Dell™ Serial-Attached SCSI Host Bus Adapter 5/i Integrated and 5/E Adapter

User's Guide

Model UCS-50

Dell™ Serial-Attached SCSI Host Bus Adapter 5/i Integrated and 5/E Adapter

User's Guide

Notes, Notices, and Cautions

NOTE: A NOTE indicates important information that helps you make better use of your computer.

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

CAUTION: A CAUTION indicates a potential for property damage, personal injury, or death.

Contents

⚠ CAUTION: Safety Instructions

Use the following safety guidelines to help ensure your own personal safety and to help protect your system and working environment from potential damage.

📝 **NOTE:** See the safety and caution statements in the documentation that came with your Dell™ PowerEdge™ system or Dell PowerVault™ storage system.

SAFETY: General

- Observe and follow service markings. Do not service any product except as explained in your user documentation. Opening or removing covers that are marked with the triangular symbol with a lightning bolt may expose you to electrical shock. Components inside these compartments should be serviced only by a trained service technician.

- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:
  - The power cable, extension cable, or plug is damaged.
  - An object has fallen into the product.
  - The product has been exposed to water.
  - The product has been dropped or damaged.
  - The product does not operate correctly when you follow the operating instructions.

- Use the product only with approved equipment.

- Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company.

- Handle batteries carefully. Do not disassemble, crush, puncture, short external contacts, dispose of in fire or water, or expose batteries to temperatures higher than 60 degrees Celsius (140 degrees Fahrenheit). Do not attempt to open or service batteries; replace batteries only with batteries designated for the product.

SAFETY: When Working Inside Your System

Before you remove the system covers, perform the following steps in the sequence indicated.

⚠ **CAUTION: Except as expressly otherwise instructed in Dell documentation, only trained service technicians are authorized to remove the system cover and access any of the components inside the system.**

🔵 **NOTICE:** To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device.

1 Turn off the system and any devices.

2 Ground yourself by touching an unpainted metal surface on the chassis before touching anything inside the system.

3 While you work, periodically touch an unpainted metal surface on the chassis to dissipate any static electricity that might harm internal components.

4 Disconnect your system and devices from their power sources. To reduce the potential of personal injury or shock, disconnect any telecommunication lines from the system.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure that both connectors are correctly oriented and aligned.

- Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

SAFETY: Protecting Against Electrostatic Discharge

Electrostatic discharge (ESD) events can harm electronic components inside your computer. Under certain conditions, ESD may build up on your body or an object, such as a peripheral, and then discharge into another object, such as your computer. To prevent ESD damage, you should discharge static electricity from your body before you interact with any of your computer's internal electronic components, such as a memory module. You can protect against ESD by touching a metal grounded object (such as an unpainted metal surface on your computer's I/O panel) before you interact with anything electronic. When connecting a peripheral (including handheld digital assistants) to your computer, you should always ground both yourself and the peripheral before connecting it to the computer. In addition, as you work inside the computer, periodically touch an I/O connector to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge:

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component. Just before unwrapping the antistatic package, be sure to discharge static electricity from your body.

- When transporting a sensitive component, first place it in an antistatic container or packaging.

- Handle all electrostatic sensitive components in a static-safe area. If possible, use antistatic floor pads and work bench pads.

Overview

The Dell™ Serial-Attached SCSI (SAS) 5 Host Bus Adapters (HBAs) are the next generation of enterprise-class storage controllers. They are not backward compatible with the previous generation of SCSI devices.

The SAS 5 HBAs are a half-length, full-size PCI-E card. They have four or eight serial connectors to support Dell-compliant SAS and Serial ATA devices. The SAS 5/E Adapter communicates with the physical disks using two x4 external connectors and the SAS 5/i Integrated communicates using a x4 internal SAS connection.

The SAS 5 HBAs are supported on platforms with PCI-E x8 or x16 connectors.

Figure 1-1. SAS 5/E Adapter
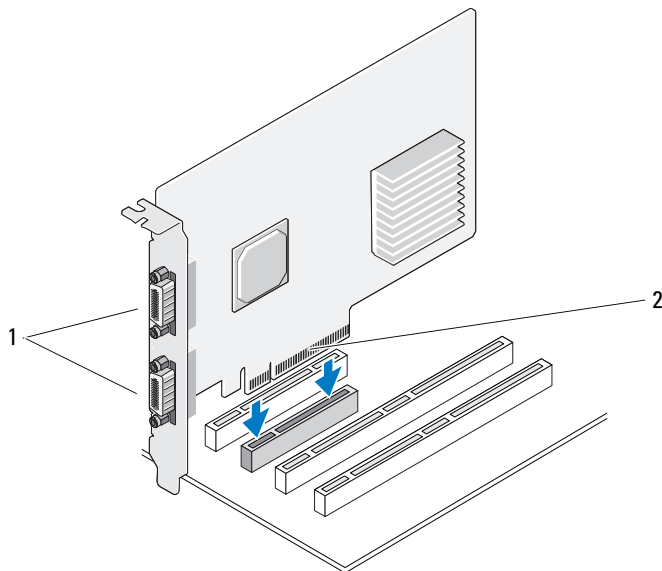
1   two x4 external connectors   2   PCI-E connector

Figure 1-2. SAS 5/i Integrated
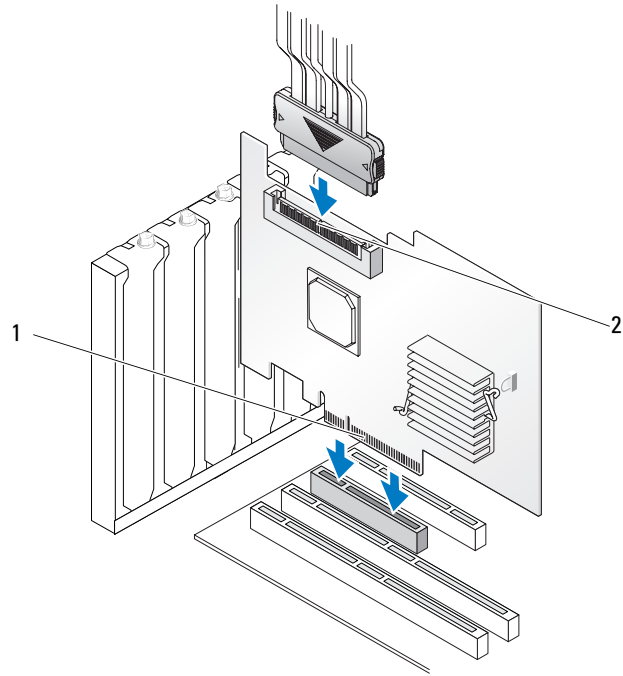
| 1 | PCI-E connector | 2 | one x4 internal connector |

2

SAS 5 HBA Features

This section provides the specifications of the Dell™ Serial-Attached SCSI (SAS) 5 Host Bus Adapters (HBAs). The following table compares the specifications of the SAS 5/E Adapter and SAS 5/i Integrated.

Table 2-1. Specification of SAS 5 HBAs

Specification	SAS 5/E Adapter	SAS 5/i Integrated
SAS technology	Yes	Yes
Support for x4, x8, or x16 Full-Size PCI Express Host Interface	Yes	Yes
Form Factor	Full-Size, Half-Length PCI Adapter	Full-Size, Half-Length PCI Adapter
I/O controller (IOC)	LSI SAS 1068	LSI SAS 1068
	Core Speed: 255 MHz	Core Speed: 255 MHz
Operating voltage requirements	+12V, +3.3V, +3.3Vaux	+12V, +3.3V, +3.3Vaux
Communication to the system	PCI-E lanes	PCI-E lanes
Communication to end devices	SAS Links	SAS Links
Connectors	2 x4 External	1 x4 Internal
Lead Free	Yes	Yes
Supported operating systems	Microsoft® Windows® 2000 Server and Windows Server® 2003 Family, Windows Vista™, Red Hat® Enterprise Linux® Versions 3, 4, and 5, SUSE® Linux Enterprise Server Versions 9 and 10.	Microsoft Windows 2000 Server and Windows Server® 2003 Family, Windows Vista, Red Hat Enterprise Linux Versions 3, 4, and 5, SUSE Linux Enterprise Server Versions 9 and 10.
Dell-compliant SAS and SATA compatibility	Yes	Yes
Dell-supported direct connected end devices	Dell-supported external storage enclosure and Dell-supported external tape devices.	Dell-compliant physical disks

Table 2-1.   Specification of SAS 5 HBAs *(continued)*

Specification	SAS 5/E Adapter	SAS 5/i Integrated
Hot add / Hot remove of end devices	Yes	Yes
SMART error support through management applications	Yes	Yes
Support for mixed physical disks sizes	Yes	Yes
Support for external tape drive	Yes	No
Port activity/status LEDs	Yes	No

LED Port Activity Feature (SAS 5/E Adapter Only)

SAS 5/E Adapter controllers are equipped with port activity/status light-emitting diodes (LEDs). These LEDs enable you to quickly determine the status of an external SAS port. Each x4 connector has its own set of LEDs.

The following table describes the color of the LEDs and corresponding SAS port state.

Table 2-2.   x4 Connector LEDs Description

LEDs Color	SAS Port State
Off	It means any one of the following: • Power is on. • Port has been reset. • All links in the port are either disconnected or the cable is disconnected.
Green	All links in the port are connected and functional.
Amber	One or more links in the port is not connected. This is only applicable in a wide port configuration.

3

Hardware Installation

This chapter describes how to install the Dell™ Serial-Attached SCSI (SAS) 5/E Adapter.

NOTE: See your system's *Hardware Owner's Manual* for instructions on installing the SAS 5/i Integrated.

Installing the SAS 5/E Adapter

⚠ **CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Authorized service technicians: Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.**

1 Unpack the SAS 5/E Adapter and check for damage.

   NOTE: See "Getting Help" on page 35 if the adapter is damaged.

2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet. See your system's *Hardware Owner's Manual* for more information on power supplies.

3 Disconnect the system from the network and remove the cover of the system. See your system's *Hardware Owner's Manual* for more information on opening the system.

4 Select an appropriate PCI-E slot. Remove the blank filler bracket on the back of the system aligned with the PCI-E slot you have selected.

   NOTE: The SAS 5/E Adapter must be placed in the expansion slot and the SAS 5/i Integrated adapter must be placed in the embedded slot. See your system documentation for more information about the PCI-E slots.

5 Align the SAS 5/E Adapter to the PCI-E slot you have selected.

6 Insert the adapter gently, but firmly, until the adapter is firmly seated in the PCI-E slot. See Figure 3-1.

Figure 3-1. Installing a SAS 5/E Adapter
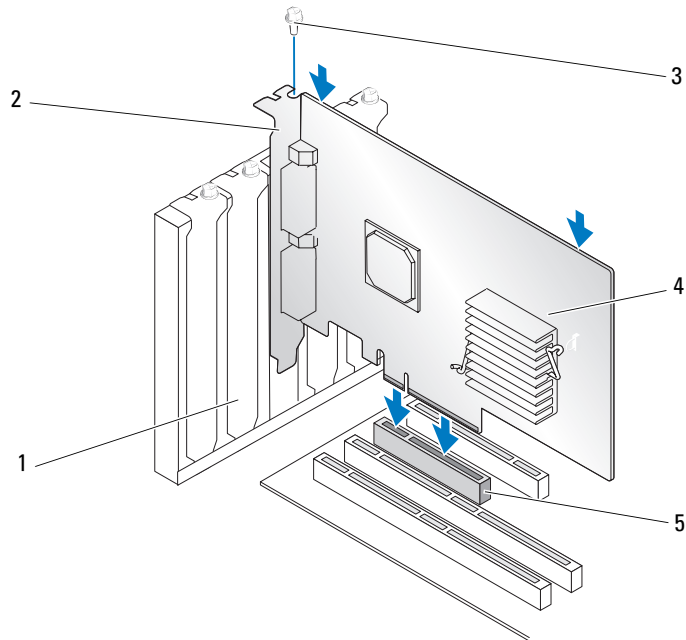
1	filler bracket	2	PCI bracket	3	bracket screw
4	SAS 5/E Adapter	5	PCI-E slot		

7 Tighten the bracket screw, if any, or use the system's retention clips to secure the adapter to the system's chassis.

8 Replace the cover of the system. See your system's *Hardware Owner's Manual* for more information on closing the system.

9 Connect the cable from the external enclosure to the adapter. See Figure 3-2.

✐ **NOTE:** The external cable can be connected to either of the two external connectors.

Figure 3-2.   Connecting the Cable From the External Enclosure
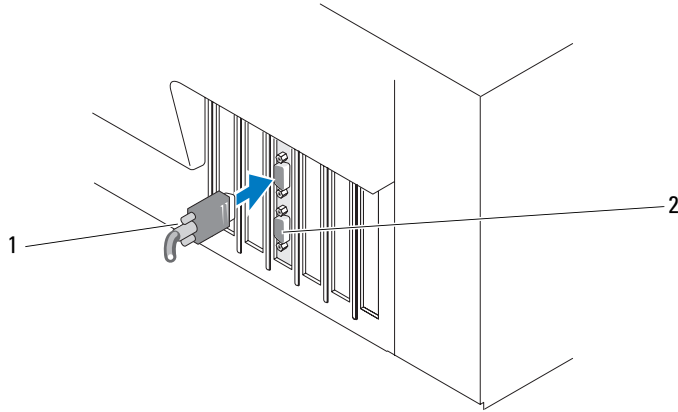
1   cable from the external enclosure   2   connector on the adapter

10 Reconnect the power cable(s) and network cables, and then turn on the system.

✐ **NOTE:** Ensure that you do not connect a hard disk and tape drive to the same SAS 5/iR Adapter.

✐ **NOTE:** For information on connecting your SAS 5i/R controller to a tape drive see your system's *Hardware Owner's Manual*.

✐ **NOTE:** Installing an operating system on a disk attached to the SAS 5/E is not supported.

4

Driver Installation

The Dell™ Serial-Attached SCSI (SAS) 5 Host Bus Adapters (HBAs) require software drivers to operate with the Microsoft® Windows®, Red Hat® Enterprise Linux®, and SUSE® Linux operating systems.

This chapter contains the procedures for installing the drivers for the following operating systems.

* Microsoft Windows 2000 Server family
* Microsoft Windows Server 2003 family
* Windows Vista™

    NOTE: Only the SAS 5/i Integrated controller card supports Windows Vista.

* Red Hat Enterprise Linux Versions 3, 4, and 5
* SUSE® Linux Enterprise Server Versions 9 and 10

The four methods for installing a driver that are discussed in this chapter are:

* Installing the driver during Windows operating system installation.
* Installing a Windows driver for a new SAS 5 HBA.
* Updating an existing Windows driver.
* Installing or updating the the driver on a new or existing Linux operating system installation.

NOTE: Device drivers are frequently updated. To ensure you have the latest version of any driver mentioned in this section, check the Dell Support website at **support.dell.com**. If a newer version exists, you can download the driver to your system.

Creating a Driver Diskette

1 Browse to the download section for the system at the Dell Support website at **support.dell.com**.

2 Locate and download the latest SAS 5 HBA driver to the system. The drivers are packaged on the Dell Support website such that it can be written to a diskette.

3 Follow the instructions on the Dell Support website for extracting the driver to the diskette.

Installing the Driver During Windows Operating System Installation

Perform the following steps to install the driver during operating system installation.

1   Boot the system using the Microsoft Windows 2000/Windows Server 2003 CD.

2   When the message **Press F6 if you need to install a third party SCSI or RAID driver** appears, press <F6> immediately.

    Within a few minutes, a screen appears that asks for additional adapters in the system.

3   Press <S>.

    The system prompts for the driver diskette to be inserted.

4   Insert the driver diskette in the diskette drive and press <Enter>.

    A list of available drivers appears.

5   Select the right driver for the installed adapter and press <Enter> to load the driver.

    ▨ **NOTE:** For Windows 2003, a message may appear that states that the driver you provided is older/newer than the Windows driver. Press <S> to use the driver that is on the floppy diskette.

6   Press <Enter> again to continue the installation.

Installing a Windows Driver for a New SAS 5 HBA

▨ **NOTE:** You do not need to install the driver on the Windows Vista operating system as the driver is native to this operating system.

Perform the following steps to configure the driver when you add the SAS 5 HBA to a system that already has Windows installed.

1   Turn off the system.

2   Install the new SAS 5 HBA in the system.

    See "Hardware Installation" on page 13 for detailed instructions on installing and cabling the SAS 5 HBA.

3   Turn on the system.

    The Windows operating system should detect the new adapter and display a message to inform the user.

4   The **Found New Hardware Wizard** screen pops up and displays the detected hardware device.

5   Click **Next**.

6   On the **Locate device driver** screen, select **Search for a suitable driver for my device** and click **Next**.

7   Provide the appropriate driver package (from your driver diskette) on the **Locate Driver Files** screen.

8   Click **Next**.

9   The wizard detects and installs the appropriate device drivers for the new SAS 5 HBA.

10 Click **Finish** to complete the installation.

11 Restart the system.

Updating an Existing Windows Driver

Perform the following steps to update the Windows driver for the SAS 5 HBA already installed on your system.

✐ **NOTE:** It is important that you close all applications on your system before you update the driver.

1 Click **Start→ Settings→ Control Panel→ System**.

The **System Properties** screen appears.

✐ **NOTE:** For systems running Windows Server 2003 operating system, click **Start→ Control Panel→ System**.

2 Click on the **Hardware** tab.

3 Click **Device Manager**.

The **Device Manager** screen appears.

4 Double-click on **SCSI and RAID Controllers**.

5 Double-click the SAS 5 HBA for which you want to update the driver.

6 Click the **Driver** tab and click on **Update Driver**.

The screen for the **Upgrade Device Driver** Wizard displays.

7 Provide the appropriate driver package (from your driver diskette) on the **Locate Driver Files** screen.

8 Select **Install from a list or specific location**.

9 Click **Next.**

10 Follow the steps in the wizard to search the diskette for the driver.

11 Select the **.INF** file from the diskette.

✐ **NOTE:** For systems running Windows Server 2003 operating system, select the name of the driver, not the **.INF** file.

12 Click **Next** and continue the installation steps in the wizard.

13 Click **Finish** to exit the wizard and restart the system for the changes to take place.

Installing the Red Hat Enterprise Linux Driver

Use the procedures in this section to install the driver for Red Hat Enterprise Linux AS (versions 3, 4, and 5) and ES (versions 3, 4, and 5).

✐ **NOTE:** The device driver for Red Hat Enterprise Linux AS Version 5 is native. To ensure you have the latest version of this driver, check the Dell Support website at **support.dell.com**. If a newer version exists, you can download the driver to your system.

Creating a Driver Diskette

Before beginning the installation, copy the drivers from the *Dell™ PowerEdge™ Service and Diagnostic Utilities* CD or download the driver appropriate for Red Hat Enterprise Linux (versions 3, 4, and 5) from the Dell Support website at **support.dell.com** to your temporary directory. This file includes two Red Hat Package Managers (RPMs) and driver update disk files. The package also contains the Dynamic Kernel Module Support (DKMS) Red Hat Package Manager (RPM) file.

The package is a gzipped tar file. After downloading the package to a Linux system, perform the following steps.

1 `gunzip` the package.

2 Execute `tar xvf` on the package.

   Note that the package contains DKMS RPM, the driver RPM (DKMS enabled) and the Driver Update Diskette (DUD image(s)).

3 Use the `dd` command to create a driver update disk. Use the appropriate image for the purpose.

   `"dd if=<name of the dd image file> of=/dev/fd0"`

4 Use the diskette for operating system installation as described later in this section.

Creating a Driver Update Diskette

The files and directories that are needed to create the Driver Update Diskette (DUD) are mentioned below.

Ø **NOTE:** The SAS 5 driver package installs these files. You do not need to do anything at this point.

- The directory **/usr/src/mptlinux-<driver_version>** contains the driver source code, **dkms.conf**, and specifications file for the driver.

- The subdirectory **redhat_driver_disk** contains the files needed to create the DUD. The files needed are **disk_info**, **modinfo**, **modules.dep**, and **pcitable**.

- To create the DUD image for pre-Red Hat Enterprise Linux (version 4), the kernel source package must be installed to compile the driver. For Red Hat Enterprise Linux 4 distribution, the kernel source is not needed.

Perform the following steps to create the DUD using the DKMS tool:

1 Install the DKMS-enabled SAS 5 driver RPM package on a system running Red Hat Enterprise Linux operating system.

2 Type the following command in any directory:

   `dkms mkdriverdisk -d redhat -m mptlinux -v <driver version>`
   `-k <kernel version>`

   This starts the process to create the SAS 5 DUD image.

3 If you want to build the DUD image for multiple kernel versions, use the following command:

```
dkms mkdriverdisk -d redhat -m mptlinux -v <driver version>
-k <kernel_version_1>, <kernel_version_2>, ...
```

4 After the DUD image has been built, you can find it in the DKMS tree for the SAS 5 driver.

NOTE: The DKMS package supports both Red Hat Enterprise Linux and SUSE Linux Enterprise Server.

Installing the Driver

Perform the following steps to install Red Hat Enterprise Linux (versions 3, 4, and 5) and the appropriate driver.

1 Boot normally from the Red Hat Enterprise Linux installation CD.

2 At the command prompt, type: `Linux expert dd`

3 When the install prompts for a driver diskette, insert the diskette and press <Enter>.

See "Creating a Driver Diskette" on page 17 for information on creating a driver diskette.

4 Complete the driver installation as directed by the program.

Installing the Driver Using an Update RPM

The following steps explain the installation procedure for the Red Hat Enterprise Linux, AS (versions 3, 4, and 5) operating systems and the appropriate driver using an update RPM.

Installing the RPM Package with DKMS Support

1 Uncompress the zipped file of the DKMS-enabled driver package.

2 Install the DKMS package using the command: `rpm -Uvh <DKMS package name>`

3 Install the driver package using the command: `rpm -Uvh <Driver package name>`

4 Restart the system to load the new driver.

Installing the SUSE Linux Enterprise Server Driver

Use the procedures in this section to install the driver for SUSE Linux Enterprise Server (versions 9 and 10).

NOTE: The device driver for SUSE Linux Enterprise Server Version 10 is native. To ensure you have the latest version of this driver, check the Dell Support website at **support.dell.com**. If a newer version exists, you can download the driver to your system.

Installing the Driver Using an Update RPM

The following process explains the installation procedure for the SUSE Linux Enterprise Server (versions 9 and 10) operating system and the appropriate driver using an update RPM.

Installing the RPM Package with DKMS Support

1 Uncompress the zipped file of the DKMS-enabled driver package.

2 Install the DKMS package using the command: `rpm -Uvh <DKMS package name>`

3 Install the driver package using the command: `rpm -Uvh <Driver package name>`

4 Restart the system to load the new driver.

Creating the Driver Update Diskette

The following files are needed before you create the DUD.

Ø **NOTE:** The SAS 5 driver package installs these files. You do not need to do anything at this point.

• The directory **/usr/src/mptlinux -<driver_version>** contains the driver source code, **dkms.conf**, and specifications file for the driver.

• The subdirectory **redhat_driver_disk** contains the files needed to create the DUD. The files needed are **disk_info**, **modinfo**, **modules.dep**, and **pcitable**.

Perform the following steps to create the DUD using the DKMS tool.

1 Install the DKMS-enabled SAS 5 driver rpm package on a system running a SUSE Linux operating system.

2 Type the following command in any directory:

```
dkms mkdriverdisk -d redhat -m mptlinux -v <driver version>
-k <kernel version>
```

This starts the process to create the SAS 5 DUD image.

3 If you want to build the DUD image for multiple kernel versions, use the following command:

```
dkms mkdriverdisk -d redhat -m mptlinux -v <driver version>
-k <kernel_version_1>, <kernel_version_2>, ...
```

4 After the DUD image has been built, you can find it in the DKMS tree for the SAS 5 driver.

Ø **NOTE:** The DKMS package supports both Red Hat Enterprise Linux and SUSE Linux Enterprise Server.

Installing SUSE Linux Enterprise Server Using the Driver Update Diskette

Ø **NOTE:** See "Creating a Driver Diskette" on page 17 for information on creating a driver diskette.

1 Insert the appropriate SUSE Linux Enterprise Server (versions 9 and 10) Service Pack (SP) CD in the system.

2 Select **INSTALLATION** from the menu options.

3 Select <F6> for the driver update disk.

4 Press <Enter> to load the Linux kernel.

5 At the prompt **Please insert the driver update floppy/CDROM**, click **OK**.

The system selects the driver from the diskette and installs it. The system then displays the message **DRIVER UPDATE ADDED** with the description of the driver module.

6 Click **OK**.

If you want to install from another driver update medium, continue with the following steps.

7 The system displays the message **PLEASE CHOOSE DRIVER UPDATE MEDIUM**.

8 Select the appropriate driver update medium.

The system selects the driver from the diskette and installs it.

Upgrading the Kernel

If you run the **up2date** utility to upgrade the kernel, the DKMS enabled driver packages must be reinstalled. To do so, type the following in the same order in a terminal window.:

```
dkms build -m <module_name> -v <module version> -k <kernel version>

dkms install -m <module_name> -v <module version> -k <kernel version>
```

Check whether the driver is successfully installed in the new kernel by typing:

```
dkms status
```

You must see a message similar to the following one on the screen:

```
<driver name>, <driver version>, <new kernel version>: installed
```

SAS 5 BIOS

BIOS of the Dell™ Serial-Attached SCSI (SAS) 5 Host Bus Adapters (HBAs) offers the following features:

- BIOS support for multiple installed instances of SAS 5/i and SAS 5/E
- POST Memory Management (PMM) support
- Read-only memory (ROM) BIOS recovery image
- POST status error messaging
- Configurable boot device selection
- Compatibility with Console Redirection
- POST accessible, text-based configuration utility

POST Messages

The BIOS of the SAS 5 HBAs displays messages during POST that include status, identifying information, and alerts on detected errors that occur during the POST process.

The POST messages display a series of information. The BIOS POST identification banner prints the BIOS identification, copyright information, and the adapter version. It displays the list of adapters and devices detected at initialization in the set hierarchical order. The BIOS also prompts you to start the Configuration Utility during the POST process.

BIOS Fault Code Messages

When the BIOS encounters errors during initialization, it stops and displays the error warning. By default, the message is followed by a pause and the user is expected to hit any key for acknowledgement. Use the Configuration Utility to disable the pause.

The BIOS offers two options:

- The BIOS process can be stopped if an error is encountered.
- The BIOS process can continue even if there is an error.

Booting With Multiple Adapters

When booting a system with multiple SAS 5 HBAs, ensure that the boot disk is attached to the adapter at the lowest ID. Selection of the system boot device is performed in the system BIOS. Proper boot order must be selected in the adapter BIOS if the existing adapters are moved within the system. Failure to do so makes the BIOS display error messages.

NOTE: System boot is not supported from an external device attached to a SAS 5/E Adapter. See the Dell Support website at **support.dell.com** for the latest information on booting from external devices.

Configuration Utility

Starting the Configuration Utility

1 Turn on and boot the system.

2 Press <Ctrl><C> during POST when prompted.
  If you wait too long and the operating system logo appears, continue to wait until the operating system completes bootup. Then restart your system and try again.

The Configuration Utility menu screen displays.

Functions Performed

NOTE: The screens are organized in a hierarchical fashion and navigations hints are displayed at the bottom of each screen. See the online help for additional information about the utility.

Table 5-1.   Functions Performed by the Configuration Utility

Function	Description
Adapter Listing	Lists all the SAS 5 HBAs in the system.
Global Properties	Lists all the configurable global properties of the Configuration Utility and allows setting their values.
Adapter Properties	Lists all the adapter properties for the selected SAS 5 HBA.
SAS Topology	Lists all the SAS 5 HBAs in the system and the physical interfaces (PHYs) supported by them.
Advanced Adapter Properties	Lists advanced properties of the selected SAS 5 HBA and allows their modification.
Device Properties	Lists properties of the selected device.
Expander Properties	Lists properties of the selected expander.
PHY Properties	Lists properties of the selected PHY.
Exit/Change Verification	Displays a message indicating the change made or the screen which is being exited and a list of available exit/verification actions.

6

Troubleshooting

To get help with problems with your Dell™ Serial-Attached SCSI (SAS) 5 Host Bus Adapter (HBA), see "Getting Help" on page 35 or access the Dell Support website at **support.dell.com**.

BIOS Boot Order

If you intend to boot to the adapter, ensure it is set appropriately in the system's BIOS boot order. For more information, refer to the system documentation for your individual system.

General Problems

Table 6-1.   General Problems

Problem	Suggested Solution
The adapter displays in Windows® Device Manager but has a yellow bang (exclamation point).	Reinstall the driver. See the driver installation procedures in "Driver Installation" on page 17.
The adapter does not appear in Windows Device Manager.	Turn off the system and reseat the adapter.
`No Physical Disks Found` message appears during a CD installation of Microsoft® Windows 2000 Server or Windows Server® 2003.	The message appears due to one of the following reasons: • The driver is not supported on the operating system. • The adapter BIOS is disabled. • Physical disks are not connected or seated properly. The corresponding solutions to the three causes of the message are: • Press <F6> to install the Device Driver during installation. • Enter the BIOS Configuration Utility to enable the BIOS. See "SAS 5 BIOS" on page 25. • Verify that the physical disks are connected or seated properly.

Physical Disk Related Issues

Table 6-2.   Physical Disk Issues

Problem	Suggested Solution
The system does not boot from the SAS 5 HBA.	Ensure that the boot disk is attached to the adapter at the lowest ID and check the adapter and physical disk boot order in the system BIOS. **NOTE:** See your system documentation for information about boot device selection.
Fatal errors or data corruption are reported in the System Event Log by the operating system when accessing physical disks.	See "Getting Help" on page 35.
Physical disk is not enumerated during POST.	• Go to the Configuration Utility and ensure that the drive is not enumerated in the SAS topology. • Verify the cable connection. • Reseat the drive. • Check the cable for damage.

Configuration Utility Error Messages

NOTE: These error messages are displayed inside the Configuration Utility. Restart your system and retry if you encounter any of these.

Table 6-3.   Configuration Utility Error Messages

Message	Meaning and Suggested Solution
An error occurred while reading non-volatile settings	An error reading any one of a number of settings from the firmware.
An error occurred while reading current adapter settings	Adapter setup and initialization has failed.
An error occurred while refreshing persistent mappings	An error occurred while clearing persistent mappings.
Advanced Device Properties settings not found	Failed to read vital configuration page from firmware.
Advanced Adapter Properties settings not found	Failed to read vital configuration page from firmware.
Error obtaining PHY properties configuration information	Failed to read vital configuration page from firmware.

Table 6-3.   Configuration Utility Error Messages *(continued)*

Message	Meaning and Suggested Solution
`Configuration Utility Options Image checksum error`	Failed to properly read Configuration Utility options from flash. Reboot the system and try again. If the problem persists, re-flash the BIOS/firmware on the adapter.
`Configuration Utility Options Image error`	Failed to properly read Configuration Utility options from flash. Reboot the system and try again. If the problem persists, re-flash the BIOS/firmware on the adapter.
`Configuration Utility Options Image not found`	Failed to properly read Configuration Utility options from flash. Reboot the system and try again. If the problem persists, re-flash the BIOS/firmware on the adapter.
`Can't load default Configuration Utility options`	Failed to allocate memory for Configuration Utility options structure.
`An error occurred while writing non-volatile settings`	An error occurred while writing one or more settings to the firmware.

BIOS Error Messages

Table 6-4.   BIOS Error Messages

Message	Meaning and Suggested Solution
`Press <Ctrl><C> to Enable BIOS`	When the BIOS is disabled, you are given the option to enable it by entering the configuration utility. You can change the setting to **Enabled** in the configuration utility.
`Adapter at Baseport xxxx is not responding where xxxx is the baseport of the controller`	If the adapter does not respond for any reason but is detected by the BIOS, it displays this warning and continues. Shut down the system and try to reseat the adapter. If this message appears again, see "Getting Help" on page 35.
`Following SAS targets are not responding...`	When the BIOS determines that previously configured physical disks are not connected to the adapter, the BIOS displays this warning. The system continues to boot. See "Physical Disk Related Issues" on page 28 for troubleshooting tips.
`Unsupported Disk Drive`	The physical disk present is not supported by the adapter.

`Adapter configuration may have changed, reconfiguration is recommended!`
 	
`Press CTRL-C to run Dell SAS 5 Configuration Utility…`
	This message appears when multiple SAS 5 HBA's are moved within the system without proper boot order selection in the system BIOS. Start the Configuration Utility and select the boot order of the SAS 5 HBA in the system BIOS.

`Initializing...`	Displays while the BIOS is waiting to initialize.

Table 6-4. BIOS Error Messages *(continued)*

Message	Meaning and Suggested Solution
SAS discovery error	Indicates that there was a discovery error reported by the firmware and may be accompanied by more such messages. Enter the Configuration Utility to investigate.
One or more unsupported device detected!	When the adapter is set to exclude SAS or SATA devices, it indicates that a device of unsupported type was discovered.
SAS Address NOT programmed on controller in slot (X)	Indicates that the specified adapter has a SAS address of 0. This causes firmware errors during initialization and can be corrected by programming the SAS address of the adapter.
Integrated RAID exception detected:	The BIOS detected an exception with one or more RAID virtual disk. For additional troubleshooting information, see the error message "Volume (xx:yy:zzz) is currently in state "STATE"" on page 30.
Volume (xx:yy:zzz) is currently in state "STATE"	Lists the current state of the specified virtual disk when it is not optimal. The state may include: • INACTIVE: The virtual disk is inactive, possibly foreign, or could be in any one of the states mentioned below. • DEGRADED: The virtual disk is in a degraded state and has lost redundancy. • RESYNCING: The virtual disk is degraded and currently rebuilding. • FAILED: The virtual disk has an error and is in a failed state. • MISSING: The virtual disk is no longer present though a record of it remains.
Device not available at	Device may not be ready at this time. The device will be retried. If the problem persists, restart your system.
Spinning up the device!	The device currently being scanned is being spun up.
ERROR! Device is not responding to Read Capacity	The device did not respond to a read capacity command. See "Getting Help" on page 35.
Device has an unsupported sector size, not 512	The device has a non-512 byte sector size. The MPIBIOS only supports a 512 byte sector for INT 13h devices.
Failed to add device, too many devices!	Could not allocate resources for additional devices.
ERROR! Adapter Malfunctioning!	The adapter did not initialize properly. There may be a problem with the adapter configuration. Reload the BIOS configuration.

Table 6-4. BIOS Error Messages *(continued)*

Message	Meaning and Suggested Solution
`MPT firmware checksum failed - Reboot system`	The checksum of the firmware failed. This only affects firmware download boot system.
	If message occurs after the BIOS has been flashed, reflash the controller BIOS. If the message continues to occur, "Getting Help" on page 35.
`MPT firmware fault`	The LSI Logic MPT firmware faulted. Restart the system. "Getting Help" on page 35.
`Adapter removed from boot order!`	An adapter that was previously in the boot order was not found. It has either been removed from the system or moved to a different slot.
`Updating Adapter List!`	A new adapter was found for which there is no record. A record will be created for it.
`Adapter(s) disabled by user`	An adapter was found, but it has been disabled in the Configuration Utility and will not be used by the BIOS.
`Adapter configuration may have changed, reconfiguration is suggested!`	An adapter has been moved or reinstalled in the system. Add it to the boot order using the available resources.
`Memory allocation failed`	The adapter could not allocate enough memory to load the Configuration Utility, its strings file, or its options file.
`Invalid or corrupt image`	One of the images for the Configuration Utility, its strings file, or its options file is corrupt. Reload the BIOS.
`Image upload failed`	Could not upload the image for the Configuration Utility, its strings file, or its options file. Reload the BIOS.
`Image not found`	Could not locate the image for the Configuration Utility, its strings file, or its options file.
`Unable to load LSI Configuration Utility`	Could not load the Configuration Utility. This error usually follows one of the four previous messages.
`Unable to load LSI Logic Corp MPT BIOS` `MRT BIOS fault 02h encountered at adapter PCI (XXh, XXh, XXh)` `Fusion-MPT Firmware Fault code 0706h`	The controller was downgraded from version 10.x or greater to 6.x. Contact Dell support for assistance

A

Updating the Firmware

Firmware updates to the Dell™ Serial-Attached SCSI (SAS) 5 Host Bus Adapter (HBA) is achieved by flashing the firmware. The firmware can be flashed while the adapter is in use. The system must be restarted for the changes to the firmware to take effect. If there is a failure while flashing the firmware (such as a power outage) the adapter reverts back to the earlier version of the firmware.

NOTE: If you flash the firmware while using the adapter, you may notice temporary degradation in the adapter's performance.

Firmware Update Utility

Firmware update utility can be run from a variety of operating systems. Firmware flash is automated and no user intervention is required. You can obtain the firmware flash utility from the *Dell™ PowerEdge™ Service and Diagnostic Utilities* CD.

NOTICE: Do not attempt to downgrade the firmware from the 10.x version (or higher) to the 6.x version. This puts the controller in a non-functional state.

NOTE: In the event of a new firmware release, check the Dell Support website at **support.dell.com** for the latest firmware updates and the firmware update procedure.

B

Getting Help

Obtaining Assistance

⚠ **CAUTION: If you need to remove the computer cover, first disconnect the computer power and modem cables from all electrical outlets.**

If you need assistance with a technical problem, perform the following steps:

1 Complete the procedures in the section "Troubleshooting Your System" of your system's *Hardware Owner's Manual*.

2 Run the system diagnostics and record any information provided.

3 Use Dell's extensive suite of online services available at Dell Support at **support.dell.com** for help with installation and troubleshooting procedures.

 For more information, see "Online Services" on page 36.

4 If the preceding steps have not resolved the problem, call Dell for technical assistance.

✍ **NOTE:** Call the support service from a phone near or at the system so that the support staff can assist you with any necessary procedures.

✍ **NOTE:** Dell's Express Service Code system may not be available in all countries.

When prompted by Dell's automated telephone system, enter your Express Service Code to route the call directly to the proper support personnel. If you do not have an Express Service Code, open the **Dell Accessories** folder, double-click the **Express Service Code** icon, and follow the directions.

For instructions on using the technical support service, see "Dell Enterprise Training" on page 37 and "Before You Call" on page 38.

✍ **NOTE:** Some of the following services are not always available in all locations outside the continental U.S. Call your local Dell representative for information on availability.

Technical Support and Customer Service

Dell's support service is available to answer your questions about Dell™ hardware. Our support staff use computer-based diagnostics to provide fast, accurate answers.

To contact Dell's support service, see "Before You Call" on page 38, and then see the contact information for your region or go to **support.dell.com**.

Online Services

You can access Dell Support at **support.dell.com**. Select your region on the **WELCOME TO DELL SUPPORT** page, and fill in the requested details to access help tools and information.

You can learn about Dell products and services on the following websites:

www.dell.com

www.dell.com/ap (Asian/Pacific countries only)

www.dell.com/jp (Japan only)

www.euro.dell.com (Europe only)

www.dell.com/la (Latin American and Caribbean countries)

www.dell.ca (Canada only)

You can access Dell Support through the following websites and e-mail addresses:

*   Dell Support websites

    support.dell.com

    support.jp.dell.com (Japan only)

    support.euro.dell.com (Europe only)

*   Dell Support e-mail addresses

    mobile_support@us.dell.com

    support@us.dell.com

    la-techsupport@dell.com (Latin America and Caribbean countries only)

    apsupport@dell.com (Asian/Pacific countries only)

*   Dell Marketing and Sales e-mail addresses

    apmarketing@dell.com (Asian/Pacific countries only)

    sales_canada@dell.com (Canada only)

*   Anonymous file transfer protocol (FTP)

    ftp.dell.com/

    Log in as user: anonymous, and use your e-mail address as your password.

Automated Order-Status Service

To check on the status of any Dell products that you have ordered, you can go to **support.dell.com**, or you can call the automated order-status service. A recording prompts you for the information needed to locate and report on your order. See the contact information for your region.

Dell Enterprise Training

Dell Enterprise training is available; see **www.dell.com/training** for more information. This service may not be offered in all locations.

Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell for customer assistance. Have your invoice or packing slip available when you call. See the contact information for your region.

Product Information

If you need information about additional products available from Dell, or if you would like to place an order, visit the Dell website at **www.dell.com**. For the telephone number to call to speak to a sales specialist, see the contact information for your region.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

1   Call Dell to obtain a Return Material Authorization Number, and write it clearly and prominently on the outside of the box.

   For the telephone number to call, see the contact information for your region.

2   Include a copy of the invoice and a letter describing the reason for the return.

3   Include a copy of any diagnostic information indicating the tests you have run and any error messages reported by the system diagnostics.

4   Include any accessories that belong with the item(s) being returned (such as power cables, media such as CDs and diskettes, and guides) if the return is for credit.

5   Pack the equipment to be returned in the original (or equivalent) packing materials.

   You are responsible for paying shipping expenses. You are also responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell. Collect-on-delivery (C.O.D.) packages are not accepted.

Returns that are missing any of the preceding requirements will be refused at our receiving dock and returned to you.

Before You Call

⚠️ **NOTE:** Have your Express Service Code ready when you call. The code helps Dell's automated-support telephone system direct your call more efficiently.

⚠️ **NOTE:** See your system's *Hardware Owner's Manual* for the telephone numbers and codes provided to contact Dell Support.

If possible, turn on your system before you call Dell for technical assistance and call from a telephone at or near the system. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the system itself. Ensure that the system documentation is available.

⚠️ **CAUTION: Before servicing any components inside your system, see your *Product Information Guide* for important safety information.**

Regulatory Notices

Electromagnetic Interference (EMI) is any signal or emission, radiated in free space or conducted along power or signal leads, that endangers the functioning of radio navigation or other safety service or seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. Radio communications services include but are not limited to AM/FM commercial broadcast, television, cellular services, radar, air-traffic control, pager, and Personal Communication Services (PCS). These licensed services, along with unintentional radiators such as digital devices, including computer systems, contribute to the electromagnetic environment.

Electromagnetic Compatibility (EMC) is the ability of items of electronic equipment to function properly together in the electronic environment. While this computer system has been designed and determined to be compliant with regulatory agency limits for EMI, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference with radio communications services, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, contact Dell™ Support or an experienced radio/television technician for additional suggestions.

Dell™ products are designed, tested, and classified for their intended electromagnetic environment. These electromagnetic environment classifications generally refer to the following harmonized definitions:

- **Class A** is typically for business environments. Class B products may also be utilized in a Class A environment.
- **Class B** is typically for residential environments. Class A products should not be utilized in a Class B environment.

Information Technology Equipment (ITE), including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, that are integrated into or connected to the system should match the electromagnetic environment classification of the computer system.

A Notice about Shielded Signal Cables: Use only shielded cables for connecting peripherals to any Dell™ device to reduce the possibility of interference with radio communications services. Using shielded cables ensures that you maintain the appropriate EMC classification for the intended environment. For parallel printers, a cable is available from Dell™. If you prefer, you can order a cable from Dell™ on the World Wide Web at www.dell.com.

Dell has determined that this product is a **Class A** harmonized product. The following sections provide country-specific EMC/EMI or product safety information.

FCC Notices (U.S. Only)

FCC, Class A

This product has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications. Operation of this product in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1 This device may not cause harmful interference.

2 This device must accept any interference received, including interference that may cause undesired operation.

> **NOTICE:** The FCC regulations provide that changes or modifications not expressly approved by Dell™ Inc. could void your authority to operate this equipment.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference with radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the system with respect to the receiver.
- Move the system away from the receiver.
- Plug the system into a different outlet so that the system and the receiver are on different branch circuits.

If necessary, consult a representative of Dell™ Inc. or an experienced radio/television technician for additional suggestions.

The following information is provided on the device or devices covered in this document in compliance with FCC regulations:

- Product name: Dell™ SAS 5/E Adapter, Dell™ SAS 5/i Integrated
- Company name: Dell™ Inc.
  Worldwide Regulatory Compliance & Environmental Affairs
  One Dell™ Way
  Round Rock, Texas 78682 USA
  512-338-4400

Industry Canada (Canada Only)

Industry Canada, Class A

This Class A digital apparatus complies with Canadian NMB-003.

> **NOTICE:** The Industry Canada regulations provide that changes or modifications not expressly approved by Dell™ Inc. could void your authority to operate this equipment.

Industry Canada (Canada uniquement)

Industry Canada, Classe A

Cet appareil numérique de Classe A est conforme à la norme NMB-003 du Canada.

AVIS : La réglementation d'Industry Canada précise que tout changement ou modification non expressément approuvé par Dell peut annuler vos droits d'utilisation de cet équipement.

CE Notice (European Union)

This product has been determined to be in compliance with 73/23/EEC (Low Voltage Directive), 89/336/EEC (EMC Directive), and amendments of the European Union.

European Union, Class A

RF INTERFERENCE WARNING: This is a Class A product. In a domestic environment this product may cause radio frequency (RF) interference, in which case the user may be required to take adequate measures.

A "Declaration of Conformity" in accordance with the preceding directives and standards has been made and is on file at

Dell™ Inc. Products Europe BV, Limerick, Ireland.

Předpisy CE (Evropská unie)

Bylo ověřeno, že tento produkt vyhovuje směrnicím 73/23/EEC (nízkonapěťová směrnice), 89/336/EEC (směrnice EMC) a dodatkům Evropské unie.

Evropská unie, třída A

RÁDIOVÉ RUŠENÍ - UPOZORNĚNÍ: Toto je produkt třídy A. V domácnosti toto zařízení může způsobovat rádiové rušení (RF). V tom případě bude nutné, aby uživatel podnikl příslušná opatření.

"Prohlášení o shodě" v souladu s výše uvedenými směrnicemi a normami bylo zpracováno a je uloženo v archivu společnosti Dell™ Inc. Products Europe BV, Limerick, Irsko.

CE-krav (Europæiske Union)

Dette produkt er i overensstemmelse med 73/23/EEC (Lavspændingsdirektiv), 89/336/EEC (EMC direktiv et) og rettelser fra den Europæiske Union.

Europæiske Union, Klasse A

ADVARSEL OM RF-FORSTYRRELSE: Dette er et Klasse A-produkt. I et hjemligt miljø kan dette produkt medføre forstyrrelse af radiofrekvens (RF), og i det tilfælde må brugeren fortage passende foranstaltninger.

En "Overensstemmelseserklæring", som er i henhold til foregående direktiver og standarder, er udført og arkiveret hos Dell Inc. Products Europe BV, Limerick, Irland.

CE-kennisgeving (Europese Unie)

Dit product voldoet aan de eisen van 73/23/EEC (laagspanningsrichtlijn), 89/336/EEC (EMC-richtlijn) en amendementen van de Europese Unie.

Europese Unie, klasse A

 RF-STORINGSWAARSCHUWING: Dit is een Klasse A-product. In een woonomgeving kan dit product radiofrequentiestoring (RF-storing) veroorzaken. Indien dit zich voordoet, moet de gebruiker de passende maatregelen nemen.

Er is in overeenstemming met de bovenstaande richtlijnen en normen een "conformiteitsverklaring" opgesteld, welke zich in het archief bevindt bij Dell™ Inc. Products Europe BV, Limerick, Ierland.

EÜ teatis (Euroopa Liit)

Käesolev toode on kooskõlas direktiividega 73/23/EMÜ (madalpinge direktiiv), 89/336/EMÜ (elektromagnetilise ühilduvuse direktiiv) ning Euroopa Liidu muudatustega.

Euroopa Liit, klass A

RAADIOSAGEDUSHÄIRE HOIATUS: Käesolev toode kuulub A-klassi. Koduses keskkonnas võib antud toode põhjustada raadiosagedushäireid, mistõttu võib selle kasutajal osutuda vajalikuks võtta asjakohaseid meetmeid.

Vastavalt eelnevatele direktiividele ja standarditele on koostatud "vastavusdeklaratsioon", mida säilitatakse ettevõttes Dell™ Inc. Products Europe BV, Limerickis, Iirimaal.

CE-ilmoitus (Euroopan unioni)

Tämä tuote täyttää direktiivin 73/23/ETY (pienjännitedirektiivi) ja direktiivin 89/336/ETY (sähkömagneettisesta yhteensopivuudesta annettu direktiivi), sellaisina kuin ne ovat muutettuina, vaatimukset.

Euroopan unioni, Luokka A

RADIOTAAJUUSHÄIRIÖITÄ KOSKEVA VAROITUS: Tämä on Luokan A tuote. Asuinympäristössä tämä laite saattaa aiheuttaa radiotaajuushäiriöitä. Häiriöiden poiston edellyttämistä toimista vastaa laitteen käyttäjä.

Yllä mainittujen direktiivien ja normien mukainen yhdenmukaisuusilmoitus on tehty, ja sitä säilyttää Dell™ Inc. Products Europe BV, Limerick, Irlanti.

Réglementation CE (Union européenne)

Ce produit a été déclaré conforme aux directives 73/23/EEC (Directive sur la faible tension), 89/336/EEC (Directive EMC) et aux amendements de l'Union européenne.

Union européenne, classe A

AVERTISSEMENT SUR LES PERTURBATIONS RF : Ce produit est un produit de classe A. Dans un environnement résidentiel, ce produit peut provoquer des perturbations radioélectriques, auquel cas l'utilisateur peut se voir obligé de prendre les mesures appropriées.

Une «Déclaration de Conformité» relative aux normes et directives précédentes a été rédigée et est enregistrée à Dell™ Inc. Products Europe BV, Limerick, Irlande.

CE-Hinweis (Europäische Union)

Es ist befunden worden, dass dieses Produkt in Übereinstimmung mit 73/23/EEC (Niederspannungs-Richtlinie), 89/336/EEC (EMC-Richtlinie) und Ergänzungen der Europäischen Union steht.

Europäische Union, Klasse A

HF-INTERFERENZWARNUNG: Dieses Produkt ist ein Produkt der Klasse A. In einer häuslichen Umgebung kann dieses Produkt Hochfrequenzstörungen verursachen. In diesem Fall muss der Benutzer die entsprechenden Maßnahmen treffen.

Eine „Konformitätserklärung" in Übereinstimmung mit den oben angeführten Normen ist abgegeben worden und kann bei Dell Inc. Products Europe BV, Limerick, Irland, eingesehen werden.

Σήμα CE (Ευρωπαϊκή Ένωση)

Το προϊόν αυτό συμμορφώνεται με τις οδηγίες 73/23/ΕΟΚ (Οδηγία περί χαμηλής τάσης), 89/336/ΕΟΚ (Οδηγία περί ηλεκτρομαγνητικής συμβατότητας), και τροποποιήσεις τους από την Ευρωπαϊκή Ένωση.

Ευρωπαϊκή Ένωση, Κατηγορία Α

ΠΡΟΕΙΔΟΠΟΙΗΣΗ ΠΑΡΕΜΒΟΛΗΣ RF: Αυτό είναι ένα προϊόν κατηγορίας Α. Σε οικιακό περιβάλλον, αυτό το προϊόν μπορεί να προκαλέσει παρεμβολές ραδιοσυχνοτήτων (RF), στην οποία περίπτωση μπορεί να απαιτηθεί η λήψη κατάλληλων μέτρων από το χρήστη.

Μια "Δήλωση συμμόρφωσης" βάσει των προηγούμενων Κοινοτικών Οδηγιών και Προτύπων έχει συνταχθεί και είναι αρχειοθετημένη στην Dell™ Inc. Products Europe BV, Limerick, Ιρλανδία.

CE jelzés (Európai Unió)

A termék megfelel az Európai Unió 73/23/EEC számú, kisfeszültségû berendezésekre vonatkozó irányelvének, valamint a 89/336/EEC számú EMC irányelvnek és azok módosításainak.

Európai Unió, „A" osztály

RF INTERFERENCIA FIGYELMEZTETÉS: „A" osztályba sorolt termék. Lakóhelyi környezetben ez a termék rádiófrekvenciás (RF) interferenciát okozhat, ebben az esetben a felhasználónak gondoskodnia kell a szükséges ellenintézkedésekről.

A vonatkozó irányelvekkel és szabványokkal összhangban "Megfelelõségi nyilatkozat" készült, amely a Dell™ vállalat írországi székhelyén rendelkezésre áll (Dell Inc. Products Europe BV, Limerick, Ireland).

Avviso CE (Unione Europea)

Questo prodotto è stato determinato essere conforme alle Direttive 73/23/CEE (Direttiva sulla bassa tensione), 89/336/CEE (Direttiva CEM) ed emendamenti dell'Unione Europea.

Unione Europea, Classe A

AVVISO DI INTERFERENZA RF: Questo prodotto è classificato come Classe A. L'utilizzo di questa apparecchiatura in un'area residenziale potrebbe causare interferenze in radiofrequenza, nel qual caso potrebbe essere richiesto all'utente di intraprendere un'azione correttiva.

Una "Dichiarazione di conformità" secondo gli standard e le direttive precedenti è stata emessa e registrata presso Dell™ Inc. Products Europe BV, Limerick, Irlanda.

CE atbilstības marķējums (Eiropas Savienība)

Šis produkts atbilst 73/23/EEK (Zemsprieguma Direktīva), 89/336/EEK (Elektromagnētiskās saderības Direktīva) un citiem Eiropas Savienības grozījumiem.

Eiropas Savienība, A klase

BRĪDINĀJUMS PAR RF TRAUCĒJUMIEM: Šis ir A klases produkts. Mājsaimniecības vidē produkts var radīt radio frekvenču (RF) traucējumus; šādā gadījumā lietotājam jāveic atbilstoši pasākumi.

Saskaņā ar iepriekšminētajām direktīvām un standartiem sastādīts "Atbilstības apliecinājums" un tas atrodams Dell™ Inc. Products Europe BV, Limerick, Īrijā arhīvā.

CE pranešimas (Europos Sąjunga)

Nustatyta, kad šis gaminys atitinka 73/23/EEC (žemosios įtampos direktyvą), 89/336/EEC (EMC direktyvą) ir Europos Sąjungos pataisas.

Europos Sąjunga, A klasė

ĮSPĖJIMAS DĖL RADIJO DAŽNIŲ TRUKDŽIŲ**:** Šis gaminys yra A klasės. Namų ūkio slygomis šis gaminys gali generuoti radijo dažnių trukdžius, dėl kurių vartotojas gali būti priverstas imtis atitinkamų priemonių.

„Atitikties deklaracija" sukurta remiantis aukščiau išvardytomis direktyvomis bei standartais ir yra laikoma bendrovės kartotekoje adresu: Dell™ Inc. Products Europe BV, Limerick, Ireland (Airija).

Avviż CE (Unjoni Ewropea)

Ġie stabbilit li dan il-prodott hu konformi ma' 73/23/KEE (Direttiva tal-Vultaġġ Baxx), 89/336/KEE (Direttiva EMC), u emendi ta' l-Unjoni Ewropea.

Unjoni Ewropea, Klassi A

TWISSIJA DWAR INTERFERENZA RF: Dan huwa prodott ta' Klassi A. F'ambjent domestiku dan il-prodott jista' jikkawża interferenza tal-frekwenza tar-radju (RF), f'liema każ l-utent jista' jkun meħtieġ li jieħu miżuri adegwati.

Saret "Dikjarazzjoni ta' Konformità" b'konformità mad-direttivi u ma' l-istandards imsemmijin qabel. Din tinsab iffajljata għand Dell™ Inc. Products Europe BV, Limerick, l-Irlanda.

Aviso da CE (União Europeia)

Foi determinado que este produto está em conformidade com Directiva 73/23/EEC (referente a equipamentos de baixa tensão), Directiva 89/336/EEC (directiva europeia sobre compatibilidade eletromagnética) e alterações da União Europeia.

União Europeia, Classe A

ADVERTÊNCIA DE INTERFERÊNCIA DE RF: Este é um produto Classe A. Num ambiente doméstico este produto pode provocar interferência de rádio frequência (RF), podendo o utilizador ser solicitado a tomar as medidas adequadas.

Uma "Declaração de Conformidade" de acordo com as directivas e padrões precedentes foi elaborada e encontra-se arquivada na Dell™ Inc. Products Europe BV, Limerick, Irlanda.

Świadectwo CE (Unia Europejska)

Niniejszy produkt został uznany za zgodny z 73/23/EWG (Dyrektywą niskonapięciową), 89/336/EWG (Dyrektywą w sprawie kompatybilności elektromagnetycznej) oraz zmianami Unii Europejskiej.

Unia Europejska, klasa A

OSTRZEŻENIE O ZAKŁÓCENIACH W PAŚMIE CZĘSTOTLIWOŚCI RADIOWYCH: Urządzenie to jest urządzeniem klasy A. W środowisku domowym produkt ten może powodować zakłócenia w odbiorze fal radiowych. W takim przypadku może być konieczne podjęcie odpowiednich działań.

"Świadectwo zgodności" zostało sporządzone zgodnie z powyższymi dyrektywami oraz normami i znajduje się w aktach firmy Dell™ Inc. Products Europe BV, Limerick, Irlandia.

CE Poznámka (Európska únia)

Tento výrobok vyhovuje požiadavkám smernice 73/23/EHS (smernica o nízkom napätí), 89/336/EHS (smernica o elektromagnetickej kompatibilite) a neskorším zmenám a doplnkom Európskej únie.

Európska únia, Trieda A

RF INTERFERENČNÉ UPOZORNENIA : Toto je zariadenie triedy A. Toto zariadenie môže v domácom prostredí spôsobiť rádiovú interferenciu, ktorú budete musieť odstrániť na vlastné náklady.

„Vyhlásenie o zhode" v súlade s doterajšími smernicami a normami je k dispozícii v spoločnosti Dell™ Inc. Products Europe BV, Limerick, Írsko.

Aviso CE (Unión Europea)

Este producto se ha fabricado de conformidad con la Directiva para bajo voltaje 73/23/EEC (Low Voltage Directive), la Directiva para compatibilidad electromagnética (EMC)89/336/EEC (EMC Directive), y las enmiendas de la Unión Europea.

Unión Europea, Clase A

ADVERTENCIA DE INTERFERENCIA RF: éste es un producto de Clase A. En un entorno doméstico este producto puede causar interferencia de radio frecuencia (RF), en cuyo caso el usuario debe tomar las medidas oportunas.

Se ha realizado una "Declaración de conformidad" de acuerdo con las directivas y estándares anteriores y está archivada en Dell™ Inc. Products Europe BV, Limerick, Irlanda.

Obvestilo CE (Evropska unija)

Ta izdelek je skladen z direktivama 73/23/EGS (direktiva o nizki napetosti) in 89/336/EGS (direktiva o elektromagnetni združljivosti) ter dopolnili Evropske unije.

Evropska unija, razred A

OPOZORILO O RADIOFREKVENČNIH MOTNJAH: To je izdelek razreda A. Ta izdelek lahko v bivalnem okolju povzroča radiofrekvenčne motnje, tako da bo uporabnik moral ustrezno ukrepati.

Podana je bila »Izjava o skladnosti«, skladna s prejšnjimi direktivami in standardi in je na voljo pri Dell Inc. Products Europe BV, Limerick, Irska.

CE-föreskrifter (Europeiska unionen)

Denna produkt överensstämmer med 73/23/EEC (lågspänningsdirektivet), 89/336/EEC (EMC-direktivet) och ändringar av dessa av den europeiska unionen.

Europeiska unionen, klass A

VARNING FÖR RF-STÖRNINGAR: Detta är en klass A-produkt. I bostadsmiljö kan produkten orsaka radiofrekvensstörningar. I förekommande fall måste användaren vidta lämpliga åtgärder.

En "Försäkran om överensstämmelse" i enlighet med de föregående direktiven och standarderna har framställts och finns registrerad hos Dell™ Inc. Products Europe BV, Limerick, Irland.

CE Bildirimi (Avrupa Birliği)

Bu ürünün, Avrupa Birliği'nin değişiklikleriyle birlikte 73/23/EEC (Düşük Voltaj Direktifi) ve 89/336/EEC (EMC Direktifi) sayılı direktiflerine uyumlu olduğu saptanmıştır.

Avrupa Birliği, Sınıf A

RF GİRİŞİMİ UYARISI: Bu A Sınıfı bir üründür. Evlerde kullanıldığında bu ürün radyo frekansı (RF) girişimine yol açabilir. Bu durumda kullanıcının yeterli önlemi alması gerekir.

Yukarıdaki direktiflere ve standartlara göre bir "Uygunluk Bildirimi" yayınlanmış ve Dell™ Inc. Products Europe BV, Limerick, İrlanda adresinde dosyalanmıştır.

CE означение

Този продукт отговаря на 73/23/EEC (Нисковолтова директива), 89/336/EEC (Директива за електромагнитна съвместимост) и измененията на Европейския съюз.

Европейски съюз, Клас A

ПРЕДУПРЕЖДЕНИЕ ЗА РАДИОЧЕСТОТНИ (RF) СМУЩЕНИЯ: Това е продукт от Клас A. В жилищна среда този продукт може да създаде радиочестотни смущения, в който случай потребителят ще трябва да вземе съответните мерки.

Изготвена е „Декларация за съответствие" според горепосочените директиви и стандарти, която се съхранява в Dell Inc. Products Europe BV, Лимерик, Ирландия.

Notificare CE

S-a stabilit că acest produs respectă cerinţele directivei 73/23/EEC privind joasa tensiune, ale directivei 89/336/EEC privind CEM şi amendamentele Uniunii Europene.

Uniunea Europeană, Clasa A

AVERTISMENT PRIVIND INTERFERENŢELE FRECVENŢEI RADIO: Acesta este un produs din clasa A. În mediul casnic, acest produs poate cauza interferenţă radio, caz în care utilizatorul trebuie să ia măsurile necesare.

Conform directivelor şi standardelor precedente, a fost emisă o Declaraţie de Conformitate care se află depusă la Dell Inc. Products Europe BV, Limerick, Irlanda.

MIC 규정사항 (한국에 한함)

MIC, A 등급

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다음은 MIC 규정 준수에 따라 본 설명서에서 언급하고 있는 등급 A 장치에 관한 것입니다 .

- 인증 수취인 :

  Dell Inc.
  Worldwide Regulatory Compliance & Environmental Affairs
  One Dell Way
  Round Rock, TX 78682 USA
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VCCI （日本のみ）

VCCI、クラス A

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

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CNCA．A 级

声明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

Corporate Contact Details (Taiwan Only)

Pursuant to Article 11 of the Commodity Inspection Act, Dell provides the following corporate contact details for the certified entity in Taiwan for the products addressed by this document:

Dell B.V. Taiwan Branch

20/F, No. 218, Sec. 2, Tung Hwa S. Road,

Taipei, Taiwan

中国大陆 RoHS

根据中国大陆《电子信息产品污染控制管理办法》（也称为中国大陆 RoHS），以下部分列出了 Dell 产品中可能包含的有毒和 / 或有害物质的名称和含量。中国大陆 RoHS 指令包含在中国信息产业部 MCV 标准："电子信息产品中有毒有害物质的限量要求"中。

Dell 企业产品 （服务器、存储设备及网络设备）

部件名称	有毒或有害物质及元素					
	铅 （Pb）	汞 （Hg）	镉 （Cd）	六价铬 （Cr VI）	多溴联苯 （PBB）	多溴联苯醚 （PBDE）
机箱 / 挡板	X	O	X	O	O	O
印刷电路部件 - PCA*	X	O	X	O	O	O
电缆 / 连接器	X	O	X	O	O	O
硬盘驱动器	X	O	X	O	O	O
光盘驱动器 （CD、 DVD 等）	X	O	O	O	O	O
磁带 / 介质	X	O	O	O	O	O
软磁盘驱动器	X	O	O	O	O	O
其它 RMSD/ 介质	X	O	O	O	O	O
电源设备 / 电源适配器	X	O	X	O	O	O
电源线	X	O	X	O	O	O
机械部件 - 风扇	X	O	O	O	O	O
机械部件 - 散热器	X	O	O	O	O	O
机械部件 - 电机	X	O	O	O	O	O
机械部件 - 其它	X	O	X	O	O	O
电池	X	O	O	O	O	O
定点设备 （鼠标等）	X	O	O	O	O	O
键盘	X	O	O	O	O	O
快擦写存储器	X	O	O	O	O	O
不间断电源设备	X	O	X	O	O	O
完整机架 / 导轨产品	X	O	X	O	O	O
软件 （CD 等）	O	O	O	O	O	O

* 印刷电路部件包括所有印刷电路板 （PCB） 及其各自的离散组件、 IC 及连接器。

"O" 表明该部件所含有害和有毒物质含量低于 MCV 标准定义的阈值。

"X" 表明该部件所含有害和有毒物质含量高于 MCV 标准定义的阈值。对于所有显示 X 的情况， Dell 按照 EU RoHS 采用了容许的豁免指标。

在中国大陆销售的相应电子信息产品 （EIP）都必须遵照中国大陆 《电子信息产品污染控制标识要求》标准贴上环保使用期限 （EPUP）标签。 Dell 产品所采用的 EPUP 标签 （请参阅实例，徽标内部的编号适用于指定产品）基于中国大陆的 《电子信息产品环保使用期限通则》标准。

Glossary

This section defines or identifies technical terms, abbreviations, and acronyms used in this document.

A

Adapter

An adapter enables the computer system to access peripheral devices by converting the protocol of one bus or interface to another. An adapter may also provide specialized function. Adapters may reside on the system board or be an add-in card. Other examples of adapters include network and SCSI adapters.

B

BIOS

(Basic Input/Output System) The part of the operating system in a system that provides the lowest level interface to peripheral devices. BIOS also refers to the Basic Input/Input Output System of other "intelligent" devices, such as RAID controllers.

BIOS Configuration Utility

The BIOS Configuration Utility configures and maintains user configurable adapter parameters. The utility resides in the adapter BIOS and its operation is independent of the operating systems on your system. The BIOS Configuration Utility, also known as Ctrl-C, is built on elements called controls. Each control performs a function.

Bus

Bus consists of electrical pathways, which move information between basic components of the computer. A computer's bus can be divided into two different types, Internal and External.

The Internal Bus connects the different components inside the case: The CPU, system memory, and all other components on the motherboard. It's also referred to as the System Bus.

The External Bus connects the different external devices, peripherals, expansion slots, I/O ports and drive connections to the rest of the computer. It is generally slower than the system bus. Another name for the External Bus, is the Expansion Bus.

D

Disk

A non-volatile, randomly addressable, rewriteable mass storage device, including both rotating magnetic and optical storage devices and solid-state storage devices, or non-volatile electronic storage elements.

DKMS

DKMS stands for Dynamic Kernel Module Support. It is designed to create a framework where kernel dependent module source can reside so that it is very easy to rebuild modules as you upgrade kernels. This will allow Linux vendors to provide driver drops without having to wait for new kernel releases while also taking out the guesswork for customers attempting to recompile modules for new kernels.

Driver

A device driver, often called a driver for short, is a program that allows the operating system or some other program to interface correctly with a peripheral device such as a printer or network PC card. Some device drivers, such as network drivers must be loaded from the config.sys file (with a device= statement) or as memory-resident programs (usually, from the autoexec.bat file). Others such as video drivers must load when you start the program for which they were designed.

DUD (Driver Update Diskette)

Acronym for driver update diskette. A DUD is an image of a diskette stored as a regular file. To use it, you have to create a real diskette from this file. The steps used to create the diskette depend on how the image is supplied.

E

Enclosure

A structure, such as a system, which contains physical disks that are grouped together to create virtual disks.

F

Firmware

Software stored in read-only memory (ROM) or Programmable ROM (PROM). Firmware is often responsible for the behavior of a system when it is first turned on. A typical example would be a monitor program in a system that loads the full operating system from disk or from a network and then passes control to the operating system.

Flash Memory

Flash memory is a compact, solid-state, rewriteable, non-volatile memory device that retains its data when the power is turned off. It offers fast access time, low power consumption, and relative immunity to severe shock or vibration. It is a special type of EEPROM that can be erased and reprogrammed in blocks instead of one byte at a time. Many modern PCs have their BIOS stored on a flash memory chip so that it can easily be updated if necessary. Such a BIOS is sometimes called a flash BIOS.

H

Hardware

The mechanical, magnetic, electronic, and electrical components making up a computer system constitutes its hardware.

Host Bus Adapter (HBA)

HBA is an acronym for Host Bus Adapter. Adapter cards typically install into a server's I/O bus and connect the server to a storage device or storage network. This is similar to the way an ethernet card connects a computer to a network.

Hot Add/Remove

It is the addition/removal of a component while the system is running and operating normally.

L

Link

A connection between any two PCI Express devices is known as a link.

M

MB

1 Megabyte = 1,048,576 bytes. However, when referring to the hard-disk drive storage, the term is often rounded to mean 1,000,000 bytes.

MHz

Megahertz or one million cycles per second is a unit of frequency commonly used to measure the operating speed of a computer processor or any other electronic component.

O

Operating System

The software that runs a computer, including scheduling tasks, managing storage, and handling communication with peripherals and performs basic input/output functions, such as recognizing input from the keyboard, sending output to the display screen, etc. is called an operating system.

P

PCI Express (PCI-E)

PCI Express is an evolutionary upgrade to the existing Peripheral Component Interconnect (PCI) bus. PCI Express is a serial connection that operates more like a network than a bus. Instead of one bus that handles data from multiple sources, PCI-E has a switch that controls several point-to-point serial connections. These connections fan out from the switch, leading directly to the devices where the data needs to go. Every device has its own dedicated connection, so devices no longer share bandwidth like they do on a normal bus.

PHY

The interface required to transmit and receive data packets transferred across the serial bus. Each PHY can form one side of the physical link in a connection with a PHY on a different Dell-qualified end device. The physical link contains four wires that form two differential signal pairs. One differential pair transmits signals, while the other differential pair receives signals. Both differential pairs operate simultaneously (full duplex) and allow concurrent data transmission in both the receive and the transmit directions.

Physical Disk

A physical disk (also known as hard disk drive) consists of one or more rigid magnetic discs rotating about a central axle, with associated read/write heads and electronics. A physical disk is used to store information, (data), in a non-volatile and randomly accessible memory space.

POST

POST, short for Power-On Self-Test is a process performed before the operating system loads when the computer is turned on. The POST tests various system components, such as RAM, the hard disk drives, and the keyboard.

R

ROM

Read-only memory (ROM), also known as firmware, is an integrated circuit programmed with specific data when it is manufactured. ROM chips are used not only in computers, but in most other electronic items as well. Data stored in these chips is nonvolatile i.e., it is not lost when the power is turned off. Data stored in these chips is either unchangeable or requires a special operation such as flashing to change.

RPM

RPM, short for "Red Hat Package Manager" is a package management system primarily intended for Linux. RPM installs, updates, uninstalls, verifies and queries software. RPM is the baseline package format of the Linux Standard Base. Originally developed by Red Hat for Red Hat Linux, RPM is now used by many Linux distributions. It has also been ported to some other operating systems such as NetWare by Novell.

S

SAS

Serial-Attached SCSI, SAS, is a serial, point-to-point, enterprise-level device interface that leverages the proven SCSI protocol set. The SAS interface provides improved performance, simplified cabling, smaller connectors, lower pin count, and lower power requirements when compared to parallel SCSI.

SATA

Serial Advanced Technology Attachment, a physical storage interface standard, is a serial link that provides point-to-point connections between devices. The thinner serial cables allow for better airflow within the system and permit smaller chassis designs.

SCSI

SCSI stands for "Small Computer System Interface," a processor-independent standard interface for system-level interfacing between a computer and intelligent devices including hard-drives, floppy disks, CD-ROM, printer, scanners and many more.

SCSIport

The SCSIport driver is a feature of the Microsoft® Windows® storage architecture, delivering SCSI commands to the storage targets. The SCSIport driver works well with storage using parallel SCSI.

SMART

Acronym for Self-Monitoring Analysis and Reporting Technology. The self-monitoring analysis and reporting technology (SMART) feature monitors the internal performance of all motors, heads, and drive electronics to detect predictable drive failures. This feature helps monitor drive performance and reliability, and protects the data on the drive. When problems are detected on a drive, you can replace or repair the drive without losing any data. SMART-compliant disks have attributes for which data (values) can be monitored to identify changes in values and determine whether the values are within threshold limits. Many mechanical failures and some electrical failures display some degradation in performance before failure.

Storport

The Storport driver has been designed to replace SCSIport and work with Windows 2003 and beyond. In addition, it offers better performance for storage adapters, providing higher I/O throughput rates, improved manageability, and an upgraded miniport interface.

W

Windows

Microsoft Windows is a range of commercial operating environments for computers. It provides a graphical user interface (GUI) to access programs and data on the computer.

Index