VERITAS NetBackup™ 5.1

Media Manager Device Configuration Guide

for UNIX and Windows

N12356C

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Preface

This guide contains configuration information for adding storage peripherals (devices) to NetBackup media servers or SAN media servers controlled by Media Manager (NetBackup master servers can also be media servers).

NetBackup (includes Media Manager) can be installed on UNIX or Windows servers. See the NetBackup release notes for information on the supported UNIX and Windows server platforms.

Media Manager is the component of VERITAS NetBackup™ and VERITAS Storage Migrator™ that is used to configure and manage media, drives, and robots that are used to store and retrieve your backup data.

The intended audience for this guide is the system administrator responsible for adding the storage peripherals to media servers, and it assumes a thorough knowledge of UNIX and Windows system and device configuration.

What Is In This Guide?

"Using This Guide" on page 1 provides important instructions for using this guide that you should read.

In addition, this guide contains a device configuration chapter for Windows and for each of the UNIX server platforms that are supported by NetBackup as media servers or SAN media servers as follows:

- "Sun4/SPARC Running Solaris 7/8/9" on page 5.
- "IBM RS6000 Running AIX 4.3.3.10/5.1/5.2" on page 29.
- "HP9000 Running HP-UX 11.0/11.11" on page 51.
- "HP Alpha Running TRU64 UNIX 5.1/5.1a/5.1b" on page 69.
- "IRIX 6.5.15 - 6.5.nn" on page 79.
- "Intel Hosts Running Enterprise Linux" on page 95.
- "Intel Hosts Running Windows NT 4.0, 2000, 2003" on page 105.

How To Use This Guide

Keep the following points in mind when using this guide. Also refer to "Using This Guide" on page 1 for more details.

- Each server platform that is supported by NetBackup as a media server or SAN media servers is described in a separate chapter in this guide. You should only have to use the chapters for the platforms on which you are configuring devices for Media Manager.
- This guide is intended for use with NetBackup Server and NetBackup Enterprise Server. For readability in this guide, the term NetBackup refers to both NetBackup server types unless specifically noted.
- Portions of this guide apply only to a specific NetBackup server type (for example, NetBackup Enterprise Server). These topics are identified with the use of italics, as in the following example:

  This is a NetBackup Enterprise Server topic.
- Portions of this guide include topics and examples that may not be applicable to your system hardware configuration. It is important to refer to the VERITAS support web site and the NetBackup release notes to determine if your hardware configuration is supported by your NetBackup server type before using this guide.

Getting Help

VERITAS offers you a variety of support options.

Accessing the VERITAS Technical Support Web Site

The VERITAS Support Web site allows you to:

- obtain updated information about NetBackup, including system requirements, supported platforms, and supported peripherals
- contact the VERITAS Technical Support staff and post questions to them
- get the latest patches, upgrades, and utilities
- view the NetBackup Frequently Asked Questions (FAQ) page
- search the knowledge base for answers to technical support questions
- receive automatic notice of product updates
- find out about NetBackup training
- read current white papers related to NetBackup

The address for the VERITAS Technical Support Web site follows:

- http://support.veritas.com

Subscribing to VERITAS Email Notification Service

Subscribe to the VERITAS Email notification service to be informed of software alerts, newly published documentation, Beta programs, and other services.

Go to http://support.veritas.com. Select a product and click “E-mail Notifications” on the right side of the page. Your customer profile ensures you receive the latest VERITAS technical information pertaining to your specific interests.

Accessing VERITAS Telephone Support

Telephone support for NetBackup is only available with a valid support contract. To contact VERITAS for technical support, dial the appropriate phone number listed on the Technical Support Guide included in the product box and have your product license information ready for quick navigation to the proper support group.

▼ To locate the telephone support directory on the VERITAS web site

1. Open http://support.veritas.com in your web browser.
2. Click the **Phone Support** icon. A page that contains VERITAS support numbers from around the world appears.

Accessing VERITAS E-mail Support

▼ To contact support using E-mail on the VERITAS web site

1. Open http://support.veritas.com in your web browser.
2. Click the **E-mail Support** icon. A brief electronic form will appear and prompt you to:
   - Select a language of your preference
   - Select a product and a platform
   - Associate your message to an existing technical support case
   - Provide additional contact and product information, and your message
3. Click **Send Message**.

Contacting VERITAS Licensing

For license information call 1-800-634-4747 option 3, fax 1-650-527-0952, or e-mail amercustomercare@veritas.com.

NetBackup Manuals

The following manuals, along with the online help, comprise the NetBackup documentation set. For a complete list of related documents, see the NetBackup release notes. Depending on your configuration, other vendor documents may also be required.

- *VERITAS NetBackup Installation Guide for UNIX*

  NetBackup_Install_UNIX.pdf

  Explains how to install NetBackup software on UNIX-based platforms.

- *VERITAS NetBackup Installation Guide for Windows*

  NetBackup_Install_Windows.pdf

  Explains how to install NetBackup software on Windows-based platforms.

- *VERITAS NetBackup Media Manager System Administrator's Guide for UNIX*

  MediaMgr_AdminGuide_Unix.pdf

  Explains how to configure and manage the storage devices and media on UNIX servers running NetBackup. Media Manager is part of NetBackup.

- *VERITAS NetBackup Media Manager System Administrator's Guide for Windows*

  MediaMgr_AdminGuide_Win.pdf

  Explains how to configure and manage the storage devices and media on Windows servers running NetBackup. Media Manager is part of NetBackup.

- *VERITAS NetBackup Release Notes for UNIX and Windows*

  NetBackup_Release_Notes.pdf

  Provides important information about NetBackup on UNIX- and Windows-based servers, such as the platforms and operating systems that are supported and operating notes that may not be in the NetBackup manuals or the online help.

- *VERITAS NetBackup Troubleshooting Guide for UNIX and Windows*

  NetBackup_Troubleshoot_Guide.pdf

  Provides troubleshooting information for UNIX- and Windows-based NetBackup products, including Media Manager.

- *VERITAS Storage Migrator Release Notes for UNIX*

StoMigrator_ReleaseNotes_UNIX.pdf

Provides information such as the platforms and operating systems that are supported and operating notes that may not be in the Storage Migrator manuals.

- *VERITAS Storage Migrator System Administrator's Guide for UNIX*

  StoMigrator_AdminGuide_UNIX.pdf

  Explains how to configure and manage Storage Migrator on a UNIX system.

Related Resources

Glossary

If you encounter unfamiliar terminology, consult the NetBackup online glossary. The glossary contains terms and definitions for NetBackup and all additional NetBackup options and agents.

The NetBackup online glossary is included in the NetBackup help file.

▼ **To access the NetBackup online glossary**

1. In the NetBackup Administration Console, click **Help** > **Help Topics**.
2. Click the **Contents** tab.
3. Click **Glossary of NetBackup Terms**.

Use the scroll function to navigate through the glossary.

Accessibility Features

NetBackup contains features that make the user interface easier to use by people who are visually impaired and by people who have limited dexterity. Accessibility features include:

- Support for assistive technologies such as screen readers and voice input (Windows servers only)
- Support for keyboard (mouseless) navigation using accelerator keys and mnemonic keys

For more information, see the *NetBackup System Administrator's Guide for Windows, Volume I* or the *NetBackup System Administrator's Guide for UNIX, Volume I*.

Conventions

The following conventions apply throughout the documentation set.

Product-Specific Conventions

The following term is used in the NetBackup 5.1 documentation to increase readability while maintaining technical accuracy.

- Microsoft Windows, Windows

  Terms used to describe a specific product or operating system developed by Microsoft, Inc. Some examples you may encounter in NetBackup documentation are, Windows servers, Windows 2000, Windows Server 2003, Windows clients, Windows platforms, or Windows GUI.

  When Windows or Windows servers is used in the documentation, it refers to all of the currently supported Windows operating systems. When a specific Windows product is identified in the documentation, only that particular product is valid in that instance.

  For a complete list of Windows operating systems and platforms that NetBackup supports, refer to the *NetBackup Release Notes for UNIX and Windows* or go to the VERITAS support web site at `http://www.support.veritas.com`.

Typographical Conventions

Here are the typographical conventions used throughout the manuals:

Conventions

Convention	Description
GUI Font	Used to depict graphical user interface (GUI) objects, such as fields, listboxes, menu commands, and so on. For example: Enter your password in the **Password** field.

Conventions (continued)

Convention	Description
Italics	Used for placeholder text, book titles, new terms, or emphasis. Replace placeholder text with your specific text. For example: Replace *filename* with the name of your file. Do *not* use file names that contain spaces. This font is also used to highlight NetBackup server-specific or operating system-specific differences. For example: *This step is only applicable for NetBackup Enterprise Server.*
`Code`	Used to show what commands you need to type, to identify pathnames where files are located, and to distinguish system or application text that is displayed to you or that is part of a code example.
Key+Key	Used to show that you must hold down the first key while pressing the second key. For example: Ctrl+S means hold down the Ctrl key while you press S.

You should use the appropriate conventions for your platform. For example, when specifying a path, use backslashes on Microsoft Windows and slashes on UNIX. Significant differences between the platforms are noted in the text.

Tips, notes, and cautions are used to emphasize information. The following samples describe when each is used.

Tip Used for nice-to-know information, like a shortcut.

Note Used for important information that you should know, but that shouldn't cause any damage to your data or your system if you choose to ignore it.

Caution Used for information that will prevent a problem. Ignore a caution at your own risk.

Command Usage

The following conventions are frequently used in the synopsis of command usage.

brackets [ ]

The enclosed command line component is optional.

Vertical bar or pipe (|)

Separates optional arguments from which the user can choose. For example, when a command has the following format:

`command` *`arg1`*`|`*`arg2`*

In this example, the user can use either the *arg1* or *arg2* variable.

Navigating Multiple Menu Levels

When navigating multiple menu levels, a greater-than sign (>) is used to indicate a continued action.

The following example shows how the > is used to condense a series of menu selections into one step:

❖ Select **Start** > **Programs** > **VERITAS NetBackup** > **NetBackup Administration Console**.

The corresponding actions could be described in more steps as follows:

1. Click **Start** in the task bar.
2. Move your cursor to **Programs**.
3. Move your cursor to the right and highlight **VERITAS NetBackup**.
4. Move your cursor to the right. First highlight and then click **NetBackup Administration Console**.

Using This Guide 1

Before You Start Configuring Devices

Observe the following important points before using this guide to configure media servers or SAN media servers, and devices.

Considerations When Using This Guide

- "How To Use This Guide" on page xii provides additional instructions for using this guide that you should review.
- This guide is intended for use with NetBackup Server and NetBackup Enterprise Server. For readability in this guide, the term *NetBackup* refers to both NetBackup server types unless specifically noted.
- Portions of this guide apply only to a specific NetBackup server type (for example, NetBackup Enterprise Server). These topics are identified with the use of italics, as in the following example:

  This is a NetBackup Enterprise Server topic.
- Read the **Before You Start** section (if applicable) of the chapters in this guide. These sections provide any important platform-specific instructions, or may contain specific instructions or limitations pertaining to NetBackup server types.
- Portions of this guide include hardware-specific topics and examples that may not be applicable to your system hardware configuration or NetBackup server type.

  It is important to refer to the VERITAS support web site (see "Use the VERITAS Support Web Site" on page 2) and the NetBackup release notes (see "Read the NetBackup Release Notes" on page 2) to determine if your hardware configuration is supported before using this guide.
- The information in this guide supplements the manuals provided by hardware and operating system vendors.
- Configuration file settings found in portions of this guide were tested and are known to work, but other configuration settings may also work.

- To minimize configuration errors on UNIX servers, you can cut/paste configuration details from the text version of this configuration guide.

  The formatting of this text file is similar, but is not identical to the printed version of the guide. Be sure to review the differences as explained at the beginning of the file. This file is installed with NetBackup Media Manager software in the following path:

  `/usr/openv/volmgr/MediaMgr_DeviceConfig_Guide.txt`.

Use the VERITAS Support Web Site

Visit the VERITAS support web site (`http://www.support.veritas.com`) to determine the current support for the following:

- NetBackup Enterprise Server and NetBackup Server.
- NetBackup licensed optional software (for example, SSO).
- Your UNIX or Windows server platform.
- Your robot and drive types.

Read the NetBackup Release Notes

Each server platform that is supported by NetBackup as a media server or SAN media server is described in a separate chapter in this guide. You should have to use only the chapters for the platforms on which you are configuring devices for Media Manager. Refer to the NetBackup release notes to determine the server platforms that are supported.

General Device Configuration Sequence

Use the following general sequence when configuring your devices.

1. Physically connect the storage devices to the media server and perform any hardware configuration steps specified by the device or operating system vendor.

   See the appropriate chapter of this guide for your media server or SAN media server platform.

2. For NetBackup to recognize and communicate with the connected devices, and for device discovery to discover devices, NetBackup issues SCSI pass-thru commands to the devices.

   The server platforms supported by NetBackup as servers may require special operating system configuration changes. This may include changes needed for device discovery and other configuration requirements for devices to be recognized.

Create any required system device files for the drives and robotic control. Device files are created automatically on Windows and on some UNIX platforms.

See the appropriate chapter of this guide for your media server or SAN media server platform.

3. Use one of the available Media Manager configuration interfaces to add the storage devices to your Media Manager configuration.

   See the NetBackup Media Manager system administrator's guide for instructions.

Configuration Cautions

Observe the following cautions:

- Starting with release 4.5, NetBackup uses SCSI reserve/release to improve data integrity. SCSI reserve/release operates at the SCSI target level and depends on the fibre-to-scsi bridge hardware working correctly.

  The use of SCSI reserve/release is enabled by default, but can be disabled using the NetBackup Administration Console configuration GUI. See the Reference Topics appendix of the NetBackup Media Manager system administrator's guide for information about the NetBackup use of SCSI reserve/release.

- VERITAS does not recommend or support the use of single-ended to differential SCSI converters on Media Manager controlled devices. You may encounter problems if you use these converters.

Sun4/SPARC Running Solaris 7/8/9 2

This chapter explains how to configure storage devices for use with Media Manager running on a Sun4/SPARC platform.

After configuring the hardware, use one of the available Media Manager configuration interfaces to add the drives and robots to your Media Manager configuration

The major topics included are as follows:

- "Before You Start" on page 6
- "Preventing Possible System Problems" on page 7
- "SSO Configurations With More Than 16 Tape Drives" on page 7
- "Understanding the SCSI Passthru Drivers" on page 8
- "Configuring SG and ST Drivers" on page 10
- "Configuring the Sun StorEdge Network Foundation HBA Driver" on page 13
- "Configuring Third-Party Fibre Channel HBA Drivers" on page 13
- "Configuring Robotic Controls" on page 14
- "Configuring Tape Drives" on page 17
- "Configuring Optical Disk Drives" on page 24
- "Command Summary" on page 26

Before You Start

Observe the following points when performing the configurations described in this chapter:

- For NetBackup to recognize and communicate with connected devices, and for device discovery to discover devices, NetBackup issues SCSI pass-thru commands to the devices in a configuration.

  Devices must have device files, which are links to character-special files with naming conventions that are driver and HBA-dependent. NetBackup installs its own pass-through driver called SG (SCSI Generic).

  This driver must be properly configured to create device files for any device used by NetBackup, or performance and functionality is limited. Each tape or optical disk drive device also has a device file that is created for use by the system tape/disk driver interface, which must exist for all read or write I/O capability.

  Device files must exist that follow the naming conventions explained in "Configuring Robotic Controls" on page 14, "Configuring Tape Drives" on page 17, and "Configuring Optical Disk Drives" on page 24.

- Use `mt` and `/usr/openv/volmgr/bin/sgscan` to verify that the devices are configured correctly. Make sure you can "see" your devices on the SAN before you install and configure the SSO option.
- When configuring devices, you should attach all peripherals and reboot the system with the reconfigure option (`boot -r` or `reboot -- -r`).
- When removing or replacing adapter cards, remove all device files previously associated with the adapter card.
- If you use the Automated Cartridge System (ACS) robotic software, you must ensure that the SunOS/BSD Source Compatibility Package is installed, so that the ACS software can make use of shared libraries in `/usr/ucblib`.

If You Are Using NetBackup Server

Portions of this chapter include configuration topics and examples for configurations and options that are not supported in NetBackup Server. It is important to refer to the VERITAS support web site to determine support for NetBackup Server, before using this chapter.

Topics Not Applicable to NetBackup Server

"SSO Configurations With More Than 16 Tape Drives" on page 7.

Preventing Possible System Problems

When system memory is limited, Solaris unloads unused drivers from memory and reloads drivers as needed. Tape drivers are a frequent candidate for unloading, since they tend to be less heavily used than disk drivers. Depending on the timing of these unload and load events for the st (Sun), sg (VERITAS), and fibre channel drivers, various problems may result. These problems can range from devices “disappearing” from a SCSI bus to system panics.

VERITAS recommends adding the following `forceload` statements to the `/etc/system` file. These statements prevent the st and sg drivers from being unloaded from memory.

```
forceload: drv/st
forceload: drv/sg
```

Other statements may be necessary for various fibre channel drivers, such as the following example for JNI drivers. This statement prevents the named driver from being unloaded from memory.

```
forceload: drv/fcaw
```

SSO Configurations With More Than 16 Tape Drives

This is a NetBackup Enterprise Server topic.

When the number of tape devices that are configured approaches 16, changes in tape device status may not be visible to all media servers in a Shared Storage Option (SSO) configuration. This is because the default maximum size of IPC message queues may not be large enough.

In these cases, communication between the `rdevmi` process on the scan hosts and the `oprd` processes on the media servers can be interrupted when the number of messages sent exceeds the maximum size of the queue.

VERITAS recommends adding the following statements to the `/etc/system` file. These statements increase the maximum number of messages that can be created, and the number of bytes per queue. A reboot is necessary for the changes to take effect.

```
set msgsys:msginfo_msgtql=512
set msgsys:msginfo_msgmnb=65536
```

Be aware that increasing the maximum size of the IPC message queue may increase the amount of memory allocated to other IPC message queues on the system. The impact of these changes should be fully assessed before they are implemented.

Understanding the SCSI Passthru Drivers

NetBackup Media Manager provides its own driver for communicating with SCSI-controlled robotic peripherals. This driver is called the SCSA (Generic SCSI passthru driver), also referred to as the sg driver.

Note Since NetBackup uses its own passthru driver, the Solaris 8.0 sgen scsi passthru driver is not supported.

The sg driver is also used

- By the `avrd` process to scan drives.
- By NetBackup and Storage Migrator for locate-block positioning.
- By NetBackup and Storage Migrator for SAN error recovery.
- By NetBackup and Storage Migrator for Quantum SDLT performance optimization.
- By NetBackup and Storage Migrator for SCSI reserve/release.
- To set the optical drive type (as explained in "Setting the HP Optical Drive Type in Nonvolatile Memory" on page 26).
- By the NetBackup device configuration GUIs to collect robot and drive information.

▼ To manipulate the sg driver

Perform the following steps as the root user.

1. Determine if an sg driver is loaded by using the following command:

```
/usr/sbin/modinfo | grep sg

141 fc580000  2d8c 116   1  sg (SCSA Generic Revision: 3.4d)
153 fc7fa000  1684  49   1  msgsys (System V message facility)
```

2. Remove the existing driver:

```
/usr/sbin/rem_drv sg
```

3. Install or reconfigure the sg driver.

   a. If configuration is needed, run the following command first:

   ```
   /usr/bin/rm -f /kernel/drv/sg.conf
   ```

   b. To install the driver run the following command:

   ```
   /usr/openv/volmgr/bin/driver/sg.install
   ```

Once the driver has been installed, it is not necessary to reboot the system or run the `sg.install` command during or after each system boot.

Configuring SG and ST Drivers

This procedure contains instructions for configuring the sg driver for SCSI targets 0 thru 6 and 8 thru 15 for fast or wide adapter cards.

In this procedure, you execute `sg.build` to add these targets to the `st.conf`, `sg.conf` and `sg.links` files. Adjust the `-mt` and `-ml` parameters to create the range of targets and LUNs required by your configuration.

▼ To configure drivers

1. Execute the `sg.build` script to add target IDs 0-6, 8-15, and LUNs 0-1 to the following files:

   ```
   /usr/openv/volmgr/bin/driver/st.conf
   /usr/openv/volmgr/bin/driver/sg.conf
   /usr/openv/volmgr/bin/driver/sg.links

   cd /usr/openv/volmgr/bin/driver
   /usr/openv/volmgr/bin/sg.build all -mt 15 -ml 1
   ```

   The `-mt 15` parameter specifies the maximum target ID that is in use on any SCSI bus (or bound to a fibre channel device).

   The `-ml 1` parameter specifies the maximum target LUN that is in use on any SCSI bus (or by a fibre channel device).

2. The file `/usr/openv/volmgr/bin/driver/st.conf` is used to replace the following seven entries in the `/kernel/drv/st.conf` file:

   ```
   name="st" class="scsi"
      target=0 lun=0;
   name="st" class="scsi"
      target=1 lun=0;
   name="st" class="scsi"
      target=2 lun=0;
   name="st" class="scsi"
      target=3 lun=0;
   name="st" class="scsi"
      target=4 lun=0;
   name="st" class="scsi"
      target=5 lun=0;
   name="st" class="scsi"
      target=6 lun=0;
   ```

   a. Make a copy of the `/kernel/drv/st.conf` file.

   b. Edit the `/kernel/drv/st.conf` file.

Place a # in column one of each line of the seven default entries.

The temporary file `./st.conf` contains the entries that you need to insert into `/kernel/drv/st.conf`.

c. Reboot the system with the reconfigure option (`boot -r` or `reboot -- -r`).

d. Verify that the system created device nodes for all the tape devices using the following command: `ls -l /dev/rmt/*cbn`

3. The following is an example of the `/usr/openv/volmgr/bin/driver/sg.conf` file to add targets 0-6, 8-15, and LUNs 0-1:

```
name="sg" class="scsi" target=0 lun=0;
name="sg" class="scsi" target=0 lun=1;
name="sg" class="scsi" target=1 lun=0;
name="sg" class="scsi" target=1 lun=1;
name="sg" class="scsi" target=2 lun=0;
name="sg" class="scsi" target=2 lun=1;
name="sg" class="scsi" target=3 lun=0;
name="sg" class="scsi" target=3 lun=1;
name="sg" class="scsi" target=4 lun=0;
name="sg" class="scsi" target=4 lun=1;
name="sg" class="scsi" target=5 lun=0;
name="sg" class="scsi" target=5 lun=1;
name="sg" class="scsi" target=6 lun=0;
name="sg" class="scsi" target=6 lun=1;
name="sg" class="scsi" target=8 lun=0;
name="sg" class="scsi" target=8 lun=1;
name="sg" class="scsi" target=9 lun=0;
name="sg" class="scsi" target=9 lun=1;
name="sg" class="scsi" target=10 lun=0;
name="sg" class="scsi" target=10 lun=1;
name="sg" class="scsi" target=11 lun=0;
name="sg" class="scsi" target=11 lun=1;
name="sg" class="scsi" target=12 lun=0;
name="sg" class="scsi" target=12 lun=1;
name="sg" class="scsi" target=13 lun=0;
name="sg" class="scsi" target=13 lun=1;
name="sg" class="scsi" target=14 lun=0;
name="sg" class="scsi" target=14 lun=1;
name="sg" class="scsi" target=15 lun=0;
name="sg" class="scsi" target=15 lun=1;
```

4. The following is an example of the `/usr/openv/volmgr/bin/driver/sg.links` file to add targets 0-6, 8-15, and LUNs 0-1:

```
# begin SCSA Generic devlinks file - creates nodes in /dev/sg
type=ddi_pseudo;name=sg;addr=0,0;  sg/c\N0t0l0
type=ddi_pseudo;name=sg;addr=0,1;  sg/c\N0t0l0
type=ddi_pseudo;name=sg;addr=1,0;  sg/c\N0t1l0
type=ddi_pseudo;name=sg;addr=1,1;  sg/c\N0t1l1
type=ddi_pseudo;name=sg;addr=2,0;  sg/c\N0t2l0
type=ddi_pseudo;name=sg;addr=2,1;  sg/c\N0t2l1
type=ddi_pseudo;name=sg;addr=3,0;  sg/c\N0t3l0
type=ddi_pseudo;name=sg;addr=3,1;  sg/c\N0t3l1
type=ddi_pseudo;name=sg;addr=4,0;  sg/c\N0t4l0
type=ddi_pseudo;name=sg;addr=4,1;  sg/c\N0t4l1
type=ddi_pseudo;name=sg;addr=5,0;  sg/c\N0t5l0
type=ddi_pseudo;name=sg;addr=5,1;  sg/c\N0t5l1
type=ddi_pseudo;name=sg;addr=6,0;  sg/c\N0t6l0
type=ddi_pseudo;name=sg;addr=6,1;  sg/c\N0t6l1
type=ddi_pseudo;name=sg;addr=8,0;  sg/c\N0t8l0
type=ddi_pseudo;name=sg;addr=8,1;  sg/c\N0t8l1
type=ddi_pseudo;name=sg;addr=9,0;  sg/c\N0t9l0
type=ddi_pseudo;name=sg;addr=9,1;  sg/c\N0t9l1
type=ddi_pseudo;name=sg;addr=a,0;  sg/c\N0t10l0
type=ddi_pseudo;name=sg;addr=a,1;  sg/c\N0t10l1
type=ddi_pseudo;name=sg;addr=b,0;  sg/c\N0t11l0
type=ddi_pseudo;name=sg;addr=b,1;  sg/c\N0t11l1
type=ddi_pseudo;name=sg;addr=c,0;  sg/c\N0t12l0
type=ddi_pseudo;name=sg;addr=c,1;  sg/c\N0t12l1
type=ddi_pseudo;name=sg;addr=d,0;  sg/c\N0t13l0
type=ddi_pseudo;name=sg;addr=d,1;  sg/c\N0t13l1
type=ddi_pseudo;name=sg;addr=e,0;  sg/c\N0t14l0
type=ddi_pseudo;name=sg;addr=e,1;  sg/c\N0t14l1
type=ddi_pseudo;name=sg;addr=f,0;  sg/c\N0t15l0
type=ddi_pseudo;name=sg;addr=f,1;  sg/c\N0t15l1
# end SCSA devlinks
```

Caution The field separator between the fields `addr=`*x*, *y*`;` and `sg/` is a tab. The `addr=` field uses hexadecimal notation, while the `sg/` field uses decimal values.

5. Install the new sg driver configuration.

```
/usr/bin/rm -f /kernel/drv/sg.conf
/usr/openv/volmgr/bin/driver/sg.install
```

6. Verify that the sg driver found all the robots, tape drives, and optical disk drives (see the appropriate hardware configuration sections in this chapter for instructions).

Configuring the Sun StorEdge Network Foundation HBA Driver

The StorEdge Network Foundation HBA requires special configuration to bind device World Wide port names for use by the VERITAS sg driver.

The script `/usr/openv/volmgr/bin/sg.build` adds the proper entries to the `sg.links` and `sg.conf` files. Before running the script, make sure that all devices are powered on and connected to the HBA.

An example of the additional entries in `/usr/openv/volmgr/bin/driver/sg.conf` follows:

```
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="22000090a50001c8";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="22000090a50001c8";
```

An example of the additional entries in `/usr/openv/volmgr/bin/driver/sg.links` follows:

```
type=ddi_pseudo;name=sg;addr=w22000090a50001c8,0;       sg/c\N0t\A1l0
type=ddi_pseudo;name=sg;addr=w22000090a50001c8,1;       sg/c\N0t\A1l1
```

Note Each time a new device is added or an old device removed, re-create and re-install the new sg configuration (see "Configuring SG and ST Drivers" on page 10).

The script `/usr/openv/volmgr/bin/sgscan` checks for devices that are not configured, and produces output similar to the following example:

```
#WARNING: detected StorEdge Network Foundation connected devices not
        in sg configuration file:
#
#    Device World Wide Port Name 21000090a50001c8
#
#    See /usr/openv/volmgr/MediaMgr_DeviceConfig_Guide.txt topic
#    "Configuring the Sun StorEdge Network Foundation HBA/Driver"
#    for information on how to use sg.build and sg.install
#    to configure these devices
```

Configuring Third-Party Fibre Channel HBA Drivers

Fibre channel devices should be bound to specific target IDs by modifying the HBA driver's configuration files. The binding process assures that the target ID will not change after a system reboot or a fibre channel configuration change. In some instances, VERITAS products are configured to use a specific target ID, which if changed will cause the products to fail until they are configured correctly.

The binding process is vendor and product unique. Please refer to the documentation available for your specific HBA.

The binding may be based on the fibre channel World Wide name of the port (WWPN) or the node (WWNN), or the destination ID (AL-PA or fabric assigned).

Once the selected binding is in place, the configuration proceeds in the same manner as for parallel SCSI installations (see "Configuring SG and ST Drivers" on page 10).

Note Each time a new device is added or an old device removed, the binding must be updated to the new configuration.

Configuring Robotic Controls

Robots are controlled through a SCSI or a network connection.

- SCSI control is covered in the following sections.
- Configuration of network controlled robotic libraries (for example, ACS robot types) is discussed in the appendices of the Media Manager system administrator's guides.

Configuring SCSI Robotic Controls

Read this topic if you plan to use a robotic storage device that is controlled through a SCSI robotic connection. Information on supported SCSI robots (vendor models) can be found on the VERITAS support web site.

When communicating with SCSI-controlled robotic peripherals, Media Manager utilizes the SCSA Generic (`sg`) driver. This driver is provided with NetBackup.

Note You must install the `sg` driver before continuing with the instructions in this topic (see "Configuring SG and ST Drivers" on page 10 for details).

To display the device files that are available to be used through the `sg` driver, use the `sgscan` command with the `all` parameter and note the lines that indicate changer devices (robotic libraries), as in the following example:

```
# /usr/openv/volmgr/bin/sgscan all
/dev/sg/c0t5l0: Tape (/dev/rmt/0): "HP      C1537A"
/dev/sg/c0t6l0: Cdrom: "TOSHIBA XM-5401TASUN4XCD"
/dev/sg/c1t2l0: Tape (/dev/rmt/7): "EXABYTE EXB-85058HE-0000"
/dev/sg/c1t4l0: Tape (/dev/rmt/9): "EXABYTE EXB-8900MH000202"
/dev/sg/c1t5l0: Changer: "EXABYTE EXB-210"
/dev/sg/c2t2l0: Tape (/dev/rmt/10): "Quantum DLT4000"
/dev/sg/c2t5l0: Tape (/dev/rmt/11): "QUANTUM DLT7000"
```

```
/dev/sg/c3t0l0: Disk (/dev/rdsk/c1t0d0): "FUJITSU M2952ESP SUN2.1G"
/dev/sg/c3t3l0: Disk (/dev/rdsk/c1t3d0): "FUJITSU M2952ESP SUN2.1G"
/dev/sg/c4t4l0: Tape (/dev/rmt/4): "Quantum DLT4000"
/dev/sg/c4t5l0: Tape (/dev/rmt/5): "Quantum DLT4000"
/dev/sg/c5t0l0: Disk (/dev/rdsk/c5t0d0): "SONY    SMO-F541"
/dev/sg/c5t1l0: Disk (/dev/rdsk/c5t1d0): "SONY    SMO-F541"
/dev/sg/c5t2l0: Disk (/dev/rdsk/c5t2d0): "SEAGATE ST11200N SUN1.05"
/dev/sg/c5t6l0: Disk (/dev/rdsk/c5t6d0): "SEAGATE ST11200N SUN1.05"
/dev/sg/c6t3l0: Changer: "SONY    DMS-B35"
/dev/sg/c6t5l0: Tape (/dev/rmt/6): "SONY    GY-2120"
/dev/sg/c7t0l0: Disk (/dev/rdsk/c7t0d0): "SEAGATE ST32550W SUN2.1G"
/dev/sg/c7t3l0: Disk (/dev/rdsk/c7t3d0): "MICROP  4221-09   1128RA"
/dev/sg/c7t4l0: Disk (/dev/rdsk/c7t4d0): "MICROP  4221-09MZ  Q4D"
/dev/sg/c8t2l0: Tape (/dev/rmt/14): "Quantum DLT4000"
/dev/sg/c8t3l0: Changer: "STK     9740"
/dev/sg/c8t4l0: Tape (/dev/rmt/13): "STK     SD-3"
/dev/sg/c8t6l0: Changer: "STK     9710"
/dev/sg/c9t0l0: Changer: "EXABYTE Exabyte 18D"
/dev/sg/c9t1l0: Tape (/dev/rmt/15): "Quantum DLT4000"
```

Note Specific device types can be filtered from the output using other forms of `sgscan`.
Usage: `sgscan [all|basic|changer|disk|tape] [conf] [-v]`

Examples of SCSI Robotic Control Device Files

Example 1

Using the previous `sgscan` output, if the SCSI robotic control for an Exabyte 210 is SCSI ID 5 of adapter 1, use the following path:

```
/dev/sg/c1t5l0
```

Example 2

Using the previous `sgscan` output, if the SCSI robotic control for a Sony library is SCSI ID 3 of adapter 6, use the following path:

```
/dev/sg/c6t3l0
```

Example 3

Using the previous `sgscan` output, if the SCSI robotic control for an STK 9710 is SCSI ID 6 of adapter 8 and you want to use TLD robotics, use the following path:

```
/dev/sg/c8t6l0
```

Example 4

If the SCSI robotic control for a DLT2700, DLT4700, or HP C1560B was SCSI ID 5 of adapter 0, use the following path:

```
/dev/sg/c0t5l1
```

Note that logical unit number 1 is used for those devices. The sg driver configuration can be modified so `sgscan` lists LUN 1 devices. In the sample `sgscan` output the configuration was not modified.

Example 5

Using the previous `sgscan` output, even if the SCSI robotic control for an STK 9740 is SCSI ID 3 of adapter 8, you would not enter any path to configure ACS robotic control.

Instead, assuming ACS control over the network, enter the appropriate ACSLS Host name. If you want to use TLD robotics to control the 9740, specify the following path:

```
/dev/sg/c8t3l0
```

Example 6 (IBM 3570 B-series Robotic Libraries)

If there is one drive in the robotic library, the robotic control is LUN 1 of the drive's SCSI ID. If there are two drives, the robotic control is LUN 1 of the Drive 1 SCSI ID. The SCSI ID's are viewed and configured by using the front panel on the robot.

The robotic control for the IBM 3570 B01/B02 is TLD, so if there are two drives, they may be connected to different host systems. If this is the case, the host system which is connected to drive 1 must also have the robotic control. Also, the library should be in RANDOM mode and BASE configuration. See the operator's guide supplied with the unit for information on setting library mode and configuration.

Assume a configuration as follows:

```
# /usr/openv/volmgr/bin/sgscan

/dev/sg/c0t0l0: Disk (/dev/rdsk/c0t0d0): "IBM   DCAS32160SUN2.1G"
/dev/sg/c0t6l0: Cdrom: "TOSHIBA XM5701TASUN12XCD"
/dev/sg/c1t5l0: Tape (/dev/rmt/1): "IBM     03570B02"
/dev/sg/c1t6l0: Tape (/dev/rmt/2): "IBM     03570B02"
```

If drive 1 is SCSI ID 5, the robotic control for the robotic library is `/dev/sg/c1t5l1`.

Example 7 (Fujitsu M8100 Stackers)

The robotic control for the Fujitsu M8100 stacker is TSH. The unit must be set up to run in SYSTEM Mode and 2LUN Mode. See the M8100 Cartridge Tape Drive product guide supplied with the unit for information on setting the library modes.

The robotic control is LUN 1 of the drive's SCSI ID. The SCSI ID's are viewed and configured by using the front panel on the stacker.

Assume a configuration as follows:

```
# /usr/openv/volmgr/bin/sgscan

/dev/sg/c1t0l0: Tape (/dev/rmt/0): "FUJITSU M8100AA2"
/dev/sg/c1t0l1: Changer: "FUJITSU M8100AA2"
```

If the drive is SCSI ID 0, the robotic control for the stacker is `/dev/sg/c1t0l1`.

Configuring Tape Drives

Read the following topics if you plan to use any peripheral with physical or virtual tape drives.

Using Berkeley-Style Close

The examples in this section use Berkeley-style close for tape drives. This is indicated by the letter `b` after the density specification. You must specify Berkeley-style close for tape devices that you configure under Media Manager.

The terms *Berkeley-style close* and *AT&T style close* refer to where a tape is left logically positioned after a close operation (in relation to a tape mark). One style leaves an application logically positioned before a tape mark and the other leaves it after. Applications must assume where the tape is left after a close in order to establish the correct orientation the next time they do a tape-position or read operation. Some operating systems allow tape devices to be configured with either type of close. NetBackup assumes it is using Berkeley-style close.

Fast-Tape Positioning (locate-block)

For AIT, DLT, Exabyte, DTF, and half-inch tape drives, Media Manager supports the SCSI `locate-block` command for positioning to a specific block on a tape. This approach improves tape-positioning greatly over the alternative method.

Enabling locate-block

NetBackup and Storage Migrator use the `locate-block` command by default if you did not uninstall the sg passthru driver. This uninstall procedure is explained in "Understanding the SCSI Passthru Drivers" on page 8. The driver is automatically installed with Media Manager.

Disabling locate-block

VERITAS recommends that you do not disable locate-block positioning. If you need to disable locate-block positioning, execute the following command:

```
touch /usr/openv/volmgr/database/NO_LOCATEBLOCK
```

With locate-block positioning disabled, NetBackup uses the `forward-space-file/record` method and Storage Migrator skips file marks.

No Rewind Device Files

When adding tape drives to a Media Manager configuration, you need only specify a no rewind on close device path. To display the tape device files that are configured on your system, use the `sgscan` command with the `tape` parameter.

```
# /usr/openv/volmgr/bin/sgscan tape
/dev/sg/c0t5l0: (/dev/rmt/0): "HP      C1537A"
/dev/sg/c1t2l0: (/dev/rmt/7): "EXABYTE EXB-85058HE-0000"
/dev/sg/c1t4l0: (/dev/rmt/9): "EXABYTE EXB-8900MH000202"
/dev/sg/c2t2l0: (/dev/rmt/10): "Quantum DLT4000"
/dev/sg/c2t5l0: (/dev/rmt/11): "QUANTUM DLT7000"
/dev/sg/c4t4l0: (/dev/rmt/4): "Quantum DLT4000"
/dev/sg/c4t5l0: (/dev/rmt/5): "Quantum DLT4000"
/dev/sg/c6t5l0: (/dev/rmt/6): "SONY    GY-2120"
/dev/sg/c8t2l0: (/dev/rmt/14): "Quantum DLT4000"
/dev/sg/c8t4l0: (/dev/rmt/13): "STK     SD-3"
/dev/sg/c9t1l0: (/dev/rmt/15): "Quantum DLT4000"
```

Note All device types can be displayed in the output using the `all` parameter with `sgscan`. This command can be helpful for associating tape devices with other SCSI devices that may be configured on the same adapter. Usage: `sgscan [all|basic|changer|disk|tape] [conf] [-v]`

No rewind on close device files are in the `/dev/rmt` directory, and have the following format:

`/dev/rmt/`*`LOGICAL_DRIVE`* `cbn`

Where:

- *LOGICAL_DRIVE* is the logical drive id, as shown by the `sgscan` command.
- `c` indicates compression.
- `b` indicates Berkeley-style close.
- `n` indicates no rewind on close.

Examples of No Rewind Device Files

Example 1

Using the `sgscan` output, if an Exabyte 8505C drive is SCSI ID 2 of adapter 1, the device path you use follows:

```
/dev/rmt/7cbn
```

Example 2

Using the `sgscan` output, if a DLT7000 drive is SCSI ID 5 of adapter 2, the device path you use follows:

```
/dev/rmt/11cbn
```

Configuring Nonstandard Tape Drives

Nonstandard drive types may require changes to the kernel before you can use them on some levels of Solaris. The `st.conf` file must be edited and an entry must be added for any drive types you are using that are not supported by Solaris or if you want to use any of the VERITAS lab-tested drive entries. See "Editing the st.conf File" on page 20 and "Lab-Tested st.conf Entries" on page 21.

Depending on your Solaris system level, you may be able to use some tape drives without editing the entries in this file. Solaris operating systems have built-in defaults for drives that may be used. Note that the drive must be natively supported by Solaris in a manner that is compatible with NetBackup.

Refer to the header section of your `st.conf` file for a list of drives that are natively supported in the Solaris kernel.

Solaris Patches

Some drives (for example, Quantum SDLT600) require Solaris patches for support. In these cases VERITAS lists the required patches for the drive on the Device Support List (DSL) web page.

Configuring Non-QIC Tape Drives

The terms *variable mode* or *fixed mode* refer to the behavior of reads and writes and the way the kernel packs physical tape records into logical tape records for an application. Variable-mode devices allow more flexibility in reading previously written tapes. Many tape devices can be accessed in either mode. NetBackup assumes variable mode for non-QIC drives.

Caution As shown by the `st.conf` entries, you must configure non-QIC tape drives as variable-mode devices, if they are to be used by Media Manager. Otherwise NetBackup is able to write data, but may not be able to read it correctly. During a read, you may see a "not in tar format" error.

Editing the st.conf File

Review the following important points when editing this file:

- Each valid drive entry in the `st.conf` file consists of two sections (the drive-entry-list and the list of data-property-names). The last field of each entry in the drive-entry-list is a link (data-property-name) to the corresponding entry in the list of data-property-names.
- Each valid entry in the drive-entry-list requires a comma (,) at the end of the line, unless it is the last uncommented drive in the list. In this case, the line must end with a semi-colon (;).

  Each valid entry in the list of data-property-names contains a semi-colon (;) at the end of the line.
- Uppercase and lowercase are significant. For example, using Hp instead of HP is not valid.
- Spaces are significant within quoted strings.

  Note that the vendor name of the vendor / product field must always be the first eight characters of the field. The following example entry shows the vendor / product field for an HP C1533A drive. The correct vendor name is HP + six spaces.

  ```
  "HP      C1533A",
  ```

  If you were to omit four of the spaces in the vendor name as shown in the following example, the drive would not be recognized correctly. The incorrect vendor name used would be HP + 2 spaces + C153.

  ```
  "HP  C1533A",
  ```
- The best way to ensure that your entries are accurate is to copy them from the `MediaMgr_DeviceConfig_Guide.txt` file into the `st.conf` file.

  See "Considerations When Using This Guide" on page 1.
- After making any changes, verification with a test backup and restore should be done. Incorrect entries in this file may result in data loss.

Lab-Tested st.conf Entries

The following entries were tested by VERITAS and are known to work, but other settings may also work for these drives in your configuration.

```
tape-config-list =

"ARCHIVE VIPER 150", "Archive 150 Tape", "ARCHIVE_VIP",
"BNCHMARKDLT1", "Benchmark DLT1", "BM-DLT",
"Compaq  DLT8000", "Quantum DLT8000 Tape Drive", "DLT8k-data",
"COMPAQ  SuperDLT1", "Compaq SuperDLT", "SDLT-data",
"COMPAQ  SDLT320", "COMPAQ SuperDLT drive", "SDLT-320",
"DEC     DLT2000", "DEC DLT Tape Drive", "DEC-DLT",
"DEC     DLT2700", "DEC DLT Tape Stacker", "DEC-DLT",
"DEC     TZ89", "DEC DLT Tape Drive", "Q-DLT7000",
"EXABYTE EXB8500C", "Exabyte EXB-8500C 8mm Helical Scan", "EXB-8500C",
"EXABYTE EXB-8505", "Exabyte EXB-8505 8mm Helical Scan", "EXB-8505",
"EXABYTE EXB-8500", "Exabyte EXB-8500 8mm Helical Scan", "EXB-8500",
"EXABYTE EXB-8900", "Exabyte EXB-8900 Mammoth", "EXB-8900",
"EXABYTE Mammoth2", "Mammoth2 8MM Helical Scan Drive", "EXB-MAMMOTH2",
"FUJITSU M2488", "Fujitsu M2488", "FJ-D3",
"FUJITSU M8100", "Fujitsu M8100 1/2 Inch Cartridge", "FJ-M8100",
"HP      HP354", "HP 4mm DAT Drive", "HP-DAT",
"HP      C1533A", "HP DAT Autoloader", "HP-DAT",
"HP      C1557A", "HP Dat DDS3 Autoloader", "HP-DAT-DDS3",
"HP      C5683A", "HP DDS-4 4mm DAT", "HP_DAT_4",
"HP      Ultrium", "HP Ultrium", "Ultrium",
"HP      Ultrium 2-SCSI", "HP Ultrium", "ULTRIUM2",
"IBM     03590", "IBM 3590 1/2 Inch Cartridge", "IBM-3590",
"IBM     03570", "IBM 3570 1/2 Inch Cartridge", "IBM-3590",
"IBM     03590H", "IBM 3590H 1/2\" Cartridge", "CLASS_3590",
"IBM     03592", "IBM 3592", "CLASS_3592",
"IBM     ULTRIUM-TD1", "IBM Ultrium", "CLASS_3580",
"IBM     ULT3580-TD1", "IBM 3580 Ultrium", "CLASS_3580",
"IBM     ULT3580-TD2", "IBM 3580 Ultrium-2", "CLASS_LTO2",
"IBM     Ultrium-TD2", "IBM Ultrium-2", "CLASS_LTO2",
"SEAGATE ULTRIUM06242-XXX","Seagate LTO","SEAGATE_LTO",
"SONY    GY-2120", "Sony DTF Drive", "gy20-data",
"SONY    GY-8240", "DTF2", "gy2120-data",
"SONY    SDX-300C", "SONY 8mm AIT", "SONY_AIT",
"SONY    SDX-400C", "SONY 8mm AIT", "SONY_AIT",
"SONY    SDX-500C", "SONY 8mm AIT2", "SONY_AIT",
"SONY    SDX-700C",  "Sony AIT3 8mm", "SONY_AIT3",
"SONY    SDZ-100", "SONY S-AIT", "SONY_SAIT",
"SONY    SDZ-130", "SONY S-AIT FC", "SONY_SAIT",
"SONY    TSL-A300C", "SONY 8mm AIT", "SONY_AIT",
"SONY    TSL-A500C", "SONY 8mm AIT2", "SONY_AIT",
```

```
"STK     4781", "STK 1/2 Inch Cartridge (4480)", "STK-4781",
"STK     4791", "STK 1/2 Inch Cartridge (Silverton)", "STK-4791",
"STK     4890", "STK 1/2 Inch Cartridge (Twin Peaks)", "STK-4890",
"STK     9840", "STK 1/2 Inch Cartridge (9840)", "STK-9840",
"STK     T9840B", "STK 1/2 Inch Cartridge (9840B)", "STK-9840",
"STK     T9840C", "STK 1/2 Inch Cartridge (9840C)", "STK-9840",
"STK     T9940A","STK 60 Gig Tape Drive","CLASS_STK",
"STK     SD-3", "STK 1/2 Inch Cartridge (Redwood)", "STK-SD-3",
"STK     T9940A", "STK 60 Gig Tape Drive", "CLASS_STK",
"STK     T9940B", "STK 60 Gig Tape Drive", "CLASS_STK",
"SUN     DLT4000", "SUN DLT Tape Drive", "DEC-DLT",
"SUN     DLT7000", "SUN DLT7000 Tape Drive", "Q-DLT7000",
"TANDBERGSLR5 4/8GB", "Tandberg 8 Gig QIC", "TAND-8G-VAR",
"TANDBERGDLT4000", "Tandberg DLT4000", "DEC-DLT",
"TANDBERGDLT7000", "Tandberg DLT7000", "Q-DLT7000",
"TANDBERGDLT8000", "Tandberg DLT8000 Tape Drive", "DLT8k-data",
"TANDBERGSuperDLT1", "TANDBERGSuperDLT1", "SDLT-data",
"Quantum DLT2000", "Quantum DLT Tape Drive", "DEC-DLT",
"Quantum DLT4000", "Quantum DLT Tape Drive", "DEC-DLT",
"Quantum DLT4500", "Quantum DLT Tape Stacker", "DEC-DLT",
"Quantum DLT4700", "Quantum DLT Tape Stacker", "DEC-DLT",
"QUANTUM DLT7000", "Quantum DLT7000 Tape Drive", "Q-DLT7000",
"QUANTUM DLT8000", "Quantum DLT8000 Tape Drive", "DLT8k-data",
"Quantum DLT2700", "Quantum DLT Tape Stacker", "DEC-DLT",
"QUANTUM SuperDLT1", "QuantumSuperDLT", "SDLT-data",
"QUANTUM SDLT320",  "Quantum SDLT320-DTE", "SDLT320";
```

Caution Note in the list of data-property-names that the third parameter (variable mode) must be zero. Not using zero causes restores to fail and may result in data loss (the first entry, ARCHIVE_VIP, is the only exception and is 512).

```
ARCHIVE_VIP = 1,0x32,512,0x163a,4,0x0,0x0,0x0,0x0,3;
BM-DLT = 1,0x38,0,0x18639,4,0x40,0x40,0x40,0x40,3;
CLASS_3580 = 1,0x24,0,0x45863d,2,0x00,0x01,0;
CLASS_3590 = 1,0x24,0,0x1c63d,4,0x0,0x0,0x0,0x0,3;
CLASS_3592 = 1,0x24,0,0x45D639,2,0x00,0x51,0;
CLASS_LTO2 = 1,0x24,0,0x45863d,2,0x00,0x01,0;
CLASS_STK  = 1,0x36,0,0x1d639,1,0x00,0;
DEC-DLT = 1,0x36,0,0x9639,4,0x0,0x0,0x0,0x0,3;
DLT8k-data = 1,0x38,0,0x19639,4,0x1a,0x1b,0x41,0x41,3;
EXB-8500C = 1,0x35,0,0x9639,4,0x14,0x15,0x8C,0x00,3;
EXB-8505 = 1,0x35,0,0x9639,4,0x14,0x15,0x8C,0x00,3;
EXB-8500 = 1,0x35,0,0x9639,4,0x14,0x00,0x00,0x15,2;
EXB-8900 = 1,0x35,0,0x9639,4,0x27,0x27,0x27,0x00,3;
EXB-MAMMOTH2 = 1,0x35,0,0x19639,4,0,0x27,0x28,0x7f,2;
FJ-D3 = 1,0x21,0,0xCA19,4,0x09,0x09,0x09,0x09,0;
```

```
FJ-M8100 = 1,0x24,0,0x1d63d,4,0x0,0x0,0x0,0x0,3;
gy20-data = 1,0x36,0,0xd659,1,0x00,0;
gy2120-data = 1,0x36,0,0x19659,1,0x00,0;
HP-DAT = 1,0x34,0,0x9639,4,0x0,0x0,0x0,0x0,3;
HP-DAT-DDS3 = 1,0x34,0,0,0x9639,4,0x0,0x8c,0x8c,0x8c,3;
HP_DAT_4 = 1,0x34,0,0x9639,4,0x00,0x8c,0x8c,0x8c,1;
IBM-3590 = 1,0x24,0,0x1c63d,4,0x0,0x0,0x0,0x0,3;
Q-DLT7000 = 1,0x38,0,0x19639,4,0x82,0x83,0x84,0x85,3;
SDLT-data = 1,0x38,0,0x19639,4,0x90,0x91,0x90,0x91,3;
SDLT-320 = 1,0x38,0,0x19639,4,0x92,0x93,0x92,0x93,3;
SDLT320 =  1,0x38,0,0x8639,4,0x90,0x91,0x92,0x93,3;
SEAGATE_LTO = 1,0x36,0,0x1d639,4,0x00,0x00,0x00,0x00,1;
SONY_AIT = 1,0x36,0,0x9639,4,0x0,0x0,0x0,0x0,0;
SONY_AIT3 = 1,0x36,0,0xd679,4,0x00,0x00,0x00,0x00,0;
SONY_SAIT = 1,0x36,0,0x1d639,4,0x00,0x00,0x00,0x00,0;
STK-4781 = 1,0x24,0,0x1d43d,1,0x00,0;
STK-4791 = 1,0x24,0,0x1d67d,1,0x00,0;
STK-4890 = 1,0x24,0,0x1d67d,1,0x00,0;
STK-9840 = 1,0x36,0,0x1d639,1,0x00,0;
STK-SD-3 = 1,0x24,0,0x1d67d,1,0x00,0;
TAND-8G-VAR = 1,0x37,0,0x963b,4,0xa0,0xd0,0xd0,0xd0,3;
Ultrium = 1,0x36,0,0x19639,4,0x00,0x00,0x00,0x00,3;
ULTRIUM2 = 1,0x36,0,0xd639,4,0x40,0x00,0x00,0x00,3;
```

Note Reboot the system when you have finished changing the `st.conf` file. Use the reconfigure option (`boot -r` or `reboot -- -r`) to allow the kernel's SCSI tape (st) driver to recognize the drives as the correct type during system initialization.

Adding Logical Unit Number Entries

If the devices you are adding utilize the logical unit number (LUN) concept, (such as many fibre channel SAN configurations) you may also have to add entries to the following files:

- `st.conf`
- `sg.conf`
- `sg.links`

See the "Configuring SG and ST Drivers" on page 10 for information on `sg.build`, a script that is used to create these files, and examples of the proper syntax to use.

Configuring Optical Disk Drives

Read the following topics if you plan to use optical disk drives.

Configuring HP Optical Disk Drives

To use standalone HP optical-disk drives, the sg driver must be installed (see "Understanding the SCSI Passthru Drivers" on page 8). The system must also be configured to recognize the optical drives as disk drives at system boot time.

If you are adding HP 1.2 gigabyte or equivalent model magneto-optical disk drives, the system may not recognize these as disk drives and thus cannot use them. See "Setting the HP Optical Drive Type in Nonvolatile Memory" on page 26 for more information.

The Solaris 8 6/00 release introduced volume manager (`vold`), which attempts to manage all removable media devices. If `vold` manages an optical disk, NetBackup cannot access it.

Edit `/etc/vold.conf` and comment out the following line. Optical disks will then work as they did before this Solaris 8 change.

```
#use rmdisk drive /dev/rdsk/c*s2 dev_rmdisk.so rmdisk%d
```

Creating Device Files

When adding optical disk drives to a Media Manager configuration, you must specify the following device paths:

- Volume header disk device path (partition 0).
- Character device path (partition 6).

To display the disk device files that are configured on your system, use the `sgscan` command with the `disk` parameter:

```
# /usr/openv/volmgr/bin/sgscan disk

/dev/sg/c0t0l0: (/dev/rdsk/c0t0d0): "IBM     DCAS32160SUN2.1G"
/dev/sg/c0t1l0: (/dev/rdsk/c0t1d0): "HP      C1113F"
/dev/sg/c0t2l0: (/dev/rdsk/c0t2d0): "HP      C1113F"
/dev/sg/c0t5l0: (/dev/rdsk/c0t5d0): "HP      C1160F"
/dev/sg/c1t0l0: (/dev/rdsk/c1t0d0): "SONY    SMO-F541"
/dev/sg/c1t1l0: (/dev/rdsk/c1t1d0): "SONY    SMO-F541"
/dev/sg/c1t2l0: (/dev/rdsk/c1t2d0): "SEAGATE ST11200N SUN1.05"
```

Note All device types can be displayed using the `all` parameter when executing `sgscan`. This command can be helpful for associating disk devices with other SCSI devices that may be configured on the same adapter. Usage: `sgscan [all|basic|changer|disk|tape] [conf] [-v]`

Optical disk device files are located in the `/dev` directory and have the following formats.

Volume header device:

`/dev/rdsk/c`*ADAPTER*`t`*TARGET*`d0s0`

Character device:

`/dev/rdsk/c`*ADAPTER*`t`*TARGET*`d0s6`

Where:

- *ADAPTER* is the logical adapter number as shown in the `sgscan` output.
- *TARGET* is the SCSI ID.

Examples of Optical Disk Device Files

Example 1

Using the previous sample `sgscan` output, if the desired optical disk drive connects to SCSI ID 5 of adapter card 0, you would use the following device paths:

Volume header device:

`/dev/rdsk/c0t5d0s0`

Character device:

`/dev/rdsk/c0t5d0s6`

Example 2

Using the previous sample `sgscan` output, if the desired optical disk drive connects to SCSI ID 0 of S bus 1 adapter card 1, you would use the following device paths:

Volume header device:

`/dev/rdsk/c1t0d0s0`

Character device:

`/dev/rdsk/c1t0d0s6`

Setting the HP Optical Drive Type in Nonvolatile Memory

To use HP optical disk drives, the system must recognize the optical drives as disk drives at system boot time. If you are adding HP 1.2 gigabyte or equivalent model magneto-optical disk drives, the system may not recognize these as disk drives.

▼ To recognize these drives

1. Install the sg loadable driver, if it is not already installed. See "Configuring SG and ST Drivers" on page 10 for information on installing this driver.

2. Use the `scsi_command` command to change the device type (stored in the drive's nonvolatile memory) from optical memory to disk. The format of the command follows.

   `/usr/openv/volmgr/bin/scsi_command -d /dev/sg/`*`sg_id`* `-disk`

   sg_id is the logical identifier assigned to the optical disk drive for use by the sg driver. See "Configuring SCSI Robotic Controls" on page 14 for information on determining the logical identifier.

Note The `/dev` path allows Media Manager to access the optical disk drive through the sg driver. This is an exception to the usual case where Media Manager uses the sg driver to access robotic controls. Therefore be sure to specify the SCSI ID for the optical disk drive, *not* the SCSI ID for the robotic control.

3. Reboot the system with the reconfigure option (`boot -r` or `reboot -- -r`) to allow the drive to be recognized as a disk drive by the kernel's SCSI disk (sd) driver during system initialization.

Command Summary

The following is a summary of commands that may be useful when configuring and verifying devices. See the procedures in this chapter for examples of their usage.

`/usr/sbin/modinfo | grep sg`

Displays whether or not the sg driver is installed.

`/usr/openv/volmgr/bin/driver/sg.install`

Installs or updates the sg driver.

`/usr/sbin/rem_drv sg`

Uninstalls the sg driver. This command is usually not necessary, since `sg.install` does this before performing a driver update.

`/usr/openv/volmgr/bin/sg.build all -mt` *`max_target`* `-ml` *`max_lun`*

Updates `st.conf`, `sg.conf`, and `sg.links`, and generates SCSI Target IDs with multiple LUNs.

`/usr/openv/volmgr/bin/sgscan all`

Scans all connected devices with a SCSI inquiry and provides correlation between physical and logical devices using all device files in `/dev/sg`.

Also checks for devices connected to the Sun StorEdge Network Foundation HBA that are not configured for use by VERITAS products.

`/usr/openv/volmgr/bin/scsi_command -d /dev/sg/`*`sg_id`* `-disk`

Changes the device type (stored in the drive's nonvolatile memory) from optical memory to disk.

sg_id is the logical identifier assigned to the optical disk drive for use by the sg driver. See "Configuring SCSI Robotic Controls" on page 14 for information on determining the logical identifier.

`boot -r or reboot -- -r`

Reboot the system with the reconfigure option (`-r`) to allow a drive to be recognized as a disk drive during system initialization by the kernel's SCSI disk (sd) driver.

IBM RS6000 Running AIX 4.3.3.10/5.1/5.2 3

This chapter explains how to configure storage devices for use with Media Manager running on an IBM RS6000 system.

After configuring the hardware, use one of the available Media Manager configuration interfaces to add the drives and robots to your Media Manager configuration

The major topics included are as follows:

- "Before You Start" on page 30
- "RS6000 AIX Adapter Number Conventions" on page 30
- "The SCSI Passthru Driver (ovpass)" on page 31
- "Configuring Robotic Controls" on page 32
- "Configuring Tape Drives" on page 39
- "Configuring Optical Disk Drives" on page 44
- "Command Summary" on page 49

Before You Start

Observe the following points when performing the configurations described in this chapter:

- Attach all peripherals and reboot the system before configuring devices. Many of these steps may be accomplished using `smit` (the System Management Interface Tool). See the `smit(1)` man page for more information.
- For NetBackup to recognize and communicate with connected devices, and for device discovery to discover devices, NetBackup issues SCSI pass-thru commands to the devices in a configuration.

  The ovpass driver must be properly configured for SCSI-controlled robot discovery, and device files must exist that follow the naming conventions explained in "Configuring Robotic Controls" on page 32, "Configuring Tape Drives" on page 39, and "Configuring Optical Disk Drives" on page 44.
- Use `smit` and `/usr/sbin/lsdev` to verify that the devices are configured correctly. Make sure you can "see" your devices on the SAN before you install and configure the SSO option.
- To obtain error and debugging information about devices and robotic software daemons, the `syslogd` daemon must be configured to be active. See `syslogd(1)` for more information.

RS6000 AIX Adapter Number Conventions

The location code for an adapter consists of two pairs of digits with the format *AA-BB*; where *AA* identifies the location code of the drawer containing the adapter card and *BB* identifies both the I/O bus and slot containing the card.

A value of 00 for *AA* means that the adapter card is located in the CPU drawer or system unit, depending on the type of system. Any other value for *AA* indicates that the card is located in an I/O expansion drawer; in which case the value for *BB* identifies the I/O bus and slot number in the CPU drawer that contains the asynchronous expansion adapter. The first digit identifies the I/O bus with 0 corresponding to the standard I/O bus and 1 corresponding to the optional I/O bus. The second digit identifies the slot on the indicated I/O bus.

The first digit of *BB* identifies the I/O bus containing the adapter card. If the card is in the CPU drawer or system unit, this digit will be 0 for the standard I/O bus or 1 for the optional I/O bus. If the card is in an I/O expansion drawer, this digit is 0. The second digit identifies the slot number on the indicated I/O bus (or slot number in the I/O expansion drawer) that contains the card.

A location code of 00-00 is used to identify the Standard I/O Planar.

Examples

`00-05` identifies an adapter card that is in slot 5 of the standard I/O bus in either the CPU drawer or system unit, depending on the type of system.

`00-12` identifies an adapter card that is in slot 2 of the optional I/O bus in the CPU drawer.

`18-05` identifies an adapter card located in slot 5 of an I/O expansion drawer. The drawer is the one connected to the asynchronous expansion adapter located in slot 8 of the optional I/O bus in the CPU drawer.

The SCSI Passthru Driver (ovpass)

Read this topic if you plan to use SCSI-controlled robotic peripherals or HP 1.2 gigabyte or equivalent model magneto-optical disk drives.

If you are using an API robot, such as an IBM Automatic Tape Library (ATL), refer to the NetBackup Media Manager Administration guide for information on configuring the robotic peripheral.

When communicating with SCSI-controlled robotic peripherals on an IBM RS6000 system, Media Manager utilizes a SCSI passthru driver called `ovpass`.

This driver is also used to set the optical drive type, as documented in "Setting the HP Optical Drive Type in Nonvolatile Memory" on page 46. `ovpass` is not required if the only device being used is the IBM 3590 B11 tape stacker.

Note You cannot use `smit` to configure `ovpass` device files.

▼ To install the ovpass driver

❖ Enter:`/usr/openv/volmgr/bin/driver/install_ovpass`

▼ To ensure the driver device files are accessible after a system boot

❖ Add the following command to the system startup script:

`/usr/openv/volmgr/bin/driver/mkdev_ovpass`

▼ To remove the ovpass driver

❖ Enter: `/usr/openv/volmgr/bin/driver/remove_ovpass`

Upgrading The SCSI Passthru Driver

Note The following upgrade procedure is required only if you get an error while trying to configure a FCP SCSI device. See step 5 on page 33 for details.

Some versions of Media Manager before release 4.5 used a version of the passthru driver that did not support FCP SCSI controllers.

Caution Any device files (`/dev/ovpass`*n*) will be removed and must be re-created.

▼ **To upgrade to the latest passthru driver**

1. Remove the old `ovpass` driver.

   ```
   /usr/openv/volmgr/bin/driver/remove_ovpass
   ```

2. Install the new `ovpass` driver.

   ```
   /usr/openv/volmgr/bin/driver/install_ovpass
   ```

Configuring Robotic Controls

Robots are controlled through a SCSI or a network connection.

- SCSI control is covered in the following section.
- Configuration for network controlled robotic libraries (for example, ACS robots) is discussed in the appendices of the Media Manager system administrator's guides.

Configuring SCSI Robotic Controls

Read this topic if you plan to use a robotic storage device that is controlled through a SCSI robotic connection. Information on supported SCSI robots (vendor models) can be found on the VERITAS support web site.

▼ **To check for and create the necessary device files**

1. Install the SCSI passthru driver as explained in "The SCSI Passthru Driver (ovpass)" on page 31.

2. Display which SCSI controllers are physically available on your machine by using the following command:

   ```
   /usr/sbin/lsdev -C  | grep I/O
   ```

In the following sample output, SCSI controller 1 (01) has been assigned the logical identifier scsi0:

```
scsi0  Available 00-01    SCSI I/O Controller
```

In the following sample output, FCP SCSI controller 3A-08 has been assigned the logical identifier fscsi0:

```
fscsi0 Available 3A-08-01 FC SCSI I/O Controller Protocol Device
```

3. Display the SCSI device files that have already been created by using the following command:

```
/usr/sbin/lsdev -C -s scsi
```

The example output follows:

```
hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
```

This output shows that two disk drives and one tape drive are configured as follows:

- hdisk0 is a disk drive at controller 1 (01) and SCSI ID 0 (0,0)
- hdisk1 is a disk drive at controller 1 (01) and SCSI ID 1 (1,0)
- rmt0 is a tape drive at controller 1 (01) and SCSI ID 3 (3,0)

If the device files for the SCSI robotic control already exist, they appear in the `lsdev` output as ovpass0, ovpass1, etc. The output for this example does not show any ovpass files so you would have to create them as explained in the next step.

4. Display the FCP SCSI device files that have already been created by using the following command:

```
/usr/sbin/lsdev -C -s fcp
```

5. If device files for the desired robotic control SCSI ID do not exist, create the files using the following commands.

Note If you get an error (`mkdev` error code 0514-0520) while trying to configure a FCP SCSI device, review the topic "Upgrading The SCSI Passthru Driver" on page 32.

```
mkdev -c media_changer -s scsi -t ovpass -p controller -w id,lun
mkdev -c media_changer -s fcp -t ovpass -p controller
          -w scsi_id,lun
```

Where:

- *controller* is the logical identifier of the drive's SCSI adaptor, such as scsi0, scsi1 or vscsi1.

- *id* is the SCSI ID of the robotic connection.
- *scsi_id* is the fibre channel identifier for the N_Port address (D_ID) of the robotic connection.
- *lun* is the logical unit number of the robotic connection.

Several methods exist for determining the D_ID of the robot as follows:

- Inspect the name server for the switch (if available). Each vendor uses a unique method to make this information available. Consult the documentation for the switch vendor.
- Inspect the bridge for mapping information (if available). Each vendor uses a unique method to make this information available. Consult the documentation for the bridge vendor.
- Inspect the odm database for any tape devices in the robot using the following command:

  ```
  /usr/bin/odmget -q "name=rmtX" CuAt
  ```

  Where *rmtX* is the name of the tape device (for example: rmt0 or rmt1).

  The following output shows that rmt0 is at SCSI ID 0x1009ef and the robot might also be at this address:

  ```
  CuAt:
  name = "rmt0"
  attribute = "scsi_id"
  value = "0x1009ef"
  type = "R"
  generic = "DU"
  rep = "s"
  nls_index = 6
  ```

- Use the smc (Library Medium Changer) entry for the robot to determine the correct SCSI ID and lun values. Inspect the `lsdev` output from step 4 and look for an entry like the following:

  ```
  smc0 Available 14-08-01 IBM 3584 Library Medium Changer
  (FCP)
  ```

  If you see an entry for the robot, inspect the odm database using the following command:

  ```
  /usr/bin/odmget -q "name=smc0" CuAt
  ```

  ```
  CuAt:
  name = "smc0"
  attribute = "scsi_id"
  value = "0x111ca"
  type = "R"
  ```

```
generic = "DU"
rep = "s"
nls_index = 25

CuAt:
name = "smc0"
attribute = "lun_id"
value = "0x1000000000000"
type = "R"
generic = "DU"
rep = "s"
nls_index = 26
```

From the example output, the SCSI ID is 0x111ca and the lun is 1. The lun is derived from the lun ID, by right shifting it 48 bits.

6. Display the newly created logical identifier for the device by using one of the following commands:

```
/usr/sbin/lsdev -C -s scsi
/usr/sbin/lsdev -C -s fcp
```

In the following example output, `ovpass0` is a SCSI robotic control device file:

```
hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
ovpass0 Available 00-01-5,0    VERITAS Media Changer
```

The path name for these types of device files has the following form, where *ovpass_id* is the logical identifier assigned to the device.

`/dev/`*`ovpass_id`*

In this example, you would use the following device file path:

```
/dev/ovpass0
```

Examples of SCSI Robotic Control Device Files

Example 1

Assume this robot is not a TSD or an HP C1560B. The `ovpass` driver has been installed and the desired SCSI robotic controller is controller 1 at SCSI ID 5, but the device files do not exist.

1. Determine the logical identifier for the SCSI controller as follows:

```
/usr/sbin/lsdev -C -c adapter | grep SCSI
```

The following output shows that `scsi0` is the logical name for SCSI controller 1.

```
scsi0  Available 00-01    SCSI I/O Controller
```

2. Check if the device files exist for `ovpass` at SCSI ID 5.

```
/usr/sbin/lsdev -C -s scsi
```

The output shows that the device files exist for tape and disk, but not for the SCSI robotic control at controller 1 (scsi0) and SCSI ID 5 (5,0).

```
hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
```

3. Create the device files by using the following command:

```
mkdev -c media_changer -t ovpass -s scsi -p scsi0 -w 5,0
```

4. Display the device files by issuing the following `lsdev` command:

```
/usr/sbin/lsdev -C -s scsi

hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
ovpass0 Available 00-01-5,0    VERITAS Media Changer
```

For this example use the following device file path to configure the SCSI robotic control connected to controller 1 and SCSI ID 5:

```
/dev/ovpass0
```

Example 2

Assume the robot is a DLT2700 / DLT4700 (TSD) or an HP C1560B (TL4). The `ovpass` driver has been installed, but the device files for SCSI robotic control at controller 1 with SCSI ID 3 and logical unit number 1 do not exist.

1. Determine the logical identifier for the SCSI controller:

```
/usr/sbin/lsdev -C -c adapter | grep -i SCSI
```

The following output shows that `scsi0` is the logical name for SCSI controller 1:

```
scsi0  Available 00-01    SCSI I/O Controller
```

2. Check if the device files exist for `ovpass` at SCSI ID 5.

```
/usr/sbin/lsdev -C -s scsi
```

The following output shows that the device files exist for tape and disk, but not for the SCSI robotic control at controller 1 (scsi0), SCSI ID 3, and logical unit number 1 (3,1):

```
hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
```

3. The device files can now be created using the following command:

```
mkdev -c media_changer -t ovpass -s scsi -p scsi0 -w 3,1
```

4. Display the device files by issuing the `lsdev` command.

```
/usr/sbin/lsdev -C -s scsi

hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
ovpass0 Available 00-01-3,1    VERITAS Media Changer
```

For this example, the device file to use for the TSD SCSI robotic control connected at controller 1 with SCSI ID 3 and logical unit number 1 would be:

```
/dev/ovpass0
```

Example 3

Assume the robot is an STK 9710 connected to a F/W Differential SCSI board and the passthru driver has been installed. Assume the drives are at SCSI ID's 4 and 5, and the robotics is at SCSI ID 6.

1. Determine the correct scsi controller.

```
lsdev -C | grep scsi

scsi0    Available 00-02       SCSI I/O Controller
ascsi0   Available 00-04       Wide SCSI I/O Controller Adapter
vscsi0   Available 00-04-0,0   SCSI I/O Controller Protocol Device
vscsi1   Available 00-04-0,1   SCSI I/O Controller Protocol Device

lsdev -C -c tape

rmt2  Available 00-04-01-4,0 Other SCSI Tape Drive
rmt3  Available 00-04-01-5,0 Other SCSI Tape Drive
```

2. The drives are on Adapter 00-04-01. Therefore, `vscsi1` is the correct adapter for making the ovpass device file as follows:

```
mkdev -c media_changer -t ovpass -s scsi -p vscsi1 -w 6,0
```

Note Never use the scsi adapter name.

Example 4 (IBM 3570 B-series Robotic Libraries)

If there is one drive in the robotic library, the robotic control is LUN 1 of the drive's SCSI ID. If there are two drives, the robotic control is LUN 1 of the Drive 1 SCSI ID. The SCSI IDs can be set or viewed using the front panel on the robot. The robotic control for the IBM 3570 B01/B02 is TLD, so if there are two drives they may be connected to different host systems.

If this is the case, the host system which is connected to Drive 1 must also have the robotic control. Also, the library should be in RANDOM mode and BASE configuration. See the operator's guide supplied with the unit for information on setting library mode and configuration.

Assume a configuration as follows:

```
lsdev -C -c tape

rmt0 Available 00-02-01-5,0 Other SCSI Tape Drive
rmt0 Available 00-02-01-6,0 Other SCSI Tape Drive
```

If drive 1 is SCSI ID 5, the robotic control for the robotic library will be LUN 1 of this SCSI ID. Assuming vscsi1 is the correct adapter, make the passthru device (ovpass) as follows:

```
mkdev -c media_changer -t ovpass -s scsi -p vscsi1 -w 5,1
```

Configuring IBM 3590 Stacker Robotic Controls

If you plan to use a Tape Stacker Half-inch (TSH) robotic storage device, see the VERITAS support web site for the vendor model associated with the TSH robot type.

Perform the following steps to check for and create the necessary device files:

1. Display the SCSI tape devices configured in the system using the following command:

   ```
   /usr/sbin/lsdev -C -c tape

   rmt0  Defined   00-02-00-4,0 Other SCSI Tape Drive
   rmt1  Available 00-08-00-6,0 2.3 GB 8mm Tape Drive
   .
   .
   rmt12 Available 00-04-01-6,0 IBM 3590 Tape Drive and Medium Changer
   ```

2. The SCSI robotic path for the IBM 3590 is the same as the no rewind on close tape path. When configuring the TSH SCSI robotic path, the robotic control path for the 3590 would be `/dev/rmt12.1`. The tape drive path would also be `/dev/rmt12.1`.

Configuring Tape Drives

If you are using IBM tape drives, VERITAS recommends that you install the IBM AIX tape driver. Refer to the IBM documentation when using this driver.

If you are using other tape drives, VERITAS recommends that you use the IBM AIX OST (other SCSI tape) driver. Refer to the IBM documentation when using this driver.

Configuring Non-QIC Tape Drives

The terms *variable length block* or *fixed length block* refer to the behavior of reads and writes and the way the kernel packs physical tape records into logical tape records for an application. Variable-mode devices allow more flexibility in reading previously written tapes. Many tape devices can be accessed in either mode. NetBackup assumes variable length for non-QIC drives.

For more information, see `chdev(1)`, `smit(1)` and the system management guide. The `smit` application is the most convenient way to manually change from fixed to variable-length-block devices.

Caution Non-QIC tape drives must be configured as variable-length-block devices if they will be used by Media Manager. Otherwise NetBackup is able to write data but may not be able to read it correctly. During a read, you may see a “not in tar format” error.

Automatic Configuration

When a non-QIC tape drive is configured using NetBackup, NetBackup will automatically issue the `chdev` command to configure the drive as a variable length block device. It is normally not necessary to manually run the `chdev` command, but the details of the command issued by NetBackup are provided (see “Using the chdev Command” on page 39).

Using the chdev Command

Ensure that the device being used is configured for variable mode by using the `chdev` command as follows:

```
/usr/sbin/chdev  -l Dev -a block_size=0
```

Where *Dev* is the logical identifier for the drive (for example: `rmt0` or `rmt1`).

Using Extended-File Marks for Drives

Tape drives must be configured to use extended file marks, if those tape drives are capable of supporting them (for example, 8-mm drives). See `chdev(1)` and `smit(1)` for additional information. Otherwise, NetBackup may not be able to use those drives.

Automatic Configuration

When a tape drive is configured using NetBackup, NetBackup will automatically issue the `chdev` command to configure the drive to use extended file marks. It is normally not necessary to manually run the `chdev` command, but the details of the command issued by NetBackup are provided (see "Using the chdev Command" on page 40).

Using the chdev Command

Ensure that the device being used is configured for extended file marks as required by Media Manager by using the `chdev` command as follows:

```
/usr/sbin/chdev -l Dev -a extfm=yes
```

Where *Dev* is the logical identifier for the drive (for example: `rmt0` or `rmt1`)

Fast-Tape Positioning (locate-block)

For DLT, Exabyte, and half-inch cartridge tape drives, Media Manager supports the SCSI `locate-block` command for positioning tape to a specific block. This improves tape-positioning greatly over what can be obtained with the alternative.

Media Manager uses the `locate-block` command by default unless you disable it by executing the following:

```
touch /usr/openv/volmgr/database/NO_LOCATEBLOCK
```

With locate-block positioning disabled, NetBackup uses the `forward-space-file/record` method.

Creating No Rewind Device Files

When adding tape drives to a Media Manager configuration, you need only specify a no rewind on close device path. These SCSI device files are in the `/dev` directory and have the following format:

```
/dev/rmtID.1
```

Where *ID* is the logical identifier assigned to the device by the system.

▼ To check for and create the necessary device files

1. Display which SCSI controllers are physically available by using the `lsdev` command as follows:

   ```
   /usr/sbin/lsdev -C  | grep I/O
   ```

   This sample output shows that SCSI controller 1 (`00-01`) has been assigned the logical identifier `scsi0`.

   ```
   scsi0  Available 00-01    SCSI I/O Controller
   ```

2. Display the SCSI device files that have already been created by using one of the following commands:

   ```
   /usr/sbin/lsdev -C -s scsi
   /usr/sbin/lsdev -C -s fcp

   hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
   hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
   rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
   ```

   This example output shows that two disk drives and one tape drive exist as follows:

   - `hdisk0` is a disk drive at controller 1 (00-01) and SCSI ID 0 (`0,0`)
   - `hdisk1` is a disk drive at controller 1 (00-01) and SCSI ID 1 (`1,0`)
   - `rmt0` is a tape drive at controller 1 (00-01) and SCSI ID 3 (`3,0`)

   If the device files for the SCSI tape drives exist, they appear in the output as `rmt0`, `rmt1`, and so on. The previous example output shows `rmt0`.

   For `rmt0` and `rmt1`, you would use the following no rewind on close device files:

   ```
   /dev/rmt0.1
   /dev/rmt1.1
   ```

3. If the device files for the SCSI ID of the desired tape drive do not exist, create them using the following command:

   `/usr/sbin/mkdev -c tape -s scsi -t ost -p` *`controller`* `-w` *`id,lun`*

   Where:

   - *controller* is the logical identifier of the SCSI adapter for the device, such as `scsi0` or `scsi1`.
   - *id* is the SCSI ID of the drive connection.
   - *lun* is the logical unit number of the drive connection.

   An example for an 8-mm drive connected to controller 0 and SCSI ID 5 follows:

```
mkdev -c tape -s scsi -t ost -p scsi0 -w 5,0
```

You can display the newly created logical identifier for the device by using the `lsdev` command.

```
/usr/sbin/lsdev -C -s scsi

hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
rmt1    Available 00-01-00-5,0 Other SCSI Tape Drive
ovpass0 Available 00-01-6,0    VERITAS Media Changer
```

The `rmt1` device file has been created.

4. If the device files do not exist on a FCP controller, use the following command to create them, where *device* is the controller number from step 1 on page 41. For example, fscsi0.

```
/usr/sbin/cfgmgr -l device
```

5. Ensure that the device being used is configured for variable-mode and extended file marks as required by Media Manager by using the `chdev` command as follows, where *Dev* is the logical identifier for the drive (for example: `rmt0` or `rmt1`).

```
/usr/sbin/chdev -l Dev -a block_size=0
/usr/sbin/chdev -l Dev -a extfm=yes
```

No Rewind Device File Example

Assume the device files for the desired SCSI 8-mm tape drive (controller 1, SCSI ID 5) do not exist.

1. Determine the logical identifier for the SCSI controller as follows:

```
/usr/sbin/lsdev -C -c adapter | grep SCSI
```

The following output shows that `scsi0` is the logical name for SCSI controller 1:

```
scsi0  Available 00-01    SCSI I/O Controller
```

2. Check if the device files exist for any device at SCSI ID 5.

```
/usr/sbin/lsdev -C -s scsi
```

The following output shows that some device files exist for tape and disk, but not for the 8-mm tape drive at controller 1 (scsi0) and SCSI ID 5 (5,0):

```
hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
```

```
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
```

3. Create the desired device files by using the following command:

```
mkdev -c tape -t ost -s scsi -p scsi0 -w 5,0
```

4. Display the device files by issuing the following `lsdev` command:

```
/usr/sbin/lsdev -C -s scsi

hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
rmt1    Available 00-01-00-5,0 Other SCSI Tape Drive
```

5. To ensure that the tape device is configured for variable-mode and extended file marks, use the following commands:

```
chdev -l rmt1 -a block_size=0
chdev -l rmt1 -a extfm=yes
```

Enter the following device file path to configure the 8-mm drive connected to controller 1 and SCSI ID 5:

```
/dev/rmt1.1
```

Using Multiple Tape Densities

After creating the necessary device files for your tape drives you may want to use non-default densities on drives that support them (for example, Exabyte 8500C tape drives).

There are two configurable densities available for all tape drives, although not all tape drives support multiple densities. The default density for both density setting 1 and density setting 2 is 0, which means maximum density.

To modify either of the density settings, you can use `smit(1)` or commands similar to the following:

```
chdev -l tapedev -a density_set_1=Density
chdev -l tapedev -a density_set_2=Density
```

Where:

- *tapedev* is the logical identifier for the drive, such as `rmt0` or `rmt1`.
- *Density* is the decimal number representing the desired density.

To use density setting 1, use the following no rewind on close device file:

```
/dev/rmt*.1
```

To use density setting 2, use the following no rewind on close device file:

`/dev/rmt*.5`

Configuring Optical Disk Drives

When adding optical disk drives to a Media Manager configuration, you specify only a character device path. Optical disk character device files are located in the `/dev` directory and have the following format, where *ID* is the logical identifier assigned to the device by the system.

`/dev/rhdisk`*ID*

Note To use HP optical disk drives, the system must recognize the optical drives as disk drives at system boot time. If you are adding HP 1.2 gigabyte or equivalent model magneto-optical disk drives to an AIX system, the system may not recognize them as disk drives, and thus cannot use them. See "Setting the HP Optical Drive Type in Nonvolatile Memory" on page 46 for information on correcting this condition.

Creating Device Files

▼ To check for and create the necessary device files

1. Display which SCSI controllers are physically available on your machine by using the following `lsdev` command:

   ```
   /usr/sbin/lsdev -C -c adapter | grep SCSI
   ```

   This sample output shows that SCSI controller 1 (`00-01`) has been assigned the logical identifier `scsi0`.

   ```
   scsi0  Available 00-01    SCSI I/O Controller
   ```

2. Display the SCSI device files that have already been created by using the following `lsdev` command:

   ```
   /usr/sbin/lsdev -C -s scsi
   ```

   The following example output shows that two disk drives and one tape drive exist:

   - `hdisk0` is a disk drive at controller 1 (00-01) and SCSI ID 0 (0,0)
   - `hdisk1` is a disk drive at controller 1 (00-01) and SCSI ID 1 (1,0)
   - `rmt0` is a tape drive at controller 1 (00-01) and SCSI ID 3 (3,0)

If the device files for the SCSI optical disk drives exist, they show up in the output as `hdisk0`, `hdisk1`, and so on.

```
hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
```

For `hdisk0`, you would use the following device path:

```
/dev/rhdisk0
```

3. If the device files for the desired optical drive's SCSI ID do not exist, you can create them with the following command:

   `mkdev -c disk -s scsi -t osdisk -p` *`controller`* `-w` *`id,lun`*

   Where:

   - *controller* is the logical identifier of the device's SCSI adapter, such as `scsi0` or `scsi1`.
   - *id* is the SCSI ID of the drive connection.
   - *lun* is the logical unit number of the drive connection.

   An example for an optical disk drive on controller 1 and SCSI ID 5 follows:

   ```
   mkdev -c disk -t osdisk -s scsi -p scsi0 -w 5,0
   ```

4. You can display the newly-created logical identifier for the device by using the following command:

   ```
   /usr/sbin/lsdev -C -s scsi

   hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
   hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
   rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
   hdisk2  Available 00-01-00-5,0 Other SCSI Disk Drive
   ovpass0 Available 00-01-6,0    VERITAS Media Changer
   ```

   The device files for `hdisk2` have been created and you can now use them.

Examples of Optical Disk Device Files

Assume the device files for the desired optical disk drive (controller 1, SCSI ID 5) do not yet exist.

1. Determine the logical identifier for the SCSI controller as follows:

   ```
   /usr/sbin/lsdev -C -c adapter | grep SCSI
   ```

   The output shows that `scsi0` is the logical name for SCSI controller 1.

```
scsi0  Available 00-01    SCSI I/O Controller
```

2. Check to see if the device files exist for `ovpass` at SCSI ID 5.

   ```
   /usr/sbin/lsdev -C -s scsi
   ```

   The output shows that some device files exist for tape and disk, but not for the optical disk drive at controller 1 (`scsi0`) and SCSI ID 5 (5,0).

   ```
   hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
   hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
   rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
   ```

3. Create device files for the optical disk drive on controller 1 at SCSI ID 5 by using the following command:

   ```
   mkdev -c disk -t osdisk -s scsi -p scsi0 -w 5,0
   ```

4. Display the device files by issuing the `lsdev` command.

   ```
   /usr/sbin/lsdev -C -s scsi

   hdisk0  Available 00-01-00-0,0 400 MB SCSI Disk Drive
   hdisk1  Available 00-01-00-1,0 400 MB SCSI Disk Drive
   rmt0    Available 00-01-00-3,0 Other SCSI Tape Drive
   hdisk2  Available 00-01-00-5,0 Other SCSI Disk Drive
   ```

5. Enter the following character device file path to configure the optical disk drive connected to controller 1 and SCSI ID 5:

   ```
   /dev/rhdisk2
   ```

Setting the HP Optical Drive Type in Nonvolatile Memory

To use HP optical disk drives, the system must recognize the optical drives as disk drives at system boot time. If you are adding HP 1.2 gigabyte or equivalent model magneto-optical disk drives to an AIX system, the system may not recognize them as disk drives and cannot use them.

▼ To detect whether the system recognizes the optical drives

1. Execute the following command after system boot.

   ```
   /usr/sbin/lsdev -C -s scsi
   ```

2. If you see the appropriate controller and SCSI ID combination for the optical drive listed as Other SCSI Disk Drive, the system recognizes the drive as a disk drive.

```
hdisk0  Available 00-00-0S-0,0 2.2 GB SCSI Disk Drive
rmt0    Available 00-00-0S-3,0 Other SCSI Tape Drive
omd0    Defined   00-00-0S-6,0 Other SCSI Read/Write Optical Drive
ovpass0 Available 00-00-0S-2,0 VERITAS Media Changer
```

▼ To recognize these drives when the operating system does not

1. Install the `ovpass` driver if it is not already installed. See "The SCSI Passthru Driver (ovpass)" on page 31.

2. Create the `ovpass` device file for the optical drive so that the driver can be used to communicate with the optical drive.

   a. Display the SCSI device files that have already been created by using the following command: `/usr/sbin/lsdev -C -s scsi`

      The following example output shows that a disk drive, a tape drive, an optical drive, and SCSI robotic control are configured:

      - `hdisk0` is a disk drive at controller 1 (00) and SCSI ID 0 (0,0)
      - `rmt0` is a tape drive at controller 1 (00) and SCSI ID 3 (3,0)
      - `omd0` is an optical drive at controller 1 (00) and SCSI ID 6 (6,0)
      - `ovpass0` refers to the SCSI robotic control for controller 1 (00) and SCSI ID 2 (2,0)

```
hdisk0  Available 00-00-0S-0,0 2.2 GB SCSI Disk Drive
rmt0    Available 00-00-0S-3,0 Other SCSI Tape Drive
omd0    Defined   00-00-0S-6,0 Other SCSI Read/Write Optical
                                                        Drive
ovpass0 Available 00-00-0S-2,0 VERITAS Media Changer
```

   b. Create the device files for the optical drive by using the following command:

```
mkdev -c media_changer -s scsi -t ovpass -p controller
      -w id,lun
```

      Where:

      controller is the logical identifier of the drive's SCSI adapter, such as scsi0 or scsi1.

      id is the SCSI ID of the optical drive (not the robotic connection).

      lun is the logical unit number of the optical drive.

      For example:

```
mkdev -c media_changer -s scsi -t ovpass -p scsi 0 -w 6,0
```

Use the following command to obtain the logical identifier for the optical drive you just created:

```
/usr/sbin/lsdev -C -s scsi
```

c. Verify the temporary `ovpass` device file created in step b.

```
/usr/openv/volmgr/bin/scsi_command -d /dev/ovpass_id -inquiry
```

Where *ovpass_id* is the logical identifier assigned to the temporary device. For example if the temporary ovpass device was `ovpass2`, enter the following:

```
/usr/openv/volmgr/bin/scsi_command -d /dev/ovpass2 -inquiry
```

The output shows the following:

```
removable device type c_8h_HP
```

3. Use the following command to change the device type (stored in the drive's nonvolatile memory) from optical memory to disk. The format of the command is as follows, where *ovpass_id* is the logical identifier assigned to the device.

```
/usr/openv/volmgr/bin/scsi_command -d /dev/ovpass_id -disk
```

For example:

```
/usr/openv/volmgr/bin/scsi_command -d /dev/ovpass1 -disk
```

4. Remove the ovpass device files and the optical drive that were created by using `rmdev` command as in the following:

```
rmdev -l ovpass_id -d
rmdev -l optical_drive_id -d
```

Where:

- *ovpass_id* is the logical identifier assigned to the device.
- *optical_drive_id* is the optical drive identifier assigned to the optical drive.

For example:

```
rmdev -l ovpass1 -d
rmdev -l omd0 -d
```

5. Reboot the system to allow the drive to be recognized as a disk drive by the kernel's SCSI disk driver during system initialization.

The optical drive should be displayed as: `hdisk`*logical_number*, where *logical_number* is the logical number assigned to the drive by the system.

For example:

```
/usr/sbin/lsdev -C -s scsi
```

The following example output shows a disk drive, tape drive, robotic control, and optical drive:

```
hdisk0  Available 00-00-0S-0,0 2.2 GB SCSI Disk Drive
rmt0    Available 00-00-0S-3,0 Other SCSI Tape Drive
ovpass0 Available 00-00-0S-2,0 VERITAS Media Changer
hdisk1  Available 00-00-0S-6,0 Other SCSI Disk Drive
```

Command Summary

The following is a summary of commands that may be useful when configuring devices. See the procedures in this chapter for examples of their usage.

`/usr/openv/volmgr/bin/driver/install_ovpass`

Installs the ovpass driver for the first time.

`/usr/openv/volmgr/bin/driver/remove_ovpass`

Removes the ovpass driver.

`/usr/openv/volmgr/bin/driver/mkdev_ovpass`

Place this command in the system startup script to ensure that the ovpass driver device files are accessible after each system boot.

`/usr/sbin/lsdev -C | grep I/O`

Displays adapters that are physically available on your server.

`/usr/sbin/lsdev -C -s` *`filetype`*

Displays the device files that have been created, where *filetype* defines the type of file displayed. `scsi` displays SCSI files and `fcp` displays fibre channel files.

`mkdev -c media_changer -s scsi -t ovpass -p` *`controller`* `-w` *`id,lun`*

Creates device files for the robotic control SCSI ID.

Where *controller* is the logical identifier of the drive SCSI adaptor (such as `scsi0` or `scsi1`), *id* is the SCSI ID of the robotic connection, and *lun* is the logical unit number of the robotic connection.

`mkdev -c media_changer -s fcp -t ovpass -p` *`controller`* `-w` *`scsi_id,lun`*

Creates device files for the robotic control fibre channel SCSI ID.

Where *controller* is the logical identifier of the drive SCSI adaptor (such as `scsi0` or `scsi1`), *scsi_id* is the fibre channel SCSI ID of the robotic connection, and *lun* is the logical unit number of the robotic connection.

`mkdev -c disk -s scsi -t osdisk -p controller -w id,lun`

Creates device files for optical disk drives.

Where *controller* is the logical identifier of the drive SCSI adaptor (such as `scsi0` or `scsi1`), *id* is the SCSI ID of the robotic connection, and *lun* is the logical unit number of the robotic connection.

`mkdev -c tape -s scsi -t ost -p controller -w id,lun`

Creates device files for tapes.

Where *controller* is the logical identifier of the drive SCSI adaptor (such as `scsi0` or `scsi1`), *id* is the SCSI ID of the robotic connection, and *lun* is the logical unit number of the robotic connection.

`/usr/sbin/chdev -l dev -a block_size=0`

Configures the drive with logical identifier specified by *dev* (for example: `rmt0`) to variable mode.

`/usr/sbin/chdev -l dev -a extfm=yes`

Configures the drive with logical identifier specified by *dev* (for example: `rmt0`) for extended file marks.

`/usr/openv/volmgr/bin/scsi_command -d /dev/ovpass_id -disk`

Used for HP optical disk drives to change the device type (stored in the drive's nonvolatile memory) from optical memory to disk.

Where *ovpass_id* is the logical identifier assigned to the device.

`/etc/lsattr -l dev -E -H`

Displays device information, where *dev* is the name of the device (for example, `rmt1`).

`/usr/sbin/cfgmgr -l device`

Creates device files on a FCP controller, where *device* is the controller number (for example, fscsi0).

`/usr/bin/odmget -q "name=rmtX" CuAt`

Displays the device attributes for the device (*rmtX*). This command can be used to determine SCSI target and lun pairs when configuring fibre channel devices.

Where *rmtX* is the name of the tape device (for example: rmt0 or rmt1).

HP9000 Running HP-UX 11.0/11.11 4

This chapter explains how to configure storage devices for use with Media Manager running on an HP9000 system.

After configuring the hardware, use one of the available Media Manager configuration interfaces to add the drives and robots to your Media Manager configuration

The major topics included are as follows:

- "Before You Start" on page 52
- "Configuring Robotic Controls" on page 53
- "Configuring Tape Drives" on page 59
- "Configuring Optical Disk Drives" on page 65
- "SSO Configurations With More Than 16 Tape Drives" on page 66
- "Command Summary" on page 67

Before You Start

Observe the following points when performing the configurations described in this chapter:

- For NetBackup to recognize and communicate with connected devices and for device discovery to discover devices, NetBackup issues SCSI pass-thru commands to the devices in a configuration.

  Device files must exist that follow the naming conventions explained in "Configuring Robotic Controls" on page 53, "Configuring Tape Drives" on page 59, and "Configuring Optical Disk Drives" on page 65.

- Use `/usr/sbin/sam` (HP utility) and `ioscan -f` to verify that the devices are configured correctly. Make sure you can "see" your devices on the SAN before you install and configure the SSO option.

- Some HP SCSI adapters do not support SCSI pass-thru, so devices on these adapters are not auto-discovered.

If You Are Using NetBackup Server

Portions of this chapter include configuration topics and examples for configurations and options that are not supported in NetBackup Server. It is important to refer to the VERITAS support web site to determine support for NetBackup Server, before using this chapter.

Topics Not Applicable to NetBackup Server

- "Enabling SCSI Reserve/Release" on page 63.
- "Cautions with Using the HP-UX EMS Tape Device Monitor" on page 63.
- "SSO Configurations With More Than 16 Tape Drives" on page 66

Configuring Robotic Controls

Robots are controlled through a SCSI or a network connection. Robot control configuration can be found as follows:

- SCSI control is covered in the following sections.
- Configuration of network controlled robotic libraries (for example, ACS robots) is discussed in the appendices of the Media Manager System Administrator's Guides.

Configuring SCSI Robotic Controls

Read this topic if you plan to use a robotic storage device that is controlled through a SCSI robotic connection. Information on supported SCSI robots (vendor models) can be found on the VERITAS support web site.

Determining Which Passthru Driver to Configure

When communicating with SCSI-controlled robotic peripherals, Media Manager robotic software uses the `spt` or `sctl` SCSI passthru driver. The driver that is used depends on the type of SCSI interface on the system.

The two types of SCSI interfaces are as follows:

- Interfaces that use the scsi1/scsi3 bus-adapter driver require the `spt` passthru driver. The 28655A SCSI interface is in this category.

  See "Configuring Device Files for the spt Passthru Driver" on page 54.

- Interfaces that use the c700 or c720 bus-adapter driver require the `sctl` passthru driver. For example, the following interfaces are in this category:
  - The GSC built-in SCSI interface.
  - Add-on cards for HP9000-700.
  - Some add-on cards for HP9000-800 D, K, T, and V series systems.

  When attaching an autochanger (robotic library) device to a GSC interface and using the `sctl` driver, the `schgr` device driver must also be installed. Without this driver installed, the system will not bind the driver to the device. See the `autochanger(7)` man page.

  See "Configuring Device Files for the sctl Passthru Driver" on page 56.

Examples

To determine the type of interface on your system, use the `ioscan -f` command as shown in the following examples.

Example 1: 28655A SCSI Interface (spt driver)

```
ioscan -f

Class    I  H/W Path Driver S/W State   H/W Type     Description
==============================================================
bc       0           root    CLAIMED    BUS_NEXUS
bc       1 56        bc      CLAIMED    BUS_NEXUS    Bus Converter
ext_bus  0 56/52     scsi1   CLAIMED    INTERFACE    HP 28655A - SCSI
                                                             Interface
target   0 56/52.2   target  CLAIMED    DEVICE
tape     0 56/52.2.0 tape2   CLAIMED    DEVICE       HP  HPC1533A
```

In this case, the `ext_bus` entry (which designates the bus adapter) specifies a `scsi1` driver. You would configure the `spt` passthru driver for the SCSI robotic controls on this system (see "Configuring Device Files for the spt Passthru Driver" on page 54).

Example 2: Built-in SCSI interface (sctl driver)

```
ioscan -f

Class      I  H/W Path     Driver   S/W State  H/W Type  Description
=================================================================
ext_bus    2  10/12/5      c700     CLAIMED    INTERFACE Built-in SCSI
target    11  10/12/5.0    tgt      CLAIMED    DEVICE
tape       0  10/12/5.0.0  stape    CLAIMED    DEVICE    HP C1533A
target    12  10/12/5.2    tgt      CLAIMED    DEVICE
disk       6  10/12/5.2.0  sdisk    CLAIMED    DEVICE  TOSHIBA CD-ROM
```

In this case, the `ext_bus` entry specifies a `c700` driver. You would configure the `sctl` passthru driver for the SCSI robotic controls on this system (see "Configuring Device Files for the sctl Passthru Driver" on page 56).

Configuring Device Files for the spt Passthru Driver

Use the following procedure to configure these types of device files. See "Determining Which Passthru Driver to Configure" on page 53 to determine if you require these files.

Note The HP-UX kernel has to be configured to use the `spt` SCSI passthru driver. Refer to the HP-UX `scsi_pt (7)` man page.

The device files for the `spt` driver have the following format:

`/dev/spt/c`*CONTROLLER*`t`*TARGET*`l`*UNIT*

Where:

- *CONTROLLER* is the Instance number of the controlling bus. The Instance value is displayed in the output of `ioscan -f` in the column labeled I of the controller's entry (`ext_bus` in the column labeled Class).
- *TARGET* is the SCSI ID of the robotic control.
- *UNIT* is the SCSI logical unit number (LUN) of the robot. This is usually 0.

You must create the device files for the spt driver manually, as they are not created automatically when the system boots.

▼ To create these device files

These steps are also documented in the `scsi_pt(7)` man page.

1. Install and configure the driver as described in the man page.
2. Determine the character major number of the spt driver using `lsdev -d spt`.
3. Use the following commands to create the device file for the SCSI robotic control:

   ```
   mkdir /dev/spt
   mknod /dev/spt/Name c Major 0xIITL00
   ```

   Where:

   - *Name* is the device name as defined in the format: c*CONTROLLER*t*TARGET*l*UNIT*
   - *Major* is the character major number (from the `lsdev` command).
   - *II* is two hexadecimal digits identifying the controlling bus interface card by its Instance number.
   - *T* is one hexadecimal digit representing the SCSI ID of robotic control.
   - *L* is one hexadecimal digit representing the SCSI LUN of the robotic control.

Example of Creating a Device File

If the robotic control for an HP Optical Disk Library (ODL) is on a secondary SCSI bus at SCSI ID 3, LUN 0, use the following steps to create the device file.

1. Use the `ioscan -f` command to get information on the SCSI bus and the robotic control.

```
Class   I  H/W Path  Driver  S/W State H/W Type     Description
```

```
=================================================================
bc       0            root     CLAIMED   BUS_NEXUS
bc       1  56        bc       CLAIMED   BUS_NEXUS    Bus Converter
ext_bus  1  56/16     scsi1    CLAIMED   INTERFACE    HP 28655A - SCSI
                                                              Interface
target   4  56/16.3   target   CLAIMED   DEVICE
spt      0  56/16.3.0 spt      CLAIMED   DEVICE       HP    C1700T
```

The Instance number for the robot's SCSI bus is 1. It also confirms that the spt driver is attached to the optical robotic control at H/W Path `56/16.3.0`.

2. Use `lsdev` to get the character major number for the spt driver.

```
lsdev -d spt
```

The output from this command shows that the character major number for the spt driver is 137.

```
Character     Block       Driver          Class
137           -1          spt             spt
```

3. Create the `/dev/spt` directory, if it has not already been created.

```
mkdir /dev/spt
```

4. Create the device file as follows:

```
mknod /dev/spt/c1t3l0 c 137 0x013000
```

This command creates the `/dev/spt/c1t3l0` device file. Specify this file as the robot control path when configuring your device under Media Manager.

Configuring Device Files for the sctl Passthru Driver

Use the following procedure to configure these types of device files. See "Determining Which Passthru Driver to Configure" on page 53 to determine if you require these files.

Note You do not have to reconfigure the HP-UX kernel to use the `sctl` passthru driver on HP9000-700 systems, since the generic SCSI driver is part of basic HP-UX.

If the devices do not exist, you can create device files by using the `mknod` command as follows. See the `scsi_ctl(7)` man page.

```
mkdir /dev/sctl
cd /dev/sctl

/etc/mknod cCONTROLLERtTARGETlLUN c 203 0xIITL00
```

Where:

- *CONTROLLER* is the Instance number of the controlling bus. The Instance value is displayed in `ioscan -f` output under column I of the controller entry (ext_bus in the Class column).
- *TARGET* is the SCSI ID of the robotic control.
- *LUN* is the SCSI logical unit number.
- *II* are two hexadecimal digits that identify the controlling bus interface card by its Instance number (same as controller).
- *T* is one hexadecimal digit representing the SCSI ID.
- *L* is one hexadecimal digit representing the SCSI LUN.

Using ioscan With sctl Robots

If the robotic control has its own SCSI ID, it has an entry similar to the following:

```
Class     I  H/W Path   Driver   S/W State H/W Type  Description
===================================================================
unknown  -1  2/0/1.1.0  unknown  UNCLAIMED UNKNOWN   LAGO SYSLS-340L
```

The `Class`, `I`, and `Driver` columns may also have invalid information. In these instances the robotics are correct, but `ioscan` returns invalid information.

Examples of Creating Device Files

Example 1

In this example the robotic control for a ADIC Scalar 100 library is on a SCSI bus with a instance number of 7 (ext_bus entry, I column), SCSI ID 2 and LUN 0. The robotic control for an IBM ULT3583-TL library is on the same SCSI bus at SCSI ID 3 and LUN 0.

Use the following procedure to create the robotic device files:

1. Use the `ioscan -f` command to get information on the SCSI bus and the robotic control.

```
Class     I  H/W Path     Driver  S/W State H/W Type  Description
=================================================================
ext_bus   7  0/7/0/1      c720    CLAIMED   INTERFACE SCSI C896 Fast
                                                          Wide LVD
target   10  0/7/0/1.0    tgt     CLAIMED   DEVICE
tape     65  0/7/0/1.0.0  stape   CLAIMED   DEVICE  QUANTUM SuperDLT1
target   11  0/7/0/1.1    tgt     CLAIMED   DEVICE
tape     66  0/7/0/1.1.0  stape   CLAIMED   DEVICE  QUANTUM SuperDLT1
target   12  0/7/0/1.2    tgt     CLAIMED   DEVICE
autoch   14  0/7/0/1.2.0  schgr   CLAIMED   DEVICE    ADIC Scalar 100
target   13  0/7/0/1.3    tgt     CLAIMED   DEVICE
```

```
autoch   19  0/7/0/1.3.0  schgr   CLAIMED   DEVICE    IBM ULT3583-TL
target   14  0/7/0/1.4    tgt     CLAIMED   DEVICE
tape     21  0/7/0/1.4.0  atdd    CLAIMED   DEVICE    IBM ULT3580-TD1
target   15  0/7/0/1.5    tgt     CLAIMED   DEVICE
tape     19  0/7/0/1.5.0  atdd    CLAIMED   DEVICE    IBM ULT3580-TD1
```

2. The commands to create the device files follow. See the "Command Summary" on page 67 for the `mknod` command format or see the `scsi_ctl(7)` man page.

   ```
   cd /dev/sctl
   /etc/mknod c7t2l0 c 203 0x072000
   /etc/mknod c7t3l0 c 203 0x073000
   ```

   This creates the following device files, which you specify to Media Manager during configuration of the ADIC robotic control and IBM robotic control respectively:

   ```
   /dev/sctl/c7t2l0
   /dev/sctl/c7t3l0
   ```

Note It is important to also create the passthru driver device files for tape drives. See "Configuring Tape Drives" on page 59.

Example 2

Assume the robotic control for an Exabyte 10i tape stacker (TS8) is on a built-in SCSI bus at SCSI ID 3, LUN 0. Also assume that an `ioscan -f` verifies that the SCSI ID is 3 and shows that the Instance number for the robot's SCSI bus is 1.

The commands to create the device file are

```
cd /dev/sctl
/etc/mknod c1t3l0 c 203 0x013000
```

This creates the following device file, which you specify to Media Manager:

```
/dev/sctl/c1t3l0
```

Example 3

1. Use the `ioscan -f` command to get information on the SCSI bus and the robotic control.

```
Class    I H/W Path          Driver  S/W State H/W Type  Description
=====================================================================
ext_bus 3 0/0/0.8.0.0.0      fcpmux  CLAIMED   INTERFACE HP A3308
                                                FCP-SCSI MUX Interface
target  0 0/0/0.8.0.0.0.0    tgt     CLAIMED   DEVICE
tape    0 0/0/0.8.0.0.0.0.0 stape   CLAIMED   DEVICE  QUANTUM DLT7000
target  1 0/0/0.8.0.0.0.1    tgt     CLAIMED   DEVICE
autoch  0 0/0/0.8.0.0.0.1.0 schgr   CLAIMED   DEVICE    STK9740
```

```
target  2 0/0/0.8.0.0.0.7   tgt     CLAIMED   DEVICE
ctl     3 0/0/0.8.0.0.0.7.0 sctl    CLAIMED   DEVICE    Initiator
```

With fibre channel and SCSI muxes the hardware paths are a bit longer. If you use the bus H/W Path as a mask and apply it to the other hardware paths for devices on that bus, you are left with *SCSI ID.SCSI LUN* for the device.

This example has a bus with H/W Path of 0/0/0.8.0.0.0, which has an instance number (I column) of 3. Applying the mask shows a DLT 7000 drive at SCSI ID 0, SCSI LUN 0 and a STK 9740 robot at SCSI ID 1, SCSI LUN 0 also on this bus.

When configuring the robotic device file for the STK 9740 robot, you would use controller=3, target=1, and lun=0. To enable the passthru path for the Quantum DLT 7000 drive, you would use controller=3, target=0, and lun=0.

2. The commands to create the device file for the robotic control are as follows:

```
cd /dev/sctl
/etc/mknod c3t1l0 c 203 0x031000
```

These commands create the following device file, which you specify to Media Manager during configuration of the robotic control:

```
/dev/sctl/c3t1l0
```

3. The commands to create the passthru device file for the tape drive follow. See the "Command Summary" on page 67 for the `mknod` command format or see the `scsi_ctl(7)` man page.

```
cd /dev/sctl
/etc/mknod c3t0l0 c 203 0x030000
```

These commands create the following passthru device file.

```
/dev/sctl/c3t0l0
```

Although the passthru device file is used during NetBackup operation, it is not specified during configuration. During Media Manager tape drive configuration, the following no rewind on close device file path is used:

```
/dev/rmt/c3t0d0BESTnb
```

Configuring Tape Drives

Read the following topics if you plan to use tape drives:

Using Berkeley Style Close

The examples in this section show *Berkeley-style close* for tape drives as indicated by the letter `b` after the compression specification. It is mandatory to specify Berkeley-style close for tape devices that you configure under Media Manager.

The terms *Berkeley-style close* and *AT&T style close* refer to operations where a tape is left logically positioned after a close operation (in relation to a tape mark). One style leaves an application logically positioned before a tape mark and the other leaves it after. Applications must assume where the tape is left after a close in order to establish the correct orientation the next time they do a tape-position or read operation. Some operating systems allow tape devices to be configured with either type of close. NetBackup assumes it is using Berkeley-style close on an HP9000.

Using the Passthru Driver for Tape Drives

NetBackup and Storage Migrator can function without a passthru path to tape devices, *but* the following capabilities are not available:

- Locate-block (fast-tape) positioning
- Data protection provided by SCSI reserve/release
- Automatic configuration for tape devices
- Performance optimization for Quantum SDLT drives.

Note Passthru paths are not supported on HP-PB adapters such as HP 28696A - Wide SCSI or HP 28655A - SE SCSI.

Automatic Configuration

Because using the passthru path is so important, NetBackup will automatically create the corresponding passthru path whenever a tape drive is configured with a device file of the format: `/dev/rmt/c`*CONTROLLER*`t`*TARGET*`d`*UNIT*`BESTnb`.

These paths are created in the `/dev/sctl` directory, which will also be created if it does not exist. Passthru paths will also be created automatically whenever the NetBackup device configuration wizard is run. In either case, NetBackup will not modify or delete any existing passthru paths. NetBackup assumes that any existing passthru paths were created correctly.

NetBackup does not detect the type of adapter cards installed in the system, so it will also create passthru paths for tape drives connected to adapter cards that do not support passthru. This is expected and will not cause any problems.

It is normally not necessary to manually create passthru paths for tape drives, but the steps for doing so are provided (see "Enabling Passthru Paths" on page 61).

Enabling Passthru Paths

To enable passthru paths, a device file in the directory `/dev/sctl` must exist for the tape drives. Create the device files as shown in the following example.

Note When using the `mknod` command for tape drives, *TARGET* is the SCSI ID of the tape drive *not* the SCSI ID of the robotic control.

Example:

In this example the robotic control for a ADIC Scalar 100 library is on a SCSI bus with a instance number of 7 (ext_bus entry, I column), SCSI ID 2 and LUN 0, and the robotic control for a IBM ULT3583-TL library is on the same SCSI bus at SCSI ID 3 and LUN 0.

The ADIC library contains 2 Quantum Super DLT drives, one with SCSI ID 0, SCSI LUN 0 and the other with SCSI ID 1, SCSI LUN 0.

The IBM library contains 2 IBM Ultrium LTO drives, one with SCSI ID 4, SCSI LUN 0 and the other with SCSI ID 5, SCSI LUN 0.

Use the following procedure to create the robotic control device files and the passthru driver tape drive device files:

1. Assume the configuration from `ioscan -f` is as follows:

```
Class     I  H/W Path     Driver  S/W State H/W Type   Description
==============================================================
ext_bus   7  0/7/0/       c720    CLAIMED    INTERFACE  SCSI C896 Fast
                                                           Wide LVD
target   10  0/7/0/1.0    tgt     CLAIMED    DEVICE
tape     65  0/7/0/1.0.0  stape   CLAIMED    DEVICE   QUANTUM SuperDLT1
target   11  0/7/0/1.1    tgt     CLAIMED    DEVICE
tape     66  0/7/0/1.1.0  stape   CLAIMED    DEVICE   QUANTUM SuperDLT1
target   12  0/7/0/1.2    tgt     CLAIMED    DEVICE
autoch   14  0/7/0/1.2.0  schgr   CLAIMED    DEVICE     ADIC Scalar 100
target   13  0/7/0/1.3    tgt     CLAIMED    DEVICE
autoch   19  0/7/0/1.3.0  schgr   CLAIMED    DEVICE     IBM ULT3583-TL
target   14  0/7/0/1.4    tgt     CLAIMED    DEVICE
tape     21  0/7/0/1.4.0  atdd    CLAIMED    DEVICE     IBM ULT3580-TD1
target   15  0/7/0/1.5    tgt     CLAIMED    DEVICE
tape     19  0/7/0/1.5.0  atdd    CLAIMED    DEVICE     IBM ULT3580-TD1
```

Note Use the IBM `atdd` driver when configuring IBM tape drives on HP-UX. Configure `atdd` and BEST device paths according to IBM driver documentation. Do not configure `atdd` for robotic control of IBM robots. Check the VERITAS support web site for the latest recommended `atdd` driver version from IBM.

2. The commands to create the robotic device files follow. See the "Command Summary" on page 67 for the `mknod` command format or see the `scsi_ctl(7)` man page.

```
cd /dev/sctl
/etc/mknod c7t2l0 c 203 0x072000
/etc/mknod c7t3l0 c 203 0x073000
```

This creates the following device files, which you specify to Media Manager during configuration of the ADIC robotic control and IBM robotic control respectively:

```
/dev/sctl/c7t2l0
/dev/sctl/c7t3l0
```

3. The commands to create the passthru device files for the tape drives are as follows:

```
cd /dev/sctl
/etc/mknod c7t0l0 c 203 0x070000
/etc/mknod c7t1l0 c 203 0x071000
/etc/mknod c7t4l0 c 203 0x074000
/etc/mknod c7t5l0 c 203 0x075000
```

These commands create the following passthru device files. Although the passthru device files for tape drives are used during NetBackup operation, they are not specified during configuration.

```
/dev/sctl/c7t0l0
/dev/sctl/c7t1l0
/dev/sctl/c7t4l0
/dev/sctl/c7t5l0
```

During Media Manager tape drive configuration, the following no rewind on close device files are used. See "No Rewind Device Files" on page 64 for instruction on creating no rewind device files.

```
/dev/rmt/c7t0d0BESTnb
/dev/rmt/c7t1d0BESTnb
/dev/rmt/c7t4d0BESTnb
/dev/rmt/c7t5d0BESTnb
```

Fast-Tape Positioning (locate-block)

Locate-block is supported for most drive types in HP9000 for Fast/Wide GSC SCSI adapters. See the VERITAS support web site for a list of drive types that are supported.

Enabling locate-block

NetBackup and Storage Migrator use the locate-block command by default if a passthru path is configured. See "Enabling Passthru Paths" on page 61.

Disabling locate-block

To disable locate-block positioning, execute the following command:

```
touch /usr/openv/volmgr/database/NO_LOCATEBLOCK
```

With locate-block positioning disabled, NetBackup uses the `forward-space-file/record` method and Storage Migrator skips file marks.

Enabling SCSI Reserve/Release

This is a NetBackup Enterprise Server topic.

The VERITAS implementation of SCSI reserve/release protects data on a tape from corruption by other applications in a shared drive (SSO) configuration.

▼ **To enable SCSI reserve/release**

1. Set the kernel parameter `st_ats_enabled` to zero. Using the `SAM` utility is the easiest way to set this parameter.

   Leaving this parameter set to `ONE` causes conflicts between the operating system and NetBackup or Storage Migrator's use of SCSI reserve/release commands.

2. Reboot your system.

Cautions with Using the HP-UX EMS Tape Device Monitor

This is a NetBackup Enterprise Server topic.

The Tape Device Monitor (dm_stape) of the Event Monitoring System (EMS) should be configured to *not* run on hosts participating in a tape SAN configuration. Part of the EMS service periodically polls the tape devices to monitor their condition. When this occurs from one server while another server is using the tape device, it may interfere with backup operations causing those operations to time out and abort.

The problem can be avoided in either of the following ways:

- If you want to completely disable EMS you can run the `/etc/opt/resmon/lbin/monconfig` tool and select `(K) kill (disable) Monitoring`.

- If the POLL_INTERVAL value in the `/var/stm/config/tools/monitor/dm_stape.cfg` file is set to zero, EMS will still run, but it will not log any events or poll the devices (that is, it will not send any SCSI commands).

No Rewind Device Files

When adding tape drives to the Media Manager configuration, you need only specify a no rewind on close device file path. These device files are found in the `/dev/rmt` directory and have the following format:

`/dev/rmt/c`*`CONTROLLER`*`t`*`TARGET`*`d`*`UNIT`*`BESTnb`

Where:

- *CONTROLLER* is the Instance number of the controlling bus. The Instance value is displayed in `ioscan -f` output under the column I of the controllers entry (ext_bus in the Class column).
- *TARGET* is the SCSI ID of the tape drive.
- *UNIT* is the SCSI logical unit number (LUN) of the drive. This is usually 0.

If the desired tape device file does not exist, you can create device files using the `sam` utility or with the following `mksf(1M)` command:

```
mksf -C tape -H H/W_Path -b BEST -u -n
```

Where *H/W_Path* is the hardware path of the tape drive as specified by `ioscan`.

No Rewind Device File Example

Assume that the desired 4-mm DDS2 compression tape drive is at SCSI ID 2 and `ioscan -f` shows the following:

```
Class   I  H/W Path Driver  S/W State  H/W Type     Description
==================================================================
bc      0            root   CLAIMED    BUS_NEXUS
bc      1  56        bc     CLAIMED    BUS_NEXUS    Bus Converter
ext_bus 0  56/52     scsi1  CLAIMED    INTERFACE    HP 28655A-SCSI
                                                          Interface
target  0  56/52.2   target CLAIMED    DEVICE
tape    0  56/52.2.0 tape2  CLAIMED    DEVICE       HP   HPC1533A
.
.
.
```

The Instance number for the controlling bus is 0 and the H/W path for the tape drive is `56/52.2.0`.

The command to create the device file for the drive follows:

```
mksf -C tape -H 56/52.2.0 -b BEST -u -n
```

This creates the following device file, which you specify to Media Manager:

```
/dev/rmt/c0t2d0BESTnb
```

Configuring Optical Disk Drives

When adding optical disk drives to the Media Manager configuration, you need only specify a character device path. Optical disk character device files are found in the `/dev/rdsk` directory and have the following format:

`/dev/rdsk/c`*BI*`t`*TARGET*`d0`

Where:

- *BI* is the bus Instance number of the controlling bus. The Instance value is displayed in `ioscan` output under the column I of the ext_bus entries.
- *TARGET* is the SCSI ID of the drive. This ID is in the third position of the H/W Path as displayed by `ioscan`. For example, in 56/52.5.0 the SCSI ID is 5.

You can determine the bus Instance using `ioscan -C ext_bus -f`. The output is similar to the following example:

```
Class   I  H/W Path Driver S/W State H/W Type   Description
============================================================
ext_bus 0  56/52    scsi1  CLAIMED   INTERFACE  HP 28655A- SCSI
                                                           Interface
ext_bus 1  56/53    lpr2   CLAIMED   INTERFACE  HP 28655A- Parallel
                                                           Interface
```

You can determine the configured drives using `ioscan -C disk -f`. The output is

```
Class   I  H/W Path  Driver S/W State H/W Type  Description
=============================================================
disk    1  56/52.1.0 disc3  CLAIMED   DEVICE    HP C1716T
disk    2  56/52.2.0 disc3  CLAIMED   DEVICE    HP C1716T
disk    3  56/52.5.0 disc3  CLAIMED   DEVICE    HP C2490AM
disk    4  56/52.6.0 disc3  CLAIMED   DEVICE    HP C2490AM
```

Example of an Optical Disk Device File

Assume you are using the two optical disk drives at SCSI IDs 1 and 2 as shown in the previous `disk ioscan` example. These drives are on bus `56/52`, which as shown in the previous `ext_bus ioscan`, is bus Instance 0.

The character device file paths that you specify to Media Manager follow:

For target 1:

`/dev/rdsk/c0t1d0`

For target 2:

`/dev/rdsk/c0t2d0`

Using the Configure Storage Devices Wizard with Optical Disk Drives

The Media Manager device configuration wizard can discover and automatically configure optical disk drives that have a `/dev/sctl` SCSI passthru device file.

Note Optical disk drives are not supported in an SSO configuration.

▼ **To use the device configuration wizard**

1. Create the passthru device files.

   See "Configuring Device Files for the sctl Passthru Driver" on page 56 for instructions.

2. Start the wizard from the list of wizards displayed in the right pane of the **Media and Device Management** window of the NetBackup Administration Console.

   Select **Configure Storage Devices**.

   See your NetBackup Media Manager system administrator's guide for more information on using this wizard.

SSO Configurations With More Than 16 Tape Drives

This is a NetBackup Enterprise Server topic.

When the number of tape devices that are configured approaches 16, changes in tape device status may not be visible to all media servers in a Shared Storage Option (SSO) configuration. This is because the default maximum size of IPC message queues may not be large enough.

In these cases, communication between the `rdevmi` process on the scan hosts and the `oprd` processes on the media servers can be interrupted when the number of messages sent exceeds the maximum size of the queue.

VERITAS recommends modifying the HP-UX kernel parameters using the `/usr/sbin/sam` utility. See the appropriate HP-UX documentation for information on using this utility.

▼ To modify the kernel

These statements increase the maximum number of messages that can be created, and the number of bytes per queue. A reboot is necessary for the changes to take effect.

1. Select **SAM Kernel Configuration**.
2. Select **SAM Configurable Parameters**.
3. Select **msgseg**.
4. Select **Actions** from the menu bar.
5. Select **Modify Configurable Parameter** from the menu.
6. Select **Formula/Value** and enter 4096.
7. Select **OK** to save the value.
8. Repeat step 3 thru step 7 and change the value of **msgmnb** to 32768.
9. Repeat step 3 thru step 7 and change the value of **msgtql** to 512.
10. Select **Actions** from the menu bar.
11. Select **Process New Kernel** from the menu to process the kernel modifications and exit the utility.

Be aware that increasing the maximum size of the IPC message queue may increase the amount of memory allocated to other IPC message queues on the system. The impact of these changes should be fully assessed before they are implemented.

Command Summary

The following is a summary of commands that may be useful when configuring and verifying devices. See the procedures in this chapter for examples of usage.

`ioscan -C` *`TYPE`* `-f`

Shows information about the physical interfaces. Numeric information is displayed in decimal. *TYPE* is the type of interface as follows:

`spt` specifies SCSI robotic controls.

`tape` specifies tape drives.

`disk` specifies optical disks.

`ext_bus` specifies SCSI controllers.

`mknod /dev/spt/`*`Name`* `c` *`Major`* `0x`*`IITL`*`00`

Creates device files for SCSI robotic or tape drive controls.

Name is the device name as defined in the format: c*CONTROLLER*t*TARGET*l*UNIT*

Major is the character major number (from the `lsdev` command).

II are the two hexadecimal digits identifying the controlling bus interface card by its Instance number. The Instance value is displayed in the `ioscan` output under the I column of the proper ext_bus entry.

T is one hexadecimal digit for the SCSI ID of the robotic control.

L is one hexadecimal digit for the SCSI LUN of the robotic control.

`lsdev -d spt`

Displays information about the SCSI robotic control drivers.

`mksf -C tape -H` *`H/W_Path`* `-b BEST -u -n`

Creates device files for tape drives. Where *H/W_Path* is the hardware path of the tape drive, as specified by `ioscan`.

HP Alpha Running TRU64 UNIX 5.1/5.1a/5.1b 5

This chapter explains how to configure storage devices for use with Media Manager running on an HP Alpha system.

After configuring the hardware, use one of the available Media Manager configuration interfaces to add the drives and robots to your Media Manager configuration

The main topics included in this chapter are

- "Before You Start" on page 70
- "Configuring Robotic Controls" on page 70
- "Configuring Tape Drives" on page 71
- "SSO Configurations With More Than 16 Tape Drives" on page 76
- "Command Summary" on page 77

Before You Start

Observe the following points when performing the configurations described in this chapter:

- For NetBackup to recognize and communicate with connected devices and for device discovery to discover devices, NetBackup issues SCSI pass-thru commands to the devices in a configuration.

  Device files must exist that follow the naming conventions explained in "Configuring Robotic Controls" on page 70 and "Configuring Tape Drives" on page 71. The operating system creates all device files automatically.

- Use `/sbin/hwmgr` and `/usr/openv/volmgr/bin/lsdev` to verify that the devices are configured correctly. Make sure you can "see" your devices on the SAN before you install and configure the SSO option.

If You Are Using NetBackup Server

Portions of this chapter include configuration topics and examples for configurations and options that are not supported in NetBackup Server. It is important to refer to the VERITAS support web site to determine support for NetBackup Server, before using this chapter.

Topics Not Applicable to NetBackup Server

"SSO Configurations With More Than 16 Tape Drives" on page 76.

Configuring Robotic Controls

Robots are controlled through a SCSI or a network connection. Robot control configuration is explained as follows:

- SCSI robotic control is covered in the following section.
- Configuration for network controlled robotic libraries is discussed in the appendices of the Media Manager system administrator's guide.

Configuring SCSI Robotic Controls

Read this topic if you plan to use a robotic storage device that is controlled through a SCSI robotic connection. Information on supported SCSI robots (vendor models) can be found on the VERITAS support web site.

When communicating with SCSI-controlled robotic peripherals, Media Manager robotic software utilizes the SCSI passthru capability of the media changer driver. The TRU64 UNIX kernel does not have to be changed to use this driver since this driver is part of basic TRU64 UNIX.

Creating SCSI Robotic Control Device Files

Media Manager requires that device files from the `/dev/changer` directory are used to configure SCSI robotic control. These files are created by the operating system at boot time.

To display devices that are available on the system, use the following command:

```
# hwmgr -view devices

HWID: Device Name        Mfg      Model            Location
-------------------------------------------------------------
 3:  /dev/kevm
34:  /dev/disk/floppy0c           3.5in floppy     fdi0-unit-0
55:  /dev/disk/cdrom0c   COMPAQ   CDR-8435         bus-1-targ-0-lun-0
56:  /dev/disk/dsk0c     DEC      RZ2DD-KS (C) DEC bus-2-targ-0-lun-0
57:  /dev/disk/dsk1c     DEC      RZ2DD-KS (C) DEC bus-2-targ-1-lun-0
58:  /dev/disk/dsk2c     DEC      RZ2DD-KS (C) DEC bus-2-targ-2-lun-0
70:  /dev/changer/mc0             C6280-4000       bus-2-targ-3-lun-0
71:  /dev/ntape/tape6    Quantum  DLT4000          bus-2-targ-4-lun-0
```

Example of SCSI Robotic Control Device File

The previous output the from `hwmgr` command shows an HP C6280 robot connected on bus 2 at SCSI ID 3, lun 0. The corresponding device file is `/dev/changer/mc0`. This file should be used to configure the device in Media Manager.

Configuring Tape Drives

Read the following topics if you plan to use tape drives:

Fast-Tape Positioning (locate-block)

For most drive types, Media Manager supports the SCSI `locate-block` command for positioning a tape to a specific block.

NetBackup uses the `locate-block` command by default unless you disable it by executing the following:

```
touch /usr/openv/volmgr/database/NO_LOCATEBLOCK
```

With `locate-block` positioning disabled, NetBackup uses the `forward-space-file/record` method of tape positioning.

Adding Standard Tape Drives

Media Manager requires that no rewind on close device files are used to configure tape drives. These files are created by the operating system at boot time. The device files are located in the `/dev/ntape` directory and have the following format:

`/dev/ntape/tape`*`ID`*`_d`*`DENSITY`*

Where:

- *ID* is the identification number of the tape device.
- Values for *DENSITY* can be 0 - 7. Typically, 1 (for high density) is used.

To display devices that are available on the system, use the following command:

```
# hwmgr -view devices

HWID: Device Name        Mfg      Model            Location
-------------------------------------------------------------
 3:  /dev/kevm
34:  /dev/disk/floppy0c           3.5in floppy     fdi0-unit-0
55:  /dev/disk/cdrom0c   COMPAQ   CDR-8435         bus-1-targ-0-lun-0
56:  /dev/disk/dsk0c     DEC      RZ2DD-KS (C) DEC bus-2-targ-0-lun-0
57:  /dev/disk/dsk1c     DEC      RZ2DD-KS (C) DEC bus-2-targ-1-lun-0
58:  /dev/disk/dsk2c     DEC      RZ2DD-KS (C) DEC bus-2-targ-2-lun-0
70:  /dev/changer/mc0             C6280-4000       bus-2-targ-3-lun-0
71:  /dev/ntape/tape6    Quantum  DLT4000          bus-2-targ-4-lun-0
```

No Rewind Device File Example

The previous output the from `hwmgr` command shows a Quantum DLT 4000 tape drive connected on bus 2 at SCSI ID 4, lun 0. The corresponding device file is `/dev/ntape/tape6`.

After adding a density suffix of `_d1` (for high density) the device file is `/dev/ntape/tape6_d1`. This file should be used to configure the device in Media Manager.

Adding Nonstandard Tape Drives

This topic applies to the following drive types:

- HP LTO
- Seagate LTO
- STK 9840

Some types of tape drives require changes to the kernel before you can use them on Tru64.

▼ To change the kernel

Refer to the following man pages for more information on Dynamic Device Recognition (DDR):

- `ddr.dbase(4)`
- `ddr_config(8)`

1. Add the appropriate device-specific entries to the `/etc/ddr.dbase` file (see "Device-Specific Entry for HP Ultrium 460" on page 73 and the other device entries that follow).

2. Compile the `/etc/ddr.dbase` file using the `ddr_config` (Dynamic Device Recognition) utility to create the `ddr.db` file.

Device-Specific Entry for HP Ultrium 460

```
#
# Matches "Ultrium"
#
Type = tape
Name = "HP" "Ultrium"
#
PARAMETERS:
TypeSubClass        = lto              # Linear Tape Open
BLockSize           = 262144
TagQueueDepth       = 0
MaxTransferSize     = 0xffffff         # (16MB - 1)
ReadyTimeSeconds    = 120              # seconds
SyncTransfers       = enabled
WideTransfers       = enabled
InquiryLength       = 0x20

DENSITY:
DensityNumber       = 0,1,2,3,4,5,6,7
OneFileMarkOnClose  = yes
DensityCode         = 0x42
Blocking            = 0
CompressionCode     = 1
Buffered            = 1
```

```
Speed                = 0
#
# Ultrium mode select parameters for rewind after reset behavior
#
MODESELECT:
ModeSelectNumber     = 0
SavePage             = No
PageFormat           = scsi2
BlockDescriptor      = yes
TransferLength       = 16
Hdr.Tape.BufferMode  = 0x1
Hdr.MediumType       = 0
Data.UBYTE[0]        = 0x3D      #Vendor Unique Page Code 0x3D
Data.UBYTE[1]        = 0x02
Data.UBYTE[2]        = 0x01
Data.UBYTE[3]        = 0x00
```

Device-Specific Entry for HP Ultrium 230e

```
SCSIDEVICE
Type = tape
Name = "HP      " "Ultrium"

PARAMETERS:
MaxTransferSize = 0xffffff
ReadyTimeSeconds = 0x2d
InquiryLength = 0x20

DENSITY:
DensityNumber = 0
OneFileMarkOnClose = yes
DensityCode = 0x00
Blocking = 0
CompressionCode = 0x0
Buffered = 0x1

DENSITY:
DensityNumber = 1
OneFileMarkOnClose = yes
DensityCode = 0x00
Blocking = 0
CompressionCode = 0x1
Buffered = 0x1
```

Device-Specific Entry for Seagate Viper 200 - LTO

```
SCSIDEVICE
Type = tape
Name = "SEAGATE" "ULTRIUM"

PARAMETERS:
TypeSubClass          = tk
TagQueueDepth         = 0
MaxTransferSize       = 0x0ffffff # (16MB - 1)
ReadyTimeSeconds      = 180 # seconds
CMD_PreventAllow      = supported
CMD_ExtReserveRelease = supported
BlockSize             = 0
PwrMgmt_Capable       = false

DENSITY:
DensityNumber   = 0,2,3,4,5,6,7
DensityCode     = default
CompressionCode = 0x0
Buffered        = 0x1

DENSITY:
DensityNumber   = 1
DensityCode     = default
CompressionCode = 0x1
Buffered        = 0x1
```

Device-Specific Entry for STK 9840

```
SCSIDEVICE
Type = tape
Stype = 2
Name = "STK" "9840"

PARAMETERS:
TypeSubClass          = 3480
BlockSize             = 0
MaxTransferSize       = 0x40000     # 256k
SyncTransfers         = enabled
WideTransfers         = enabled
Disconnects           = enabled
CmdReordering         = disabled
TaggedQueuing         = disabled
TagQueueDepth         = 0
```

```
WCE_Capable           = false
PwrMgmt_Capable       = false
LongTimeoutRetry      = disabled
ReadyTimeSeconds      = 240
DisperseQueue         = false
CMD_PreventAllow      = supported
CMD_ExtReserveRelease = supported

DENSITY:
#
# /dev/tape/tapeX_d0, _d4
#
DensityNumber = 0,4
DensityCode = 0x42
CompressionCode = 0
Buffered = 0x1
#
DENSITY:
#
# /dev/tape/tapeX_d1, _d5
#
DensityNumber = 1,5
DensityCode = 0x42
CompressionCode = 1
#
DENSITY:
#
# /dev/tape/tapeX_d2, _d6
#
DensityNumber = 2,6
DensityCode = 0x43
CompressionCode = 0
Buffered = 0x1
```

SSO Configurations With More Than 16 Tape Drives

This is a NetBackup Enterprise Server topic.

When the number of tape devices that are configured approaches 16, changes in tape device status may not be visible to all media servers in a Shared Storage Option (SSO) configuration. This is because the default maximum size of IPC message queues may not be large enough.

In these cases, communication between the `rdevmi` process on the scan hosts and the `oprd` processes on the media servers can be interrupted when the number of messages sent exceeds the maximum size of the queue.

VERITAS recommends modifying the Tru64 kernel parameters using the `/usr/bin/X11/dxkerneltuner` utility. See the appropriate Tru64 documentation for information on command-line utilities.

▼ To modify the kernel

These statements increase the maximum number of messages that can be created, and the number of bytes per queue. A reboot is necessary for the changes to take effect.

1. Select **IPC** from the list and click **Select Subsystem**.
2. In the **Boot Time Value** column, change the following parameter values:

   ```
   msg_mnb 65536
   msg_tql 512
   ```

3. Save the changes and exit the utility.

Be aware that increasing the maximum size of the IPC message queue may increase the amount of memory allocated to other IPC message queues on the system. The impact of these changes should be fully assessed before they are implemented.

Command Summary

The following is a summary of commands that may be useful when configuring and verifying devices. See the procedures in this chapter for usage examples.

`hwmgr -view devices`

Displays all devices on the system.

IRIX 6.5.15 - 6.5.*nn* 6

This chapter explains how to configure storage devices for use with Media Manager running on an SGI platform running IRIX.

After configuring the hardware, use one of the available Media Manager configuration interfaces to add the drives and robots to your Media Manager configuration

The major topics included are as follows:

- "Before You Start" on page 80
- "Using SCIP Controllers" on page 81
- "Using the mediad Command" on page 81
- "Configuring Robotic Controls" on page 82
- "Configuring Tape Drives Using SGI APD Software" on page 83
- "Configuring Tape Drives (IRIX 6.5.15 Only)" on page 84
- "SSO Configurations With More Than 16 Tape Drives" on page 91.
- "Configuring Optical Disk Drives" on page 92
- "Command Summary" on page 92

Before You Start

Observe the following points when performing the configurations described in this chapter:

- When configuring tape drives, two different methods are used depending upon the level of the IRIX operating system being run, as follows:
  - "Configuring Tape Drives Using SGI APD Software" on page 83 applies to all supported IRIX releases *after* version 6.5.15.
  - "Configuring Tape Drives (IRIX 6.5.15 Only)" on page 84 applies only to the IRIX 6.5.15 release.
- For NetBackup to recognize and communicate with connected devices, and for device discovery to discover devices, NetBackup issues SCSI pass-thru commands to the devices in a configuration.

  Device files must exist that follow the naming conventions explained in "Configuring Robotic Controls" on page 82, "Configuring Tape Drives (IRIX 6.5.15 Only)" on page 84, and "Configuring Optical Disk Drives" on page 92.
- Use `/usr/sbin/hinv` and `/usr/openv/volmgr/bin/mmscan` to verify that the devices are configured correctly. Make sure you can "see" your devices on the SAN before you install and configure the SSO option.
- The SCSI ID number *must be* unique for the SCSI bus it is on, and *must be* any value other than zero.
- Typical device path names used when configuring drives and robots are described. Instructions for changing and rebuilding the kernel are also included. Depending on the type and number of devices you are adding, you may have to enter information in kernel source files and then reconfigure the kernel.
- The SGI IRIX version of Media Manager has been tested using SCSI peripherals (tape drives, optical disk drives, and robotic control) attached to the built-in SCSI controllers, sometimes referred to as on-board SCSI or Integral SCSI controllers.

  When referring to these SCSI controllers, this guide uses the term *integral SCSI controller*. Communication with tape drives attached to integral SCSI controllers is done through the `tps(7M)`, `tpsc(7M)`, and `ts(7M)` tape drivers. Communication with disk drives (including optical disk drives) attached to integral SCSI controllers is done through the `dks(7M)` disk driver.

If You Are Using NetBackup Server

Portions of this chapter include configuration topics and examples for configurations and options that are not supported in NetBackup Server. It is important to refer to the VERITAS support web site to determine support for NetBackup Server, before using this chapter.

Topics Not Applicable to NetBackup Server

"SSO Configurations With More Than 16 Tape Drives" on page 91.

Using SCIP Controllers

If your IRIX system has SCIP fast-wide-differential controllers, a change to the `/var/sysgen/master.d/scip` file may be required to avoid SCSI timeouts.

You should change the following line:

```
uint            scip_mintimeout = 0
```

To the following:

```
uint            scip_mintimeout = 180
```

This value was tested with a Quantum DLT4700 and corrected driver errors. In general, it is better to try a peripheral first without modifying this file. If errors occur, then change the timeout and retry. You may have to contact SGI for further information.

After making this change, you must generate a new kernel and reboot the system as follows:

1. Run the following kernel auto-configuration script:

   ```
   /etc/autoconfig
   ```

2. Reboot the system to utilize the newly built kernel.

Using the mediad Command

Do *not* use the IRIX `mediad` command to monitor devices configured under Media Manager. If you do, Media Manager will not be able to access the devices and you will see a message similar to the following in the system log:

```
Apr 12 10:30:55 3D:boris mediad: Could not access
device /dev/rmt/tps0d4nr, Device busy
```

If you see this type of message and you are using `mediad`, then disable `mediad` as described in the `mediad(1M)` man page.

For example, assume you encounter this problem with a tape device whose device file is `/dev/rmt/tps0d4`. Instruct `mediad` to not monitor this tape device by editing the `/etc/config/mediad.config` file. `mediad` monitors this file so your change should be immediate.

In this example, you would add the following line to `mediad.config`:

```
ignore device /dev/rmt/tps0d4
```

Configuring Robotic Controls

Robots are controlled through a SCSI or a network connection. Robot control configuration is explained as follows:

- SCSI control is covered in the following section.
- Configuration for network controlled robotic libraries is explained in the appendices of the Media Manager system administrator's guides.

Configuring SCSI Robotic Controls

Read this topic if you plan to use a robotic device that is controlled through a SCSI robotic connection. Information on supported SCSI robots (vendor models) can be found on the VERITAS support web site.

When communicating with SCSI-controlled robotic peripherals on an SGI platform, Media Manager robotic software utilizes `ds(7M)`, the generic (user mode) SCSI driver. Since this driver is part of basic IRIX, you do not have to reconfigure the kernel and reboot the system to use this driver.

Examples of SCSI Robotic Control Device Files

Note Note that the second-to-last character in the following example paths is the letter l, rather than the number 1, and represents (l)ogical unit.

Example 1

If the robotics control is not for a DLT2700, DLT4700, HP C1560B, or other LUN 1 peripheral and is on SCSI bus (adapter) 0 at SCSI ID 5, the device file you specify is

```
/dev/scsi/sc0d5l0
```

Example 2

If the robotics control is not for a DLT2700, DLT4700, HP C1560B, or other LUN 1 peripheral and is on SCSI bus (adapter) 1 at SCSI ID 3, the device file you specify is

```
/dev/scsi/sc1d3l0
```

Example 3

If a DLT2700, DLT4700, HP C1560B, or other LUN 1 peripheral robotics control is on SCSI bus (adapter) 1 at SCSI ID 4 with logical unit number 1, the device file you specify is

```
/dev/scsi/sc1d4l1
```

Configuring Tape Drives Using SGI APD Software

This topic applies to all supported IRIX versions after version 6.5.15.

Beginning with the 6.5.16 release of IRIX, the SGI Asynchronous Personality Daemon (APD) and device driver license enablers are required to configure new tape devices with IRIX. The APD software will make the appropriate changes needed to the IRIX operating system (including adding device files). The following table shows SGI APD releases and the tape devices that are supported by each:

APD Release	Release Date	Release Contents (Tape Devices Supported)
APD-2.1	March 2002	StorageTek T9840B, Seagate LTO gen-1 SCSI, and Quantum SDLT 200 SCSI
APD-2.2	July 2002	Includes all of release 2.1 plus: IBM LTO gen-1 FC and IBM LTO gen-1 SCSI
APD-2.3	September 2002	includes all of releases 2.1 and 2.2 plus: IBM 3590F and SONY AIT-3
APD-2.4	November 2002	Includes all of releases 2.1, 2.2, and 2.3 plus: StorageTek T9940B
APD-2.5	February 2003	Includes all of releases 2.1, 2.2, 2.3, and 2.4 plus: Quantum SDLT 320 SCSI

APD Release	Release Date	Release Contents (Tape Devices Supported)
APD-2.6	July 2003	Includes all of releases 2.1, 2.2, 2.3, 2.4, and 2.5 plus: IBM LTO gen-2 SCSI, IBM LTO gen-2 FC, and HP LTO gen-2 SCSI

The APD software and the correct device driver license enablers are available from SGI. When you receive the APD release package, you get documentation that will guide you through the license enabler process. This process will require you to enter the SGI licensing domain where your device driver license will be activated.

The license enablers are structured using the following two models:

- One model enables you to use the license on up to 10 SGI IRIX nodes, supporting up to 20 tape drives.
- One model enables you to use the license on up to 20 SGI IRIX nodes, supporting up to 100 tape drives.

For the latest information on APD software visit the SGI web site: `sgi.com`.

Configuring Tape Drives (IRIX 6.5.15 Only)

The following topics in this section apply only to IRIX version 6.5.15.

Fast-Tape Positioning (locate-block)

For most drive types, Media Manager supports the SCSI `locate-block` command for positioning a tape to a specific block. This improves tape-positioning significantly over the alternative method.

NetBackup and Storage Migrator use the `locate-block` command by default unless you disable the command by executing the following:

```
touch /usr/openv/volmgr/database/NO_LOCATEBLOCK
```

With `locate-block` positioning disabled, NetBackup uses the `forward-space-file/record` method and Storage Migrator skips file marks.

No Rewind Device Files

When adding tape drives to a Media Manager configuration, you need only specify a no rewind on close device path. In a typical configuration, most of the desired tape device files exist and you just have to locate them in the `/dev` directory.

No rewind on close device files that connect to the integral SCSI controllers have the following format:

`/dev/rmt/tps`*CONTROLLER*`d`*TARGET*`nrvc`

Where:

- *CONTROLLER* is the SCSI bus (adapter) number.
- *TARGET* is the SCSI ID.
- The `v` specifies a variable mode device.
- The `c` specifies tape compression.

Some device types (like Exabyte) also have suffixes on device files that designate their particular drive type. For example

`/dev/rmt/tps`*CONTROLLER*`d`*TARGET*`nrv.8500c  (EXB8500C)`

Examples of No Rewind Device Files

Example 1

If the desired HP 4-mm (DAT) drive is on SCSI bus 1 at SCSI ID 4, specify the following device path for that drive:

`/dev/rmt/tps1d4nrvc`

Example 2

If the desired Exabyte 8500C or 8505 tape drive is on SCSI bus 0 at SCSI ID 3, specify the following device path for that drive:

`/dev/rmt/tps0d3nrv.8500c`

Example 3

If the desired DLT2000 or DLT4000 tape drive is on SCSI bus 0 at SCSI ID 5, specify the following device path for the drive:

`/dev/rmt/tps0d5nrvc`

Example 4

If the desired DLT7000 tape drive is on SCSI bus 0 at SCSI ID 5, specify the following device path for the drive:

```
/dev/rmt/tps0d5nrv.7000c
```

Example 5

If the desired Exabyte 8900 (Mammoth) is on SCSI bus 1 at SCSI ID 5, specify the following device file path for the drive:

```
/dev/rmt/tps1d5nrvc
```

Since this drive writes in only one format, you can ignore the other device files that are created for this drive.

Configuring Nonstandard Tape Drives

For the IRIX system to recognize nonstandard drives, specific entries are needed in the kernel. See "Changing the /var/sysgen/master.d/scsi File" on page 90 for instructions on adding the following entries.

Adding DAT drives (except the HP C1560B DAT Autoloader)

```
/* HP DAT drives. Any product number that starts with HP354.*/
{ DATTAPE, TPDAT, 2, 5, "HP", "HP354", 0, 0, {0, 0, 0, 0},
MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_SETMK|MTCAN_PART|MTCAN_PREV|
MTCAN_SYNC|MTCAN_SPEOD|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|
MTCAN_SILI|MTCAN_SEEK|MTCAN_CHTYPEANY,
/* minimum delay on i/o is 4 minutes, because when a retry is
* performed, the drive retries a number of times, and then
* rewinds to BOT, repositions, and tries again. */
40, 4*60, 4*60, 5*60, 512, 128*512, 0, (u_char*)0, 3 * 3600,
(0), 0, 0, 0,
},
```

Adding the HP C1560B DAT Autoloader

```
/* HP DAT drives. Any product number that starts with HP1533. */
{ DATTAPE, TPDAT, 2, 5, "HP", "C1533", 0, 0, {0, 0, 0, 0},
MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_SETMK|MTCAN_PART|MTCAN_PREV|
MTCAN_SYNC|MTCAN_SPEOD|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|
MTCAN_SILI|MTCAN_SEEK|MTCAN_CHTYPEANY,
/* minimum delay on i/o is 4 minutes, because when a retry is
```

```
* performed, the drive retries a number of times, and then
* rewinds to BOT, repositions, and tries again. */
40, 4*60, 4*60, 5*60, 512, 128*512, 0, (u_char*)0, 3 * 3600,
(0), 0, 0, 0,
},
```

Adding Sony DTF Drives

```
/* SONY GY-2120 drive */
{ SONYGY, TPGY2120, 4, 7, "SONY", "GY-2120", 0, 0, {0, 0, 0, 0},
MTCAN_BSF | MTCAN_BSR | MTCANT_RET | MTCAN_CHKRDY | MTCAN_PREV |
MTCAN_SEEK | MTCAN_APPEND | MTCAN_SILI | MTCAN_VAR | MTCAN_SETSZ |
MTCAN_CHTYPEANY | MTCAN_COMPRESS,
20, 100*60, 10*60, 9*60, 9*60, 16384, 256*1024,
tpsc_default_dens_count, tpsc_default_hwg_dens_names,
tpsc_default_alias_dens_names,
{0}, 0, 0, 0,
0, (u_char *)0
},

/* SONY GY-8240 drive */
{ SONYGY, TPGY2120, 4, 7, "SONY", "GY-8240", 0, 0, {0, 0, 0, 0},
MTCAN_BSF|MTCAN_BSR|MTCANT_RET|MTCAN_CHKRDY|MTCAN_PREV|
MTCAN_SEEK|MTCAN_APPEND|MTCAN_SILI|MTCAN_VAR|MTCAN_SETSZ|
MTCAN_CHTYPEANY|MTCAN_COMPRESS,
20, 100*60, 10*60, 9*60, 9*60, 16384, 256*1024,
tpsc_default_dens_count, tpsc_default_hwg_dens_names,
tpsc_default_alias_dens_names,
{0}, 0, 0, 0, 0, (u_char *)0
},
```

Adding Sony AIT-2 Dives

```
/* SONY AIT-2 drive */
{ SONYAIT, TP8MM_AIT, 4, 8, "SONY", "SDX-500C" /*AIT2*/, 0, 0, {0},
MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_SETMK|MTCAN_PART|
MTCAN_PREV|MTCAN_SYNC|MTCAN_SPEOD|MTCAN_CHKRDY|MTCAN_VAR|
MTCAN_SETSZ|MTCANT_IMM|MTCAN_SILI|MTCAN_SEEK|MTCAN_CHTYPEANY
                                                        |MTCAN_COMPRESS,
40, 4*60, 4*60, 5*60, 3*3600, 512, 512*512,
tpsc_default_dens_count, tpsc_default_hwg_dens_names,
tpsc_default_alias_dens_names,
{0}, 0, 0, 0,  0, (u_char *)0
},
```

Adding Quantum DLT 7000 Drives

```
/* DEC DLT7000 drive */
{ DECDLT, TPDLT, 7, 7, "QUANTUM", "DLT7000", 0, 0,
{0, 0, 0, 0}, MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_LEOD|
MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|MTCAN_SILI|MTCAN_SEEK|
MTCAN_SYNC|MTCAN_CHTYPEANY|MTCAN_COMPRESS,
20, 8*60, 20*60, 5*60, 4096, 64*1024, 0, (u_char*)0 },
```

Adding Quantum DLT8000 Drives or Stackers

This section is used to define arrays for density counts and density names must contain the following entry:

```
#define tpsc_dlt8000_dens_count 2
char *tpsc_dlt8000_hwg_dens_names[] = { "8000", "8000_compress" };
char *tpsc_dlt8000_alias_dens_names[] = { ".8000", ".8000c" };
```

The `struct tpsc_types tpsc_types[]` array must contain the following entry:

```
/* DEC THZxx DLT drive */
{ DECDLT, TPDLT, 0, 7, "QUANTUM", "DLT8000", 0, 0,
{0 /*8000*/, 0 /*8000c*/ },
MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_SPEOD|
MTCAN_CHKRDY|MTCAN_VAR| MTCAN_SETSZ|MTCAN_SILI|MTCAN_SEEK|
MTCAN_SYNC|MTCAN_CHTYPEANY|MTCAN_COMPRESS|MTCAN_SETDEN,
20, 8*60, 20*60, 5*60, 3*3600, 4096, 64*1024,
tpsc_dlt8000_dens_count, tpsc_dlt8000_hwg_dens_names,
tpsc_dlt8000_alias_dens_names,
{0}, 0, 0, 0,
0, (u_char *)0 },
```

Adding Quantum SDLT220 Drives

```
/* This is the config without compression */
{ DECDLT, TPDLT, 7, 9, "QUANTUM", "SuperDLT1", 0 , 0,
{0, 0, 0, 0 }, MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_SPEOD
|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|MTCAN_SILI|MTCAN_SEEK
|MTCAN_SYNC|MTCAN_CHTYPEANY,
20, 8*60, 20*60, 5*60, 3*3600, 16384, 64*1024,
tpsc_default_dens_count, tpsc_default_hwg_dens_names,
tpsc_default_alias_dens_names,
{0}, 0, 0, 0, 0, (u_char *)0 },
```

Adding Exabyte Mammoth2 Compression Drives

```
/* EXABYTE Mammoth2 */
{ EXABYTE8900, TP8MM_8900, 7, 8, "EXABYTE", "Mammoth2", 0,0,
{0, 0, 0, 0},
MTCAN_BSF|MTCAN_BSR|MTCAN_PREV|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|
MTCAN_SILI|MTCAN_CHTYPEANY|MTCAN_SPEOD|MTCAN_SYNC|
MTCAN_SEEK|MTCAN_COMPRESS,
80, 4*60, 25*60, 5*60, 5*60, 1024, 128*1024,
tpsc_default_dens_count, tpsc_default_hwg_dens_names,
tpsc_default_alias_dens_names,
{0}, 0, 0, 0,
0, (u_char *)0 },
```

Adding IBM 3590E Drives

```
/* IBM NTP drive */
{ IBMNTP, TPNTP, 3, 8, "IBM", "03590E1A", 0, 0, {0, 0, 0, 0},
MTCAN_BSF|MTCAN_BSR|MTCAN_SPEOD|MTCANT_RET|MTCAN_CHKRDY|
MTCAN_PREV|MTCAN_SEEK|MTCAN_APPEND|MTCAN_SILI|MTCAN_VAR|
MTCAN_SETSZ|MTCAN_CHTYPEANY|MTCAN_COMPRESS|MTCANT_LOAD|
MTCAN_LDREW ,
20, 14*60, 67*60, 14*60, 67*60, 16384, 512*1024,
tpsc_default_dens_count, tpsc_default_hwg_dens_names,
tpsc_default_alias_dens_names,
"\300\0\0\0\30\0", 6, 0, 0,
0, (u_char *)0 },

/* IBM NTPSTACKER drive */
{ IBMNTP, TPNTPSTACKER, 3, 8, "IBM", "03590E11", 0, 0, {0, 0, 0, 0},
MTCAN_BSF|MTCAN_BSR|MTCAN_SPEOD|MTCANT_RET|MTCAN_CHKRDY|
MTCAN_PREV|MTCAN_SEEK|MTCAN_APPEND|MTCAN_SILI|MTCAN_VAR|
MTCAN_SETSZ|MTCAN_CHTYPEANY|MTCAN_COMPRESS|MTCANT_LOAD|
MTCAN_LDREW ,
20, 14*60, 67*60, 14*60, 67*60, 16384, 512*1024,
tpsc_default_dens_count, tpsc_default_hwg_dens_names,
tpsc_default_alias_dens_names,
"\300\0\0\0\30\0", 6, 0, 0,
0, (u_char *)0 },
```

Adding STK 9840 or T9940A FC Drives

```
/* STK 9940 drive */
{ STK9840, TPSTK9840, 3, 4, "STK", "T9940A", 0, 0, {0, 0, 0, 0},
```

```
MTCAN_BSF|MTCAN_BSR|MTCANT_RET|MTCAN_CHKRDY|MTCAN_PREV|
MTCAN_SPEOD|MTCAN_SEEK| MTCAN_APPEND|MTCAN_SILI|MTCAN_VAR|
MTCAN_SETSZ|MTCAN_CHTYPEANY|MTCAN_COMPRESS,
20, 8*60, 10*60, 3*60, 3*60, 16384, 256*1024,
tpsc_default_dens_count, tpsc_default_hwg_dens_names,
tpsc_default_alias_dens_names,
{0}, 0, 0, 0,
0, (u_char *)0 },
```

Changing the /var/sysgen/master.d/scsi File

The IRIX tape driver (`tpsc`) provides support for all devices currently supported by VERITAS and coexists with the tape support (`ts`) system. You can choose which driver interface (`ts` or `tpsc`) to use for a particular device type.

The tape support system consists of a tape support driver, personality daemons, and a daemon to manage the personality daemons from SGI or the tape device vendor. For information on how to configure the tape support system, see the `ts` and `ts.config` man pages.

Adding Drive Support

To add support for a new standalone or robotic drive for either driver interface, the appropriate array must contain entries for the drives, as follows:

- For the `ts` driver interface, put entries in `struct ts_types ts_types[]`.
- For the `tpsc` driver interface, put entries in `struct tpsc_types tpsc_types[]`.

These entries are required for the system to recognize the drives. You can find this array in `/var/sysgen/master.d/scsi`.

1. No further changes are necessary if the following are both true:
   - The appropriate entries for the drive are present in this file.
   - You have previously rebuilt the kernel and modified `MAKEDEV` as explained in "Reconfiguring the Kernel and Modifying the MAKEDEV Script".
2. If the entries are *not* in the file, add them as follows:
   a. Save a copy of `/var/sysgen/master.d/scsi`.
   b. Add the entries. An easy way to make this addition is to copy the entries from the `MediaMgr_DeviceConfig_Guide.txt` file. See "Considerations When Using This Guide" on page 1.

c. Reconfigure the kernel as explained in "Reconfiguring the Kernel and Modifying the MAKEDEV Script".

Reconfiguring the Kernel and Modifying the MAKEDEV Script

If you made any changes to the `/var/sysgen/master.d/scsi` file, then you must update the kernel and modify the `MAKEDEV` script as follows:

1. Run the following kernel auto-configuration script:

   `/etc/autoconfig`

2. If you are using the tape support (`ts`) system, run `chkconfig -f ts on.`

3. Reboot the system to utilize the newly-built kernel.

SSO Configurations With More Than 16 Tape Drives

This is a NetBackup Enterprise Server topic.

When the number of tape devices that are configured approaches 16, changes in tape device status may not be visible to all media servers in a Shared Storage Option (SSO) configuration. This is because the default maximum size of IPC message queues may not be large enough.

In these cases, communication between the `rdevmi` process on the scan hosts and the `oprd` processes on the media servers can be interrupted when the number of messages sent exceeds the maximum size of the queue.

VERITAS recommends adding the following statements to the `var/sysgen/stune` file. These statements increase the maximum number of messages that can be created, and the number of bytes per queue. A reboot is necessary for the changes to take effect.

```
# Increase the maximum number of messages that can be created
msgtql = 512

# Increase message queue maximum number of bytes
msgmnb = 65536
```

Be aware that increasing the maximum size of the IPC message queue may increase the amount of memory allocated to other IPC message queues on the system. The impact of these changes should be fully assessed before they are implemented.

Configuring Optical Disk Drives

When adding optical disk drives to a Media Manager configuration, you must specify the following device paths:

- Character device path (disk partition `s7`)
- Volume header disk device path (disk partition `vh`)

In a typical SGI IRIX configuration, most of the desired optical disk device files already exist and you just have to locate them in the `/dev` directory.

Character disk device files have the following format:

`/dev/rdsk/dks`*`CONTROLLER`*`d`*`TARGET`*`s7`

Volume disk device files have the following format:

`/dev/rdsk/dks`*`CONTROLLER`*`d`*`TARGET`*`vh`

Where:

- *CONTROLLER* is the SCSI bus (adapter) number.
- *TARGET* is the SCSI ID.
- `s7` is the desired character device partition.
- `vh` is the desired volume header partition.

Examples of Optical Disk Device Files

If the desired optical disk drive is on SCSI bus 1 at SCSI ID 3, you specify the following paths:

```
/dev/rdsk/dks1d3vh  (volume header)
/dev/rdsk/dks1d3s7  (character device)
```

Command Summary

The following is a summary of commands that may be useful when configuring and verifying devices. See the procedures in this chapter for examples of their usage.

`MAKEDEV` *`Type`*

If the device files you need do not exist, you can execute this command from the `/dev` directory to create them.

Type indicates the type of device file, as follows:

- `tps` creates all the tape device file combinations for `tps` (the SCSI tape driver for Integral SCSI controllers)
- `scsi` creates all the device files for the generic SCSI driver.
- `dks` creates all the device files for `dks` (the SCSI disk driver for integral SCSI controllers).

`/etc/autoconfig`

Runs the kernel auto-configuration script.

`/sbin/hinv -v`

Shows the system configuration, including devices configured on SCSI controllers. This command can also be used to verify that a tape drive is recognized by the system.

`/sbin/uname -aR`

Shows what operating system is currently running.

`mt status`

Prints status information for the tape unit.

`chkconfig -f ts on`

Enables the (ts) tape support system.

Intel Hosts Running Enterprise Linux 7

This chapter explains how to configure devices for use with Media Manager on an Intel host platform running Linux. After configuring the hardware, use one of the available Media Manager configuration interfaces to add the drives and robots to your Media Manager configuration.

The configuration topics in this chapter apply to the following versions of Linux. These are the versions that are supported as NetBackup servers:

- Red Hat Enterprise Linux AS 2.1/ES 2.1
- Red Hat Enterprise Linux AS 3.0/ES 3.0
- SuSe SLES 8.0

The main topics included in this chapter are as follows:

- "Before You Start" on page 96
- "Configuring Robotic Controls" on page 97
- "Configuring Tape Drives" on page 98
- "Verifying The Device Configuration" on page 100
- "SSO Configurations With More Than 32 Tape Drives" on page 100
- "Other Considerations (Advanced Topics)" on page 101
- "Utilities to Test SCSI Devices" on page 103
- "Command Summary" on page 103

Before You Start

Observe the following important points when performing the tasks described in this chapter:

- For NetBackup to recognize and communicate with connected devices and for device discovery to discover devices, NetBackup issues SCSI pass-thru commands to the devices in a configuration.

  Device files must exist that follow the naming conventions explained in "Configuring Robotic Controls" on page 97 and "Configuring Tape Drives" on page 98. A built-in pass-thru driver (SG) is available.

- Verify that the st (tape) device driver is installed or loaded in the kernel. This driver allows the use of SCSI tape drives.

- Verify that the sg device driver is installed or loaded in the kernel. This driver allows passthru commands to SCSI tape drives and control of robotic devices.

  Use the `/sbin/lsmod` command to display and verify that these modules are loaded in the kernel. Example output is as follows:

  ```
  Module          Size          Used by
  sg            14844             0
  st            24556             0
  ```

  The standard Enterprise Linux releases have these modules available for loading. When running Enterprise Linux, these modules are dynamically loaded as needed. It is also possible to load these modules if they are not in the kernel. Use the following commands:

  ```
  /sbin/insmod st
  /sbin/insmod sg
  ```

- During NetBackup installation (and also at boot time), the binary `/usr/openv/volmgr/bin/make_scsi_dev` will execute and does the following:

  - Creates the directories `/dev/sg` and `/dev/st`.
  - Obtains the device file output generated by the sg and st drivers.
  - Creates device files for each tape device and library of the format required by Media Manager and places them in these directories.
  - Establishes a default tape driver operating mode. If the operator changes the default mode, NetBackup may be unable to correctly read and write tape media, resulting in data loss.

    In particular, never set `MT_ST_ASYNC_WRITES`, or `MT_ST_SYSV` to the value one. Never set `MTSETBLK` to a non-zero value. Do not interfere with the execution of `make_scsi_dev` at system boot (it is called by the `S77netbackup` startup script).

See "Configuring SCSI Robotic Control Device Paths" on page 98 and "Adding Standard Tape Drives" on page 99.

- Verify that a SCSI low-level driver is installed for each HBA in your system. Refer to your HBA vendor documentation.
  - Follow the HBA Vendor's installation guide to install or load the driver in the kernel.
  - Configure the kernel for SCSI tape support, SCSI generic support.
  - Probe all LUNs on each SCSI device and enable the SCSI low-level driver for the HBA.
  - If using LILO, be sure to add `max_scsi_luns=`*N* to the lilo.conf file. Refer to HBA documentation for specific details.
  - Enable multi-LUN support for the kernel according to Red Hat documentation.

If You Are Using NetBackup Server

Portions of this chapter include configuration topics and examples for configurations and options that are not supported in NetBackup Server. It is important to refer to the VERITAS support web site to determine support for NetBackup Server, before using this chapter.

Topics Not Applicable to NetBackup Server

"SSO Configurations With More Than 32 Tape Drives" on page 100.

Configuring Robotic Controls

To use robotics, the following drivers must be configured in the kernel or loaded as modules:

- Standard SCSI driver.
- SCSI-adaptor driver.
- Linux SCSI generic (sg) driver.

Information on supported SCSI robots (vendor models) can be found on the VERITAS support web site.

Configuring SCSI Robotic Control Device Paths

The binary `/usr/openv/volmgr/bin/make_scsi_dev` creates device files in the `/dev/sg` directory. The names of these files in this directory have the following format:

`h`*HOST*`c`*CHANNEL*`t`*TARGET*`l`*LUN*

Where:

- *HOST* is the host bus adaptor.
- *CHANNEL* is channel.
- *TARGET* is the target ID.
- *LUN* is the logical unit number.

Use the files in the `/dev/sg` directory for the robotic path when using Media Manager interfaces to configure robots.

There must be a `/dev/sg`*N* entry (where *N* is a decimal number from 0 to 255) for each device. These entries are needed by `make_scsi_dev`, which is run during the NetBackup installation.

If you have devices that are not being discovered by Media Manager device discovery, it may be because the Linux default number of these entries is not sufficient. You may need to create additional entries.

Create device entries as follows, where *N* is a decimal number from 0 to 255. After creating all entries necessary, rerun `make_scsi_dev`.

```
mknod /dev/sgN c 21 N
```

Examples of SCSI Robotic Control Device Files

```
h10c0t1l0
h10c0t2l0
h10c0t3l0
h25c0t0l0
h25c0t1l0
```

Configuring Tape Drives

To use SCSI tape drives, the following drivers must be configured in the kernel or loaded as modules:

- Standard SCSI driver
- SCSI-adaptor driver

- SCSI tape (st) driver
- Linux SCSI generic (sg) driver

Using the Passthru Driver for Tape Drives

NetBackup can function without a passthru path to tape devices, *but* the following capabilities are not available:

- Locate-block (fast-tape) positioning
- Data protection provided by SCSI reserve/release
- Automatic configuration for tape devices
- Performance optimization for Quantum SDLT drives

Enabling Passthru Paths

Several sg device files are provided by default in the typical Linux installation. If you have more devices than the default number provided, you must create the required device files.

There must be a `/dev/sg`*N* entry for each device. These entries are needed by `make_scsi_dev`, which is run during the NetBackup installation.

If you have devices that are not being discovered by Media Manager device discovery, it may be because the Linux default number of these entries is not sufficient. You may need to create additional entries.

▼ To create device entries

1. Run `mknod /dev/sg`*N* c 21 *N*. *N* is a decimal number from 0 to 255.
2. Run `make_scsi_dev`.

Adding Standard Tape Drives

`make_scsi_dev` creates device files in the `/dev/st` directory. The names of the no rewind device files in this directory have the following format:

`nh`*HOST*`c`*CHANNEL*`t`*TARGET*`l`*LUN*

Where:

- `n` is the no rewind on close device file.
- *HOST* is the host bus adaptor.

- *CHANNEL* is channel.
- *TARGET* is the target ID.
- *LUN* is the logical unit number.

When adding tape drives to a Media Manager configuration, you need to specify a no rewind on close device path. Use the files in the `/dev/st` directory when configuring tape drives.

Examples of SCSI Tape Device Files

```
nh10c0t2l0
nh10c0t3l0
```

Verifying The Device Configuration

The file `/proc/scsi/scsi` shows all devices recognized by the SCSI driver. To verify that the operating system can see the devices, run the following command from a terminal window to view this file:

```
cat /proc/scsi/scsi
```

The output displayed should be similar to the following example:

```
Attached devices:
Host: scsi0 Channel: 00 Id: 01 Lun: 00
Vendor: HP       Model: C7200-8000       Rev: 1040
Type:   Medium Changer                   ANSI SCSI revision: 03
Host: scsi0 Channel: 00 Id: 02 Lun: 00
Vendor: QUANTUM  Model: DLT8000          Rev: 010F
Type:   Sequential-Access                ANSI SCSI revision: 02
Host: scsi0 Channel: 00 Id: 03 Lun: 00
Vendor: QUANTUM  Model: DLT8000          Rev: 010F
Type:   Sequential-Access                ANSI SCSI revision: 02
```

If the operating system can see your SCSI devices, Media Manager device discovery will also see the devices.

SSO Configurations With More Than 32 Tape Drives

This is a NetBackup Enterprise Server topic.

When the number of tape devices that are configured approaches 32, changes in tape device status may not be visible to all media servers in a Shared Storage Option (SSO) configuration. This is because the default maximum size of IPC message queues may not be large enough.

Linux has no intrinsic limit for the maximum number of messages that can be created (MSGTQL). However, the maximum number of bytes for the message queue (MSGMNB) can be tuned.

VERITAS recommends adding the following statements to the `/etc/sysctl.conf` file. A reboot is necessary for the changes to take effect.

```
# Increase message queue max number of bytes
kernel.msgmnb = 65536
```

Be aware that increasing the maximum size of the IPC message queue may increase the amount of memory allocated to other IPC message queues on the system. The impact of these changes should be fully assessed before they are implemented.

Other Considerations (Advanced Topics)

You may require the following advanced topics.

Support for Additional Tape Devices

The st tape driver supports up to 32 tape devices in its default configuration. This configuration provides eight minor device numbers. The driver can be re-configured to support up to 64 tape devices (with four minor device numbers) or up to 128 tape devices (with two minor device numbers).

Since NetBackup uses only one minor number, you can modify the driver and support up to 128 tape devices. The `st.h` source file, found in the Linux source directory `/drivers/scsi`, must be modified to change the number of devices that will be supported as shown in the following table:

Number of Tape Devices Supported	Original Value	New Value
64	#define ST_NBR_MODE_BITS 2	#define ST_NBR_MODE_BITS 1
128	#define ST_NBR_MODE_BITS 2	#define ST_NBR_MODE_BITS 0

Improving Performance

The st tape driver has internal buffers that have a default size of 32K. Performance may be enhanced if they are set to match the default block size used by bptm. The default block size for bptm is 64K. Edit the `st_options.h` file as shown in the following table:

Original Value	New Value
#define ST_BUFFER_BLOCKS 32	#define ST_BUFFER_BLOCKS 64

You also may need to change the following entry to have a smaller value depending on the available system memory:

```
#define ST_MAX_BUFFERS 4
```

Follow the Red Hat guidelines for incorporating these source changes into your system.

Using the Debug Mode

The st tape driver can be put into a debug mode. This mode will echo each command and its result to the syslog. See Red Hat documentation for details.

Using an Emulex HBA

If NetBackup is unable to mount tapes when using an Emulex HBA in a fibre channel configuration, it may be necessary to modify the `lpfc.conf.c` file.

Set `lpfc_check_cond_err` to a value of zero. NetBackup is unable to mount tapes if this variable is left at a value of one.

The use of the touch file `/usr/openv/volmgr/AVRD_DEBUG` on a system with the Emulex HBA driver may cause the system log (syslog) to contain many entries that look like the following. You can ignore these messages.

```
Unknown drive error on DRIVENAME (device N, PATH) sense[0] = 0x70,
sense[1] = 0x0, sensekey = 0x5
```

Using Persistent Binding

Persistent bindings should be used to lock the mappings between SCSI Targets reported to Linux and specific devices. WWPN binding is often used. If binding is not possible with the HBA in your configuration, then add an `ENABLE_AUTO_PATH_CORRECTION` entry in the `/usr/openv/volmgr/vm.conf` file on all Linux media servers.

Utilities to Test SCSI Devices

You can manipulate tape devices with the system `mt` command. The man page for `MT(1)` explains how to do this.

Robots can be tested using the `robtest` utility in `/usr/openv/volmgr/bin`.

There is also a set of SCSI utilities available from the Linux SCSI Generic (sg) driver home page.

Command Summary

The following is a summary of commands that may be useful when configuring devices. See the appropriate sections of this chapter for examples of their usage.

`sbin/lsmod`

List loaded modules.

`sbin/insmod`

Install loadable kernel modules.

`/usr/sbin/reboot`

Stop and restart the system.

`/bin/mknod /dev/sg`*N* `c 21` *N*

Create SCSI generic device files. Where *N* is a decimal number from 0 to 255.

`/usr/openv/volmgr/bin/make_scsi_dev`

Create NetBackup device files.

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This chapter explains how to configure storage devices and install tape device drivers for use with Media Manager on an Intel platform running Microsoft Windows.

After configuring the hardware, use one of the available Media Manager configuration interfaces to add the drives and robots to your Media Manager configuration

The main topics included in this chapter are the following:

- "Before You Start" on page 106
- "Installing 32 Bit Tape Device Drivers" on page 106
- "Installing 64 Bit Tape Device Drivers" on page 108

Before You Start

Observe the following points when performing the configurations described in this chapter:

- For NetBackup to recognize and communicate with connected devices and for device discovery to discover devices, NetBackup issues SCSI pass-thru commands to the devices in a configuration.

  A tape driver must exist for each tape device. Attached devices appear in the registry. In Windows 2000 (and later supported operating system levels), devices may be controlled by the Microsoft Removable Storage Manager (RSM), which has a public API or they may be natively-attached (SCSI-controlled).

- Use the Microsoft Windows device applications to verify that the devices are configured correctly. The device applications available on your server may differ depending on your Windows operating system. Make sure you can “see” your devices on the SAN before you install and configure the SSO option.

- NetBackup may be able to discover RSM-controlled devices, but will not automatically configure RSM robots.

- If you have multiple devices connected to a fibre bridge, Windows may only see one LUN. This will normally be the device with the lowest-ordered LUN.

  This limitation occurs because of the default install settings for the device driver for some fibre channel HBAs. See your vendor documentation to verify the settings.

Installing 32 Bit Tape Device Drivers

When installing NetBackup for the first time, VERITAS recommends that you install the device drivers for your storage device *after* you install NetBackup software and *before* you configure NetBackup.

If you are upgrading NetBackup, you can install the latest tape device drivers before you upgrade NetBackup.

Use the device driver install wizard to install the latest device drivers.

▼ To obtain device driver installation software

If you do not have a CD-ROM, you can download the NetBackup Tape Device Driver installation software from the VERITAS support web site.

`http://www.support.veritas.com`

▼ To use the Device Driver Installer wizard

This wizard (located on the NetBackup CD) guides you through the installation of the latest device drivers.

1. Log in as Administrator on the server where you installed NetBackup.

2. Insert the NetBackup CD-ROM in the drive.

   On Windows systems with AutoPlay enabled for CD-ROM drives, the NetBackup installation browser starts automatically.

   On Windows systems that have AutoPlay for CD-ROM drives disabled, run `Launch.exe` from the top-level directory on the CD-ROM.

3. In the VERITAS CD Browser, click **Additional Products** > **Additional Product Installations** > **NetBackup Tape Device Drivers**.

   The Device Driver Installer wizard starts.

4. Follow the prompts in the wizard to install device drivers for your storage device.

   On the **Choosing tape drivers** screen of the wizard, select **Use VERITAS tape drivers for all tape devices**.

   Make sure you do not select **Use Plug and Play drivers** for SAN-attached devices.

   Use the **More Information** button for explanations of the available choices.

5. On the **Installing VERITAS drivers** screen of the wizard, a warning message may be displayed when the device drivers are installed indicating that the driver has not been Windows Logo tested to verify its compatibility with Windows.

   This is a standard Microsoft Windows warning. System and driver performance will not be affected, and you can safely ignore the messages. VERITAS device drivers go through a similar testing process and they are digitally signed drivers.

6. At the completion of the wizard, be sure to reboot your system.

   The drivers are installed in the following Windows directory. Different sets of drivers are installed for Windows 2000 and for Windows NT systems

   `C:\WINNT\system32\drivers`

▼ To determine the version of a device driver

The drivers are installed in the following Windows directory:

`C:\WINNT\system32\drivers`

The device driver files do not have a version number. To determine the version of a device driver file, use the Modified date found in the file Properties dialog (right click on the driver file name).

▼ **To obtain the latest tape device drivers**

Visit the VERITAS support web site.

`http://www.support.veritas.com`

Installing 64 Bit Tape Device Drivers

VERITAS does not provide 64 bit device drivers. Contact Microsoft or the tape drive vendor to obtain these drivers.

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