage.

The resource path ends with the resource instance, which uniquely identifies a hardware resource. There is an instance for each individual hardware resource supported by the monitor. The resource instance is typically the hardware path to the device (e.g., 10_12_5.0.0), but it may also be a device name as in the case of AutoRAID disk arrays.

EMS monitoring requests are applied at the resource instance level. This is unlike event monitoring requests created using the Hardware Monitoring Request Manager, which are applied at the monitor level. Thus when creating an EMS monitoring request you must select the specific resource you want to monitor. An all (*) option allows you to apply a PSM monitoring request to all current instances of the hardware. A monitoring request will not be applied to new hardware added to the system after the request is created.

PSM resource class path names are structured as follows:

/top_level_resource_class/status/subclass/subclass/instance

For example, the PSM resource class path for a SCSI tape device at hardware path 10_12_5.0.0 would be:

```
/storage/status/tapes/SCSI_tape/10_12_5.0.0
```

The PSM resource class path for an AutoRAID disk array with an ID of 000000105781 would be:

```
/storage/status/disk_arrays/AutoRAID/000000105781
```

The status resource class path for each monitor is included in the monitor descriptions are available on the Web at `http://docs.hp.com/hpux/onlinedocs/diag/ems/emd_summ.htm`.

An HP-UX man page is available for each monitor. To access the man page, type (where *monitorname* is the executable file listed in the data sheet): **man** *monitorname*

Configuring MC/ServiceGuard Package Dependencies with the PSM

The PSM allows you to create MC/ServiceGuard package dependencies for resources monitored by EMS Hardware Monitors.

To use the PSM with MC/ServiceGuard, you configure one or more of the resource instances available in the PSM as MC/ServiceGuard package dependencies. This creates an EMS monitoring request that monitors the status of the resource and alerts MC/ServiceGuard if the status of the resource changes.

Here are some examples of how PSM monitoring requests might be used:

- In a cluster where one copy of data is shared between all nodes in a cluster, you may want to failover a package if the host adapter has failed on the node running the package. Because buses, controllers, and disks are shared, package failover to another node because of bus, controller, or disk failure would not successfully run the package. To make sure you have proper failover in a shared data environment, you must create identical package dependencies on all nodes in the cluster. MC/ServiceGuard can then compare the resource “UP” values on all nodes and failover to the node that has the correct resources available.
- In a cluster where each node has its own copy of data, you may want to failover a package to another node for a host adapter, bus, controller, or disk failure. In this sort of cluster of web servers, where each node has a copy of the data and users are distributed for load balancing, you can failover a package to another node with the correct resources available. Again, the package resource dependencies should be configured the same on all nodes.

NOTE You should create the same requests on all nodes in an MC/ServiceGuard cluster.

There are two methods for configuring PSM package dependencies; using SAM, or by editing the package configuration file.

Configuring Package Dependencies using SAM

The procedure assumes you have taken the necessary steps to create the package to which you will be adding resource dependencies. Complete instructions for configuring MC/ServiceGuard clusters and packages are provided in *Managing MC/ServiceGuard*.

To create a package resource dependency:

1. From the command line, start the graphical version of SAM by typing: `sam`
2. Double-click the Clusters icon.
3. Double-click the High Availability Clusters icon.
4. Double-click on the Package Configuration icon.

   The High Availability Clusters screen is displayed showing all requests configured on that system.
5. From the **Actions** menu, select either **Create/Add a Package** or **Modify Package Configuration**.

   Depending on which option you selected, the Create/Add Package screen is displayed or the Modify Package screen is displayed.
6. If you have not yet done so, specify a Package Name and Node and Specify a Package SUBNET Address. Then click on “Specify Package Resource Dependencies…” to add PSM resources as package dependencies. The Package Resource Dependencies screen is displayed.
7. To make a package dependent on an EMS HA Monitors resource, click Add Resource. The Add Resources screen is displayed listing all the installed resources discovered by MC/ServiceGuard. The resource classes used for PSM monitoring are adapters, connectivity, storage, and system.
8. Double-click on the appropriate PSM resource class, then on the status class, then on the remaining resource subclasses until the PSM monitor instances are displayed in the **Resource Names** list. Select the desired PSM resource and click OK. A Resource Parameters screen is displayed
9. Enter an appropriate **Resource Polling Interval** value. This value determines how often EMS checks the PSM for changes in status. The value you select for polling should be related to how critical the resource is to system operation. You may want to use a short polling interval for critical resources, and a longer interval for non-critical resources. Be aware that polling can impact system performance, so avoid using a short polling interval for all resources.
10. Select **UP** from the list of **Available Resource Values**, then click **< — Add —** .
11. Click **OK** to add the package dependency.

Package failover will now occur if the status of the resource changes from UP.

Configuring Package Dependencies by Editing the Configuration File

You can also add PSM package dependencies by editing the package configuration file in `/etc/cmcluster/pkg.ascii`. See the *Managing MC/ServiceGuard* for details on modifying this file.

When using the MC/ServiceGuard commands (e.g., `cmapplyconf`) to specify the use of the PSM Resource Monitor, the section of the package configuration file that has the keyword “RESOURCE_NAME” must be uncommented and set to the value of the resource name of interest. The PSM has a different resource path name for hardware resource being monitored.

For example, assume you want to create a dependency on a SCSI disk that has a resource path of `/storage/status/disks/default/10_0_5.0.0`. You want to use a polling interval of 10 seconds and identify UP as the only state that will not cause failover. The following entry would be added to the configuration file to add a package dependency for this disk:

```
RESOURCE_NAME /storage/status/disks/default/10_0_5.0.0
RESOURCE_POLLING_INTERVAL   10
RESOURCE_UP_VALUE     =UP
```

Creating EMS Monitoring Requests for PSM

In addition to creating MC/ServiceGuard package dependencies, you can also use the PSM to create EMS monitoring requests. Because it is a state monitor rather than an event monitor, the process and options available for creating PSM requests with EMS are identical to those for the other system monitors available for EMS.

To create a PSM monitoring request:

1. From the command line, start the graphical version of SAM by typing: `sam`
2. Double-click the Resource Management icon.
3. Double-click on the Event Monitoring Service icon.

   The Event Monitoring Service main screen is displayed showing all monitoring requests configured on the system. Included are any PSM monitoring requests you may have created, and any requests created for other EMS monitors that may be running on your system. If you have not created any requests, the field area of the screen will be empty.
4. From the **Actions** menu select **Add Monitoring Request**.

   The top level resource classes are displayed. The resource classes used for PSM monitoring are adapters, connectivity, storage, and system.
5. Double-click on the appropriate resource class, then on the status class, then on the remaining resource subclasses until the PSM monitor instances are displayed in the **Resource Instance** list.
6. Select the desired PSM resource instance and click OK. If there are multiple instances, you can select the *** (All Instances)** option to apply the monitoring request to all instances of the selected resource. All Instances is a convenient way to create many requests at one time.

   The Monitoring Request Parameters screen is displayed for the selected PSM resource.
7. Using the various parameter fields available, define the monitoring request. A description of the various parameters and how they are used is included in the following section.

   Although there are many possible ways to define the monitoring request, the following settings are recommended for PSM requests:

   - **Notify** conditions set to "**Notify When value is...Not Equal Up (0)**"
   - **Options** set to **Initial** and **Return**
   - **Polling** Interval set to an appropriate value
   - **Notify via** set to the desired notification method
8. Click **OK** to save the monitoring request. The request will be added to those in the Current Monitoring Requests screen.

Repeat the above steps for each new PSM monitoring request. It will be necessary to create a new monitoring request for each notification method.

Monitoring Request Parameters

The following information describes in detail the monitoring request parameters and offers tips on how to use them.

Specifying When to Send Event - <Notify>

One of the first steps in creating a monitoring request involves specifying the conditions under which you want to be alerted. The following options are available for selecting when to send an alert.

Table 4-2 PSM Status

When value is...	You define the conditions under which you wish to be notified for a particular resource using an operator (=, not equal, >, >=, <, <=) and a value returned by the monitor (UP, DOWN, UNKNOWN). Text values are mapped to numerical values.
When value changes	This notification might be used for a resource that does not change frequently, but you need to know each time it does.
At each interval	This sends notification at each polling interval. It would most commonly be used for reminders or gathering data for system analysis. Use this for only a small number of resources at a time, and with long polling intervals of several minutes or hours; there is a risk of affecting system performance.

Determining the Frequency of Events - <Options>

If you select the **When value is...** from the <Notify> options, the Options box is displayed. Select one or more of these options:

Table 4-3 PSM Status

Initial	Use this option for testing a new request to ensure it is sending alerts to the desired destinations.
Repeat	Use this option for urgent alerts. The Repeat option sends an alert at each polling interval as long as the notify condition is met. Use this option with caution; there is a risk of high CPU use or filling log files and alert windows.
Return	Use this option to track when a condition returns to its previous value.

These Options are not available if you have selected **When value changes** or **At each interval** from the <Notify> list. In these cases the options default to:

- Repeat and Return - Not selected
- Initial - Selected

Setting the Polling Interval - <Polling Interval>

The polling interval specifies how often EMS will check the PSM for changes in hardware status. The polling interval is the maximum amount of elapsed time before EMS will be aware of a change in status for the hardware resource being monitored. A short polling interval will ensure that you have recent data. However, a short polling interval may use more CPU and system resources. You must weigh the importance of being able to respond quickly against the importance of maintaining good system performance.

Some considerations include:

- MC/ServiceGuard monitors resources every few seconds. You may want to use a short polling interval (30 seconds or less) when it is critical that you make a quick failover decision.
- You may want a polling interval of 5 minutes or so for monitoring less critical resources.
- You may want to set a very long polling interval (4 hours) to monitor failed disks that are not essential to the system, but which should be replaced in the next few days.

Selecting Protocols for Sending Events - <Notify Via>

Using the <Notify via> option, you can specify the method EMS uses to send events. The options are:

opcmsg ITO

This option sends messages to ITO applications via the opcmsg daemon. IT Operation 4.0 or above must be installed on the resource server for this option to display.

The ITO message severity options are:

- **Critical**
- **Major**
- **Minor**
- **Warning**
- **Normal**

A specified severity other than Normal is returned under the following conditions:

- The **When value is . . .** condition evaluates to TRUE
- The **When value changes** condition evaluates to TRUE

See the *HP OpenView IT/Operations Administrators Task Guide* (Part Number B4249-90003) for more information on configuring notification severity.

Templates for configuring IT/Operations and Network Node events can be found on the Hewlett-Packard High Availability public web page at `http://www.hp.com/go/ha`.

To set the opcmsg ITO:

1. Specify the notification type from the <Notify> list.
2. Select the opcmsg ITO option from the <Notify via> list.
3. Select the severity from the <Severity> list, (**Critical, Major, Minor, Warning, Normal**).

SNMP traps

This option sends messages to applications using SNMP traps, such as Network Node Manager. See *HP OpenView Using Network Node Manager* (P/N J1169-90002) for more information on configuring SNMP traps.

The following traps are used by EMS:

```
EMS_ENTERPRISE_OID     "1.3.6.1.4.1.11.2.3.1.7"
EMS_NORMAL_OID         "1.3.6.1.4.1.11.2.3.1.7.0.1" - Normal notification
EMS_ABNORMAL_OID       "1.3.6.1.4.1.11.2.3.1.7.0.2" - Abnormal notification
EMS_REBOOT_OID         "1.3.6.1.4.1.11.2.3.1.7.0.3" - Reboot notification
EMS_RESTART_OID        "1.3.6.1.4.1.11.2.3.1.7.0.4" - Restart notification
EMS_NORMAL_SEV_OID     "1.3.6.1.4.1.11.2.3.1.7.0.5" - Problem Event w/Normal Severity notification
EMS_WARNING_SEV_OID    "1.3.6.1.4.1.11.2.3.1.7.0.6" - Problem Event w/Warning Severity notification
EMS_MINOR_SEV_OID      "1.3.6.1.4.1.11.2.3.1.7.0.7" - Problem Event w/Minor Severity notification
EMS_MAJOR_SEV_OID      "1.3.6.1.4.1.11.2.3.1.7.0.8" - Problem Event w/Major Severity notification
EMS_CRITICAL_SEV_OID   "1.3.6.1.4.1.11.2.3.1.7.0.9" - Problem Event w/Critical Severity notification
```

Specify the ITO message severity for both normal and abnormal events:

- **Critical**
- **Major**
- **Minor**
- **Warning**
- **Normal**

A specified severity other than Normal is returned under the following conditions:

Certain SNMP trap monitoring requests can map directly to severity levels. For these requests, a toggle button <Map severity from value> is displayed. If this is selected, options selected from <Severity> are ignored.

- The **When value is...** condition evaluates to TRUE
- The **When value changes** condition evaluates to TRUE

To set the SNMP trap:

1. Specify the notification type from the <Notify> list.
2. Select the opcmsg ITO option from the <Notify via> list.
3. Select the severity from the <Severity> list, (**Critical, Major, Minor, Warning, Normal**).

TCP and UDP

This option sends TCP or UDP encoded events to the target host name and port indicated for that request. Thus the message can be directed to a user-written socket program.

To set the TCP or UDP conditions:

1. Select the **TCP** or **UDP** option, as appropriate, from the <Notify via> list.
2. Specify the target host name and the port.

email

This option sends event notification to the specified email address

To set for email notification:

1. Select the **Email** option from the <Notify via> list.
2. Specify the full email address in the Email Address field.

syslog

This option sends event notification to the system log.

For an abnormal event, a system logging level of `error` will be associated with the logged message.

An abnormal event message (error) is returned under the following conditions:

- The **When value is . . .** condition evaluates to TRUE
- The **When value changes** condition evaluates to TRUE

To set for a system log notification:

1. Select the Syslog option from the <Notify via> list.

Console

This option sends event notification to the system console.

To set for a console notification:

1. Select the **Console** option from the <Notify via> list.

Textlog

This option sends event notification to the specified file.

To set for an text log notification:

1. Select the **Textlog** option from the <Notify via> list.
2. Specify the filename and path in the File Path field.

A default path, `/var/opt/resmon/log/event.log`, is displayed when the Textlog option is selected.

Note that EMS HA Monitors will not create the file, it will add notifications to an existing file.

Adding a Notification Comment - <Comment>

The notification comment is useful for sending task reminders to the recipients of an event. For example, you may want to add the name of the person to contact if an event occurs. If you have configured MC/ServiceGuard package dependencies, you may want to enter the package name as a comment in the corresponding request.

Copying Monitoring Requests

There are two ways to use the copy function:

- To create requests for *multiple* resources using the same monitoring parameters. This is a quick way to set requests for multiple resources.
- To create requests for the same resource using *different* monitoring parameters. This is a quick way to create requests that send events using multiple notification methods.

To create requests for multiple resources using the same monitoring parameters:

1. From the Event Monitoring Service main screen, select the monitoring request whose parameters you wish to copy. You need to have configured at least one similar request for a similar instance.
2. From the **Actions** menu select **Copy Monitoring Request**.

   The Add Monitoring Request screen is displayed.
3. From the Add Monitoring Request screen, select a different resource instance and click **OK**.

   The Monitoring Request Parameters screen is displayed.
4. Click **OK** in the Monitoring Request Parameters screen.

   A message is displayed indicating the new request has been added, and the Event Monitoring Service main screen is displayed.

To create requests for the same resource using different monitoring parameters:

1. From the Event Monitor Service main screen, select the monitoring request with the instance for which you wish to have multiple monitoring requests.

   You need to have configured at least one request for the instance.
2. From the **Actions** menu select **Copy Monitoring Request**.

   The Add Monitoring Request screen is displayed.
3. Click **OK** in the Add Monitoring Request screen.

   The Monitoring Request Parameters screen is displayed.
4. In the Monitoring Request Parameters screen, modify the parameters as desired.
5. Click **OK**.

   A message is displayed indicating the new request has been added, and the Event Monitoring Service main screen is displayed.

Modifying Monitoring Requests

To change the monitoring parameters of a request:

1. From the Event Monitoring Service main screen, select the monitoring request whose parameters you wish to modify.
2. From the **Actions** menu select **Modify Monitoring Request**.

   The Monitoring Request Parameters screen is displayed.
3. In the Monitoring Request Parameters screen, modify the parameters as desired.
4. Click **OK**.

A message is displayed indicating the request has been modified, and the Event Monitoring Service main screen is displayed.

Removing Monitoring Requests

The Remove Monitoring Requests functions with multiple requests as well as single requests.

To remove monitoring requests:

1. From the Event Monitoring Service main screen, select the monitoring request you wish to remove.

   To select contiguous multiple requests, hold the **Shift** key and click.

   To select individual multiple requests, hold the **Ctrl** key and click.

2. From the **Actions** menu select **Remove Monitoring Request**.

   A Confirmation screen is displayed.

3. Click **OK**.

   A message is displayed indicating the request(s) has been removed, and the Event Monitoring Service main screen is displayed.

4. To start monitoring the resource again you must recreate the request, either by copying a similar request for a similar resource or by re-entering the information.

Viewing Monitoring Requests

To view the parameters for a monitoring request:

1. From the Event Monitoring Service main screen, select the monitoring request you wish to view and either:
   - Double-click, or
   - From the **Actions** menu select **View Monitoring Request**

   The View Monitoring Request Parameters screen is displayed. The parameters listed here match the parameters specified for the monitoring request.
2. To exit the View Monitoring Request screen, click **OK**.

Using the `set_fixed` Utility to Restore Hardware UP State

Most hardware event monitors cannot detect when a hardware failure has been repaired and the resource has been returned to normal operation. Consequently, these monitors cannot alert the PSM to change the status of its hardware resources from DOWN to UP. It is necessary for you to manually change the status of the hardware resources using the `set_fixed` utility included with the PSM. To determine if a monitor requires use of the `set_fixed` utility, refer to the monitor descriptions in Chapter 6, "Monitor Data Sheets."

The `set_fixed` utility includes its own man page describing how to change the state of the resource.

NOTE Make sure you have repaired the problem before you use the `set_fixed` utility to return the hardware resource status to UP. If the hardware is not repaired, the change in status to UP may cause MC/ServiceGuard to erroneously assume the hardware is working properly.

To restore the operating state of a resource to UP:

1. If necessary, list the hardware resources that currently have a status of DOWN by typing:

   ```
   /etc/opt/resmon/lbin/set_fixed -L
   ```

2. Set the status of the DOWN hardware resource to UP by typing:

   ```
   set_fixed -n resource_name
   ```

The *resource_name* is the status resource path name to the hardware resource that has been repaired. When specifying the *resource_name* you can use wildcards such as "*" to indicate all instances.

Example 4-1 Example of Using `set_fixed`

The following example sets to UP the status of the SCSI tape device at hardware path 10_12_5.0.0

```
set_fixed -n /storage/status/tapes/SCSI_tape/10_12_5.0.0
```

The following example sets to UP the status of all AutoRAID disk arrays.

```
set_fixed -n /storage/status/disk_arrays/AutoRAID/*
```

5 Hardware Monitor Configuration Files

Several configuration files are used to control the operation of each hardware event monitor. The operation of the monitor can be altered by editing the contents of the various configuration files. Before altering the contents of a configuration file, you should have a thorough understanding of what effects the changes will have on monitor operation. The following paragraphs should provide the understanding you need for using configuration files properly.

CAUTION Before editing any configuration file, create a backup copy of it. This will allow you to recreate the original environment if the changes you make do not produce the desired results.

Overview

Understanding Multiple-View and Non-Multiple-View Monitor Classes

EMS Hardware Monitors are divided into two classes: Multiple-View and Non-Multiple-View. Multiple-View monitors allow you to specify different event messages (for the same monitor) to one or more targets (“clients”). Targets may have different requirements for events, so event messages can be configured to be unique for each target. Non-Multiple-View monitor event messages are generated in the same way for all targets.

Within these two monitor classes, there are configuration files that control the operation of each hardware event monitor. Both classes of monitors use the Global and Monitor-specific configuration files (.cfg) to configure required monitor settings such as POLL_INTERVAL. In addition, Multiple-View monitors also use the Client Configuration file (.clcfg). The client configuration file allows you to configure different event messages for multiple targets.

Monitor Configuration File Types

The following configuration files control the operation of each hardware event monitor:

- **Global monitor configuration file**. The settings defined in this file are used for all monitors, unless overridden by a monitor-specific or client configuration file.
- **Monitor-specific configuration file**. Each monitor includes its own configuration file with optimized settings. Settings defined in the monitor-specific file override comparable settings defined in the global configuration file.
- **Client configuration file**. With Multiple-View hardware monitors, you can create a different Client Configuration File (*.clcfg) for each target. Settings defined in the client configuration file override comparable settings defined in either the global or monitor-specific configuration files.

NOTE For Multiple-View monitors, settings not defined in the Client Configuration File (*.clcfg) such as the POLL_INTERVAL, must be defined in either the Global or Monitor-specific configuration file (*.cfg).

Client Configuration File

As of the June 2000 release, several of the hardware monitors have been converted to be multiple-view. These monitors use an additional file for configuration, the Client Configuration File (for example, `default_disk_em.clcfg`.)

The immediate purpose of this change is to enable HP Support Applications to work with hardware monitors. There will also be long-term benefits, as well.

Clients: Targets for Events

When a hardware monitor detects an event, it can send an event message to one or more targets ("clients"). Previously, EMS hardware monitors generated events in the same way for all targets. The problem is that different targets, such as HP Support, may have different requirements for events.

The June 2000 release introduced the Multiple-View feature to several monitors; this feature will be added to most hardware monitors in future releases.

Creating a Client Configuration File (*.clcfg)

With Multiple-View hardware monitors, you can create a different Client Configuration File (*.clcfg) for each target. In this file, you can specify:

- The text to be included in event messages.
- "Qualification requirements": the time or value thresholds a problem must meet in order to generate an event. For example, the default time threshold might be to send an event if the problem is seen six times in 24 hours; however, HP Support may want to see the event three times in 24 hours. Another example: the default value threshold might be to send the event when the value associated with the problem is greater than or equal to 80, but HP Support may want to see the event when the value is greater than or equal to 70.
- Events to be enabled/disabled for a given target. For example, event 1 may be enabled for target #1, but disabled for target #2.
- Severity level for an event sent to a given target. For example, event 3 may have a severity level of CRITICAL for target #1, but a severity level of MAJOR_WARNING for target #2.

The default Client Configuration File (*.clcfg) is:

```
/var/stm/config/tools/monitor/default_MONITOR_NAME.clcfg
```

For example:

```
/var/stm/config/tools/monitor/default_disk_em.clcfg
```

The Client Configuration File for the HP Support Applications client would be:

```
/var/stm/config/tools/monitor/xxx_disk_em.clcfg
```

Verifying Monitors with a Test Event

As of the June 2000 release of the diagnostics, a standalone program is available to cause multiple-view EMS hardware monitors to generate a test event:

```
/opt/resmon/bin/send_test_event
```

OR

```
/etc/opt/resmon/lbin/send_test_event
```

The program was created for HP Support Applications to ensure that the communication mechanism from the monitor to HP Support is working. However, it can be used by customers to ensure the same thing: that the communication mechanisms from the monitor to their notification method (email, event log, SNMP trap, etc.) are working.

The program will not work with monitors that have not been updated to be multiple-view. In the long-term, all monitors are planned to be updated to be multiple-view.

Before the send_test_event program can be run, the monitors must be enabled and configured. (That is, when you run monconfig, it should say that monitoring is enabled and when you do a “Check”, the requests show up.)

The test event is #103 with a default severity of "INFORMATION". To test delivery to notification targets that by default only receive higher severity events (e.g. syslog or email to root, which receive "MAJOR_WARNING" or higher events only), you must edit the .clcfg file for the monitor to change the severity of event #103.

For more information on the command, see the manpage for send_test_event.

Sample Client Configuration File

The following is a sample of a client configuration (.clcfg) file.

```
# There are 4 types of entries in this file.   HOST_ID, DEV_ID, EQ,
# CLCFG_VERSION. Each entry starts with the appropriate tag,
# followed by one or more colon separated fields.  The number of fields and
# valid values for each field depends
# on the tag.
#
# Each entry in this file must be one line.  Meaning, no returns can be
# put in the middle of a line.  This may mean that the EQ entries will wrap.
# Text fields in the entries are case sensitive.
#
# Host ids that should be added to the event.  This information will
# be added in the order the tags are listed
# Possible host ids are:
# host_model_num
# host_os_version
# host_fw_version
# host_serial_num
# host_sw_id
# host_ems_version
# host_stm_version
# Example:
# HOST_ID: host_ems_version : host_stm_version
HOST_ID:host_model_num:host_ems_version:host_stm_version

# Device ids that should be added to the event. This information will be
# added in the order the tags are listed
# NOTE: these are specific to this monitor
# Example:
# DEV_ID: dev_product : dev_qualifier
DEV_ID:dev_pdev:dev_inq_vendor:dev_inq_prod:dev_fw_version:dev_serial_num
#DEV_ID:dev_pdev:dev_comp_tag2

# Event qualification entries for events generated by this monitor.
# NOTE: the event numbers are specific to this monitor.
# Example:
```

```
# EQ : event_number : severity : enable flag : suppression time : time window :
# threshold : value threshold 1 : operator 1 : operator 2 : value threshold 2
# event_number : the number of the event
# string of "OTHER" means use this entry when no other EQ entry matches
# event number
#
# severity : the severity of the event.  Valid values are:
#CRITICAL
#SERIOUS
#MAJOR_WARNING
#MINOR_WARNING
#INFORMATION
#
# enable flag : whether the event is enabled.  Valid values are:
#TRUE  - event is enabled
#FALSE - event is not enabled
#
# suppression time : time, in seconds, to suppress generation and trending
# for this event after generating the event.
# Valid values are:
#NOT_USED - Never suppress the event
#1 - maxint - number of seconds to suppress
#
# time window: amount of time, in seconds, event must be seen to
# qualify event.  Valid values are:
#NOT_USED - time window thresholding not used
#ANY - time window thresholding used but no time window specified
#1-maxint - time need to see threshold events to qualify
#
# threshold : number of times in time window event must be seen to qualify
# event.  Valid values are:
#1-maxint
# NOTE: to configure event to always be generated every time it is seen,
# threshold should be set to 1 and time window should be set to "ANY"
# value threshold X, operator X : value thresholds to qualify event.
# Valid values for value threshold depend on the type of value associated
# with the event.  However, predefined value of "NONE" means this value
# threshold is not used.  Valid values for operator X are:
#NO_OP - this operator not used
# >, < , >=, <=,==, !=.
# These values are used to qualify the event using the following logic:
#  value threshold 1 operator 1 value operator 2 value threshold 2
# For example, if the value is an integer and want to qualify event if
# value is between 60 and 70, inclusive, the entry would be:
# 60 : <= : <= 70.  If the value is an integer and want to qualify event
# if value is > 70, the entry would be : NONE : NO_OP : > : 70.

#
#
# Define event  #100 to be information severity, enabled, never suppressed
# and qualified every time it occurs
EQ:100:INFORMATION:TRUE:NOT_USED: ANY:1:NONE:NO_OP:NO_OP:NONE
# Define event  #101 to be critical severity, enabled, never suppressed
# and qualified every time it occurs
EQ:101:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
EQ:100072:CRITICAL:TRUE:NOT_USED: ANY :1:NONE:NO_OP:NO_OP:NONE
#
# CLCFG_VERSION is used to define the version of this file
# This information will be added to the additional event data portion
# of the event text
# CLCFG_VERSION:V.UU.FF
CLCFG_VERSION:A.01.01

EQ:103:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
```

```
# msa1000 events
EQ:110:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:111:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:120:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:121:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:130:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:131:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:140:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:141:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:150:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:151:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:220:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:221:MAJOR_WARNING:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:222:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:230:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:231:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:232:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:233:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:300:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:301:MAJOR_WARNING:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:302:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:310:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:312:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:320:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:322:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:330:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:331:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:400:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:500:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:501:MAJOR_WARNING:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:502:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:503:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
```

```
EQ:510:CRITICAL:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:520:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:600:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:900:MAJOR_WARNING:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:901:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:902:MAJOR_WARNING:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:903:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:904:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:905:MAJOR_WARNING:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
EQ:906:INFORMATION:TRUE:NOT_USED:ANY:1:NONE:NO_OP:NO_OP:NONE
#
```

Monitor-Specific and Global Configuration Files

The common operating parameters defined by the monitor-specific and global configuration files for all non-multiple-view monitors include:

- Polling Interval - identifies the frequency at which the monitor polls the hardware for status. This value is selected to provide current device status without seriously impacting system performance.
- Repeat Frequency - indicates how often the same event should be reported. Events that continue to exist should not overburden the system with a continuous stream of messages. A value of once a day is used as the default repeat frequency.
- Severity Action - determines whether the severity level will be passed to EMS for reporting or ignored.
- Event Definition - identifies each event handled by the monitor, defines its severity level, and determines what action the monitor will take when the event occurs. Actions include ignoring the event, passing it on to EMS, or using the default action defined by the Severity Action setting.

NOTE **When Do Changes Made to a Configuration File Take Effect?**

Changes made to a monitor-specific configuration file are invoked at the next polling interval or when an event occurs, which ever comes first. In either of these situations, the monitor reads its configuration file for any changes and implements any new settings.

File Names

Global configuration file: `/var/stm/config/tools/monitor/Global.cfg`

The file naming convention for the monitor-specific configuration files is:
`/var/stm/config/tools/monitor/monitor_name.cfg`

`monitorname` is the name of the monitor executable

File Format

Settings in the device configuration file use the following conventions:

- Configuration settings consist of a term defining the characteristic to be configured, followed by a value assigned to the term.

  For example, `POLL_INTERVAL 60`

- There must be at least one space between the term and each value.
- Comments begin with the pound character (#) and continue until the end of the line. A comment may occur on a line by itself, or after a blank space following the value in a configuration entry.

  For example, either of the following are valid comments:

```
# Valid values for severity_name are:

SEVERITY_ACTION   CRITICAL NOTIFY   # notify on critical events
```

Table 5-1 lists the common fields used to define monitor configuration settings. In addition to the common parameters, some monitors include other parameters in their configuration file. Any additional configuration parameters used by each monitor are listed in the monitor descriptions in the data sheets for the hardware event monitors available on the Web at `http://docs.hp.com/hpux/onlinedocs/diag/ems/emd_summ.htm`.

NOTE An HP-UX man page is available for each monitor. To access the man page, type (where `monitorname` is the executable file listed in the data sheet): **man** `monitorname`

Table 5-1 Monitor Configuration File Entries

Setting	Values	Description
SEVERITY_ACTION <severity> <action>	Valid **severity** values are: CRITICAL SERIOUS MAJOR_WARNING MINOR_WARNING INFORMATIONAL Valid **action** values are: NOTIFY IGNORE	Defines whether the monitor should report or ignore events for the indicated severity level.
DEFINE_EVENT <event_num><severity> <action>	**event_num** must be a positive integer less than 65536 for monitor-defined events, or larger than 100000 for SCSI default events Valid **severity** values are: CRITICAL SERIOUS MAJOR_WARNING MINOR_WARNING INFORMATIONAL Valid **action** values are: NOTIFY IGNORE DEFAULT	Identifies an event, the severity to be applied to the event, and the action the monitor should take when the event occurs. An action of DEFAULT indicates that the value specified in the SEVERITY_ACTION definition for the specified severity should be used.
POLL_INTERVAL <interval>	**interval** must be a positive integer indicating number of minutes to wait between polls	Defines how often the monitor should poll the device to determine if an event has occurred.

Table 5-1 Monitor Configuration File Entries (Continued)

Setting	Values	Description
REPEAT_FREQUENCY <frequency>	**frequency** must be a positive integer indicating the number of minutes to wait before a repeat event can be generated	Defines how often repeat alerts should be generated for the same event. Events for a specific device should not be reported more often than the specified frequency.

Considerations for Modifying the Monitor Configuration File Settings

The default configuration settings for each monitor have been carefully selected to provide efficient monitoring for most systems. However, it may be necessary to modify these settings in specific situations. Here are some considerations for altering the configuration settings.

NOTE Settings in the `Global.cfg` configuration file apply to all monitors, so you should avoid changing these settings. If you need to change the parameters for a monitor, do so using the monitor-specific configuration file.

Monitor Configuration File Settings

Event Definition

You may want to alter the event definition in a monitor-specific configuration file to change the severity level assigned to an event, or to suppress reporting of an event.

NOTE Be aware that any changes you make to the event definition will impact all instances of the monitor's hardware resources. You cannot modify the behavior of a specific hardware resource. For example, if a disk array is repeatedly reporting the same event and you would like to suppress it, you can do so by changing the event definition. But the change will suppress that event even if it occurs on a different disk array. This may not be the result you want.

- **Changing the severity level assigned to an event.** If you feel that the severity level assigned to an event does not reflect its importance in your environment, you can make the event more or less important. For example, if an event is currently assigned a severity level of MAJOR WARNING but from experience you feel it represents a CRITICAL condition, you can change the DEFINE_EVENT setting for the event.
- **Ignoring an event**. By default, all events are reported. If you are getting repeated notification for an event, you can ignore the event. When the condition that caused the event is corrected, you can once again set the event for notification.

Severity Action

By default, all severity levels are reported to EMS. This default was selected because even lower level events such as INFORMATION may provide valuable data for identifying trends that could lead to more serious conditions. Consequently, it is recommended that you do not suppress the reporting of any events.

However, if you do want to suppress the reporting of less important events, you can change the severity action to IGNORE. This will affect all events in that category, and all instances of the monitor's hardware resources.

Polling Interval

If you need more frequent polling to isolate a potential problem with the hardware, the polling interval can be reduced. Be aware that more frequent polling may impact system performance, so you may want to shorten the polling period only temporarily until the problem is solved. Avoid using a low polling interval for all monitors or system performance may suffer.

Repeat Frequency

If you need to be alerted to an event frequently, the repeat frequency can be reduced. The default repeat frequency is once a day.

Sample Global Configuration File

The following sample shows a portion of the global monitor configuration file.

```
# Global.cfg, $Revision: 1.10 $
#-------------------------------------------------------
# Global.cfg : Sentinel Global Configuration File
#-------------------------------------------------------

POLL_INTERVAL       60          # in minutes (one hour)

REPEAT_FREQUENCY  1440          # in minutes (one day)


#-------------------------------------------------------
#             DEFAULT ACTIONS FOR EACH SEVERITY
#             (Action can be NOTIFY or IGNORE)
#-------------------------------------------------------
SEVERITY_ACTION   CRITICAL        NOTIFY
SEVERITY_ACTION   SERIOUS         NOTIFY
SEVERITY_ACTION   MAJOR_WARNING   NOTIFY
SEVERITY_ACTION   MINOR_WARNING   NOTIFY
SEVERITY_ACTION   INFORMATION     NOTIFY


#-------------------------------------------------------
#       EXPLANATION OF EVENT CONFIGURATION LINES
#-------------------------------------------------------
#
#  config--verb event# --severity--- action- -msg-number-in-library-catalog-
#
#  DEFINE_EVENT 100001 INFORMATION   DEFAULT # msg num 1
#
#-------------------------------------------------------
#  EXPLANATION OF DEVICE STATUS INTERPRETATION FOR EVENT
#-------------------------------------------------------
#
#                     D          = DIRECT ACCESS DEVICE
#                      T         = SEQUENTIAL ACCESS DEVICE
#                       L        = PRINTER DEVICE
#                        P       = PROCESSOR DEVICE
#                         W      = WRITE ONCE READ MULTIPLE DEVICE
#                          R     = READ ONLY (CD-ROM) DEVICE
#                           S    = SCANNER DEVICE
#                            O   = OPTICAL MEMORY DEVICE
#                             M  = MEDIA CHANGER DEVICE
```

```
#                             C = COMMUNICATION DEVICE
#
#                    DTLPWRSOMC = SCSI Device Class
#
#--> [ 28 00 06 -- ] DTLPWRSOMC Not-ready to ready transition. Medium changed.
#
#      cc qq kk ss   Data elements equating to event
#
#      cc          = SCSI Additional Sense Code
#         qq       = SCSI Additional Sense Code Qualifier
#            kk    = SCSI Sense Key
#               ss = SCSI Hardware Status
#
#-------------------------------------------------------------
#      DEFAULT CONFIGURATION FOR SCSI DEVICE EVENTS
#-------------------------------------------------------------

DEFINE_EVENT 100101 INFORMATION   DEFAULT # msg num 1
#     [ 00 00 00 -- ] DTLPWRSOMC No additional sense information.
DEFINE_EVENT 100201 INFORMATION   DEFAULT # msg num 1
#     [ -- -- 00 -- ]
DEFINE_EVENT 100301 INFORMATION   DEFAULT # msg num 171
#     [ -- -- 0c -- ]
DEFINE_EVENT 100401 INFORMATION   DEFAULT # msg num 1
#     [ -- -- -- 00 ]
DEFINE_EVENT 100501 INFORMATION   DEFAULT # msg num 171
#     [ -- -- -- 04 ]

#-------------------------------------------------------------

DEFINE_EVENT 100002 INFORMATION   DEFAULT # msg num 2
#     [ 48 00 06 -- ] DTLPWRSOMC Initiator detected error message received.
#-------------------------------------------------------------

DEFINE_EVENT 100103 INFORMATION   DEFAULT # msg num 3
#     [ 53 02 06 -- ] DT--WR-OM- Medium removal prevented.
DEFINE_EVENT 100203 INFORMATION   DEFAULT # msg num 195
#     [ 5c 01 -- -- ] DT--WR-OM- Medium removal prevented.

#-------------------------------------------------------------

DEFINE_EVENT 100004 INFORMATION   DEFAULT # msg num 4
#     [ 5a 00 06 -- ] DTLPWRSOM- Operator request or state change input

#-------------------------------------------------------------

DEFINE_EVENT 100005 INFORMATION   DEFAULT # msg num 5
#     [ 5a 01 06 -- ] DT--WR-OM- Operator medium removal request.

#-------------------------------------------------------------

DEFINE_EVENT 100006 INFORMATION   DEFAULT # msg num 6
#     [ 5a 02 06 -- ] DT--W--O-- Operator selected write protect.

#-------------------------------------------------------------

DEFINE_EVENT 100007 INFORMATION   DEFAULT # msg num 7
#     [ 5a 03 06 -- ] DT--W--O-- Operator selected write permit.

#-------------------------------------------------------------

DEFINE_EVENT 100108 INFORMATION   DEFAULT # msg num 8
#     [ 28 00 06 -- ] DTLPWRSOMC Not-ready to ready transition. Medium changed.
DEFINE_EVENT 100208 INFORMATION   DEFAULT # msg num 8
```

```
#    [ 30 01 06 -- ]
DEFINE_EVENT 100308 INFORMATION   DEFAULT # msg num 8
#    [ 3a 00 06 -- ]

#-------------------------------------------------------

DEFINE_EVENT 100109 INFORMATION   DEFAULT # msg num 9
#    [ 30 00 06 -- ]
DEFINE_EVENT 100209 INFORMATION   DEFAULT # msg num 9
#    [ 30 02 06 -- ] DT--WR-O-- Cannot read medium - incompatible format.

#-------------------------------------------------------
DEFINE_EVENT 100010 INFORMATION   DEFAULT # msg num 10
#    [ 30 03 06 -- ] DT-------- Cleaning cartridge installed.

#-------------------------------------------------------

DEFINE_EVENT 100111 INFORMATION   DEFAULT # msg num 11
#    [ 27 00 06 -- ] DT--W--O-- Write protected.
DEFINE_EVENT 100211 INFORMATION   DEFAULT # msg num 11
#    [ 27 00 07 -- ]
DEFINE_EVENT 100311 INFORMATION   DEFAULT # msg num 11
#    [ -- -- 07 -- ]

#-------------------------------------------------------

DEFINE_EVENT 100012 INFORMATION   DEFAULT # msg num 12
#    [ 51 00 06 -- ] -T-----O-- Erase failure.

#-------------------------------------------------------

DEFINE_EVENT 100013 INFORMATION   DEFAULT # msg num 13
#    [ 00 11 00 -- ] -----R---- Audio play operation in progress.

#-------------------------------------------------------

DEFINE_EVENT 100014 INFORMATION   DEFAULT # msg num 14
#    [ 00 12 00 -- ] -----R---- Audio play operation paused.

#-------------------------------------------------------

DEFINE_EVENT 100015 INFORMATION   DEFAULT # msg num 15
#    [ 00 13 00 -- ] -----R---- Audio play operation successfully completed.

#-------------------------------------------------------

DEFINE_EVENT 100016 INFORMATION   DEFAULT # msg num 16
#    [ 00 15 00 -- ] -----R---- No current audio status to return.

#-------------------------------------------------------

DEFINE_EVENT 100017 INFORMATION   DEFAULT # msg num 17
#    [ 3f 00 06 -- ] DTLPWRSOMC Target operating conditions have changed.

#-------------------------------------------------------

DEFINE_EVENT 100018 INFORMATION   DEFAULT # msg num 18
#    [ 3f 01 06 -- ] DTLPWRSOMC Microcode has been changed.

#-------------------------------------------------------

DEFINE_EVENT 100019 INFORMATION   DEFAULT # msg num 19
#    [ 3f 02 06 -- ] DTLPWRSOMC Changed operating definition.
```

```
#-------------------------------------------------------

DEFINE_EVENT 100020 INFORMATION   DEFAULT # msg num 20
#    [ 3f 03 06 -- ] DTLPWRSOMC Inquiry data has changed.

#-------------------------------------------------------

DEFINE_EVENT 100021 INFORMATION   DEFAULT # msg num 21
#    [ 2a 00 06 -- ] DTL-WRSOMC Parameters changed.

#-------------------------------------------------------

DEFINE_EVENT 100022 INFORMATION   DEFAULT # msg num 22
#    [ 2a 01 06 -- ] DTL-WRSOMC Mode parameters changed.

#-------------------------------------------------------

DEFINE_EVENT 100023 INFORMATION   DEFAULT # msg num 23
#    [ 2a 02 06 -- ] DTL-WRSOMC Log parameters changed.

#-------------------------------------------------------

DEFINE_EVENT 100024 INFORMATION   DEFAULT # msg num 24
#    [ 5c 00 06 -- ] D------O-- Rpl status change.

#-------------------------------------------------------

DEFINE_EVENT 100025 MINOR_WARNING DEFAULT # msg num 25
#    [ 59 00 01 -- ] -------O-- Updated block read.

#-------------------------------------------------------

DEFINE_EVENT 100126 MINOR_WARNING DEFAULT # msg num 43
#    [ 0c 01 01 -- ] D---W--O-- Write error recovered with auto reallocation.
DEFINE_EVENT 100226 MINOR_WARNING DEFAULT # msg num 193
#    [ 11 06 -- -- ]
DEFINE_EVENT 100326 MINOR_WARNING DEFAULT # msg num 26
#    [ 17 00 01 -- ] DT--WRSO-- Recovered data with no ecc applied.
DEFINE_EVENT 100426 MINOR_WARNING DEFAULT # msg num 27
#    [ 17 01 01 -- ] DT--WRSO-- Recovered data with retries.
DEFINE_EVENT 100526 MINOR_WARNING DEFAULT # msg num 28
#    [ 17 02 01 -- ] DT--WR-O-- Recovered data with positive head offset.
DEFINE_EVENT 100626 MINOR_WARNING DEFAULT # msg num 29
#    [ 17 03 01 -- ] DT--WR-O-- Recovered data with negative head offset.
DEFINE_EVENT 100726 MINOR_WARNING DEFAULT # msg num 30
#    [ 17 04 01 -- ] ----WR-O-- Recovered data with retries / circ applied.
DEFINE_EVENT 100826 MINOR_WARNING DEFAULT # msg num 31
#    [ 17 05 01 -- ] D---WR-O-- Recovered data using previous sector id.
DEFINE_EVENT 100926 MINOR_WARNING DEFAULT # msg num 32
#    [ 17 06 01 -- ] D---W--O-- Recovered data without ecc. auto-reallocated.
DEFINE_EVENT 101026 MINOR_WARNING DEFAULT # msg num 33
#    [ 17 07 01 -- ]
DEFINE_EVENT 101126 MINOR_WARNING DEFAULT # msg num 34
#    [ 17 08 01 -- ]
DEFINE_EVENT 101226 MINOR_WARNING DEFAULT # msg num 35
#    [ 18 00 01 -- ] DT--WR-O-- Recovered data with error correction applied.
DEFINE_EVENT 101326 MINOR_WARNING DEFAULT # msg num 36
#    [ 18 01 01 -- ] D---WR-O-- Recovered data with ecc and retries applied.
DEFINE_EVENT 101426 MINOR_WARNING DEFAULT # msg num 37
#    [ 18 02 01 -- ] D---WR-O-- Recovered data with ecc/retries, auto-realloc.
DEFINE_EVENT 101526 MINOR_WARNING DEFAULT # msg num 38
#    [ 18 03 01 -- ] -----R---- Recovered data with circ.
DEFINE_EVENT 101626 MINOR_WARNING DEFAULT # msg num 39
#    [ 18 04 01 -- ] -----R---- Recovered data with lec.
```

```
DEFINE_EVENT 101726 MINOR_WARNING DEFAULT # msg num 40
#    [ 18 05 01 -- ]
DEFINE_EVENT 101826 MINOR_WARNING DEFAULT # msg num 41
#    [ 18 06 01 -- ]
DEFINE_EVENT 101926 MINOR_WARNING DEFAULT # msg num 42
#    [ 1e 00 01 -- ] D---W--O-- Recovered id with ecc correction.
DEFINE_EVENT 102026 MINOR_WARNING DEFAULT # msg num 33
#    [ -- -- 01 -- ]

#-------------------------------------------------------

DEFINE_EVENT 100027 MINOR_WARNING DEFAULT # msg num 44
#    [ 3e 00 02 -- ] DTLPWRSOMC Logical unit has not self-configured yet.

#-------------------------------------------------------

DEFINE_EVENT 100028 MINOR_WARNING DEFAULT # msg num 45
#    [ 04 04 02 -- ] DTL----O-- Logical unit not ready, format in progress.

#-------------------------------------------------------

DEFINE_EVENT 100029 MAJOR_WARNING DEFAULT # msg num 46
#    [ 5b 01 06 -- ] DTLPWRSOM- Threshold condition met.

#-------------------------------------------------------

DEFINE_EVENT 100130 MAJOR_WARNING DEFAULT # msg num 47
#    [ 0a 00 06 -- ] DTLPWRSOMC Error log overflow.
DEFINE_EVENT 100230 MAJOR_WARNING DEFAULT # msg num 48
#    [ 5b 02 01 -- ]
DEFINE_EVENT 100330 MAJOR_WARNING DEFAULT # msg num 49
#    [ 5b 02 06 -- ] DTLPWRSOM- Log counter at maximum.

#-------------------------------------------------------

DEFINE_EVENT 100031 CRITICAL      DEFAULT # msg num 49
#    [ 5b 03 06 -- ] DTLPWRSOM- Log list codes exhausted.

#-------------------------------------------------------

DEFINE_EVENT 100132 CRITICAL      DEFAULT # msg num 50
#    [ 2f 00 06 -- ] DTLPWRSOMC Commands cleared by another initiator.
DEFINE_EVENT 100232 CRITICAL      DEFAULT # msg num 51
#    [ 4e 00 06 -- ] DTLPWRSOMC Overlapped commands attempted.

#-------------------------------------------------------

DEFINE_EVENT 100133 CRITICAL      DEFAULT # msg num 52
#    [ 37 00 06 -- ] DTL-WRSOMC Rounded parameter.
DEFINE_EVENT 100233 CRITICAL      DEFAULT # msg num 53
#    [ 39 00 06 -- ] DTL-WRSOMC Saving parameters not supported.
DEFINE_EVENT 100333 CRITICAL      DEFAULT # msg num 54
#    [ 63 00 06 -- ] -----R---- End of user area encountered on this track.

#-------------------------------------------------------

DEFINE_EVENT 100034 CRITICAL      DEFAULT # msg num 55
#    [ 45 00 04 -- ] DTLPWRSOMC Select/reselect failure.

#-------------------------------------------------------

DEFINE_EVENT 100035 CRITICAL      DEFAULT # msg num 56
#    [ 07 00 04 -- ] DTL-WRSOM- Multiple peripheral devices selected.
```

```
#-------------------------------------------------------

DEFINE_EVENT 100136 CRITICAL      DEFAULT # msg num 57
#     [ 12 00 03 -- ] D---W--O-- Address mark not found for id field.
DEFINE_EVENT 100236 CRITICAL      DEFAULT # msg num 58
#     [ 13 00 03 -- ] D---W--O-- Address mark not found for data field.

#-------------------------------------------------------

DEFINE_EVENT 100137 CRITICAL      DEFAULT # msg num 67
#     [ 0c 02 03 -- ] D---W--O-- Write error - auto reallocation failed.
DEFINE_EVENT 100237 CRITICAL      DEFAULT # msg num 60
#     [ 11 00 03 -- ] DT--WRSO-- Unrecovered read error.
DEFINE_EVENT 100337 CRITICAL      DEFAULT # msg num 61
#     [ 11 01 03 -- ] DT--W-SO-- Read retries exhausted.
DEFINE_EVENT 100437 CRITICAL      DEFAULT # msg num 62
#     [ 11 02 03 -- ] DT--W-SO-- Error too long to correct.
DEFINE_EVENT 100537 CRITICAL      DEFAULT # msg num 63
#     [ 11 04 03 -- ] D---W--O-- Unrecovered read error - auto realloc failed.
DEFINE_EVENT 100637 CRITICAL      DEFAULT # msg num 64
#     [ 11 05 03 -- ] ----WR-O-- L-ec uncorrectable error
DEFINE_EVENT 100737 CRITICAL      DEFAULT # msg num 197
#     [ 11 07 -- -- ]
DEFINE_EVENT 100837 CRITICAL      DEFAULT # msg num 65
#     [ 11 0b 03 -- ]
DEFINE_EVENT 100937 CRITICAL      DEFAULT # msg num 66
#     [ 11 0c 03 -- ]
DEFINE_EVENT 101037 CRITICAL      DEFAULT # msg num 59
#     [ 16 00 03 -- ] D---W--O-- Data synchronization mark error.
DEFINE_EVENT 101137 CRITICAL      DEFAULT # msg num 60
#     [ -- -- 03 -- ]

#-------------------------------------------------------

DEFINE_EVENT 100038 CRITICAL      DEFAULT # msg num 68
#     [ 31 00 03 -- ] DT--W--O-- Medium format corrupted.

#-------------------------------------------------------
DEFINE_EVENT 100039 CRITICAL      DEFAULT # msg num 69
#     [ 31 01 03 -- ] D-L----O-- Format command failed.

#-------------------------------------------------------

DEFINE_EVENT 100140 CRITICAL      DEFAULT # msg num 70
#     [ 19 00 03 -- ] D------O-- Defect list error.
DEFINE_EVENT 100240 CRITICAL      DEFAULT # msg num 71
#     [ 19 01 03 -- ] D------O-- Defect list not available.
DEFINE_EVENT 100340 CRITICAL      DEFAULT # msg num 72
#     [ 19 02 03 -- ] D------O-- Defect list error in primary list.
DEFINE_EVENT 100440 CRITICAL      DEFAULT # msg num 73
#     [ 19 03 03 -- ] D------O-- Defect list error in grown list.
DEFINE_EVENT 100540 CRITICAL      DEFAULT # msg num 194
#     [ 1c 01 -- -- ]

#-------------------------------------------------------

DEFINE_EVENT 100141 CRITICAL      DEFAULT # msg num 74
#     [ 1c 00 03 -- ] D------O-- Defect list not found.
DEFINE_EVENT 100241 CRITICAL      DEFAULT # msg num 75
#     [ 1c 02 03 -- ] D------O-- Grown defect list not found.

#-------------------------------------------------------

DEFINE_EVENT 100142 CRITICAL      DEFAULT # msg num 67
```

```
#    [ 32 00 -- -- ]
DEFINE_EVENT 100242 CRITICAL      DEFAULT # msg num 76
#    [ 32 01 03 -- ] D---W--O-- Defect list update failure.
DEFINE_EVENT 100342 CRITICAL      DEFAULT # msg num 76
#    [ 32 02 03 -- ]

#-------------------------------------------------------

DEFINE_EVENT 100143 CRITICAL      DEFAULT # msg num 78
#    [ 06 00 03 -- ] D---WR-OM- No reference position (like track 0)found.
DEFINE_EVENT 100243 CRITICAL      DEFAULT # msg num 79
#    [ 14 00 03 -- ] DTL-WRSO-- Recorded entity not found.
DEFINE_EVENT 100343 CRITICAL      DEFAULT # msg num 80
#    [ 14 01 03 -- ] DT--WR-O-- Record not found.

#-------------------------------------------------------

DEFINE_EVENT 100044 CRITICAL      DEFAULT # msg num 81
#    [ 57 00 03 -- ] -----R---- Unable to recover table-of-contents.

#-------------------------------------------------------

DEFINE_EVENT 100045 CRITICAL      DEFAULT # msg num 82
#    [ 53 00 04 -- ] DTL-WRSOM- Media load/eject failed.

#-------------------------------------------------------

DEFINE_EVENT 100046 CRITICAL      DEFAULT # msg num 83
#    [ 00 14 00 -- ] -----R---- Audio play operation stopped due to error.

#-------------------------------------------------------

DEFINE_EVENT 100047 CRITICAL      DEFAULT # msg num 84
#    [ 5b 00 06 -- ] DTLPWRSOM- Log exception.

#-------------------------------------------------------

DEFINE_EVENT 100048 CRITICAL      DEFAULT # msg num 85
#    [ 5c 02 06 -- ] D------O-- Spindles not synchronized.

#-------------------------------------------------------

DEFINE_EVENT 100049 CRITICAL      DEFAULT # msg num 86
#    [ 4c 00 06 -- ] DTLPWRSOMC Logical unit failed self-configuration.

#-------------------------------------------------------

DEFINE_EVENT 100150 CRITICAL      DEFAULT # msg num 88
#    [ 2c 00 06 -- ] DTLPWRSOMC Command sequence error.
DEFINE_EVENT 100250 CRITICAL      DEFAULT # msg num 87
#    [ 4a 00 06 -- ] DTLPWRSOMC Command phase error.

#-------------------------------------------------------

DEFINE_EVENT 100151 CRITICAL      DEFAULT # msg num 89
#    [ 1b 00 06 -- ] DTLPWRSOMC Synchronous data transfer error.
DEFINE_EVENT 100251 CRITICAL      DEFAULT # msg num 166
#    [ -- -- 04 -- ]

#-------------------------------------------------------

DEFINE_EVENT 100152 CRITICAL      DEFAULT # msg num 91
#    [ 00 06 06 -- ]
DEFINE_EVENT 100252 CRITICAL      DEFAULT # msg num 90
```

```
#    [ 4b 00 06 -- ] DTLPWRSOMC Data phase error.

#-------------------------------------------------------

DEFINE_EVENT 100053 CRITICAL      DEFAULT # msg num 92
#    [ 10 00 04 -- ] D---W--O-- Id crc or ecc error.

#-------------------------------------------------------

DEFINE_EVENT 100054 CRITICAL      DEFAULT # msg num 93
#    [ 2b 00 06 -- ] DTLPWRSO-C Copy cannot execute; host cannot disconnect.

#-------------------------------------------------------

DEFINE_EVENT 100055 CRITICAL      DEFAULT # msg num 94
#    [ 11 0a 04 -- ] DT-----O-- Miscorrected error.

#-------------------------------------------------------

DEFINE_EVENT 100056 CRITICAL      DEFAULT # msg num 95
#    [ 11 03 04 -- ] DT--W-SO-- Multiple read errors.

#-------------------------------------------------------

DEFINE_EVENT 100057 CRITICAL      DEFAULT # msg num 96
#    [ 44 00 04 -- ] DTLPWRSOMC Internal target failure.

#-------------------------------------------------------

DEFINE_EVENT 100158 CRITICAL      DEFAULT # msg num 97
#    [ 15 01 04 -- ] DTL-WRSOM- Mechanical positioning error.
DEFINE_EVENT 100258 CRITICAL      DEFAULT # msg num 97
#    [ 3b 00 -- -- ]

#-------------------------------------------------------

DEFINE_EVENT 100059 CRITICAL      DEFAULT # msg num 98
#    [ 15 02 04 -- ] DT--WR-O-- Positioning error detected by read of medium.
#-------------------------------------------------------

DEFINE_EVENT 100060 CRITICAL      DEFAULT # msg num 99
#    [ 15 00 04 -- ] DTL-WRSOM- Random positioning error.

#-------------------------------------------------------

DEFINE_EVENT 100061 CRITICAL      DEFAULT # msg num 100
#    [ 01 00 04 -- ] D---W--O-- No index/sector signal.

#-------------------------------------------------------

DEFINE_EVENT 100062 CRITICAL      DEFAULT # msg num 101
#    [ 02 00 04 -- ] D---WR-OM- No seek complete.

#-------------------------------------------------------

DEFINE_EVENT 100063 CRITICAL      DEFAULT # msg num 102
#    [ 03 00 04 -- ] DTL-W-SO-- Peripheral device write fault.

#-------------------------------------------------------

DEFINE_EVENT 100064 CRITICAL      DEFAULT # msg num 103
#    [ 09 00 06 -- ] DT--WR-O-- Track following error.
#-------------------------------------------------------
```

```
DEFINE_EVENT 100065 CRITICAL      DEFAULT # msg num 104
#     [ 09 01 06 -- ] ----WR-O-- Tracking servo failure.

#-------------------------------------------------------

DEFINE_EVENT 100166 CRITICAL      DEFAULT # msg num 105
#     [ 09 02 06 -- ] ----WR-O-- Focus servo failure.
DEFINE_EVENT 100266 CRITICAL      DEFAULT # msg num 106
#     [ 09 03 04 -- ] ----WR-O-- Spindle servo failure.

#-------------------------------------------------------

DEFINE_EVENT 100067 CRITICAL      DEFAULT # msg num 107
#     [ 42 00 06 -- ] D--------- Power-on or self-test failure.

#-------------------------------------------------------

DEFINE_EVENT 100068 CRITICAL      DEFAULT # msg num 108
#     [ 40 00 06 -- ] D--------- Ram failure -- should use 40 nn.

#-------------------------------------------------------
DEFINE_EVENT 100069 CRITICAL      DEFAULT # msg num 109
#     [ 40 00 06 -- ] D--------- Ram failure -- should use 40 nn.

#-------------------------------------------------------

DEFINE_EVENT 100170 CRITICAL      DEFAULT # msg num 110
#     [ 47 00 06 -- ] DTLPWRSOMC Scsi parity error.
DEFINE_EVENT 100270 CRITICAL      DEFAULT # msg num 110
#     [ 47 00 0b -- ]

#-------------------------------------------------------

DEFINE_EVENT 100171 CRITICAL      DEFAULT # msg num 111
#     [ 46 00 0b -- ] DTLPWRSOMC Unsuccessful soft reset.
DEFINE_EVENT 100271 CRITICAL      DEFAULT # msg num 111
#     [ -- -- 0b -- ]

#-------------------------------------------------------

DEFINE_EVENT 100172 CRITICAL      DEFAULT # msg num 112
#     [ 04 00 02 -- ] DTLPWRSOMC Logical unit not ready, cause not reportable.
DEFINE_EVENT 100272 CRITICAL      DEFAULT # msg num 113
#     [ 04 01 02 -- ] DTLPWRSOMC Logical unit is in process of becoming ready.
DEFINE_EVENT 100372 CRITICAL      DEFAULT # msg num 115
#     [ 04 02 02 -- ] DTLPWRSOMC Logical unit not ready, init command required.
DEFINE_EVENT 100472 CRITICAL      DEFAULT # msg num 116
#     [ 04 03 02 -- ] DTLPWRSOMC Logical unit not ready, manual fix required.
DEFINE_EVENT 100572 CRITICAL      DEFAULT # msg num 120
#     [ 08 01 04 -- ] DTL-WRSOMC Logical unit communication time-out.
DEFINE_EVENT 100672 CRITICAL      DEFAULT # msg num 183
#     [ 25 01 05 -- ]
DEFINE_EVENT 100772 CRITICAL      DEFAULT # msg num 117
#     [ 29 00 06 -- ] DTLPWRSOMC Power on, reset, or bus device reset occurred.
DEFINE_EVENT 100872 CRITICAL      DEFAULT # msg num 112
#     [ 48 00 0b -- ]
DEFINE_EVENT 100972 CRITICAL      DEFAULT # msg num 182
#     [ 5d 00 01 -- ]
DEFINE_EVENT 101072 CRITICAL      DEFAULT # msg num 165
#     [ -- -- 02 -- ]

#-------------------------------------------------------

DEFINE_EVENT 100173 CRITICAL      DEFAULT # msg num 118
```

```
#    [ 04 00 05 -- ]
DEFINE_EVENT 100273 CRITICAL      DEFAULT # msg num 118
#    [ 08 00 04 -- ] DTL-WRSOMC Logical unit communication failure.
DEFINE_EVENT 100373 CRITICAL      DEFAULT # msg num 114
#    [ 41 00 04 -- ] D--------- Data path failure -- should use 40 nn.

#-----------------------------------------------------------

DEFINE_EVENT 100074 CRITICAL      DEFAULT # msg num 119
#    [ 05 00 04 -- ] DTL-WRSOMC Logical unit does not respond to selection.

#-----------------------------------------------------------

DEFINE_EVENT 100075 CRITICAL      DEFAULT # msg num 121
#    [ 08 02 04 -- ] DTL-WRSOMC Logical unit communication parity error.

#-----------------------------------------------------------

DEFINE_EVENT 100176 CRITICAL      DEFAULT # msg num 187
#    [ 00 06 0b -- ]
DEFINE_EVENT 100276 CRITICAL      DEFAULT # msg num 122
#    [ 1a 00 05 -- ] DTLPWRSOMC Parameter list length error.
DEFINE_EVENT 100376 CRITICAL      DEFAULT # msg num 123
#    [ 20 00 05 -- ] DTLPWRSOMC Invalid command operation code.
DEFINE_EVENT 100476 CRITICAL      DEFAULT # msg num 123
#    [ 21 00 05 -- ] DT--WR-OM- Logical block address out of range.
DEFINE_EVENT 100576 CRITICAL      DEFAULT # msg num 162
#    [ 21 01 05 -- ] --------M- Invalid element address.
DEFINE_EVENT 100676 CRITICAL      DEFAULT # msg num 125
#    [ 22 00 05 -- ] D--------- Illegal function for device type
DEFINE_EVENT 100776 CRITICAL      DEFAULT # msg num 126
#    [ 24 00 05 -- ] DTLPWRSOMC Invalid field in cdb. Check fld ptr in sense.
DEFINE_EVENT 100876 CRITICAL      DEFAULT # msg num 127
#    [ 25 00 05 -- ] DTLPWRSOMC Logical unit not supported.
DEFINE_EVENT 100976 CRITICAL      DEFAULT # msg num 128
#    [ 26 00 05 -- ] DTLPWRSOMC Invalid field in param list -- chk fld ptr.
DEFINE_EVENT 101076 CRITICAL      DEFAULT # msg num 129
#    [ 26 01 05 -- ] DTLPWRSOMC Parameter not supported -- chk fld ptr.
DEFINE_EVENT 101176 CRITICAL      DEFAULT # msg num 130
#    [ 26 02 05 -- ] DTLPWRSOMC Parameter value invalid -- chk fld ptr.
DEFINE_EVENT 101276 CRITICAL      DEFAULT # msg num 130
#    [ 26 03 05 -- ] DTLPWRSOMC Threshold parameters not supported.
DEFINE_EVENT 101376 CRITICAL      DEFAULT # msg num 184
#    [ 27 00 05 -- ]
DEFINE_EVENT 101476 CRITICAL      DEFAULT # msg num 188
#    [ 2c 00 0b -- ]
DEFINE_EVENT 101576 CRITICAL      DEFAULT # msg num 185
#    [ 3a 00 05 -- ]
DEFINE_EVENT 101676 CRITICAL      DEFAULT # msg num 132
#    [ 3d 00 05 -- ] DTLPWRSOMC Invalid bits in identify message.
DEFINE_EVENT 101776 CRITICAL      DEFAULT # msg num 133
#    [ 43 00 05 -- ] DTLPWRSOMC Message error.
DEFINE_EVENT 101876 CRITICAL      DEFAULT # msg num 189
#    [ 43 00 0b -- ]
DEFINE_EVENT 101976 CRITICAL      DEFAULT # msg num 134
#    [ 49 00 05 -- ] DTLPWRSOMC Invalid message error.
DEFINE_EVENT 102076 CRITICAL      DEFAULT # msg num 190
#    [ 4e 00 0b -- ]
DEFINE_EVENT 102176 CRITICAL      DEFAULT # msg num 135
#    [ 58 00 05 -- ] -------O-- Generation does not exist.
DEFINE_EVENT 102276 CRITICAL      DEFAULT # msg num 136
#    [ 64 00 05 -- ] -----R---- Illegal mode for this track.
DEFINE_EVENT 102376 CRITICAL      DEFAULT # msg num 186
#    [ 80 01 06 -- ]
```

```
DEFINE_EVENT 102476 CRITICAL      DEFAULT # msg num 133
#     [ -- -- 05 -- ]
DEFINE_EVENT 102576 CRITICAL      DEFAULT # msg num 169
#     [ -- -- 09 -- ]
DEFINE_EVENT 102676 CRITICAL      DEFAULT # msg num 174
#     [ -- -- -- 02 ]

#-------------------------------------------------------

DEFINE_EVENT 100077 INFORMATION   DEFAULT # msg num 137
#     [ 00 01 06 -- ] -T-------- Filemark detected.

#-------------------------------------------------------

DEFINE_EVENT 100078 INFORMATION   DEFAULT # msg num 138
#     [ 00 02 06 -- ] -T----S--- End-of-partition/medium detected.

#-------------------------------------------------------

DEFINE_EVENT 100079 INFORMATION   DEFAULT # msg num 139
#     [ 00 03 06 -- ] -T-------- Setmark detected.

#-------------------------------------------------------

DEFINE_EVENT 100080 INFORMATION   DEFAULT # msg num 140
#     [ 00 04 06 -- ] -T----S--- Beginning-of-partition/medium detected.

#-------------------------------------------------------

DEFINE_EVENT 100081 INFORMATION   DEFAULT # msg num 141
#     [ 00 05 04 -- ] -T----S--- End-of-data detected.

#-------------------------------------------------------

DEFINE_EVENT 100082 CRITICAL      DEFAULT # msg num 142
#     [ 03 01 04 -- ] -T-------- No write current.

#-------------------------------------------------------

DEFINE_EVENT 100083 CRITICAL      DEFAULT # msg num 143
#     [ 03 02 04 -- ] -T-------- Excessive write errors.

#-------------------------------------------------------

DEFINE_EVENT 100084 CRITICAL      DEFAULT # msg num 144
#     [ 0c 00 03 -- ] -T----S--- Write error -- sense key -> whether recovered.

#-------------------------------------------------------

DEFINE_EVENT 100185 CRITICAL      DEFAULT # msg num 145
#     [ 11 08 03 -- ] -T-------- Incomplete block read (postamble not found).
DEFINE_EVENT 100285 CRITICAL      DEFAULT # msg num 146
#     [ 11 09 03 -- ] -T-------- No gap found.
DEFINE_EVENT 100385 CRITICAL      DEFAULT # msg num 147
#     [ 14 02 03 -- ] -T-------- Filemark or setmark not found.
DEFINE_EVENT 100485 CRITICAL      DEFAULT # msg num 148
#     [ 14 03 03 -- ] -T-------- End-of-data not found.
DEFINE_EVENT 100585 CRITICAL      DEFAULT # msg num 149
#     [ 14 04 03 -- ] -T-------- Block sequence error.
DEFINE_EVENT 100685 CRITICAL      DEFAULT # msg num 150
#     [ 2d 00 03 -- ] -T-------- Overwrite error on update in place.
DEFINE_EVENT 100785 CRITICAL      DEFAULT # msg num 191
#     [ 30 01 03 -- ]
DEFINE_EVENT 100885 CRITICAL      DEFAULT # msg num 151
```

```
#    [ 33 00 03 -- ] -T-------- Tape length error.
DEFINE_EVENT 100985 CRITICAL      DEFAULT # msg num 155
#    [ 50 00 03 -- ] -T-------- Write append error.
DEFINE_EVENT 101085 CRITICAL      DEFAULT # msg num 158
#    [ 51 00 03 -- ] -T-----O-- Erase failure.
DEFINE_EVENT 101185 CRITICAL      DEFAULT # msg num 159
#    [ 52 00 03 -- ] -T-------- Cartridge fault.

#-------------------------------------------------------

DEFINE_EVENT 100186 CRITICAL      DEFAULT # msg num 152
#    [ 3b 01 03 -- ] -T-------- Tape position error at beginning-of-medium.
DEFINE_EVENT 100286 CRITICAL      DEFAULT # msg num 153
#    [ 3b 02 03 -- ] -T-------- Tape position error at end-of-medium.

#-------------------------------------------------------

DEFINE_EVENT 100187 CRITICAL      DEFAULT # msg num 154
#    [ 3b 08 04 -- ] -T-------- Reposition error.
DEFINE_EVENT 100287 CRITICAL      DEFAULT # msg num 156
#    [ 50 01 04 -- ] -T-------- Write append position error.
DEFINE_EVENT 100387 CRITICAL      DEFAULT # msg num 156
#    [ 50 02 04 -- ] -T-------- Position error related to timing.

#-------------------------------------------------------

DEFINE_EVENT 100088 CRITICAL      DEFAULT # msg num 160
#    [ 53 01 03 -- ] -T-------- Unload tape failure.

#-------------------------------------------------------

DEFINE_EVENT 100089 INFORMATION   DEFAULT # msg num 161
#    [ 28 01 06 -- ] DTLPWRSOMC Not-ready to ready transition. Medium changed.

#-------------------------------------------------------

DEFINE_EVENT 100190 CRITICAL      DEFAULT # msg num 163
#    [ 3b 0d 05 -- ] --------M- Medium destination element full.
DEFINE_EVENT 100290 CRITICAL      DEFAULT # msg num 164
#    [ 3b 0e 05 -- ] --------M- Medium source element empty.

#-------------------------------------------------------

DEFINE_EVENT 100091 CRITICAL      DEFAULT # msg num 167
#    [ -- -- 06 -- ]

#-------------------------------------------------------

DEFINE_EVENT 100092 CRITICAL      DEFAULT # msg num 168
#    [ -- -- 08 -- ]

#-------------------------------------------------------

DEFINE_EVENT 100193 CRITICAL      DEFAULT # msg num 170
#    [ -- -- 0a -- ]
DEFINE_EVENT 100293 CRITICAL      DEFAULT # msg num 172
#    [ -- -- 0d -- ]

#-------------------------------------------------------

DEFINE_EVENT 100194 CRITICAL      DEFAULT # msg num 173
#    [ 1d 00 -- -- ]
DEFINE_EVENT 100294 CRITICAL      DEFAULT # msg num 173
#    [ -- -- 0e -- ]
```

```
#-------------------------------------------------------

DEFINE_EVENT 100095 INFORMATION   DEFAULT # msg num 177
#    [ -- -- -- 10 ]

#-------------------------------------------------------

DEFINE_EVENT 100096 INFORMATION   DEFAULT # msg num 177
#    [ -- -- -- 14 ]

#-------------------------------------------------------

DEFINE_EVENT 100097 MAJOR_WARNING DEFAULT # msg num 179
#    [ -- -- -- 18 ]

#-------------------------------------------------------

DEFINE_EVENT 100098 INFORMATION   DEFAULT # msg num 180
#    [ -- -- -- 22 ]

#-------------------------------------------------------

DEFINE_EVENT 100099 MAJOR_WARNING DEFAULT # msg num 181
#    [ -- -- -- 28 ]

#-------------------------------------------------------

DEFINE_EVENT 100100 MAJOR_WARNING DEFAULT # msg num 176
#    [ -- -- -- 08 ]

#-------------------------------------------------------
DEFINE_EVENT 100299 CRITICAL      DEFAULT # msg num 255
#    [ -- -- -- -- ] DTLPWRSOMC Error info is not recognized.


#-------------------------------------------------------
```

Sample Monitor-Specific Configuration File

The following is a sample of a device configuration file.

```
#*****************************************************************************#
#* fw_disk_array.cfg      : monitor configuration statements for all         *#
#*                          events handled by the fw_disk_array monitor      *#
#*****************************************************************************#


#*****************************************************************************#
#* These items will appear in the global config file, but are repeated       *#
#* here for documentation purposes.  They could also appear here to override*#
#* the global values.                                                        *#
#*****************************************************************************#

# POLL_INTERVAL        60       # polling interval in minutes
# REPEAT_FREQUENCY     1440       # in minutes, for one day


#*****************************************************************************#
#* This list of default actions for each severity also appears in the        *#
#* global configuration file, and should not generally appear here.          *#
#* It is shown for documentation purposes.                                   *#
#*****************************************************************************#
```

```
SEVERITY_ACTION    INFORMATION       NOTIFY
SEVERITY_ACTION    MINOR_WARNING     NOTIFY
SEVERITY_ACTION    MAJOR_WARNING     NOTIFY
SEVERITY_ACTION    SERIOUS           NOTIFY
SEVERITY_ACTION    CRITICAL          NOTIFY


#*************************************************************************#
#*                                                                       *#
#* cfg-verb  event# --severity--- action- ---------description---------- *#
#*                                                                       *#
#*************************************************************************#

DEFINE_EVENT   3    INFORMATION   DEFAULT # Target Operating conditions changed
DEFINE_EVENT   4    INFORMATION   DEFAULT # Microcode has been changed
DEFINE_EVENT   6    INFORMATION   DEFAULT # Inquiry data has changed
DEFINE_EVENT   7    CRITICAL      DEFAULT # Failed write operation
DEFINE_EVENT   8    CRITICAL      DEFAULT # Auto reallocation failed
DEFINE_EVENT   9    CRITICAL      DEFAULT # Reconstruction Failed (write)
DEFINE_EVENT  10    SERIOUS       DEFAULT # Reconstruction failed (read)
DEFINE_EVENT  11    CRITICAL      DEFAULT # Unrecovered Read/write error
DEFINE_EVENT  12    CRITICAL      DEFAULT # Deferred error caused drive warning
DEFINE_EVENT  13    CRITICAL      DEFAULT # Hardware component diag failure
DEFINE_EVENT  14    CRITICAL      DEFAULT # Failed testUnit ready command
DEFINE_EVENT  15    CRITICAL      DEFAULT # Format unit command failed
DEFINE_EVENT  16    SERIOUS       DEFAULT # Mode select command failed
DEFINE_EVENT  17    SERIOUS       DEFAULT # Drive failed because deferred error
DEFINE_EVENT  18    CRITICAL      DEFAULT # Drive replacement error
DEFINE_EVENT  19    MAJOR_WARNING DEFAULT # Excessive Media error rate
DEFINE_EVENT  20    MAJOR_WARNING DEFAULT # Excessive Seek Error rate
DEFINE_EVENT  21    MAJOR_WARNING DEFAULT # Excessive grown defects
DEFINE_EVENT  22    SERIOUS       DEFAULT # No response from a drive
DEFINE_EVENT  23    SERIOUS       DEFAULT # Communication errors
DEFINE_EVENT  24    SERIOUS       DEFAULT # No drive present when it should be
DEFINE_EVENT  25    CRITICAL      DEFAULT # Subsystem component failure
DEFINE_EVENT  26    MINOR_WARNING DEFAULT # AC power fail.  On battery.
DEFINE_EVENT  27    CRITICAL      DEFAULT # AC power fail. 2 minutes to shutdown
DEFINE_EVENT  28    CRITICAL      DEFAULT # AC power fail, DC power gone.
DEFINE_EVENT   29     INFORMATION    DEFAULT  # AC power was lost, now back
```

Startup Configuration File

Each hardware event monitor has its own startup configuration file which contains the monitoring requests currently defined for the monitor. At startup, following the execution of the IOSCAN utility (performing a real/hard ioscan), or when using the Hardware Monitoring Request Manager (`monconfig`) to manage monitoring requests, the entries in the startup configuration file are used to create monitoring requests for the monitor.

Each monitoring request in the startup configuration file is applied to all instances of the monitor's hardware resources. An identical set of default requests are included in the startup configuration file for each monitor.

You modify the contents of the startup configuration file using the Hardware Monitoring Request Manager. When you use the Hardware Monitoring Request Manager to create or manage monitoring requests, the results are stored as an entry in the monitor's startup configuration file. If you have selected the All Monitors option for the request, an entry will be made in the startup configuration file for all the monitors.

NOTE **When Do Changes Made to a Startup Configuration File Take Effect?**

Changes made to a startup configuration file are invoked when the system is restarted, following the execution of the IOSCAN utility (performing a real/hard ioscan), or when the Hardware Monitoring Request Manager is used to manage monitoring requests. For example, when you add, delete, or modify a monitoring request using the Hardware Monitoring Request Manager, the changes to the startup configuration file will take effect immediately.

File Names

The file naming convention for the startup configuration files is:
`/var/stm/config/tools/monitor/monitorname.sapcfg`

`monitorname` is the name of the monitor executable.

File Format

Entries in the startup configuration file use the following conventions:

- The startup configuration file contains monitoring request entries identifying the notification method and reporting criteria for the monitor. Each entry contains records consisting of a keyword, followed by a colon (:), followed by the value assigned to the keyword. For example, `Criteria Threshold: INFORMATION`
- 'MONITOR' must be the first keyword found in each entry, but the remaining records in the entry are not order-dependent. For example:
  `MONITOR: /storage/events/disk_arrays/FW_SCSI`
- Comments begin with the pound character (#) and continue until the end of the line. A comment may occur on a line by itself or after a blank space following the value for a keyword.

  For example, either of the following are valid comments:

```
# Default monitoring entries

Target Type: SYSLOG    # Send events to syslog
```

Table 5-2 identifies the keywords that make up each entry in the startup configuration file. Each entry must contain the keywords identified as *required*.

Considerations for Modifying the Startup Configuration File Settings

While you can edit the contents of the startup configuration file directly, the better approach is to use the Hardware Monitoring Request Manager (`monconfig`) to create and manage your monitoring requests. Using the monitoring request manager you can create requests for multiple monitors simultaneously. And the Hardware Monitoring Request Manager ensures that all request entries are formatted correctly.

The only benefit that editing the configuration file offers is that you can use the `COMMENT` setting to add information that will be included with the event.

Table 5-2 Startup Configuration File Entries

Keyword	Values	Description
MONITOR (required)	A valid event monitor resource path	Identifies the hardware event monitor to which the entry applies. All entries must use the resource path for the monitor being configured. Note: This must the first keyword in each entry
Criteria Threshold (required)	Valid values include: CRITICAL SERIOUS MAJOR_WARNING MINOR_WARNING INFORMATIONAL	Defines the severity level used as the notification criteria threshold.
Criteria Operator (required)	Valid operators are: %< (less than) %<= (less than or equal to) > (greater than) >= (greater than or equal to) ! (not equal to)	This value identifies the arithmetic operator used with the criteria threshold to control what events are reported. The operator treats each severity level as a numeric value assigned as follows: Critical = 5 Serious = 4 Major warning = 3 Minor warning = 2 Informational = 1 The event severity received is the left operand and the Criteria Threshold value is the right operand.

Table 5-3 Startup Configuration File Entries

Keyword	Values	Description
Target Type (required)	Valid values include: UDP TCP OPC SNMP TEXTLOG SYSLOG EMAIL CONSOLE	Identifies the method of notification used.
Target Type Modifier (required for the following target types) **UDP** Target UDP Host - hostname of the machine to which UDP event messages will be sent Target UDP Port - port number on the host that will be used for the network connection **TCP** Target TCP Host - hostname of the machine to which TCP event messages will be sent Target TCP Port - port number on the host that will be used for the network connection **USERLOG** Target USERLOG - name of the log file to which TCP event messages will be sent **EMAIL** Target EMAIL Address - email address of the recipient of the event messages		
Comment: (Optional)	Any text string.	An optional field which will be presented as user data in each event meeting this criteria.

Default File Entries

The following default monitoring requests illustrate the structure of the entries in the startup configuration file.

Table 5-4 Default Monitoring Requests

Description	Entry

Entry to send all events to textlog	`MONITOR: /storage/events/disk_arrays/FW_SCSI`
	`  Criteria Threshold: INFORMATION`
	`  Criteria Operator: >=`
	`  Target Type: TEXTLOG`
	`  Target TEXTLOG File: /var/opt/resmon/log/event.log`

Entry to send SERIOUS and CRITICAL events to syslog	`MONITOR: /storage/events/disk_arrays/FW_SCSI`
	`  Criteria Threshold: SERIOUS`
	`  Criteria Operator: >=`
	`  Target Type: SYSLOG`

Entry to send SERIOUS and CRITICAL events to email	`MONITOR: /storage/events/disk_arrays/FW_SCSI`
	`  Criteria Threshold: SERIOUS`
	`  Criteria Operator: >=`
	`  Target Type: EMAIL`
	`  Target EMAIL address: root`

Peripheral Status Monitor (PSM) Configuration File

Interaction between the PSM and a hardware event monitor is controlled by a PSM configuration file. This file defines what severity levels will result in DOWN status being reported, and what action, if any, is required to return the hardware to UP status. Any hardware event monitor that does not include a PSM configuration file will not be monitored by the PSM.

NOTE **When Do Changes Made to a PSM Configuration File Take Effect?**

The PSM checks its configuration files every 10 seconds, so any changes will be invoked when the file is checked. If the hardware configuration has changed and the PSM is communicating with all the monitors to determine what their resources are, it may take a few minutes for any changes to a configuration file to take effect.

File Names

The file naming convention for the PSM configuration files is:

`/var/stm/config/tools/monitor/monitorname.psmcfg`

`monitorname` is the name of the monitor executable.

File Format

The PSM configuration file contains a single entry using the following conventions:

- The entry consists of keywords defining the characteristic to be configured, followed by a value assigned to the keyword.
- There must be at least one space between the keyword and each value.
- Comments begin with the pound character (#) and continue until the end of the line. A comment may occur on a line by itself or after a blank space following the value for a keyword.

Table 5-5 identifies the keywords that make up the entry in the PSM configuration file. The entry must contain the keywords identified as *required*.

Considerations for Modifying the PSM Configuration File

- The only change you should consider making to the PSM configuration file is redefining the severity levels which cause a change to DOWN status. By default, SERIOUS and CRITICAL events will result in a DOWN status. If you want to include lower level events, or restrict the status change to just CRITICAL events, you can do so using the `DOWN_SEVERITY_THRESHOLD` and `DOWN_SEVERITY_OPERATOR` settings.

NOTE Do not attempt to change the value of `MONITOR_STATE_HANDLING`. Changing this value may result in unpredictable results when attempting to reset the hardware status of the resource to `UP`.

It is recommended that you not lower the severity levels that can cause a `DOWN` status. If you do, events that do not warrant a status of `DOWN` may cause it to occur.

Table 5-5 PSM Configuration File Fields

Keyword	Values	Description
MONITOR_RESOURCE_NAME (required)	A valid event monitor resource path name	Identifies the hardware event monitor to which the entry applies Note: This must the first keyword in the file.
PSM_RESOURCE_NAME (Optional)	A valid PSM (status) resource path name	This value should be related to MONITOR_RESOURCE_NAME. If not specified, the default will be created by replacing the word “events” in the MONITOR_RESOURCE_NAME with the word “status”.
MONITOR_STATE_HANDLING (Optional)	Identifies the type of state handling the monitor performs. Valid values include: NO_UP_CONTROL (Default) - the monitor uses the severity mapping of events to control the DOWN state as well as calling the appropriate API routines to send DOWN state messages to the PSM. The UP state will be controlled by the set_fixed(1m) command. UP_STATE_CONTROL- the monitor uses the severity mapping of events to control the DOWN state as well as calling the appropriate API routines to send DOWN state messages to the PSM. The monitor itself controls the UP state by calling the appropriate API routines to send UP state messages to the PSM. ALL_STATE_CONTROL - the monitor itself controls both states by calling the appropriate API routines to send UP and DOWN state messages to the PSM.	

Table 5-5 PSM Configuration File Fields (Continued)

Keyword	Values	Description
DOWN_SEVERITY_THRESHOLD (Optional. This value is required if DOWN_SEVERITY_OPERATOR is specified)	Valid values include: CRITICAL SERIOUS (Default) MAJOR_WARNING MINOR_WARNING INFORMATIONAL	Defines the event severity level used with DOWN_SEVERITY_OPERATOR

DOWN_SEVERITY_OPERATOR (Optional)	Valid values include:=
	`!=`
	`<`
	`<=`
	`>`
	`>= (Default)`
		Defines the operator used with the event severity and DOWN_SEVERITY_THRESHOLD as operands.
		The event severity received is the left operand and the DOWN_SEVERITY_THRESHOLD value is the right operand.

Example File Entries

The following examples illustrate the various types of file entries that can be made for the PSM monitor.

Example 1: Use all default values. SERIOUS and CRITICAL event will cause DOWN status.

```
MONITOR_RESOURCE_NAME:  /storage/events/disks/default
```

Example 2: Change the entry so MAJOR_WARNING events will also cause DOWN status.

```
MONITOR_RESOURCE_NAME:  /storage/events/disks/default
DOWN_SEVERITY_THRESHOLD:   MAJOR_WARNING
DOWN_SEVERITY_OPERATOR: >=
```

Pushing EMS Hardware Monitors configuration to multiple systems

To push EMS Hardware Monitors configuration to multiple systems, do the following:

- Do the configuration on one system via monconfig (creates appropriate /var/stm/config/tools/monitor/*.sapcfg)
- Do additional manual edits, if any, in the other configuration files:

  /var/stm/config/tools/monitor/*.cfg, default_*.clcfg
  /var/stm/config/tools/monitor/Global.cfg
  /var/stm/data/tools/monitor/

NOTE The default values in these files work; it would only be if you had specific configurations you wanted to change and push out that you would need this step.

- For each system where the new configuration is desired, copy all /var/stm/config/tools/monitor/*.cfg, default_*.clcfg, *.sapcfg to new system except any file with the name “predictive” or “rst” (ISEE) or “ovfn” (HPEN) in it. Execute /etc/opt/resmon/lbin/startcfg_client to enable the new configuration.

NOTE If OPC (OpenView) configuration is desired, the initial configuration must be done on a system where OPC is installed. Otherwise, it will not be available for use in monconfig.

6 Special Procedures

This chapter describes the special procedures required for the Fibre Channel Arbitrated Loop Monitor (`dm_fc_hub`), and for the Fibre Channel Switch Monitor (`dm_fc_sw`).

Fibre Channel Arbitrated Loop Hub Monitor

History

- IPR 9902: Initial release

Supported Products

- Fibre Channel Arbitrated Loop Hub Model A3724A
- Fibre Channel Arbitrated Loop Hub Model A4839A

Special Requirements

The FC-AL Hub monitor requires:

Device Firmware revisions:

- Device Agent Firmware revision 2.14 or greater
- Hub Controller Firmware revision 3.06 or greater

  Firmware and installation instructions are available at `http://www.software.hp.com`

C++ runtime support patches:

- 10.20 PHSS_16585 (supersedes PHSS_14262)
- 11.00 PHSS_16587 (supersedes PHSS_14577)

Before using the hub monitor, edit the monitor configuration file, `/var/stm/config/tools/monitor/dm_fc_hub.cfg`, to indicate what hubs will be monitored. See “Configuring the FC-AL Monitor Configuration File” on page 129, for more information.

Resource Path

Event monitoring: `/connectivity/events/hubs/FC_hub`
Status monitoring: `/connectivity/status/hubs/FC_hub`

Executable File

`/usr/sbin/stm/uut/bin/tools/monitor/dm_fc_hub`

Monitor Behavior

- The monitor uses polling only with a default interval of 60 minutes.
- At initial startup the monitor does not retrieve any log information from the hub.

PSM State Control

The monitor does not support automatic state control. The `set_fixed` utility must be used to return a hardware resource to the UP state following a failure. See “Configuring the FC-AL Monitor Configuration File” on page 129, for more information.

Initial Monitor Configuration

Unlike the other EMS Hardware Monitors, the FC-AL hub monitor requires some initial configuration before it will function. Because a FC-AL hub is not part of the host's configuration, the host cannot detect any hubs during startup. You must tell the hub monitor what hubs you want it to monitor. This is done by defining two settings in the hub monitor configuration file, `HUB_COUNT` and `HUB_X_IP_ADDRESS`.

Configuring the FC-AL Monitor Configuration File

To configure the FC-AL monitor configuration file complete the following steps:

Step 1. Determine which hubs you want the monitor to be responsible for. Record the IP address for each of these hubs.

Step 2. Open file `/var/stm/config/tools/monitor/dm_fc_hub.cfg` in an ASCII text editor.

Step 3. Add the following line to the file:

`HUB_COUNT` *`n`*

Replace "*n*" with the value that reflects the number of hubs for which the monitor will be responsible. For example, the following line would monitor 5 hubs:

```
HUB_COUNT 5
```

Step 4. Add the following line to file:

`HUB_`*`X`***`_IP_ADDRESS`** *`nn.nn.nnn.nnn`*

Change the placeholder "*X*" to the number 1, and replace the "*nn*" fields with the IP address of the hub that will be designated as hub 1.

The completed line will look similar to the following:

```
HUB_1_IP_ADDRESS 15.43.214.101
```

Step 5. If multiple hubs will be monitored, replicate the line from step 4 for each hub, changing the hub number and IP Address for each. When you are done, the number of lines should equal the number defined in the `HUB_COUNT` setting. For example, the following lines would configure the monitor for three hubs:

```
HUB_COUNT 3
HUB_1_IP_ADDRESS 15.43.214.101
HUB_2_IP_ADDRESS 15.43.214.171
HUB_3_IP_ADDRESS 15.43.214.184
```

Step 6. Save the file.

Step 7. To invoke the changes made to the hub configuration file, you must use the Enable Monitoring option of the Hardware Monitoring Request Manager, even if monitoring is already enabled. The Enable Monitoring option runs the startup client, which reads the contents of the configuration file and starts the hub monitor to begin monitoring of the FC-AL hubs. See "Enabling Hardware Event Monitoring" on page 42 for more information.

There are other settings in the configuration file that can be changed to customize the operation of the FC-AL hub monitor. These settings are defined in Chapter 5, "Hardware Monitor Configuration Files."

Adding or Removing an FC-AL Hub

Adding or removing a hub from the monitor configuration involves changing the same configuration file settings described in the preceding procedure, HUB_COUNT and HUB_X_IP_ADDRESS.

Changing the FC-AL Hub Monitoring Configuration

To change the FC

Step 1. Determine the IP address for each hub your are adding or deleting.

Step 2. Open file /var/stm/config/tools/monitor/dm_fc_hub.cfg in an ASCII text editor.

Step 3. Locate the following line in the file and change value "*n*" to reflect the new number of hubs to be monitored:

HUB_COUNT *n*

Step 4. If you are adding a hub, add the following line to file:

HUB_*X*_IP_ADDRESS *nn.nn.nnn.nnn*

Change the placeholder "*X*" to the number you want assigned to the hub (typically the next sequential number available), and replace the "*nn*" fields with the IP address of the hub.

The completed line will look similar to the following:

HUB_5_IP_ADDRESS 15.43.214.101

Repeat this step for each hub you are adding.

Step 5. If you are removing a hub, locate the HUB_X_IP_ADDRESS line for the hub to be removed and delete it from the file. If you deleting multiple hubs, delete the line for each one.

Step 6. Save the file.

Step 7. To invoke the changes immediately, run the Hardware Monitoring Request Manager and select the (E)nable Monitoring option. This option runs the startup client, which will cause the changes to the hub monitoring to take effect immediately. See "Enabling Hardware Event Monitoring" on page 42 for more information.

Alternatively you can do nothing and the changes will be made at the next hub polling interval when the monitor recognizes the changes and launches the startup client to invoke them

Configuration Files

Startup Configuration File

File name: /var/stm/config/tools/monitor/dm_fc_hub.sapcfg

Default Entries: The monitor uses the standard default monitor request entries shown in Table 5-4 on page 100.

Monitor Configuration File

File name: /var/stm/config/tools/monitor/dm_fc_hub.cfg

Default settings:

- **Polling Interval:** 60 minutes

- **Repeat Frequency:** 1 day (1440 minutes)
- **Severity Action:** Notify for all levels

The hub monitor also uses the following settings to configure the SNMP environment used by the hub. Note that two of these settings (`HUB_COUNT` and `HUB_X_IP_ADDRESS`) are required to indicate to the monitor what hubs should monitored. Changes that involve adding or deleting hubs to the configuration file while the monitor is running will be invoked at the next polling interval, or following the selection of the (E)nable Monitoring option from the Hardware Monitoring Request Manager (`monconfig`).

Table 6-1 PSM Configuration File Fields

Setting	Default Value	Description
HUB_COUNT *value*	none	Identifies the number of hubs (value) the monitor will be responsible for monitoring. **This setting is required.**
HUB_X_IP_ADDRESS *IP_address*	none	Identifies the IP address for each hub the monitor will monitor. The "X" placeholder is replaced by the number assigned to the hub, and "*IP_address*" is replaced by the IP address of the hub. There must be a separate setting for each hub. **This setting is required.**
SITE_SNMP_GET_COMMUNITY *text* HUB_X_SNMP_GET_COMMUNITY *text*	public	These settings define the SNMP community assigned to the hubs being monitored. The SITE setting is used for all hubs, unless overridden by a HUB_X setting for the specific hub identified by X. The text string cannot contain embedded spaces.
SITE_LOCATION *text* HUB_X_LOCATION *text*	none	These settings define the text string used to identify the hub location in log messages. The SITE setting is used for all hubs, unless overridden by a HUB_X setting for the specific hub identified by X. The text string cannot contain embedded spaces.
SITE_CONTACT *text* HUB_X_CONTACT *text*	none	These settings define the text string used to identify the contact person in log messages. The SITE setting is used for all hubs, unless overridden by a HUB_X setting for the specific hub identified by X. The text string cannot contain embedded spaces.
SITE_SNMP_RETRY *value* HUB_X_SNMP_RETRY *value*	3	These settings define the SNMP retry value in seconds. The SITE setting is used for all hubs, unless overridden by a HUB_X setting for the specific hub identified by X. Valid values are 1 - 5.
SITE_SNMP_TIMEOUT *value* HUB_X_SNMP_ TIMEOUT *value*	2	These settings define the SNMP timeout value in seconds. The SITE setting is used for all hubs, unless overridden by a HUB_X setting for the specific hub identified by X. Valid values are 1 - 5.

Table 6-1 PSM Configuration File Fields (Continued)

Setting	Default Value	Description
HUB_X_IS_MONITORED *value*	1 (Yes)	This setting determines if the indicated hub will be monitored. Valid values are 0 (No) and 1 (Yes).
HUB_X_SYSNAME *text*	none	Identifies the hub's sysname if the hub's system.sysName value is not set.

PSM Configuration File

File name: `/var/stm/config/tools/monitor/dm_fc_hub.psmcfg`

Default settings:

- **PSM Resource Name:** `/connectivity/status/hubs/FC_hub`
- **State Handling:** Requires the use of set_fixed to set UP state.
- **DOWN state mapping:** Serious and Critical map to DOWN.

Fibre Channel Switch Monitor

History

- IPR 9904: Initial release

Supported Products

- Gigabit Fibre Channel Switch Model A5223A

Special Requirements

The FC Switch monitor requires:

C++ runtime support patches:

- 10.20 PHSS_16585 (supersedes PHSS_14262)
- 11.00 PHSS_16587 (supersedes PHSS_14577)

Before using the switch monitor, edit the monitor configuration file, `/var/stm/config/tools/monitor/dm_fc_sw.cfg`, to indicate what switches will be monitored. See "Configuring the FC Switch Monitor Configuration File" on page 134, for more information.

Resource Path

Event monitoring: `/connectivity/events/switches/FC_switch`
Status monitoring: `/connectivity/status/switches/FC_switch`

Executable File

`/usr/sbin/stm/uut/bin/tools/monitor/dm_fc_sw`

Monitor Behavior

- The monitor uses polling only with a default interval of 60 minutes.
- At initial startup the monitor does not retrieve any log information from the switch.

PSM State Control

The monitor does not support automatic state control. The `set_fixed` utility must be used to return a hardware resource to the UP state following a failure. See "Using the set_fixed Utility to Restore Hardware UP State" on page 91, for more information.

Initial Monitor Configuration

Unlike the other EMS Hardware Monitors, the FC switch monitor requires some initial configuration before it will function. Because a FC switch is not part of the host's configuration, the host cannot detect any switches during startup. You must tell the switch monitor what switches you want it to monitor. This is done by defining two settings in the switch monitor configuration file, `SW_COUNT` and `SW_X_IP_ADDRESS`.

Configuring the FC Switch Monitor Configuration File

To configure the FC switch monitor configuration file complete the following steps:

Step 1. Determine which switches you want the monitor to be responsible for. Record the IP address for each of these switches.

Step 2. Open file `/var/stm/config/tools/monitor/dm_fc_sw.cfg` in an ASCII text editor.

Step 3. Add the following line to the file:

`SW_COUNT` *`n`*

Replace "*n*" with the value that reflects the number of switches for which the monitor will be responsible. For example, the following line would monitor 5 switches:

```
SW_COUNT 5
```

Step 4. Add the following line to file:

`SW_`*`X`***`_IP_ADDRESS`** *`nn.nn.nnn.nnn`*

Change the placeholder "*X*" to the number 1, and replace the "*nn*" fields with the IP address of the switch that will be designated as switch 1.

The completed line will look similar to the following:

```
SW_1_IP_ADDRESS 15.43.214.101
```

Step 5. If multiple switches will be monitored, replicate the line from step 4 for each switch, changing the switch number and IP Address for each. When you are done, the number of lines should equal the number defined in the `SW_COUNT` setting. For example, the following lines would configure the monitor for three switches:

```
SW_COUNT 3
SW_1_IP_ADDRESS 15.43.214.101
SW_2_IP_ADDRESS 15.43.214.171
SW_3_IP_ADDRESS 15.43.214.184
```

Step 6. Save the file.

Step 7. To invoke the changes made to the switch configuration file, you must use the Enable Monitoring option of the Hardware Monitoring Request Manager, even if monitoring is already enabled. The Enable Monitoring option runs the startup client, which reads the contents of the configuration file and starts the switch monitor to begin monitoring of the FC switches. See "Enabling Hardware Event Monitoring" on page 42, for more information.

There are other settings in the configuration file that can be changed to customize the operation of the FC switch monitor. These settings are defined in Chapter 5, "Hardware Monitor Configuration Files."

Adding or Removing an FC Switch

Adding or removing a switch from the monitor configuration involves changing the same configuration file settings described in the preceding procedure, `SW_COUNT` and `SW_X_IP_ADDRESS`.

Changing the FC Switch Monitoring Configuration

To change the FC switch monitoring configuration compete the following steps:

Step 1. Determine the IP address for each switch you are adding or deleting.

Step 2. Open file `/var/stm/config/tools/monitor/dm_fc_sw.cfg` in an ASCII text editor.

Step 3. Locate the following line in the file and change value "*n*" to reflect the new number of switches to be monitored:

```
SW_COUNT n
```

Step 4. If you are adding a switch, add the following line to file:

```
SW_X_IP_ADDRESS nn.nn.nnn.nnn
```

Change the placeholder "*X*" to the number you want assigned to the switch (typically the next sequential number available), and replace the "*nn*" fields with the IP address of the switch.

The completed line will look similar to the following:

```
SW_5_IP_ADDRESS 15.43.214.191
```

Repeat this step for each switch you are adding.

Step 5. If you are removing a switch, locate the `SW_X_IP_ADDRESS` line for the switch to be removed and delete it from the file. If you deleting multiple switches, delete the line for each one.

Step 6. Save the file.

Step 7. To invoke the changes immediately, run the Hardware Monitoring Request Manager and select the (E)nable Monitoring option. This option runs the startup client, which will cause the changes to the switch monitoring to take effect immediately. See "Enabling Hardware Event Monitoring" on page 42.

Alternatively you can do nothing and the changes will be made at the next switch polling interval when the monitor recognizes the changes and launches the startup client to invoke them.

Configuration Files

Startup Configuration File

File name: `/var/stm/config/tools/monitor/dm_fc_sw.sapcfg`

Default Entries: The monitor uses the standard default monitor request entries shown in Table on page 120.

Monitor Configuration File

File name: `/var/stm/config/tools/monitor/dm_fc_sw.cfg`

Default settings:

- **Polling Interval:** 60 minutes
- **Repeat Frequency:** 1 day (1440 minutes)
- **Severity Action:** Notify for all levels

The switch monitor also uses the following settings to configure the SNMP environment used by the switch. Note that two of these settings (SW_COUNT and SW_X_IP_ADDRESS) are required to indicate to the monitor what switches should monitored. Changes that involve adding or deleting switches to the configuration file while the monitor is running will be invoked at the next polling interval, or following the selection of the (E)nable Monitoring option from the Hardware Monitoring Request Manager (monconfig).

Table 6-2 PSM Configuration File Fields

Setting	Default Value	Description
SW_COUNT *value*	none	Identifies the number of switches (value) the monitor will be responsible for monitoring. **This setting is required.**
SW_X_IP_ADDRESS *IP_address*	none	Identifies the IP address for each switch the monitor will monitor. The "X" placeholder is replaced by the number assigned to the switch, and "*IP_address*" is replaced by the IP address of the switch. There must be a separate setting for each switch. **This setting is required.**
SITE_SNMP_GET_COMMUNITY *text* SW_X_SNMP_GET_COMMUNITY *text*	public	These settings define the SNMP community assigned to the switches being monitored. The SITE setting is used for all switches, unless overridden by a SW_X setting for the specific switch identified by X. The text string cannot contain embedded spaces.
SITE_LOCATION *text* SW_X_LOCATION *text*	none	These settings define the text string used to identify the switch location in log messages. The SITE setting is used for all switches, unless overridden by a SW_X setting for the specific switch identified by X. The text string cannot contain embedded spaces.
SITE_CONTACT *text* SW_X_CONTACT *text*	none	These settings define the text string used to identify the contact person in log messages. The SITE setting is used for all switches, unless overridden by a SW_X setting for the specific switch identified by X. The text string cannot contain embedded spaces.
SITE_SNMP_RETRY *value* SW_X_SNMP_RETRY *value*	1	These settings define the SNMP retry value in seconds. The SITE setting is used for all switches, unless overridden by a SW_X setting for the specific switch identified by X. Valid values are 1 - 5.
SITE_SNMP_TIMEOUT *value* SW_X_SNMP_ TIMEOUT *value*	1	These settings define the SNMP timeout value in seconds. The SITE setting is used for all switches, unless overridden by a SW_X setting for the specific switch identified by X. Valid values are 1 - 5.

Table 6-2 PSM Configuration File Fields (Continued)

Setting	Default Value	Description
SW_X_IS_MONITORED *value*	1 (Yes)	This setting determines if the indicated switch will be monitored. Valid values are 0 (No) and 1 (Yes).
SW_X_SYSNAME *text*	none	Identifies the switch's sysname if the switch's system.sysName value is not set.

PSM Configuration File

File name: `/var/stm/config/tools/monitor/dm_fc_sw.psmcfg`

Default settings:

- **PSM Resource Name:** `/connectivity/status/switches/FC_sw`
- **State Handling:** Requires the use of set_fixed to set UP state.
- **DOWN state mapping:** Serious and Critical map to DOWN.

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