

Veritas NetBackup Device Configuration Guide

UNIX, Windows, Linux

Release 6.5

Veritas NetBackup Device Configuration Guide

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NetBackup 6.5

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Introduction

Use this guide to help set up and configure storage devices on their host systems before you add them to NetBackup. This guide is organized as follows:

- Information about operating systems. For information about how to configure the operating system of the server to work with NetBackup, see [“Operating systems”](#) on page 15.
- Information about robotic storage devices. For more information about specific robotic libraries, see [“Robotic storage devices”](#) on page 107.

First set up and configure the storage devices on the host system. Then, add them to NetBackup and configure them so they are available for backups. For instructions, see the *NetBackup Administrator’s Guide, Volume I* or the NetBackup Administration Console help.

Using this guide

- 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:
NetBackup Enterprise Server only.
- Read the “Before you start” sections (if applicable) of the chapters in this guide. These sections provide any important platform-specific instructions or may contain specific instructions or limitations for server types.
- To determine if your hardware configuration is supported, see:
 - The NetBackup support Web site (see [“Use the support Web site”](#) on page 13)
 - The NetBackup release notes (see [“Read the NetBackup Release Notes”](#) on page 13)
- The information in this guide supplements the manuals that the hardware and operating system vendors provide.

- Symantec tested the configuration file options in this guide; other configuration settings may also work.
- To minimize configuration errors, you can cut and paste configuration details from a text file of the operating system chapters of this configuration guide. The format of this text file is similar to the printed version of the guide. Be sure to review the differences as explained at the beginning of the text file.

The `NetBackup_DeviceConfig_Guide.txt` file is installed with NetBackup server software in the following paths:

- `/usr/opensv/volmgr` (UNIX)
- `install_path\VERITAS\Volmgr` (Windows)

General device configuration sequence

Use the following general sequence when you configure devices.

- 1 Physically connect the storage devices to the media server. Perform any hardware configuration steps that the device vendor or the operating system vendor specifies.
- 2 Create any required system device files for the drives and robotic control. Device files are created automatically on Windows and on some UNIX platforms. Explicit configuration of device files is required on some UNIX servers to make full use of NetBackup features.
For SCSI controlled libraries, NetBackup issues SCSI commands to the robotic devices. SCSI commands allow NetBackup to discover and configure devices automatically. You may have to configure the server operating system to allow device discovery.
For information about how to configure the operating system of the server, see “[Operating systems](#)” on page 15. For more information about specific robotic libraries, see “[Robotic storage devices](#)” on page 107.
- 3 Add the storage devices to NetBackup and configure them.
For instructions, see the *NetBackup Administrator’s Guide, Volume I* or the NetBackup Administration Console help.
You can configure devices in NetBackup from the master server or the media server to which the devices are attached (the *device host*). For more information, see “To administer devices on other servers” in the *NetBackup Administrator’s Guide, Volume I* or the NetBackup Administration Console help.

Configuration cautions

Observe the following cautions:

- In multiple-initiator (multiple host bus adapter) environments, NetBackup uses SCSI reservation to avoid tape drive usage conflicts and possible data loss problems. SCSI reservation operates at the SCSI target level; the fibre-to-SCSI bridge hardware must work correctly.
By default, NetBackup uses SPC-2 SCSI reserve and release. Alternatively, you can use SCSI persistent reserve or disable SCSI reservation entirely. For information about the NetBackup use of SCSI reservation, see the following:
 - “Enable SCSI reserve” in the *NetBackup Administrator’s Guide, Volume I*.
 - “How NetBackup reserves drives” in the *NetBackup Administrator’s Guide, Volume II*.
- Symantec does not recommend or support the use of single-ended to differential SCSI converters on NetBackup controlled devices. You may encounter problems if you use these converters.

Use the support Web site

The Symantec Enterprise Support Web site contains device and library compatibility information for NetBackup. It also contains supported platform information for the following:

- NetBackup Enterprise Server and NetBackup Server.
- NetBackup licensed optional software (for example, the Shared Storage Option for Tape).
- Server platform.
- Robot and drive types.

For the compatibility information, see the Compatibility List for NetBackup Server or NetBackup Enterprise Server. The following is the address for the site:
<http://entsupport.symantec.com>

Read the *NetBackup Release Notes*

To determine the server platforms that NetBackup supports, see the *NetBackup Release Notes*.

Operating systems

- [“AIX”](#) on page 17
- [“HP-UX”](#) on page 45
- [“Linux”](#) on page 63
- [“Solaris”](#) on page 73
- [“Tru64”](#) on page 93
- [“Windows”](#) on page 103

AIX

This chapter explains how to configure drivers and device files to use storage devices with NetBackup on IBM AIX systems.

After you configure the hardware, add the robots and the drives to NetBackup.

The major topics are as follows:

- [“Before you start”](#) on page 18
- [“RS/6000 AIX adapter number conventions”](#) on page 18
- [“The SCSI pass-through driver oypass”](#) on page 19
- [“Configuring robotic control device files”](#) on page 21
- [“Configuring tape drive device files”](#) on page 32
- [“Configuring optical disk drive device files”](#) on page 38
- [“Command summary”](#) on page 42

Before you start

Observe the following points when you configure the operating system:

- Verify that NetBackup supports your server platform and devices. The Symantec support Web site contains server platform compatibility information. For the compatibility information, see the Compatibility List for NetBackup Server or NetBackup Enterprise Server. The following is the URL:
`http://entsupport.symantec.com`
- Attach all peripherals and reboot the system before you configure devices. For many configuration steps, you can use the `smit` System Management Interface Tool. For more information, see the `smit(1)` man page.
- For SCSI controlled libraries, NetBackup issues SCSI commands to the robotic devices. To discover and communicate with SCSI connected devices, NetBackup uses the Symantec `ovpass` pass-through driver. It is included with NetBackup.
You must configure the `ovpass` driver and create the device files. For details, see:
 - “[Configuring robotic control device files](#)” on page 21
 - “[Configuring tape drive device files](#)” on page 32
 - “[Configuring optical disk drive device files](#)” on page 38
- To verify that the devices are configured correctly, use `smit` and `/usr/sbin/lscdev`. For the shared storage options, ensure that the operating system detects the devices on the SAN before you install and configure the option.
- To obtain error and debug information about devices and robotic software daemons, the `syslogd` daemon must be active. See `syslogd(1)` for more information.

RS/6000 AIX adapter number conventions

The location code for an adapter consists of two pairs of digits with the format *AA-BB*:

- *AA* identifies the location code of the drawer that contains the adapter card, as follows:
 - If *AA* is 00, the adapter card is located in the CPU drawer or system unit, depending on the type of system.
 - If *AA* is not 00, the card is located in an I/O expansion drawer, as follows:

- The first digit identifies the I/O bus; 0 corresponds to the standard I/O bus and 1 corresponds to the optional I/O bus.
- The second digit identifies the slot on the I/O bus.
- *BB* identifies the I/O bus and the slot that contains the card:
 - The first digit of *BB* identifies the I/O bus that contains the adapter card, as follows:
 - If the card is in the CPU drawer or system unit, 0 represents the standard I/O bus and 1 represents 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 I/O bus (or slot number in the I/O expansion drawer) that contains the card.

A location code of 00-00 identifies the Standard I/O Planar.

Examples

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

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

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

The SCSI pass-through driver `ovpass`

For SCSI-controlled robotic peripherals, Symantec provides the `ovpass` pass-through driver. NetBackup uses the `ovpass` driver for SCSI and FCP robot control. (NetBackup also uses the `ovpass` driver for HP 1.2 gigabyte or equivalent model magneto-optical disk drives.)

For full feature support, NetBackup requires the `ovpass` pass-through driver and SCSI pass-through device paths. If you do not use the SCSI pass-through driver, performance suffers. NetBackup and its processes use the pass-through driver:

- To scan drives
- For SCSI reservations
- For SCSI `locate-block` operations
- For SAN error recovery
- For Quantum SDLT performance optimization

- To set the optical drive type (as explained in “[Setting the HP optical drive type in NVRAM](#)” on page 40)
- To collect robot and drive information
- To collect TapeAlert information from tape drives
- For WORM tape support
- For future features and enhancements

The `ovpass` driver is not required if the only device you use is the IBM 3590 B11 tape stacker.

Note: You cannot use the System Manager Interface Tool (SMIT) to configure `ovpass` device files.

To install the `ovpass` driver

- ◆ Enter: `/usr/openv/volmgr/bin/driver/install_ovpass`

To ensure that 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 pass-through driver

Some versions of NetBackup earlier than release 4.5 used a version of the `ovpass` pass-through driver that did not support Fibre Channel protocol SCSI controllers. If an error occurs when you create a Fibre Channel Protocol device file, you may need to upgrade the NetBackup `ovpass` pass-through driver. The following upgrade procedure is required only if you an error occurs when you create a Fibre Channel SCSI device file.

Caution: This procedure removes any device files (`/dev/ovpassn`). If the device files are required, you must recreate them.

To upgrade to the latest pass-through driver

- 1 Remove the old `ovpass` driver:
`/usr/openv/volmgr/bin/driver/remove_ovpass`
- 2 Install the new `ovpass` driver:

```
/usr/opensv/volmgr/bin/driver/install_ovpass
```

Configuring robotic control device files

A robotic device in a library moves the media between storage slots and the drives in the library. NetBackup supports SCSI control and API control of robotic devices. SCSI control includes Fibre Channel Protocol (FCP), which is SCSI over Fibre Channel. You must configure the method of robotic control, as follows:

- To configure SCSI or Fibre Channel Protocol control, see “[Configuring SCSI or FCP robotic controls](#)” on page 21.
- To configure API control over a LAN, see:
 - “[Sun StorageTek ACSLS robots](#)” on page 155
 - “[IBM Automated Tape Library \(ATL\)](#)” on page 137
 - “[ADIC Automated Media Library \(AML\)](#)” on page 123

Configuring SCSI or FCP robotic controls

To configure SCSI or Fibre Channel Protocol control, you must create a device file in AIX for the robotic device. The device file is the interface between AIX and the device. The device file is derived from the NetBackup `ovpass` pass-through driver.

NetBackup uses the device file to configure robotic control. If you use device discovery in NetBackup, NetBackup discovers the robotic control device files (and hence the devices) automatically. If you add a robot manually in NetBackup, you must enter the pathname to the device file.

A library may have more than one robotic device. Each robotic device requires a device file.

To create the device file, you must specify the controller name and the SCSI address of the device. To determine the name and address, see the following:

- “[Determining the controller name](#)” on page 22
- “[Determining the SCSI address](#)” on page 23

To create the device file, see the following:

- “[Creating the device file](#)” on page 26

If the `ovpass` device file already exists, you do not have to configure the robotic controls. To determine if it exists, see “[Determining if the device file exists](#)” on page 22.

For examples of the procedures, see “[SCSI robotic control configuration examples](#)” on page 28.

Before you configure the robotic controls, the NetBackup SCSI pass-through driver `ovpass` must be installed. For more information, see [“The SCSI pass-through driver `ovpass`”](#) on page 19.

Determining if the device file exists

If the `ovpass` device file already exists for the device, robotic control exists. Therefore, you do not have to configure the robotic controls. An `ovpass` device file would exist if one was configured already for NetBackup.

For usage information for the AIX commands, see their man pages.

To determine if the device files exist

- 1 Display the current device files by using the AIX `lsdev` command. For SCSI device files, use the `-s scsi` option and argument. For Fibre Channel Protocol device files, use the `-s fcp` option and argument. The following are examples of the two options:

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

If the device files exist, they appear in the `lsdev` output as `ovpass0`, `ovpass1`, and so on. In the following example, `ovpass0` is an SCSI robotic device file for NetBackup:

```
ovpass0 Available 00-01-5,0 Veritas Media Changer
```

- 2 If an `ovpassx` device file exists, you can determine which robotic device it is for. To do so, correlate the `ovpass` device file location to the locations of the controllers; for a procedure, see:
 - [“Determining the controller name”](#) on page 22
- 3 If an `ovpassx` device file does not exist, use the following procedures to create one:
 - [“Determining the controller name”](#) on page 22
 - [“Determining the SCSI address”](#) on page 23
 - [“Creating the device file”](#) on page 26

Determining the controller name

To create a device file, you must know the controller name. To determine the controller name, use the following procedure. (You also must know the SCSI address. For more information, see [“Determining the SCSI address”](#) on page 23.)

For usage information for the AIX commands, see their man pages.

To determine the controller name

- 1 Display the I/O controllers in the system by using the following AIX command:

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

The output shows the name, the status, the location, and the description. The following example shows both an SCSI controller (`scsi0`) and a Fibre Channel SCSI controller (`fscsi0`):

```
scsi0 Available 00-01 SCSI I/O Controller
fscsi0 Available 10-68-01 FC SCSI I/O Controller Protocol Device
```

If you have more than one SCSI controller, identify the appropriate controller by correlating the tape drive locations to the controllers. To do so, continue with the following steps.

- 2 Display the devices that are connected to the SCSI controllers by using the following `lsdev` command. For SCSI devices, use `scsi` for the *type*; for Fibre Channel Protocol devices, use `fcp` for the *type*.

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

The following are examples of SCSI drive and Fibre Channel SCSI drive output:

```
rmt0 Available 00-01-00-3,0 Other SCSI Tape Drive
rmt1 Available 10-68-01 Other FC SCSI Tape Drive
```

- 3 Correlate the location of the drives with the names of the controllers. For example, the SCSI tape drive at location `00-01-00-3,0` is attached to the controller at `00-01`. So the controller name is `scsi0`.

Determining the SCSI address

To create a device file, you must know the SCSI address, which is an SCSI ID and a logical unit number (LUN). (You also must know the controller name. For more information, see [“Determining the controller name”](#) on page 22.)

A library may have more than one tape drive and more than one robotic control device. Usually, the SCSI ID identifies the library, and the LUNs identify the tape drives and the robotic control devices in the library.

However, a Fibre Channel attached library may have more than one SCSI ID; each ID corresponds to a physical connection (port) on the library. The LUNs then identify the tape drives and the robotic devices in each partition of the library.

AIX commands do not reveal the SCSI addresses of robotic devices that do not have device files. Therefore:

- To determine the SCSI ID, you must first determine the SCSI addresses of the tape drives. Then, use the tape drive addresses to infer the SCSI ID of the robotic device.

For the libraries that have more than one robotic device, you must determine the SCSI ID and LUN for each robotic device.

To determine the SCSI ID, use the procedure later in this subsection.

- To determine the LUN, refer to the vendor documentation. How the library assigns LUNs to its devices depends on the library:
 - The library may use a specific LUN for the robotic control device. For example, LUN 0 may be the robotic device and LUN 1 and higher may be the tape drives.
 - The library may include the management software that assigns LUNs when you configure it. The software also may let you determine the LUNs for the drives and robotic devices.
 - The library may use physical switches (such as DIP switches) that let you specify the LUNs for the drives and robotic devices.

For usage information for the AIX commands, see their man pages.

AIX may device files automatically for some SCSI attached IBM libraries. For those libraries, see “[IBM libraries](#)” on page 25.

To determine the SCSI ID for a robotic device

- 1 Display the SCSI and Fibre Channel devices in the system by using the following `lsdev` command. For SCSI devices, use `scsi` for the *type*; for Fibre Channel Protocol devices, use `fc` for the *type*.

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

The following are examples of an SCSI drive and a Fibre Channel SCSI drive:

```
rmt0 Available 00-01-00-3,0 Other SCSI Tape Drive
rmt1 Available 10-68-01 Other FC SCSI Tape Drive
```

- 2 Inspect the ODM database for the SCSI IDs of the tape drives in the library. Use the `odmget` command as in the following example (`rmtX` is the name of the tape device):

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

The following example output shows that `rmt0` is at SCSI ID `0x1009ef`.

CuAt:

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

For a Fibre Channel Protocol controlled device, the SCSI ID is the ID of the `N_Port` on the robotic device (the destination ID (`D_ID`)).

- 3 Repeat [step 2](#) for each tape drive in the library.

- 4 Determine the SCSI ID to use for each device file, as follows:
 - If all tape drives in the library have the same SCSI ID and one robotic device exists, use that SCSI ID.
 - If all tape drives in the library have the same SCSI ID and more than one robotic device exists, create a device file for each robotic device. Use the same SCSI ID for each device file.
 - If the tape drives have more than one SCSI ID, a robotic device likely exists for each SCSI ID. Create a device file for each SCSI ID.To determine the LUN of each robotic device, consult the vendor documentation.

Alternative methods to determine the SCSI ID

Several alternative methods exist to determine the SCSI ID of a robotic device, as follows:

- Use the `lsattr` command rather than the `odmget` command. For example, the following command shows the attributes of tape device `rmt0`:

```
/usr/sbin/lsattr -l rmt0 -E -H
```
- In a Fibre Channel switch environment, inspect the name server for the switch (if available). Each vendor uses a unique method to show address information. Consult the documentation for the switch vendor.
- In a Fibre Channel bridge environment, inspect the bridge for mapping information (if available). Each vendor uses a unique method to show address information. Consult the documentation for the bridge vendor.

Also see “[IBM libraries](#)” on page 25.

IBM libraries

AIX may create device files automatically for some IBM libraries that use the IBM Atape driver. If so, you can use AIX commands to determine the SCSI address.

To determine the SCSI address for an IBM library

- 1 Display the tape devices as in the following `lsdev` command:

```
lsdev -Cc tape
```

The following shows both the SCSI and Fibre Channel Protocol medium changers and tape drives:

```
smc0 Available 14-08-00-6,0 IBM 3583 Library Medium Changer
rmt0 Available 14-08-00-0,0 IBM 3580 Ultrium Tape Drive
rmt1 Available 14-08-00-1,0 IBM 3580 Ultrium Tape Drive
smc1 Available 20-58-01 IBM 3584 Library Medium Changer (FCP)
rmt2 Available 20-58-01 IBM 3580 Ultrium Tape Drive (FCP)
rmt3 Available 20-58-01 IBM 3580 Ultrium Tape Drive (FCP)
```

For an SCSI robotic control device, the SCSI ID and LUN are displayed. For example, the medium changer `smc0` is at SCSI ID 6, LUN 0.

For a Fibre Channel Protocol controlled device, use the `odmget` command to display the SCSI address of the robotic device, as in the next step.

- 2 Inspect the ODM database for the attributes of the medium changer device file. Use the `odmget` command as in the following example:

```
/usr/bin/odmget -q "name=smc1" CuAt
```

The following example output shows that `smc1` is at SCSI ID `0x111ca` and the LUN is 1. The LUN is derived from the LUN ID by moving it 48 bits to the right. For a Fibre Channel Protocol controlled device, the SCSI ID is the ID of the `N_Port` on the robotic device (the destination ID (`D_ID`)).

```
CuAt:
  name = "smc1"
  attribute = "scsi_id"
  value = "0x111ca"
  type = "R"
  generic = "DU"
  rep = "s"
  nls_index = 25

CuAt:
  name = "smc1"
  attribute = "lun_id"
  value = "0x1000000000000"
  type = "R"
  generic = "DU"
  rep = "s"
  nls_index = 26
```

Before you create the `ovpass` device file, remove the `smcx` device file.

Creating the device file

If the `ovpass` device file does not exist, use the following procedure to create it. Use the controller name and SCSI address you determined for the robotic control device.

NetBackup uses the device file to configure robotic control. If you use device discovery in NetBackup, NetBackup discovers the robotic control device file (and hence the device) automatically. If you add the robot manually, you must enter the pathname to the device file. The device files reside in the `/dev` directory.

For examples of both SCSI and Fibre Channel procedures, see [“SCSI robotic control configuration examples”](#) on page 28.

Note: If a `smc` device file exists for an IBM library, remove the `smc` device file before you configure the `ovpass` device file. For instructions, see the IBM AIX documentation.

Note: If an error occurs when you configure a Fibre Channel Protocol device file, review the topic “[Upgrading the SCSI pass-through driver](#)” on page 20. The error may be a `mkdev` error code 0514-0520.

To create a robotic control device file

- 1 Create the device file by using the AIX `mkdev` command. The following is the command syntax:

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

The following are the arguments for the command:

- `-s type` is `scsi` for an SCSI attached robot or `fc` for a Fibre Channel attached robot.
- `-p controller` is the logical identifier of the drive's SCSI adaptor, such as `scsi0`, `fscsi0`, or `vscsi1`.
- `-w scsi_id` is the SCSI ID of the robotic connection. For a Fibre Channel Protocol controlled device, the SCSI ID is the ID of the `N_Port` on the robotic device (the destination ID (`D_ID`)).
- `lun` (the second argument to the `-w` option) is the logical unit number of the robotic connection.

For example:

```
mkdev -c media_changer -s fc -t ovpass -p fscsi0 -w 0x111ca,1
```

- 2 To verify, display the device files by using the `lsdev` command. For SCSI devices, use `scsi` for the `type`; for Fibre Channel Protocol devices, use `fc` for the `type`.

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

In the following example output, `ovpass0` is an 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
```

SCSI robotic control configuration examples

For examples of how to create device files, see the following. All examples assume that the `ovpass` driver is installed and that the robotic devices are in the `Available` state.

- [“Example 1 – robotic device at LUN 0”](#) on page 28
- [“Example 2 – robotic device at LUN 1”](#) on page 29
- [“Example 3 – robotic device at LUN 6”](#) on page 29
- [“Example 4 – IBM 3570 B-series robotic library”](#) on page 30
- [“Example 5 – Fibre Channel attached library”](#) on page 30

Example 1 — robotic device at LUN 0

For this example, assume that the robot is a LUN 0 controlled robot. The SCSI controller is controller 1 (00-01) at SCSI ID 5.

To configure robot control at LUN 0

- 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 `ovpass` device file exists at SCSI ID 5.

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

The output shows the device files exist for tape and disk. However, a device file does not exist for the controller `scsi0` and SCSI ID 5.

```
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 file by using the following command:

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

- 4 Display the device files 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  
ovpass0 Available 00-01-5,0 Veritas Media Changer
```

- 5 To configure the robotic control manually in NetBackup, use the following device file pathname:

```
/dev/ovpass0
```

Example 2 — robotic device at LUN 1

For this example, assume that the robot is a LUN 1 controlled robot. The SCSI controller is controller 1 (00-01) at SCSI ID 3.

To configure robot control at LUN 1

- 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 file exists for `ovpass` at SCSI ID 5, as follows:

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

The following output shows that the device files exist for tape and disk. However, a device file does not exist for the controller `scsi0`, SCSI ID 3, and LUN 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 Create the device file by using the following command:

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

- 4 Display the device files 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
ovpass0 Available 00-01-3,1 Veritas Media Changer
```

- 5 To configure the robotic control manually in NetBackup, use the following device file pathname:

```
/dev/ovpass0
```

Example 3 — robotic device at LUN 6

Assume the robot and the drives are connected to an SCSI adapter. Assume that the drives are at SCSI IDs 4 and 5 and the robotic device is at SCSI ID 6.

To configure robot control at LUN 6

- 1 Display the SCSI controllers:

```
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
```

- 2 Display the tape drives:

```
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
The drives are on controller 00-04-01 (vscsi1).
```

- 3 Use `vscsi1` as the controller name when you create the `ovpass` device file:

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

Example 4 — IBM 3570 B-series robotic library

If the robotic library contains one drive, the robotic control is LUN 1 of the drive's SCSI ID. If it contains two drives, the robotic control is LUN 1 of the drive 1 SCSI ID.

You can view or set the SCSI IDs by using the front panel on the robot.

The robotic control for the IBM 3570 B01/B02 is NetBackup type TLD; if two drives exist, they may be connected to different host systems.

In this example, the drive 1 host system provides the robotic control. Also, the library should be in RANDOM mode and BASE configuration. See the library's operator guide 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
rmt1 Available 00-02-01-6,0 Other SCSI Tape Drive
```

If drive 1 is SCSI ID 5, the robotic control for the robotic library is LUN 1 of this SCSI ID. If `vscsi1` is the correct adapter, use the following command to create the device file:

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

Example 5 — Fibre Channel attached library

In this example, the library contains two robotic devices. For brevity, this example shows only the Fibre Channel devices.

To configure robotic control for a Fibre Channel device

- 1 Display the I/O controllers in the system by using the following AIX command:

```
/usr/sbin/lsdev -C | grep I/O
fscsi0 Available 10-68-01 FC SCSI I/O Controller Protocol
Device
fscsi1 Available 20-58-01 FC SCSI I/O Controller Protocol
Device
```

- 2 Display the Fibre Channel devices in the system by using the following `lsdev` command:

```
/usr/sbin/lsdev -C -s fcp
rmt0 Available 10-68-01 Other FC SCSI Tape Drive
rmt1 Available 10-68-01 Other FC SCSI Tape Drive
```

```
rmt2    Available 10-68-01 Other FC SCSI Tape Drive
rmt3    Available 10-68-01 Other FC SCSI Tape Drive
rmt4    Available 10-68-01 Other FC SCSI Tape Drive
rmt5    Available 10-68-01 Other FC SCSI Tape Drive
```

All tape drives are connected to controller 10-68-01, which is the controller named `fscsi0`.

- 3 Display the attributes for the tape drives by using the `odmget` command. The following example shows excerpts from the output of `rmt0` and `rmt3`:

```
/usr/bin/odmget -q "name=rmt0" CuAt
CuAt:
    name = "rmt0"
    attribute = "scsi_id"
    value = "0x11400"
    type = "R"
    generic = "D"
    rep = "s"
    nls_index = 6
/usr/bin/odmget -q "name=rmt3" CuAt
CuAt:
    name = "rmt3"
    attribute = "scsi_id"
    value = "0x11500"
    type = "R"
    generic = "D"
    rep = "s"
    nls_index = 6
```

In this example, `rmt0` through `rmt2` have SCSI ID `0x11400`, and `rmt3` through `rmt5` have SCSI ID `0x11500`. Because two SCSI IDs exist, two robotic devices exist in this library.

- 4 The library uses LUN 0 for robotic control (determined from the library configuration software). Therefore, configure the two robotic control device files by using the following commands:

```
mkdev -c media_changer -s fcp -t ovpass -p fscsi0 -w 0x11400,0
mkdev -c media_changer -s fcp -t ovpass -p fscsi0 -w 0x11500,0
```

- 5 Display the Fibre Channel protocol devices by using the following command:

```
/usr/sbin/lsdev -C -s fcp
ovpass0 Available 10-68-01 Veritas Media Changer
ovpass1 Available 10-68-01 Veritas Media Changer
rmt0    Available 10-68-01 Other FC SCSI Tape Drive
rmt1    Available 10-68-01 Other FC SCSI Tape Drive
rmt2    Available 10-68-01 Other FC SCSI Tape Drive
rmt3    Available 10-68-01 Other FC SCSI Tape Drive
rmt4    Available 10-68-01 Other FC SCSI Tape Drive
rmt5    Available 10-68-01 Other FC SCSI Tape Drive
```

- 6 To configure the robotic control manually in NetBackup, use the following device file pathnames when you configure devices in NetBackup:

```
/dev/ovpass0
```

```
/dev/ovpass1
```

Configuring IBM 3590B11 stacker robotic controls

For the IBM 3590B11 stacker, robotic control is provided through the same device file as for the drive in the stacker. Therefore, you do not need to configure the `ovpass` driver robotic control for the IBM 3590B11 stacker.

To check for and create an IBM 3590B11 device file

- 1 Display the tape devices that are configured in the system by using the following AIX 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 you configure 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 drive device files

If you use IBM tape drives, Symantec recommends that you install the IBM AIX Atape driver. For information about the driver, see the IBM documentation.

If you use other tape drives, Symantec recommends that you use the IBM AIX `ost` (other SCSI tape) driver. For information about the driver, see the IBM documentation.

Configuring non-QIC tape drives

Variable length block and *fixed length block* refer to how the operating system reads from and writes to a tape. Variable-mode devices allow more flexibility to read previously written tapes. Many tape devices can be accessed in either mode. NetBackup assumes variable length for non-quarter inch cartridge (QIC) drives.

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

Caution: For NetBackup, you must configure non-QIC tape drives as variable-length-block devices. Otherwise NetBackup can write data but may not be able to read it correctly. During a read, you may see a `not in tar format` error.

NetBackup configuration

When you add a non-QIC tape drive to NetBackup, NetBackup issues the `chdev` command to configure the drive as a variable length block device. For reference, the following is the command that NetBackup uses to configure a drive for variable mode:

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

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

Therefore, you do not have to configure the drive manually for variable mode.

Using extended-file marks for drives

If a tape drive supports extended file marks, you must configure it to use them (for example, 8-mm drives). Otherwise, NetBackup may not be able to use those drives.

For information, see the AIX `chdev(1)` and `smit(1)` man pages.

Automatic configuration

When you add a tape drive to NetBackup, NetBackup issues the `chdev` command to configure the drive to use extended file marks. For reference, the following is the command that netBackup uses to configure a drive for extended file marks:

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

Dev is the logical identifier for the drive (such as `rmt0` or `rmt1`)

Therefore, you do not have to configure the drive manually for extended file marks.

Fast-tape positioning (locate-block)

AIT, DLT, Exabyte, and half-inch cartridge tape drives.

To position a tape to a specific block, NetBackup supports the SCSI `locate-block` command.

NetBackup uses the `locate-block` command by default.

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

```
touch /usr/opensv/volmgr/database/NO_LOCATEBLOCK
```

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

Disabling SPC-2 SCSI reserve

By default, NetBackup uses SPC-2 SCSI reserve and release for tape drive reservations in shared drive environments. The NetBackup Shared Storage Option provides shared drive functionality in NetBackup.

Alternatively, you can use SCSI persistent reserve for shared tape drive reservations in NetBackup, as follows:

- For the tape drives that support SPC-3 Compatible Reservation Handling (CRH), you can use SCSI persistent reserve by enabling it in NetBackup. No special configuration in AIX is required.
- For the tape drives that do *not* support CRH, you must disable SPC-2 SCSI reserve in AIX for those drives. After you disable SPC-2 SCSI reserve, you can use persistent reserve by enabling it in NetBackup. If the drive does not support CRH and you do not disable SPC-2 SCSI reserve, access attempts to the drive fail.

Caution: If the tape driver does *not* let you disable SPC-2 SCSI reserve, do *not* use SCSI persistent reserve with the drives that do not support CRH. The `sctape` driver is an example of a tape driver that lets you disable SPC-2 SCSI reserve.

To disable SPC-2 SCSI reserve, use the AIX `chdev` command to change the reserve attribute for the device file for the tape drive. For example, the following command disables SPC-2 SCSI reserve for tape drive `rmt0` with the rewind on close device file:

```
chdev -l rmt0 -a res_support=no
```

Conversely, you can enable SPC-2 SCSI reserve by using the following command:

```
chdev -l rmt0 -a res_support=yes
```

For information about the `chdev` command, see the AIX `chdev` man page.

For more information about NetBackup and SCSI reservations, see the following:

- The description of the **Enable SCSI Reserve** Media host property in the following:
 - *The NetBackup Administrator's Guide for UNIX and Linux, Volume I*
 - *The NetBackup Administrator's Guide for Windows, Volume I*
- The “How NetBackup reserves drives” topic in the following:
 - *The NetBackup Administrator's Guide for UNIX and Linux, Volume II*
 - *The NetBackup Administrator's Guide for Windows, Volume II*

Creating no rewind device files

By default, NetBackup uses no rewind device files. 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. The `.1` extension specifies the no rewind, no retention on open device file.

Normally, AIX creates tape drive device files automatically at boot time.

Alternatively, you can run the AIX `cfgmgr` command, which should create the device files. If they do not exist, you must create them for the tape drives.

To check for and create a no rewind device file

- 1 Display the I/O controllers in the system by using the following `lsdev` command:

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

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

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

- 1 Display the SCSI and Fibre Channel devices in the system by using the following `lsdev` command. For SCSI devices, use `scsi` for the *type*; for Fibre Channel Protocol devices, use `fcp` for the *type*.

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

The following example shows two disk drives and a tape drive:

```
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
```

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

- 2 If a device file does not exist for the wanted tape drive, create it by using the following command:

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

The following are the arguments for the command:

- *controller* is the logical identifier of the drive's SCSI adaptor, such as `scsi0`, `fscsi0`, or `vscsi1`.
- *scsi_id* is the SCSI ID of the drive connection.
- *lun* is the logical unit number of the drive connection.

For example, the following command creates a device file for a non-IBM 8-mm drive connected to controller `scsi0` at SCSI address 5, 0:

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

- 3 To verify, display the SCSI device files by using the `lsdev` command, as follows:

```
/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
```

The output shows that the `rmt1` device file was created.

- 4 If the device files do not exist on an FCP controller, use the following command to create them. *device* is the controller number from [step 1](#) on page 35.

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

You may receive a message that a device package is required for an FCP changer. NetBackup uses the `ovpass` driver for medium changers, so you can disregard the message.

- 5 Ensure that the device is configured for variable-mode and extended file marks. Use the `chdev` command, as follows (*dev* is the logical identifier for the drive (for example, `rmt1`)).

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

- 6 To configure the drive manually in NetBackup, enter the following device file pathname:

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

No rewind device file example

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

To create a no rewind device file for SCSI ID 5

- 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 Determine 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.

However, a device files does not exist 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 device file 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
```

- 6 To configure the drive manually in NetBackup, enter the following device file pathname:

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

Using multiple tape densities

After you create the device files for your tape drives, you can configure densities on the drives that support multiple densities. Exabyte 8500C is an example of a tape drive for which you can use different densities.

All tape drives support two configuration settings for density, 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 the System Manager Interface Tool (SMIT) or commands similar to the following:

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

The following describe the arguments to the command options:

- *tapedev* is the logical identifier for the drive, such as `rmt0` or `rmt1`.
- *density* is a decimal number from 0 to 255 that represents the wanted density. Zero (0) selects the default density for the tape drive, which is usually the drive's high density setting. Permitted values and their meanings vary with different types of tape drives.

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
```

Adding Sony AIT drives

Sony S-AIT drives have DIP switches (SWA and SWB) located on the bottom of the drive.

For the NetBackup Shared Storage Option, you must set the SWA-1 (No Reply Unit Attention After Process Login) switch correctly. Its factory setting depends on the serial number of the drive.

If the drive has an early serial number, switch SWA-1 may be off. If so, change the switch to on.

Drives with newer serial numbers have SWA-1 set to on as the default, as shown in [Table 2-1](#). These newer serial numbers are:

- SDZ-130 :01442007 and later
- SDZ-130/L :01200696 and later

Also, for the drives that have a date of May 17, 2004 and later, the DIP switch is set to on.

Table 2-1 DIP switch positions for AIT drives

Switch	Setting (1 = On and 0 = Off)
SWA-1	1
SWA-2	0
SWA-3	0
SWA-4	0
SWA-5	0
SWA-6	0
SWA-7	1
SWA-8	0

Configuring optical disk drive device files

By default, AIX may configure optical disk drives as type `omd`. NetBackup requires that optical disk drives be configured as type `hdisk`. NetBackup also requires character device files for optical drives, so the device file name is `rhdisk` (*r* represents raw I/O (character) access).

The device files are located in the `/dev` directory. The `rhdisk` device files have the following format, where *ID* is the logical identifier assigned to the device by the system:

```
/dev/rhdiskID
```

For more information and procedures, see:

- [“Creating optical disk device files”](#) on page 39

- “Setting the HP optical drive type in NVRAM” on page 40

Creating optical disk device files

If a `rhdisk` device file for an optical drive does not exist, use the following procedure to create one.

To check for and create optical drive device files in AIX

- 1 Display the SCSI controllers in the system by using the following `lsdev` command:

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

The following 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 devices in the system by using 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
```

The 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.

- 3 If a device file for the wanted optical drive does not exist, create it by using the following command:

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

The following are the arguments for the command:

- *controller* is the logical identifier of the drive’s SCSI adaptor, such as `scsi0` or `fscsi0`.
- *scsi_id* is the SCSI ID of the drive connection.
- *lun* is the logical unit number of the drive connection.

For example, the following command creates a device file for an optical disk drive on controller 1 and SCSI ID 5:

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

- 4 To verify, display the SCSI device files by using the `lsdev` command, as follows:

```
/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
```

The output shows that the device file for `hdisk2` was created. The raw version of the file is named `rhdisk2`.

- 5 If you add the drive to NetBackup manually, use the following device file pathname:

```
/dev/rhdisk2
```

Setting the HP optical drive type in NVRAM

To use HP optical disk drives, AIX must recognize the optical drives as disk drives at system boot time. However, AIX may recognize HP 1.2 gigabyte or equivalent model magneto-optical disk drives as optical drives. If so, you must change the device type in nonvolatile random access memory (NVRAM) to disk drive.

NetBackup device discovery cannot detect them as optical drives. Therefore, you must create a device file by using the NetBackup `ovpass` driver. NetBackup then can recognize optical drives as

To determine how AIX recognizes an HP optical drive

- ◆ Display the SCSI device files that have already been created by using the following command:

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

The following is example output:

```
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
```

The output shows a disk drive device file, a tape drive device file, and an `omd` optical drive device file:

- `hdisk0` is a disk drive at controller 0 (00-00) and SCSI ID 0 (0, 0)
- `rmt0` is a tape drive at controller 0 (00-00) and SCSI ID 3 (3, 0)
- `omd0` is an optical drive at controller 0 (00-00) and SCSI ID 6 (6, 0)

The example output shows the HP optical drive is configured as the default drive type, `omd`. NetBackup requires the `hdisk` drive type. Therefore, you must create the `hdisk` device files, which includes the raw version (`rhdisk`).

To configure HP optical drives as `hdisk` in AIX

- 1 Install the `ovpass` driver if it is not already installed. See “[The SCSI pass-through driver `ovpass`](#)” on page 19.
- 2 Create the device files for the optical drive by using the following command:


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

The following are the arguments for the command:

- *controller* is the logical identifier of the drive's SCSI adaptor, such as *scsi0* or *fscsi0*.
- *scsi_id* is the SCSI ID of the drive connection (not the robotic connection).
- *lun* is the logical unit number of the drive connection.

For example:

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

- 3 Obtain the logical identifier for the optical drive device file you created by using the following command:

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

The following is example output:

```
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-6,0 Veritas Media Changer
```

- 4 Verify the *ovpass* device file created in [step 2](#) by using the following command (*ovpassx* represents the device file name and logical identifier):

```
/usr/opensv/volmgr/bin/scsi_command -d /dev/ovpassx -inquiry
```

For example, if the temporary *ovpass* device was *ovpass0*, enter the following:

```
/usr/opensv/volmgr/bin/scsi_command -d /dev/ovpass0 -inquiry
```

The output should be similar to the following:

```
removable device type c_8h_HP
```

- 5 Change the device type from optical memory to disk by using the following command (*ovpassx* represents the device file name and logical identifier):

```
/usr/opensv/volmgr/bin/scsi_command -d /dev/ovpassx -disk
```

For example:

```
/usr/opensv/volmgr/bin/scsi_command -d /dev/ovpass0 -disk
```

- 6 Remove the *ovpass* and the *omd* device files by using the *rmdev* command as follows:

```
rmdev -l ovpassx -d
```

```
rmdev -l omdx -d
```

Where:

- *ovpassx* is the logical identifier assigned to the device.
- *omdx* is the optical drive identifier assigned to the optical drive.

- 7 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 `hdiskx`, where `x` is the logical number assigned to the drive by the system. For example:

```
/usr/sbin/lsdev -C -s scsi
hdisk0 Available 00-00-0S-0,0 2.2 GB SCSI Disk Drive
rmt0 Available 00-00-0S-3,0 Other SCSI Tape Drive
hdisk1 Available 00-00-0S-6,0 Other SCSI Disk Drive
```

The output shows a disk drive device file, a tape drive device file, and a `hdisk` optical drive device file:

- 1 If you add the drive to NetBackup manually, use the following device file pathname:

```
/dev/rhdisk1
```

Command summary

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

```
/usr/opensv/volmgr/bin/driver/install_ovpass
```

Installs the `ovpass` driver for the first time.

```
/usr/opensv/volmgr/bin/driver/remove_ovpass
```

Removes the `ovpass` driver.

```
/usr/opensv/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 the 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 `fc` displays fibre channel files.

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

Creates the device files for the robotic control SCSI ID.

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

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

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

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. *lun* is the logical unit number of the robotic connection.

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

Creates the device files for optical disk drives.

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

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

Creates the device files for tapes.

controller is the logical identifier of the drive SCSI adaptor (such as *scsi0* or *scsi1*). *id* is the SCSI ID of the robotic connection. *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/opensv/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 the device information, where *dev* is the name of the device (for example, *rmt1*).

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

Creates the device files on a Fibre Channel Protocol 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 you configure fibre channel devices.

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

HP-UX

This chapter explains how to configure drivers and device files to use storage devices with NetBackup on HP-UX systems.

After you configure the hardware, add the robots and the drives to NetBackup.

The major topics are as follows:

- [“Before you start”](#) on page 46
- [“Configuring robotic controls”](#) on page 46
- [“Configuring tape drives”](#) on page 54
- [“Configuring optical disk drives”](#) on page 59
- [“Configuring SAN clients”](#) on page 60
- [“Errors when more than 10 NetBackup jobs are active”](#) on page 61
- [“Command summary”](#) on page 61

Before you start

Observe the following points when you configure the operating system:

- Verify that NetBackup supports your server platform and devices. The Symantec support Web site contains server platform compatibility information. For the compatibility information, see the Compatibility List for NetBackup Server or NetBackup Enterprise Server. The following is the URL:
`http://entsupport.symantec.com`
- For SCSI controlled libraries, NetBackup issues SCSI commands to the robotic devices. For NetBackup to function correctly, the properly named device files must exist. For more information, see:
 - “[Configuring robotic controls](#)” on page 46
 - “[Configuring tape drives](#)” on page 54
 - “[Configuring optical disk drives](#)” on page 59
- To verify that the devices are configured correctly, use the HP-UX `/usr/sbin/sam` utility and the `ioscan -f` command. For the NetBackup shared storage options, ensure that the operating system detects the devices on the SAN.
- Some HP SCSI adapters do not support SCSI pass through; therefore, devices on such adapters are not discovered automatically.

Configuring robotic controls

A robotic device in a library moves the media between storage slots and the drives in the library. NetBackup supports SCSI control and API control of robotic devices. You must configure the method of robotic control, as follows:

- To configure SCSI or Fibre Channel Protocol control, see “[Configuring SCSI and FCP robotic controls](#)” on page 46.
- To configure API control over a LAN, see:
 - “[ADIC Automated Media Library \(AML\)](#)” on page 123
 - “[IBM Automated Tape Library \(ATL\)](#)” on page 137
 - “[Sun StorageTek ACSLS robots](#)” on page 155

Configuring SCSI and FCP robotic controls

To communicate with and control SCSI-controlled robotic peripherals, NetBackup uses the HP-UX SCSI pass-through driver `spt` or `sctl`. The driver

NetBackup uses depends on the type of SCSI interface on the system. For more information, see:

- [“How to determine which pass-through driver to configure”](#) on page 47
- [“Configuring device files for the sctl pass-through driver”](#) on page 48
- [“Configuring device files for the spt pass-through driver”](#) on page 53

A library may have more than one robotic device. Each robotic device requires a device file.

How to determine which pass-through driver to configure

The pass-through driver NetBackup uses depends on the type of SCSI interface on the system, as follows:

- For the SCSI devices that are connected to EISA, GSC, HSC, or PCI (and its derivatives) cards, NetBackup uses the sctl pass-through driver. To configure the device files, see [“Configuring device files for the sctl pass-through driver”](#) on page 48.
- For the Fibre Channel devices that are connected to Fibre Channel host bus adapters (HBAs), NetBackup uses the sctl pass-through driver. To configure the device files, see [“Configuring device files for the sctl pass-through driver”](#) on page 48.
- For the SCSI devices that are connected to HP-PB interface cards on PA-RISC systems, NetBackup uses the spt pass-through driver. To configure the device files, see [“Configuring device files for the spt pass-through driver”](#) on page 53.

To determine which pass-through driver to configure, use the `ioscan -f` command:

- If the system contains an EISA, GSC, HSC, or PCI SCSI interface card, the `ext_bus` entry for the card *may* show one of the following. For these systems, configure sctl device files.
 - SCSI adapters:
 - For PA-RISC systems, the `ext_bus` entry may be `c700`, `c720`, or `c8xx`.
 - For Itanium systems, the `ext_bus` entry may be `mpt`.
 - Fibre Channel host bus adapters:
 - For PA-RISC systems, the `ext_bus` entry may be `fcpdev` or `fcpmux`.
 - For Itanium systems, the `ext_bus` entry may be `fcd_vbus`.

- If the system contains an HP-PB SCSI interface card, the `ext_bus` entry for the card shows a `scsi1` driver. Configure device files to use the `spt` driver.

If the robotic control has its own SCSI ID, the `ioscan` output shows 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 SYSL3-340L
```

In these circumstances, the robotics are correct but `ioscan` returns invalid information.

For examples of the `ioscan -f` output, see:

- [“Example of how to create a sctl device file for SCSI \(PA-RISC\)”](#) on page 49
- [“Example of how to create a sctl device file for FCP \(PA-RISC\)”](#) on page 50
- [“Example of how to create sctl device files for FCP \(Itanium\)”](#) on page 51
- [“Example of how to create a spt device file”](#) on page 54

Configuring device files for the sctl pass-through driver

For the SCSI- or FCP-controlled robotic devices that are connected to EISA, GSC, HSC, or PCI (and its derivatives) cards, NetBackup uses the `sctl` pass-through driver.

You must create the robotic control device files for the `sctl` driver manually; they are not created automatically when the system boots.

If you use device discovery in NetBackup, NetBackup discovers the robotic control device files in `/dev/sctl` automatically. If you add a robot manually in NetBackup, you must enter the pathname to the device file.

Prerequisites: Before you create the device files, you must do the following:

- Install and configure the `sctl` driver. For more information, see the HP-UX `scsi_ctl(7)` man page.
The `sctl` driver may be the default pass-through driver on your system. If so, you do not have to configure the kernel to use the `sctl` pass-through driver.
- Install and configure the `schgr` device driver. For more information, see the HP-UX `autochanger(7)` man page.
- Attach the devices.

To create sctl device files

- 1 Determine the card instance number and the SCSI ID and LUN of the robotic device by using the `ioscan -f` command.
 - The instance number of the card is in the `I` column of the output.

- The `H/W Path` column of the changer output (`schgr`) includes the SCSI ID and LUN. Use the card's `H/W Path` value to filter the changer's `H/W Path` entry; the SCSI ID and the LUN remain.
- 2 Determine the character major number of the `sctl` driver by using the `lsdev` command, as follows:

```
lsdev -d sctl
```

Examine the output for an entry that shows `sctl` in the `Driver` column.

- 3 Use the following commands to create the device file for the SCSI robotic control:

```
mkdir /dev/sctl
cd /dev/sctl
mknod /dev/spt/cCARDtTARGETlLUN c Major 0xII TL00
```

Where:

- `CARD` is the card instance number of the adapter.
- `TARGET` is the SCSI ID of the robotic control.
- `LUN` is the SCSI logical unit number (LUN) of the robot.
- `Major` is the character major number (from the `lsdev` command).
- `II` are two hexadecimal digits that represent the card instance number.
- `T` is a hexadecimal digit that represents the SCSI ID of robotic control.
- `L` is a hexadecimal digit that represents the SCSI LUN of the robotic control.

For examples of how to create device files, see:

- [“Example of how to create a sctl device file for SCSI \(PA-RISC\)”](#) on page 49
- [“Example of how to create sctl device files for FCP \(Itanium\)”](#) on page 51
- [“Example of how to create sctl device files for FCP \(Itanium\)”](#) on page 51

Example of how to create a sctl device file for SCSI (PA-RISC)

In this example, two robots exist:

- An ADIC Scalar 100 library is on an SCSI bus with an instance number of 7, 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.

To create SCSI robotic device files for HP-UX PA-RISC

- 1 Determine the card instance number and the SCSI ID and LUN of the robotic device by using the `ioscan -f` command:

```
ioscan -f
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

```

The card H/W Path is 0/7/0/1; the card instance number (I column) is 7.

Apply the H/W Path value as a mask. The ADIC robotic device (schgr) is at SCSI ID 2, LUN 0 on this bus. The IBM robotic device (schgr) is at SCSI ID 3, LUN 0 on this bus.

- 2 Determine the character major number of the sctl driver by using the `lsdev` command, as follows:

```

lsdev -d sctl
Character      Block      Driver      Class
      203          -1      sctl        ctl

```

The output from this command shows that the character major number for the sctl driver is 203.

- 3 The commands to create the device files follow. For the ADIC robot, the card instance number is 7, the target is 2, and the LUN is 0. For the IBM robot, the card instance number is 7, the SCSI ID is 3, and the LUN is 0.

```

cd /dev/sctl
/usr/sbin/mknod c7t210 c 203 0x072000
/usr/sbin/mknod c7t310 c 203 0x073000

```

If you add the robots to NetBackup manually, you would specify the following for ADIC robotic control and IBM robotic control respectively:

```

/dev/sctl/c7t210
/dev/sctl/c7t310

```

Example of how to create a sctl device file for FCP (PA-RISC)

In the following example, an STK 9740 robot contains one drive.

With Fibre Channel, the hardware paths are longer than with SCSI.

To create an FCP robotic device file for HP-UX PA-RISC

- 1 Determine the card instance number and the SCSI ID and LUN of the robotic device by using the `ioscan -f` command:

```

ioscan -f
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

```

The interface card instance number (I column) is 3. If you use the card's H/W Path value as a mask (0/0/0.8.0.0.0), a DLT 7000 drive is at SCSI ID 0, LUN 0. An STK 9740 robot is at SCSI ID 1, LUN 0.

- 2 Determine the character major number of the sctl driver by using the `lsdev` command, as follows:

```

lsdev -d sctl
Character      Block      Driver      Class
203           -1         sctl        ctl

```

The output from this command shows that the character major number for the sctl driver is 203.

- 3 The commands to create the device file for the STK 9740 robotic control are as follows. The card instance number is 3, the target is 1, and the LUN is 0.

```

cd /dev/sctl
/usr/sbin/mknod c3t110 c 203 0x031000

```

If you add the robot to NetBackup manually, you would specify the following pathname for robotic control:

```
/dev/sctl/c3t110
```

Example of how to create sctl device files for FCP (Itanium)

With Fibre Channel, the hardware paths are longer than with SCSI.

In this example, the following devices are attached to the host.

- An HP EML E-Series robot with four HP drives (two LTO2 and two LTO3 drives). A separate path exists for each drive pair. The robotic control is through card instance 12 (0/4/1/1.2.12.255.0).
- An HP VLS 6000 robot with six drives. The robot is partitioned into two virtual libraries, three Quantum SDLT320 drives in one library and three HP LTO3 drives in the other library. Separate robotic control exists for each library.

To create FCP robotic device files for HP-UX Itanium

- 1 Determine the card instance numbers and the SCSI IDs and LUNs of the robotic device by using the `ioscan -f` command. The following command output excerpt shows the Fibre Channel devices on a host:

```

ext_bus 4 0/4/1/1.2.10.255.0    fcd_vbus CLAIMED INTERFACE FCP Device Interface
target  7 0/4/1/1.2.10.255.0.0    tgt      CLAIMED DEVICE
tape    18 0/4/1/1.2.10.255.0.0.0  stape    CLAIMED DEVICE    HP Ultrium 3-SCSI

```

```
tape      20  0/4/1/1.2.10.255.0.0.1  stape    CLAIMED  DEVICE    HP Ultrium 3-SCSI
ext_bus   13  0/4/1/1.2.11.255.0       fcd_vbus CLAIMED  INTERFACE FCP Device Interface
target    8   0/4/1/1.2.11.255.0.0     tgt       CLAIMED  DEVICE
autoch    4   0/4/1/1.2.11.255.0.0.0  schgr     CLAIMED  DEVICE    HP VLS
tape      22  0/4/1/1.2.11.255.0.0.1  stape     CLAIMED  DEVICE    QUANTUM SDLT320
tape      23  0/4/1/1.2.11.255.0.0.2  stape     CLAIMED  DEVICE    QUANTUM SDLT320
tape      24  0/4/1/1.2.11.255.0.0.3  stape     CLAIMED  DEVICE    QUANTUM SDLT320
autoch    5   0/4/1/1.2.11.255.0.0.4  schgr     CLAIMED  DEVICE    HP VLS
tape      25  0/4/1/1.2.11.255.0.0.5  stape     CLAIMED  DEVICE    HP Ultrium 3-SCSI
tape      26  0/4/1/1.2.11.255.0.0.6  stape     CLAIMED  DEVICE    HP Ultrium 3-SCSI
tape      27  0/4/1/1.2.11.255.0.0.7  stape     CLAIMED  DEVICE    HP Ultrium 3-SCSI
ext_bus   12  0/4/1/1.2.12.255.0       fcd_vbus CLAIMED  INTERFACE FCP Device Interface
target    6   0/4/1/1.2.12.255.0.0     tgt       CLAIMED  DEVICE
autoch    1   0/4/1/1.2.12.255.0.0.0  schgr     CLAIMED  DEVICE    HP EML E-Series
tape      19  0/4/1/1.2.12.255.0.0.1  stape     CLAIMED  DEVICE    HP Ultrium 2-SCSI
tape      21  0/4/1/1.2.12.255.0.0.2  stape     CLAIMED  DEVICE    HP Ultrium 2-SCSI
```

The following devices are attached to this host:

- The robotic control for the HP EML E-Series robot is through card instance 12 (0/4/1/1.2.12.255.0). Two of the drives are accessed through the same path, and the other two are accessed through card instance 4 (0/4/1/1.2.10.255.0).
- The robotic controls for the HP VLS 6000 robot partitions are through card instance 13. Robotic control for one partition is at SCSI ID 0 and LUN 0. Robotic control for the other partition is at SCSI ID 0 and LUN 4.

- 2 Determine the character major number of the sctl driver by using the `lsdev` command, as follows:

```
lsdev -d sctl
Character      Block      Driver      Class
      203          -1        sctl        ctl
```

The output from this command shows that the character major number for the sctl driver is 203.

- 3 The commands to create the devices file for the robotic controls are as follows:

```
cd /dev/sctl
/usr/sbin/mknod c12t010 c 203 0x0c0000
/usr/sbin/mknod c13t010 c 203 0x0d0000
/usr/sbin/mknod c13t014 c 203 0x0d0400
```

If you add the robots to NetBackup manually, you would specify the following pathnames for robotic control. The first device file is for the HP EML E-Series robot. The second and third device files are for the VLS 6000 robot (two robotic devices).

```
/dev/sctl/c12t010
/dev/sctl/c13t010
/dev/sctl/c13t014
```

Configuring device files for the spt pass-through driver

For the SCSI-controlled robotic devices that are connected to HP-PB SCSI interface cards on PA-RISC systems, NetBackup uses the `spt` pass-through driver.

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

Note: The HP-UX kernel must be configured to use the `spt` SCSI pass-through driver. For instructions, see the HP-UX `scsi_pt(7)` man page.

To create spt device files

- 1 Install and configure the `spt` driver as described in the HP-UX `scsi_pt(7)` man page.
- 2 Determine the card instance number and the SCSI ID and LUN of the robotic device by using the `ioscan -f` command:
 - The instance number of the card is in the `I` column of the output.
 - The `H/W Path` column of the changer output (`schgr`) includes the SCSI ID and LUN. Use the card's `H/W Path` value to filter the changer's `H/W Path` entry; the SCSI ID and the LUN remain.

- 3 Determine the character major number of the `spt` driver, as follows:

```
lsdev -d spt
```

Examine the output for an entry that shows `spt` in the `Driver` column.

- 4 Use the following commands to create the device file for the SCSI robotic control:

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

Where:

- *CARD* is the card instance number of the adapter.
- *TARGET* is the SCSI ID of the robotic control.
- *LUN* is the SCSI logical unit number (LUN) of the robot, usually 0.
- *Major* is the character major number (from the `lsdev` command).
- *II* are two hexadecimal digits that represent the card instance number.
- *T* is a hexadecimal digit that represents the SCSI ID of robotic control.
- *L* is a hexadecimal digit that represents the SCSI LUN of the robotic control.

Example of how to create a spt device file

In this example, the robotic control for an HP Optical Disk Library (ODL) is on a secondary SCSI bus at SCSI ID 3, LUN 0.

To create spt robotic device files for HP-UX

- 1 Determine the card instance number and the SCSI ID and LUN of the robotic device by using the `ioscan -f` command:

```
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 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 `ext_bus` entry for the interface card specifies a `scsi1` driver (spt driver). The card instance number for the robot's SCSI bus is 1. The spt driver is attached to the optical robotic control at H/W Path 56/16.3.0.

- 2 Determine the character major number of the spt driver by using the `lsdev` command, as follows:

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

The output from this command shows that the character major number for the spt driver is 137. The major number for the driver may be different on your system.

- 3 Create the `/dev/spt` directory (if it does not exist):

```
mkdir /dev/spt
```

- 4 Create the device file as follows:

```
mknod /dev/spt/c1t310 c 137 0x013000
```

This command creates the `/dev/spt/c1t310` device file (instance 1, target 3, and LUN 0). If you add the robot manually in NetBackup, specify this file as the robot control path.

Configuring tape drives

NetBackup requires the tape drive device files that support the best density and compression, no rewind on close, and Berkeley style close. The device files are in the `/dev/rmt` directory, and they have the following format:

```
/dev/rmt/c#t#d#BESTnb
```

Where:

- `c#` is the card instance number.

- *t#* is the SCSI ID.
- *d#* is the device LUN.
- BEST indicates the highest density format and data compression the device supports.
- *n* indicates no rewind on close.
- *b* indicates Berkeley-style close.

The following are examples of tape drive device files:

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

By default, HP-UX creates tape drive device files when the system is booted. However, the tape driver must be installed and configured, and the devices must be attached and operational.

Alternatively, you can create tape drive device files manually. To do so, use either the HP-UX System Administration Manager (SAM) utility or the `insf(1M)` command. For information, see the HP-UX documentation.

NetBackup uses the device files to configure tape drive access. If you use device discovery in NetBackup, NetBackup discovers the device files in `/dev/rmt` automatically (and hence the devices). If you add a drive manually in NetBackup, you must enter the pathname to the device file.

Although NetBackup requires the `/dev/rmt` device files during configuration, NetBackup uses pass-through device files for tape drive access. For more information, see “[Pass-through paths for tape drives](#)” on page 57.

No rewind device files

NetBackup requires no rewind on close for tape devices. The letter *n* in the file name indicates no rewind device files.

Berkeley-style close

NetBackup requires Berkeley-style close for tape devices. The letter *b* in the file name indicates Berkeley-style close device files.

Berkeley-style close and *AT&T style close* refer to the position of a tape after a close operation (in relation to a tape mark). One style positions the tape logically before a tape mark and the other after it. To establish the correct position for the next tape operation, applications must assume the tape's position after a close. Some operating systems allow tape devices to be configured with either type of close. NetBackup assumes Berkeley-style close on HP-UX systems.

Fast-tape positioning (locate-block)

HP-UX supports locate-block for most drive types for Fast Wide GSC SCSI adapters. For a list of drive types that are supported, see the Symantec support Web site.

NetBackup uses the locate-block command by default if a pass-through path is configured. See “[Pass-through paths for tape drives](#)” on page 57.

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

```
touch /usr/opensv/volmgr/database/NO_LOCATEBLOCK
```

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

Disabling SPC-2 SCSI reserve

In a shared drive environment, you must disable SPC-2 SCSI reserve and release in HP-UX. If you do not, conflicts occur between the operating system and NetBackup.

By default, NetBackup uses SPC-2 SCSI reserve and release for tape drive reservations in shared drive environments. Alternatively, you can use SCSI persistent reserve for shared tape drive reservations in NetBackup. The NetBackup Shared Storage Option provides shared drive functionality in NetBackup.

However, to use SCSI reservations in NetBackup, you must disable SPC-2 SCSI reserve and release in HP-UX.

Symantec recommends that you use the SAM utility to disable SPC-2 SCSI reserve and release.

To disable SPC-2 SCSI reserve in HP-UX

- 1 Set the kernel parameter `st_ats_enabled` to 0 (zero).
- 2 Reboot the system.

For more information about NetBackup and SCSI reservations, see the following:

- The description of the **Enable SCSI Reserve** Media host property in the following:
 - *The NetBackup Administrator's Guide for UNIX and Linux, Volume I*
 - *The NetBackup Administrator's Guide for Windows, Volume I*
- The “How NetBackup reserves drives” topic in the following:
 - *The NetBackup Administrator's Guide for UNIX and Linux, Volume II*
 - *The NetBackup Administrator's Guide for Windows, Volume II*

Pass-through paths for tape drives

Applies to tape drives and optical disk drives.

Although NetBackup requires the `/dev/rmt` device files for drives for configuration, NetBackup uses pass-through device files for drive access. NetBackup automatically creates pass-through device files if the appropriate `/dev/rmt` tape drive device files exist.

NetBackup creates the pass-through device files in the `/dev/sct1` directory. NetBackup does not modify or delete any existing pass-through paths.

NetBackup does not detect the type of adapter cards that are installed in the system. Therefore, NetBackup creates pass-through paths for tape drives connected to the adapter cards that do not support pass through. These pass-through paths do not cause problems.

Although NetBackup uses the pass-through device files during tape drive operations, you specify the `/dev/rmt` device files if you configure drives manually in NetBackup. NetBackup then uses the pass-through device file automatically.

Usually, you do not have to create pass-through paths for drives. However, instructions to do so are provided for reference (see “[Enabling HP-UX pass-through paths](#)” on page 57).

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

Enabling HP-UX pass-through paths

Usually, NetBackup creates pass-through paths for tape drives automatically. However, you can create them manually. The following example shows how to create the pass-through device files.

Example of how to create a tape drive pass-through device file

The robotic control for an ADIC Scalar 100 library is on a SCSI bus with an instance number of 7. The SCSI ID is 2, and the LUN is 0. The robotic control for an 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 has a SCSI ID of 0 and a LUN of 0. The other has a SCSI ID of 1 and a LUN of 0.

The IBM library contains 2 IBM Ultrium LTO drives. One has a SCSI ID of 4 and a LUN of 0. The other has a SCSI ID of 5 and a LUN of 0.

To create pass-through tape drive device files

- 1 Determine the devices that are attached to the SCSI bus by using the `ioscan -f` command:

```
ioscan -f
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 you configure IBM tape drives on HP-UX. Configure `atdd` and BEST device paths according to the IBM driver documentation. Do not configure `atdd` for robotic control of IBM robots. For the latest recommended `atdd` driver version from IBM, check the Symantec support Web site.

- 2 Create the pass-through device files for the tape drives as follows:

```
cd /dev/sctl
/usr/sbin/mknod c7t010 c 203 0x070000
/usr/sbin/mknod c7t110 c 203 0x071000
/usr/sbin/mknod c7t410 c 203 0x074000
/usr/sbin/mknod c7t510 c 203 0x075000
```

Note: When you use the `mknod` command for tape drives, the target is the SCSI ID of the tape drive. It is *not* the SCSI ID of the robotic control.

These commands create the following pass-through device files.

```
/dev/sctl/c7t010
/dev/sctl/c7t110
/dev/sctl/c7t410
/dev/sctl/c7t510
```

Although the pass-through device files for tape drives are used during NetBackup operation, they are not used during NetBackup configuration. During NetBackup tape drive configuration, use the following device files to configure the tape drives.

```
/dev/rmt/c7t0d0BESTnb
/dev/rmt/c7t1d0BESTnb
```

```
/dev/rmt/c7t4d0BESTnb
/dev/rmt/c7t5d0BESTnb
```

Cautions for the HP-UX EMS Tape Device Monitor

This topic is a NetBackup Enterprise Server topic.

You should configure the Tape Device Monitor (`dm_stape`) so it does *not* run on HP-UX hosts in a SAN configuration. The Tape Device Monitor is a component of the Event Monitoring System (EMS). The EMS service periodically polls the tape devices to monitor their conditions. When a server polls the devices while another server uses a tape device, backup operations may time out and fail.

You can avoid the situation in either of the following ways:

- To disable EMS completely, run the HP-UX Hardware Monitoring Request Manager and select (K) kill (disable) Monitoring.
 Invoke the Hardware Monitoring Request Manager by using the `/etc/opt/resmon/lbin/monconfig` command.
- To configure EMS so it does not log any events or poll devices, set the `POLL_INTERVAL` value to 0 (zero). The `POLL_INTERVAL` parameter is in the following HP-UX configuration file:

```
/var/stm/config/tools/monitor/dm_stape.cfg
EMS runs but does not send any SCSI commands.
```

Configuring optical disk drives

When you add optical disk drives to NetBackup, 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#t#d0
```

Where:

- `c#` is the instance number of the interface card to which the device is attached. The instance value is displayed in `ioscan` output under the column I of the `ext_bus` entry for the card.
- `t#` is the address of the device on the interface (that 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.

To determine the bus instance number, use the `ioscan` command as follows:

```
ioscan -C ext_bus -f
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
```

Then, to determine the SCSI ID of the optical drives, use the `ioscan` command as follows:

```
ioscan -C disk -f
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 that two optical disk drives are at SCSI IDs 1 and 2 as shown in the previous `ioscan disk` example output. These drives are on bus 56/52, which as shown in the previous `ioscan ext_bus` example is instance 0.

The following are the character device file paths for the optical drives:

- Target 1: `/dev/rdisk/c0t1d0`
- Target 2: `/dev/rdisk/c0t2d0`

Using the NetBackup Device Configuration Wizard

The NetBackup Device Configuration Wizard can discover and automatically configure the optical disk drives that have a `/dev/sctl` SCSI pass-through device file.

For more information about pass-through paths for drives, see “[Pass-through paths for tape drives](#)” on page 57.

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

Configuring SAN clients

NetBackup SAN clients use tape drivers and SCSI pass-through methods for Fibre Transport traffic to NetBackup FT media servers. On HP-UX systems, NetBackup SAN clients require the `sctl` pass-through driver and pass-through tape drive device files.

If the `sctl` driver is not the default pass-through driver on your system, install and configure the `sctl` driver. For more information, see the HP-UX `scsi_ctl(7)` man page.

If the `sctl` driver is installed, by default HP-UX creates the `/dev/rmt` tape drive device files when the system is booted. (The NetBackup FT media server must be active and the SAN must be zoned correctly.) NetBackup automatically creates

the required `/dev/sctl` pass-through device files from the `/dev/rmt` tape drive device files.

The media server FT devices appear as ARCHIVE Python tape devices during SCSI inquiry on the SAN client. However, they are not tape devices and do not appear as tape devices in NetBackup device discovery.

Errors when more than 10 NetBackup jobs are active

Applies to HP PA-RISC systems only.

If a NetBackup master server resides on an HP-UX PA-RISC host and more than 10 NetBackup jobs are active, additional jobs may fail. The NetBackup status code is 81 (the NetBackup volume manager daemon (`vmcd`) is not active).

This error indicates an operating system problem, not a NetBackup problem. The number of pending undo operations on a semaphore exceed the operating system limit. These errors continue to occur until fewer than 10 jobs are active.

To resolve this OS limitation, Symantec recommends that you modify the HP-UX kernel `semnmu` parameter. Increase the value by at least the number of jobs greater than 10 that you want active concurrently. Symantec recommends at least 50 for the value. (The default value for `semnmu` is 30.)

Symantec recommends that you use the HP System Management Homepage (SMH) to change the value of `semnmu` to 50. A reboot is necessary for the changes to take effect. For information about the SMH utility, see the HP-UX documentation.

(The HP-UX System Administration Manager (SAM) utility is deprecated in HP-UX 11i V3 release.)

Command summary

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

```
ioscan -C class -f
```

Shows the information about the physical interfaces. Numeric information is displayed in decimal. `class` 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.

```
mkknod /dev/spt/cCARDtTARGETlLUN c Major 0xIITL00
```

Creates the device files for SCSI robotic or tape drive controls, where:

- *CARD* is the card instance number of the adapter.
- *TARGET* is the SCSI ID of the robotic control.
- *LUN* is the SCSI logical unit number (LUN) of the robot.
- *Major* is the character major number (from the `lsdev` command).
- *II* are two hexadecimal digits that represent the card instance number.
- *T* is a hexadecimal digit that represents the SCSI ID of robotic control.
- *L* is a hexadecimal digit that represents the SCSI LUN of the robotic control.

```
lsdev -d driver
```

Displays the information about the SCSI robotic control drivers. *driver* is either `sctl` or `spt`.

```
mksf -C tape -H hw-path -b BEST -u -n
```

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

Linux

This chapter explains how to configure drivers and device files to use storage devices with NetBackup on enterprise Linux systems on Intel platforms.

After you configure the hardware, add the robots and the drives to NetBackup.

The major topics are as follows:

- [“Before you start”](#) on page 64
- [“Using the pass-through driver”](#) on page 64
- [“Verifying the Linux drivers”](#) on page 65
- [“Configuring robotic control device files”](#) on page 65
- [“Configuring tape drive device files”](#) on page 67
- [“The Linux 2.4 kernel and the make_scsi_dev script”](#) on page 68
- [“Verifying the device configuration”](#) on page 69
- [“Configuring SAN clients”](#) on page 70
- [“Advanced topics”](#) on page 70
- [“Utilities to test SCSI devices”](#) on page 72
- [“Command summary”](#) on page 72

Before you start

Observe the following important points when you configure the operating system:

- Verify that NetBackup supports your server platform and devices. The Symantec support Web site contains server platform compatibility information. For the compatibility information, see the Compatibility List for NetBackup Server or NetBackup Enterprise Server. The following is the URL:
`http://entsupport.symantec.com`
- For SCSI controlled libraries, NetBackup issues SCSI commands to the robotic devices. For NetBackup to function correctly, the properly named device files must exist. For more information, see:
 - “[Configuring robotic control device files](#)” on page 65
 - “[Configuring tape drive device files](#)” on page 67
- Verify that an 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 and SCSI generic support.
 - Probe all LUNs on each SCSI device and enable the SCSI low-level driver for the HBA.
 - Enable multi-LUN support for the kernel according to the Linux documentation.
- Linux kernels earlier than 2.4.15 do not support 16-byte SCSI commands. Therefore, HBAs cannot support WORM media for either LTO-3 or SDLT drives. To override this limitation, create a touch file as follows:
`touch /usr/openv/volmgr/database/SIXTEEN_BYTE_CDB`
- Multipath configurations (multiple paths to robots and drives) are supported only with the following:
 - The 2.6 kernel or later
 - Native path (`/dev/nstx`, `/dev/sgx`)
 - The `sysfs` file system that is mounted on `/sys`

Using the pass-through driver

For full feature support, NetBackup requires the SCSI generic (sg) pass-through driver and SCSI pass-through device paths.

To verify that the pass-through driver is installed, see “[Verifying the Linux drivers](#)” on page 65.

To create pass-through robotic device files, see “[Configuring robotic control device files](#)” on page 65.

To create pass-through tape drive device files, see “[Configuring tape drive device files](#)” on page 67.

Verifying the Linux drivers

To use SCSI tape drives and robotic libraries, the following drivers must be configured in the kernel or loaded as modules:

- Linux SCSI generic (sg) driver. This driver allows pass-through commands to SCSI tape drives and control of robotic devices.
- SCSI tape (st) driver. This driver allows the use of SCSI tape drives.
- Standard SCSI driver.
- SCSI-adaptor driver.

Verify that the drivers are installed and loaded in the kernel. You can use the `/sbin/lsmmod` command to verify that the `st` and the `sg` drivers 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 the `sg` and the `st` modules available for loading. The modules are loaded as needed. Also, you can load these modules if they are not in the kernel. Use the following commands:

```
/sbin/modprobe st  
/sbin/modprobe sg
```

Configuring robotic control device files

NetBackup uses device files to configure robotic control for SCSI devices. (A robotic device in a library moves the media between storage slots and the drives in the library.) NetBackup supports SCSI control and API control of robotic devices. SCSI control includes Fibre Channel Protocol (FCP), which is SCSI over Fibre Channel.

How you configure SCSI control depends on the Linux kernel version. For more information, see:

- “[Configuring 2.4 kernel SCSI robotic control device file](#)” on page 66
- “[Configuring 2.6 kernel SCSI robotic control device paths](#)” on page 66

To configure API control over a LAN, see:

- “[Sun StorageTek ACSLS robots](#)” on page 155
- “[IBM Automated Tape Library \(ATL\)](#)” on page 137
- “[ADIC Automated Media Library \(AML\)](#)” on page 123

Configuring 2.4 kernel SCSI robotic control device file

For the Linux 2.4 kernel, NetBackup requires robotic control device files in a `/dev/sg` directory.

The NetBackup `make_scsi_dev` script creates the required device files. For more information about what the script does, see “[The Linux 2.4 kernel and the make_scsi_dev script](#)” on page 68.

If the `/dev/sgx` files that the `make_scsi_dev` script requires do not exist, the script cannot create the required device files. You must create the `/dev/sgx` files and then run the `make_scsi_dev` script.

A library may have more than one robotic device. Each robotic device requires a device file.

To create Linux 2.4 kernel robotic control device files

- 1 For each robotic control device that does not have a `/dev/sgx` file, create one. To do so, run the `mknod` command as in the following example (`x` is a decimal number from 0 to 255):

```
mknod /dev/sgx c 21 x
```

For more information, see the Linux documentation.

- 2 Run the following NetBackup script:

```
/usr/openv/volmgr/bin/make_scsi_dev
```

The following are examples of robotic control device files:

```
h10c0t110
```

```
h25c0t010
```

If you use device discovery in NetBackup, NetBackup looks for robotic control device files in the `/dev/sg` directory. NetBackup discovers the robotic control device files (and hence the devices) automatically. Alternatively, if you add a robot manually in NetBackup, you must enter the pathname to the device file for that robotic device.

Configuring 2.6 kernel SCSI robotic control device paths

The `sg` driver provides robotic control, which includes a device file for each device in the system. These device files have the format `/dev/sgx`, where `x` is a decimal number from 0 to 255. Linux should create the device files

automatically. If the device files do not exist, see the Linux documentation for information about how to create them.

If you use device discovery in NetBackup, NetBackup looks for `/dev/sgx` robotic control device files. NetBackup discovers the robotic control device files (and hence the devices) automatically. Alternatively, if you add a robot manually in NetBackup, you must enter the pathname to the device file for that robotic device.

The NetBackup `avrd` daemon establishes a default tape driver operating mode. If the operator changes the default mode, NetBackup may not read and write tapes correctly, which results in data loss.

Configuring tape drive device files

By default, NetBackup uses no rewind device files.

How you configure SCSI tape drives depends on the Linux kernel version. For more information, see:

- [“Creating 2.4 kernel tape drive device files”](#) on page 67
- [“Configuring 2.6 kernel tape drive device files”](#) on page 68

Creating 2.4 kernel tape drive device files

For the Linux 2.4 kernel, NetBackup uses the `st` driver for normal tape operations such as writes and uses the `sg` driver for pass-through commands. Therefore, NetBackup requires tape drive device files in a `/dev/st` directory and a `/dev/sg` directory.

The NetBackup `make_scsi_dev` script creates the required device files. For more information about what the script does, see [“The Linux 2.4 kernel and the `make_scsi_dev` script”](#) on page 68.

If the `/dev/sgx` files that the `make_scsi_dev` script requires do not exist, the script cannot create the required device files. You must create the `/dev/sgx` files and then run the `make_scsi_dev` script.

To create Linux 2.4 kernel tape drive device files

- 1 For each tape drive that does not have a `/dev/sgx` file, create one. To do so, run the `mknod` command as in the following example (*x* is a decimal number from 0 to 255):

```
mknod /dev/sgx c 21 x
```

For more information, see the Linux documentation.

You do not have to make `st` nodes.

- 2 Run the following NetBackup script:

```
/usr/opensv/volmgr/bin/make_scsi_dev
```

The following are examples of tape drive device files:

```
nh10c0t210
```

```
nh10c0t310
```

If you use device discovery in NetBackup, NetBackup looks for tape drive device files in the `/dev/st` directory. NetBackup discovers the device files (and hence the devices) automatically. Alternatively, if you add a drive manually in NetBackup, you must enter the pathname to the device file for that drive. Given the `/dev/st` device file, NetBackup automatically uses the appropriate `/st/sg` device file for pass-through commands.

Configuring 2.6 kernel tape drive device files

For tape drive device files, NetBackup uses only the `/dev/nstx` files (`n` indicates the no rewind device file). The Linux driver should create the device files automatically. If the device files do not exist, see the Linux documentation for information about how to create them.

If you use device discovery in NetBackup, NetBackup looks for `/dev/nstx` device files. NetBackup discovers the device files (and hence the devices) automatically. Alternatively, if you add a drive manually in NetBackup, you must enter the pathname to the device file for that drive.

The Linux 2.4 kernel and the `make_scsi_dev` script

For the Linux 2.4 kernel, the NetBackup `make_scsi_dev` script creates the required device files when you install NetBackup (and when the system is booted). The script does the following:

- Obtains the device file output that the `sg` and the `st` drivers generate (the `/dev/sg*` and `/dev/st*` output).
- Creates the `/dev/sg` and `/dev/st` directories.
- Creates the device files for each robotic device and tape device in the format that NetBackup requires. Places the device files in the `/dev/sg` and `/dev/st` directories.
- Establishes a default tape driver operating mode. If the operator changes the default mode, NetBackup may not read and write tapes correctly, which results in data loss.

Most importantly, never set `MT_ST_ASYNC_WRITES` or `MT_ST_SYSV` to the value one and never set `MTSETBLK` to a nonzero value.

The following are the formats of the device file names:

- Robotic control device files: `hHOSTcCHANNELtTARGETlLUN`

- Tape drive device files: `nhHOSTcCHANNELtTARGETlLUN`

Where:

- `n` is the no rewind on close device file (tape drive device files only)
- `HOST` is the host bus adaptor
- `CHANNEL` is channel
- `TARGET` is the target ID
- `LUN` is the logical unit number

The following are examples of robotic control device files:

```
h10c0t110  
h25c0t010
```

The following are examples of tape drive no rewind device files:

```
nh10c0t210  
nh10c0t310
```

Note: Do not interfere with the execution of `make_scsi_dev` at system boot (the `S77netbackup` startup script calls it).

Verifying the device configuration

The `/proc/scsi/scsi` file shows all of the devices that the SCSI driver detects. 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 that is displayed should be similar to the following:

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 detects the SCSI devices, NetBackup can discover them.

Configuring SAN clients

SAN clients use tape drivers and SCSI pass-through methods for Fibre Transport traffic to NetBackup FT media servers. Linux SAN clients require the SCSI Generic (sg) driver and pass-through tape drive device files.

To verify that the driver is installed, see [“Verifying the Linux drivers”](#) on page 65.

Also, by default Linux does not add generic SCSI device files above LUN 0. Therefore, you may have to modify the `/etc/rc.local` file to scan LUN 1 and higher. The following example `/etc/rc.local` file excerpt shows LUN 1, targets 0-7 on Controllers 0-2. Your requirements may vary. Note that the last line is the `MAKEDEV` command, which makes the required device files.

```
# Add the troublesome device on LUN 1 for the FT server
echo "scsi add-single-device 0 0 0 1" > /proc/scsi/scsi
echo "scsi add-single-device 0 0 1 1" > /proc/scsi/scsi
echo "scsi add-single-device 0 0 2 1" > /proc/scsi/scsi
echo "scsi add-single-device 0 0 3 1" > /proc/scsi/scsi
echo "scsi add-single-device 0 0 4 1" > /proc/scsi/scsi
echo "scsi add-single-device 0 0 5 1" > /proc/scsi/scsi
echo "scsi add-single-device 0 0 6 1" > /proc/scsi/scsi
echo "scsi add-single-device 0 0 7 1" > /proc/scsi/scsi
echo "scsi add-single-device 1 0 0 1" > /proc/scsi/scsi
echo "scsi add-single-device 1 0 1 1" > /proc/scsi/scsi
echo "scsi add-single-device 1 0 2 1" > /proc/scsi/scsi
echo "scsi add-single-device 1 0 3 1" > /proc/scsi/scsi
echo "scsi add-single-device 1 0 4 1" > /proc/scsi/scsi
echo "scsi add-single-device 1 0 5 1" > /proc/scsi/scsi
echo "scsi add-single-device 1 0 6 1" > /proc/scsi/scsi
echo "scsi add-single-device 1 0 7 1" > /proc/scsi/scsi
echo "scsi add-single-device 2 0 0 1" > /proc/scsi/scsi
echo "scsi add-single-device 2 0 1 1" > /proc/scsi/scsi
echo "scsi add-single-device 2 0 2 1" > /proc/scsi/scsi
echo "scsi add-single-device 2 0 3 1" > /proc/scsi/scsi
echo "scsi add-single-device 2 0 4 1" > /proc/scsi/scsi
echo "scsi add-single-device 2 0 5 1" > /proc/scsi/scsi
echo "scsi add-single-device 2 0 6 1" > /proc/scsi/scsi
echo "scsi add-single-device 2 0 7 1" > /proc/scsi/scsi
/dev/MAKEDEV sg
```

The media server FT devices appear as ARCHIVE Python tape devices during SCSI inquiry on the SAN client. However, they are not tape devices and do not appear as tape devices in NetBackup device discovery.

Advanced topics

See 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. Because NetBackup uses only one minor number, you can modify the driver to support up to:

- 64 tape devices (with four minor device numbers)
- 128 tape devices (with two minor device numbers)

Modify the `ST_NBR_MODE_BITS` parameter in the `st.h` file; use a value from [Table 4-1](#). The `st.h` file resides in the `/drivers/scsi` directory.

Table 4-1 `st.h` `ST_NBR_MODE_BITS` values

Number of tape drives to support	Use this value for <code>ST_NBR_MODE_BITS</code>
64	1
128	0

Improving performance

Internal `st` tape driver buffers have a default size of 32K. You may improve performance if you set those buffers to match the default block size that the NetBackup `bptm` process uses. The default block size for `bptm` is 64K.

Modify the `ST_BUFFER_BLOCKS` parameter in the `st_options.h` file; set the value to 64.

Depending on the available system memory, you also may need to reduce the number of buffers to allow. To do so, modify the `ST_MAX_BUFFERS` parameter in the `st_options.h` file. The default value is 4.

To incorporate these source changes into your system, follow the operating system guidelines.

Using the debug mode

You can enable debug mode for the `st` tape driver. This mode echoes each command and its result to the system log. For details, see the Linux documentation.

Using an Emulex HBA

If NetBackup cannot mount tapes when an Emulex Fibre Channel HBA is installed, you may have 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 set to one.

If you use a `/usr/opensv/volmgr/AVRD_DEBUG` touch file on a system with an Emulex HBA driver, the system log may contain entries similar to the following:

```
Unknown drive error on DRIVENAME (device N, PATH) sense[0] = 0x70,  
sense[1] = 0x0, sensekey = 0x5
```

You can ignore these messages.

Using persistent binding

Use persistent bindings to lock the mappings between the SCSI targets that are reported to Linux and the specific devices. World Wide Port Name (WWPN) binding is often used. If you cannot use binding with the HBA in your configuration, add an `ENABLE_AUTO_PATH_CORRECTION` entry in the `/usr/opensv/volmgr/vm.conf` file on all Linux media servers.

Utilities to test SCSI devices

You can manipulate tape devices with the system `mt` command. For more information, see the `mt(1)` man page.

You can use the NetBackup `robtest` utility to test robots. The `robtest` utility resides in `/usr/opensv/volmgr/bin`.

A set of SCSI utilities are available from the Linux SCSI Generic (sg) driver home page.

Command summary

The following is a summary of commands that were used in this chapter:

```
/sbin/lsmmod
```

List the modules that are loaded.

```
/sbin/modprobe
```

Install loadable kernel modules.

```
/usr/sbin/reboot
```

Stop and restart the system.

```
/bin/mknod /dev/sgN c 21 N
```

Create SCSI generic device files. Where *N* is a decimal number from 0 to 255.

```
/usr/opensv/volmgr/bin/make_scsi_dev
```

Create NetBackup device files for Linux distributions that run the 2.4 kernel. For Linux distributions that run the 2.6 kernel, this command is not used.

Solaris

This chapter explains how to configure drivers and device files to use storage devices with NetBackup on Solaris systems.

After you configure the hardware, add the robots and the drives to NetBackup.

The major topics are as follows:

- [“Before you start”](#) on page 74
- [“Unloading drivers”](#) on page 75
- [“The NetBackup SCSI pass-through driver sg”](#) on page 75
- [“Special configuration for the Sun StorEdge Network Foundation HBA driver”](#) on page 76
- [“Configuring Fibre Channel HBA drivers”](#) on page 77
- [“Configuring the sg and the st drivers”](#) on page 77
- [“Configuring robotic controls”](#) on page 82
- [“Configuring tape drives”](#) on page 84
- [“Configuring optical disk drives”](#) on page 87
- [“Configuring SAN clients”](#) on page 89
- [“Command summary”](#) on page 90

Before you start

Observe the following points when you configure the operating system:

- Verify that NetBackup supports your server platform and devices. The Symantec support Web site contains server platform compatibility information. For the compatibility information, see the Compatibility List for NetBackup Server or NetBackup Enterprise Server. The following is the URL:

`http://entsupport.symantec.com`

- For SCSI controlled libraries, NetBackup issues SCSI commands to the robotic devices. For NetBackup to function correctly, the properly named device files must exist, as follows:
 - NetBackup installs its own pass-through driver, the `sg` driver SCSI generic. You must configure this driver properly to create device files for any device NetBackup uses.
 - The Solaris tape and disk driver interfaces also create a device file for each tape or optical disk drive device. These device files must exist for all read or write I/O capability.

For more information, see:

- “[Configuring robotic controls](#)” on page 82,
- “[Configuring optical disk drives](#)” on page 87
- Verify that the Solaris `st` driver is installed.
- Verify that the devices are configured correctly. To do so, use the Solaris `mt` command and the NetBackup `/usr/opensv/volmgr/bin/sgscan` utility. For the NetBackup shared storage options, ensure that the SAN and storage devices are configured correctly.
- When you configure devices, you should attach all peripherals and reboot the system with the reconfigure option (`boot -r` or `reboot -- -r`).
- If you remove or replace adapter cards, remove all device files associated with that adapter card.
- If you use the Automated Cartridge System (ACS) robotic software, you must ensure that the SunOS BSD Source Compatibility Package is installed. The package is required so that the ACS software can use the shared libraries in `/usr/ucblib`.
- Sun systems with parallel SCSI host bus adapters do not support 16-byte SCSI commands on any devices that are attached to these HBAs. Therefore, those HBAs do not support WORM media. To override this limitation, create a touch file as follows:

```
touch /usr/opensv/volmgr/database/SIXTEEN_BYTE_CDB
```

Unloading drivers

When system memory is limited, Solaris unloads unused drivers from memory and reloads drivers as needed. Tape drivers are often unloaded because they are used less often than disk drivers. When the driver loads and unloads occur may cause problems. The drivers are the `st` driver (from Sun), the `sg` driver (from Symantec), and Fibre Channel drivers.

These problems can range from an SCSI bus not able to detect a device to system panics.

Symantec recommends that you add the following `forceload` statements to the `/etc/system` file. These statements prevent Solaris from unloading the `st` and the `sg` drivers 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:

```
forceload: drv/fcaw
```

The NetBackup SCSI pass-through driver `sg`

NetBackup provides its own driver to communicate with SCSI-controlled robotic peripherals. This driver is called the `SCSA` (generic SCSI pass-through driver), also referred to as the `sg` driver.

Note: Because NetBackup uses its own pass-through driver, NetBackup does not support the Solaris `sgen` SCSI pass-through driver.

For full feature support, NetBackup requires the `sg` driver and SCSI pass-through device paths.

To determine if a `sg` driver is loaded

- ◆ Invoke the following command:

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

If the driver is loaded, output includes a line similar to the following:

```
141 fc580000 2d8c 116 1 sg (SCSA Generic Revision: 3.5e)
```

To install the `sg` driver

- ◆ Invoke the following command:

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

After you install the driver, you do not have to reboot the system or run the `sg.install` command during or after each system boot.

To remove the sg driver

- ◆ Invoke the following command:

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

To reinstall the sg driver

- 1 Remove the `sg.conf` file, as follows:

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

- 2 Install the `sg` driver, as follows:

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

Special configuration for the Sun StorEdge Network Foundation HBA driver

When you configure the `sg` driver, it binds the StorEdge Network Foundation host bus adapter World Wide Port Names for use by the `sg` driver. The configuration process is described in [“Configuring the `sg` and the `st` drivers”](#) on page 77.

The configuration process uses the Solaris `luxadm` command to probe for HBAs that are installed in the system. Ensure that the `luxadm` command is installed and in the shell path.

Before you configure the `sg` and the `st` drivers, ensure that all devices are powered on and connected to the HBA.

For procedures, see [“Configuring the `sg` and the `st` drivers”](#) on page 77.

To determine if a host contains a StorEdge Network Foundation HBA, you can run the following command:

```
/usr/opensv/volmgr/bin/sgscan
```

If the script detects a StorEdge Network Foundation HBA, it 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/opensv/volmgr/NetBackup_DeviceConfig_Guide.txt topic
#   "Special configuration for Sun StorEdge Network Foundation
#   HBA/Driver" for information on how to use sg.build and
#   sg.install to configure these devices
```

Each time you add or remove a device, you should configure the `sg` and the `st` drivers again.

Configuring Fibre Channel HBA drivers

For Fibre Channel HBAs other than Sun StorEdge Network Foundation, you must bind the devices to specific target IDs on the NetBackup host. When you bind devices to targets, the target ID does not change after a system reboot or a Fibre Channel configuration change.

In some instances, Symantec products are configured to use a specific target ID. If you change the ID, the products fail until you configure the ID correctly.

How you bind devices to targets is vendor and product specific. For information about how to modify the HBA configuration files to bind devices to targets, see the documentation for the HBA.

The binding may be based on the following:

- Fibre Channel World Wide Port Name (WWPN)
- World Wide Node Name (WWNN)
- The destination target ID and LUN

After you bind the devices to target IDs, continue with the Solaris configuration in the same manner as for parallel SCSI installations. For procedures, see [“Configuring the sg and the st drivers”](#) on page 77.

Each time you add or remove a device, you must update the bindings and then configure the sg and the st drivers again.

Configuring the sg and the st drivers

You must configure the Sun st driver for use with the devices attached to each Solaris host that functions as a NetBackup media server.

You may have to configure the sg driver, as follows:

- If the host requires more SCSI addresses than targets 0 through 6 and LUNs 0 and 1, you must configure the sg driver. (By default, NetBackup configures the sg driver for SCSI targets 0 through 6 and LUNs 0 and 1.)

The two most common reasons LUNs greater than 1 are required are for virtual tape libraries and SCSI to FC bridges. These devices use one target ID with multiple LUNs for the devices in or connected to them.

- If the host contains a Fibre Channel Protocol (FCP) host bus adapter (HBA), you must configure the sg driver. FCP HBAs include StorEdge Network Foundation HBAs.

If the host requires only SCSI targets 0 through 6 and LUNs 0 and 1, you do not have to configure the sg driver. However, you still must complete the configuration procedure so that the st driver is configured and the device files are created.

When you install NetBackup server software, NetBackup configures the `sg` driver for SCSI targets 0 through 6 and LUNs 0 and 1, as follows:

- Installs and loads the `sg` driver.
- Creates the `/kernel/drv/sg.conf` file.
- Creates the `/dev/sg` directory and `sg` nodes.
- Adds the entries to the `/etc/devlink.tab` file.

NetBackup also creates the entries that you can add to the `st.conf` file. Therefore, you can add the entries after you install NetBackup and before you configure devices in NetBackup. (When you install NetBackup server software, you should examine the installation trace to verify that the `sg` driver was configured correctly.)

The NetBackup `sg.build` script in the following procedure creates the following files:

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

For examples of the files, see:

- “[st.conf file example](#)” on page 80
- “[sg.conf file example](#)” on page 80
- “[sg.links file example](#)” on page 81

Each time you add or remove a device, you should configure the `sg` and the `st` drivers again.

To configure the `sg` and the `st` drivers

Note: Perform [step 1](#) only if: the host requires SCSI addresses greater than targets 0 through 6 and LUNs 0 and 1 or the host contains an FCP HBA.

- 1 Invoke the following two commands to run the `sg.build` script to create target IDs and LUNs:

```
cd /usr/opensv/volmgr/bin/driver
/usr/opensv/volmgr/bin/sg.build all -mt target -ml lun
```

The following describes the options:

- The `all` option creates the NetBackup `st.conf`, `sg.conf`, and `sg.links` files and populates them with the appropriate entries.
- The `-mt target` option and argument specifies the maximum target ID that is in use on the SCSI bus (or bound to an FCP HBA). The maximum value is 126. By default, the SCSI initiator target ID of the adapter is 7, so the script does not create entries for target ID 7.

- The `-ml lun` option and argument specifies the maximum number of LUNs that are in use on the SCSI bus (or by an FCP HBA). The maximum value is 255.
- 2 Replace the following seven entries in the `/kernel/drv/st.conf` file with the entries from the `/usr/opensv/volmgr/bin/driver/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;
```

You should make a copy of the `/kernel/drv/st.conf` file before you modify it. Rather than replace the default entries, you can comment them out. To do so, place a `#` character at the beginning of each line of the seven default entries.
 - 3 Reboot the system with the reconfigure option (`boot -r` or `reboot -- -r`). During the boot process, the system probes all targets in the `st.conf` file for devices. It should create device files for all devices it discovers.
 - 4 Verify that the system created the device nodes for all the tape devices by using the following command:

```
ls -l /dev/rmt/*cbn
```

Note: Perform [step 5](#) only if: the host requires SCSI addresses greater than targets 0 through 6 and LUNs 0 and 1 or the host contains an FCP HBA.

- 5 Install the new sg driver configuration by invoking the following two commands:

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

The NetBackup `sg.install` script:
 - Installs and loads the sg driver.
 - Copies the `/usr/opensv/volmgr/bin/driver/sg.conf` file to `/kernel/drv/sg.conf`.
 - Creates the `/dev/sg` directory and nodes.
 - Appends the `/usr/opensv/volmgr/bin/driver/sg.links` file to the `/etc/devlink.tab` file.
- 6 Verify that the sg driver finds all of the robots, tape drives, and optical disk drives.

To configure the devices, see the following:

 - [“Configuring robotic controls”](#) on page 82

- “Configuring tape drives” on page 84
- “Configuring optical disk drives” on page 87

st.conf file example

The following `/usr/opensv/volmgr/bin/driver/st.conf` file example shows targets 0-15 and LUNs 0-7.

```
name="st" class="scsi" target=0 lun=0;
name="st" class="scsi" target=0 lun=1;
name="st" class="scsi" target=0 lun=2;
name="st" class="scsi" target=0 lun=3;
name="st" class="scsi" target=0 lun=4;
name="st" class="scsi" target=0 lun=5;
name="st" class="scsi" target=0 lun=6;
name="st" class="scsi" target=0 lun=7;
name="st" class="scsi" target=1 lun=0;
name="st" class="scsi" target=1 lun=1;
name="st" class="scsi" target=1 lun=2;
.
<entries omitted for brevity>
.
name="st" class="scsi" target=15 lun=5;
name="st" class="scsi" target=15 lun=6;
name="st" class="scsi" target=15 lun=7;
```

sg.conf file example

The following `/usr/opensv/volmgr/bin/driver/sg.conf` file example shows targets 0-15 and LUNs 0-8. It also includes target entries for three StorEdge Network Foundation HBA ports.

The `sg.build -mt` option does not affect FCP targets, but the `-ml` option does. The Solaris `luxadm` command detected three ports (identified by their World Wide Names). Therefore, the `sg.build` script created entries for LUNs 0 through 7 for those three ports.

```
name="sg" class="scsi" target=0 lun=0;
name="sg" class="scsi" target=0 lun=1;
name="sg" class="scsi" target=0 lun=2;
name="sg" class="scsi" target=0 lun=3;
name="sg" class="scsi" target=0 lun=4;
name="sg" class="scsi" target=0 lun=5;
name="sg" class="scsi" target=0 lun=6;
name="sg" class="scsi" target=0 lun=7;
name="sg" class="scsi" target=1 lun=0;
name="sg" class="scsi" target=1 lun=1;
name="sg" class="scsi" target=1 lun=2;
.
<entries omitted for brevity>
.
```



```

name="sg" class="scsi" target=15 lun=5;
name="sg" class="scsi" target=15 lun=6;
name="sg" class="scsi" target=15 lun=7;

name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53c3";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53c3";
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53c6";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53c6";
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53c9";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53c9";
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53cc";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53cc";
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53b9";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53b9";
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53c3";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53c3";
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53c6";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53c6";
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53c9";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53c9";
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53cc";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53cc";
name="sg" parent="fp" target=0 lun=0 fc-port-wwn="500104f0008d53b9";
name="sg" parent="fp" target=0 lun=1 fc-port-wwn="500104f0008d53b9";

```

sg.links file example

The following `/usr/opensv/volmgr/bin/driver/sg.links` file example shows targets 0-15 and LUNs 0-7. It also includes entries for three StorEdge Network Foundation HBA ports.

The `sg.build -mt` option does not affect FCP targets, but the `-ml` option does. The Solaris `luxadm` command detected three ports (identified by their World Wide Names). Therefore, the `sg.build` script created entries for LUNs 0 through 7 for those three ports.

```

# begin SCSA Generic devlinks file - creates nodes in /dev/sg
type=ddi_pseudo;name=sg;addr=0,0;          sg/c\N0t010
type=ddi_pseudo;name=sg;addr=0,1;          sg/c\N0t011
type=ddi_pseudo;name=sg;addr=0,2;          sg/c\N0t012
type=ddi_pseudo;name=sg;addr=0,3;          sg/c\N0t013
type=ddi_pseudo;name=sg;addr=0,4;          sg/c\N0t014
type=ddi_pseudo;name=sg;addr=0,5;          sg/c\N0t015
type=ddi_pseudo;name=sg;addr=0,6;          sg/c\N0t016
type=ddi_pseudo;name=sg;addr=0,7;          sg/c\N0t017
type=ddi_pseudo;name=sg;addr=1,0;          sg/c\N0t110
type=ddi_pseudo;name=sg;addr=1,1;          sg/c\N0t111
.
<entries omitted for brevity>
.
type=ddi_pseudo;name=sg;addr=f,5;          sg/c\N0t1515
type=ddi_pseudo;name=sg;addr=f,6;          sg/c\N0t1516

```

```

type=ddi_pseudo;name=sg;addr=f,7;          sg/c\N0t1517
type=ddi_pseudo;name=sg;addr=w500104f0008d53c3,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53c3,1;    sg/c\N0t\A111
type=ddi_pseudo;name=sg;addr=w500104f0008d53c6,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53c6,1;    sg/c\N0t\A111
type=ddi_pseudo;name=sg;addr=w500104f0008d53c9,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53c9,1;    sg/c\N0t\A111
type=ddi_pseudo;name=sg;addr=w500104f0008d53cc,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53cc,1;    sg/c\N0t\A111
type=ddi_pseudo;name=sg;addr=w500104f0008d53b9,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53b9,1;    sg/c\N0t\A111
type=ddi_pseudo;name=sg;addr=w500104f0008d53c3,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53c3,1;    sg/c\N0t\A111
type=ddi_pseudo;name=sg;addr=w500104f0008d53c6,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53c6,1;    sg/c\N0t\A111
type=ddi_pseudo;name=sg;addr=w500104f0008d53c9,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53c9,1;    sg/c\N0t\A111
type=ddi_pseudo;name=sg;addr=w500104f0008d53cc,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53cc,1;    sg/c\N0t\A111
type=ddi_pseudo;name=sg;addr=w500104f0008d53b9,0;    sg/c\N0t\A110
type=ddi_pseudo;name=sg;addr=w500104f0008d53b9,1;    sg/c\N0t\A111
# end SCSI devlinks

```

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

Configuring robotic controls

A robotic device in a library moves the media between storage slots and the drives in the library. NetBackup supports SCSI control and API control of robotic devices. You must configure the method of robotic control, as follows:

- To configure SCSI control, see “[Configuring SCSI and FCP robotic controls](#)” on page 82.
- To configure API control over a LAN, see:
 - “[ADIC Automated Media Library \(AML\)](#)” on page 123
 - “[IBM Automated Tape Library \(ATL\)](#)” on page 137
 - “[Sun StorageTek ACSLS robots](#)” on page 155

Configuring SCSI and FCP robotic controls

To communicate with SCSI-controlled robotic peripherals, NetBackup uses the NetBackup SCSI Generic (sg) driver.

Before you configure robotic control, you must install and configure the `sg` driver. Solaris uses the `sg` configuration to create the robotic control device files. For procedures, see:

- “[The NetBackup SCSI pass-through driver `sg`](#)” on page 75
- “[Configuring the `sg` and the `st` drivers](#)” on page 77

If you use device discovery in NetBackup, NetBackup discovers the robotic control device files in the `/dev/sg` directory (and hence the devices) automatically. If you add a robot manually in NetBackup, you must enter the pathname to the device file.

To display the device files that the `sg` driver can use, use the `sgscan` command with the `all` parameter. The word “Changer” in the `sgscan` output identifies robotic control device files.

Examples of SCSI and FCP robotic control device files

The following is an example of `sgscan all` output from a host. The examples refer to this `sgscan` output.

```
# /usr/opensv/volmgr/bin/sgscan all
/dev/sg/c0t6l0: Cdrom: "TOSHIBA XM-5401TASUN4XCD"
/dev/sg/c1tw500104f0008d53b9l0: Changer: "STK      SL500"
/dev/sg/c1tw500104f0008d53c3l0: Tape (/dev/rmt/0): "HP      Ultrium 3-SCSI"
/dev/sg/c1tw500104f0008d53c6l0: Tape (/dev/rmt/1): "HP      Ultrium 3-SCSI"
/dev/sg/c1tw500104f0008d53c9l0: Tape (/dev/rmt/2): "IBM     ULTRIUM-TD3"
/dev/sg/c1tw500104f0008d53cc10: Tape (/dev/rmt/3): "IBM     ULTRIUM-TD3"
/dev/sg/c2t1l0: Changer: "STK      SL500"
/dev/sg/c2t2l0: Tape (/dev/rmt/22): "HP      Ultrium 3-SCSI"
/dev/sg/c2t3l0: Tape (/dev/rmt/10): "HP      Ultrium 3-SCSI"
/dev/sg/c2ta10: Tape (/dev/rmt/18): "IBM     ULTRIUM-TD3"
/dev/sg/c2tb10: Tape (/dev/rmt/19): "IBM     ULTRIUM-TD3"
/dev/sg/c3t0l0: Disk (/dev/rdisk/c1t0d0): "FUJITSU MAV2073RCSUN72G"
/dev/sg/c3t3l0: Disk (/dev/rdisk/c1t3d0): "FUJITSU MAV2073RCSUN72G"
```

You can filter the `sgscan` output for device types by using other `sgscan` options. The following is the `sgscan` usage statement:

```
sgscan [all|basic|changer|disk|tape] [conf] [-v]
```

If you use device discovery in NetBackup, NetBackup discovers the robotic control device files (and hence the devices) automatically. If you add a robot manually in NetBackup, you must enter the pathname to the device file.

Example 1 — StorEdge Network Foundation HBA

The robotic control for a Sun StorEdge Network Foundation HBA attached library is LUN 0 of World Wide Node Name (WWNN) 500104f0008d53b9. Therefore, the following is the device file pathname:

```
/dev/sg/c1tw500104f0008d53b9l0
```

Example 2 — STK SL500

If the SCSI robotic control for an STK SL500 is SCSI ID 1 of adapter 2, the following is the device file pathname:

```
/dev/sg/c2t110
```

Configuring tape drives

NetBackup uses the tape drive device files that support compression, no rewind on close, and Berkeley style close. The device files are in the `/dev/rmt` directory, and they have the following format:

```
/dev/rmt/IDcn
```

Where:

- `ID` is the logical drive number as shown by the `sgscan` command.
- `c` indicates compression.
- `b` indicates Berkeley-style close.
- `n` indicates no rewind on close.

If you use NetBackup device discovery, NetBackup discovers the device files and hence the devices. If you add a tape drive to a NetBackup configuration manually, you must specify the pathname to the device file. NetBackup requires compression, no rewind on close, and Berkeley-style close device files.

To display the tape device files that are configured on your system, use the NetBackup `sgscan` command with the `tape` parameter, as follows:

```
# /usr/opensv/volmgr/bin/sgscan tape
/dev/sg/c1tw500104f0008d53c310: Tape (/dev/rmt/0): "HP      Ultrium 3-SCSI"
/dev/sg/c1tw500104f0008d53c610: Tape (/dev/rmt/1): "HP      Ultrium 3-SCSI"
/dev/sg/c1tw500104f0008d53c910: Tape (/dev/rmt/2): "IBM    ULTRIUM-TD3"
/dev/sg/c1tw500104f0008d53cc10: Tape (/dev/rmt/3): "IBM    ULTRIUM-TD3"
/dev/sg/c2t210: Tape (/dev/rmt/22): "HP    Ultrium 3-SCSI"
/dev/sg/c2t310: Tape (/dev/rmt/10): "HP    Ultrium 3-SCSI"
/dev/sg/c2ta10: Tape (/dev/rmt/18): "IBM   ULTRIUM-TD3"
/dev/sg/c2tb10: Tape (/dev/rmt/19): "IBM   ULTRIUM-TD3"
```

The following are examples of device files to use for compression, Berkeley-style close, and no rewind:

- For the Ultrium3 SCSI drive at LUN 0 of World Wide Node Name (WWNN) 500104f0008d53c3, the device file pathname is:

```
/dev/rmt/0cn
```

- For the HP Ultrium3 SCSI drive at SCSI ID 2 of adapter 2, the device file pathname is:

```
/dev/rmt/22cn
```

You can show all device types by using the `all` option. The output can help you associate tape devices with other SCSI devices that may be configured on the same adapter. The following is the `sgscan` usage statement:

```
sgscan [all|basic|changer|disk|tape] [conf] [-v]
```

Using Berkeley-style close

NetBackup requires Berkeley-style close for tape drives. Therefore, you must specify Berkeley-style close for the tape devices that you configure under NetBackup.

Berkeley-style close and *AT&T style close* refer to the position of a tape after a close operation (in relation to a tape mark). One style positions logically before a tape mark and the other after it. To establish the correct position for the next tape operation, applications must assume the tape's position after a close. Some operating systems allow tape devices to be configured with either type of close.

The letter `b` in the device file names in the `/dev/rmt` directory specifies Berkeley-style close.

No rewind device files

NetBackup requires no rewind on close device files for tape drives.

With no rewind on close, the tape is not rewound after a close operation. It remains in position for the next write operation.

The letter `n` in the device file names in the `/dev/rmt` directory specifies no rewind on close.

Fast-tape positioning (locate-block)

AIT, DLT, Exabyte, DTF, and half-inch tape drives.

To position a tape to a specific block, NetBackup supports the SCSI `locate-block` command. It requires the NetBackup `sg` driver.

NetBackup uses the `locate-block` command by default.

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

```
touch /usr/opensv/volmgr/database/NO_LOCATEBLOCK
```

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

Disabling SPC-2 SCSI reserve

By default, NetBackup uses SPC-2 SCSI reserve and release for tape drive reservations in shared drive environments. The NetBackup Shared Storage Option provides shared drive functionality in NetBackup.

Alternatively, you can use SCSI persistent reserve for shared tape drive reservations in NetBackup, as follows:

- For the tape drives that support SPC-3 Compatible Reservation Handling (CRH), you can use SCSI persistent reserve by enabling it in NetBackup. No special configuration in Solaris is required.
- For the tape drives that do *not* support CRH, you must disable SPC-2 SCSI reserve in Solaris for those drives. After you disable SPC-2 SCSI reserve, you can use persistent reserve by enabling it in NetBackup. If the drive does not support CRH and you do not disable SPC-2 SCSI reserve, access attempts to the drive fail.

To disable SPC-2 SCSI reserve, modify the Solaris `st.conf` file on the NetBackup media server. In the `tape-config-list` section of the `st.conf` file, set the `ST_NO_RESERVE_RELEASE` configuration value (0x20000) in the appropriate data-property-name entry. For example, the following entry disables SCSI reserve and release for all tape drives that use the `DLT7k-data` configuration values:

```
DLT7k-data = 1,0x38,0,0x20000,4,0x82,0x83,0x84,0x85,2;
```

For more information about the `st.conf` file, see the Solaris `st(7D)` man page.

For more information about NetBackup and SCSI reservations, see the following:

- The description of the **Enable SCSI Reserve** Media host property in the following:
 - *The NetBackup Administrator's Guide for UNIX and Linux, Volume I*
 - *The NetBackup Administrator's Guide for Windows, Volume I*
- The “How NetBackup reserves drives” topic in the following:
 - *The NetBackup Administrator's Guide for UNIX and Linux, Volume II*
 - *The NetBackup Administrator's Guide for Windows, Volume II*

Configuring nonstandard tape drives

Solaris includes the device drivers that support most standard devices.

To receive the most current support for devices, you should install the latest Solaris patch for the `st` driver.

However, if you have a device that Solaris does not support, the device manufacturer should provide the software to install and administer the device

properly. In addition, the device vendor should contact Sun Microsystems to add support for the device to Solaris.

For more information about what you need for unsupported devices, contact the device vendor. Also see the Solaris devices and file systems documentation.

Configuring optical disk drives

Available on Solaris SPARC only.

When you add an optical disk drive to a NetBackup configuration manually, you must specify the following device paths:

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

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

- Volume header device:
`/dev/rdisk/cADAPTERtTARGETd0s0`
- Character device:
`/dev/rdisk/cADAPTERtTARGETd0s6`

Where:

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

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

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

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

You can show all device types by using the `all` option. The output can help you associate tape devices with other SCSI devices that may be configured on the same adapter. The following is the `sgscan` usage statement:

```
sgscan [all|basic|changer|disk|tape] [conf] [-v]
```

The following are examples of device files:

- If the optical disk drive connects to SCSI ID 5 of adapter card 0, the following are the device file pathnames:
 - Volume header device: `/dev/rdisk/c0t5d0s0`

- Character device: `/dev/rdisk/c0t5d0s6`
- If the wanted optical disk drive connects to SCSI ID 0 of S bus 1 adapter card 1, the following are the device file pathnames:
 - Volume header device: `/dev/rdisk/c1t0d0s0`
 - Character device: `/dev/rdisk/c1t0d0s6`

Configuring HP optical disk drives

To use stand-alone HP optical disk drives with NetBackup, the `sg` driver must be installed (see “[The NetBackup SCSI pass-through driver sg](#)” on page 75). Solaris also must be configured to recognize the optical drives as disk drives at system boot time.

If you add HP 1.2 GB or equivalent model magneto-optical disk drives, Solaris may not recognize these as disk drives and therefore cannot use them. See “[Setting the HP optical drive type in nonvolatile memory](#)” on page 88 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:

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

Optical disks then work as they did before this Solaris 8 change.

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 add HP 1.2 gigabyte or equivalent model magneto-optical disk drives, the system may not recognize them as disk drives.

The NetBackup `sg` driver must be installed and configured. If it is not already, see:

- “[The NetBackup SCSI pass-through driver sg](#)” on page 75
- “[Configuring the sg and the st drivers](#)” on page 77

To configure Solaris to recognize HP optical drives

- 1 Use the NetBackup `scsi_command` utility to change the device type (stored in the drive’s nonvolatile memory) from optical memory to disk. The format of the command follows.

```
/usr/opensv/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.

Note: Be sure that you specify the device file for the optical disk drive *not* the device file for the robotic control. To determine the correct device file, see “[Configuring SCSI and FCP robotic controls](#)” on page 82.

- 2 Reboot the system with the reconfigure option (`boot -r` or `reboot -- -r`). During the boot process, the kernel SCSI disk (`sd`) driver recognizes the optical drive as a disk drive.

Configuring SAN clients

NetBackup SAN clients use tape drivers and SCSI pass-through methods for Fibre Transport traffic to NetBackup FT media servers. You must configure the Solaris operating system so that it recognizes the FT devices on the NetBackup media servers. To do so, modify the `/kernel/drv/st.conf` file as follows:

- 1 Find the `tape-config-list=` section or create it if it does not exist.
- 2 Add the following line to the `tape-config-list=` section:

```
"ARCHIVE Python", "FT Pipe", "ARCH_04106";
```

An ARCHIVE Python line that *contains* ARCH_04106 may exist in the `st.conf` file already. However, it should begin with a comment character (`#`). If it does not, add a comment character to the beginning of the existing line.

Note: Symantec owns the ARCHIVE brand name and Python product name. Therefore, `st.conf` file changes to Archive Python do not affect an existing tape drive product.

- 3 Find the line that *begins* with ARCH_04106, copy it, and paste it after the `tape-config-list=` line. Delete the comment character (`#`) from the beginning of the line. The following is an example of the line:

```
ARCH_04106 = 1, 0x2C, 0, 0x09639, 4, 0x00, 0x8C, 0x8c, 0x8C, 3;
```

Modify the `/kernel/drv/st.conf` so Solaris discovers devices on two LUNS as follows:

- 1 Find the following line in the `st.conf` file:

```
name="st" class="scsi" target=0 lun=0;
```
- 2 Replace that line and the following lines through target 5 with the following. This modifies the `st.conf` file to include searches on non-zero LUNS.

```
name="st" class="scsi" target=0 lun=0;  
name="st" class="scsi" target=0 lun=1;  
name="st" class="scsi" target=1 lun=0;  
name="st" class="scsi" target=1 lun=1;  
name="st" class="scsi" target=2 lun=0;
```

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

The media server FT devices appear as ARCHIVE Python tape devices during SCSI inquiry on the SAN client. However, they are not tape devices and do not appear as tape devices in NetBackup device discovery.

Command summary

The following is a summary of commands that may be useful when you configure and verify 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/opensv/volmgr/bin/driver/sg.install
```

Installs the `sg` driver or updates the `sg` driver.

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

Uninstalls the `sg` driver. This command usually is not necessary because `sg.install` uninstalls the old driver before it upgrades a driver update.

```
/usr/opensv/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/opensv/volmgr/bin/sgscan all
```

Scans all connected devices with an SCSI inquiry and provides correlation between physical and the logical devices that use all device files in `/dev/sg`.

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

```
/usr/opensv/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. For information about how to determine the logical identifier, see [“Configuring SCSI and FCP robotic controls”](#) on page 82.

```
boot -r or reboot -- -r
```

Reboot the system with the reconfigure option (-r). The kernel's SCSI disk (sd) driver then recognizes the drive as a disk drive during system initialization.

Tru64

This chapter explains how to configure drivers and device files to use storage devices with NetBackup on HP Tru64 systems.

After you configure the hardware, add the robots and the drives to NetBackup.

The major topics are as follows:

- [“Before you start”](#) on page 94
- [“Configuring robotic controls”](#) on page 94
- [“Configuring tape drives”](#) on page 95
- [“Command summary”](#) on page 101

Before you start

Observe the following points when you configure the operating system:

- Verify that NetBackup supports your server platform and devices. The Symantec support Web site contains server platform compatibility information. For the compatibility information, see the Compatibility List for NetBackup Server or NetBackup Enterprise Server. The following is the URL:
`http://entsupport.symantec.com`
- NetBackup issues SCSI pass-through commands to the devices in a configuration. For NetBackup to discover and communicate with connected devices, the properly named device files must exist. For details, see:
 - “[Configuring robotic controls](#)” on page 94
 - “[Configuring tape drives](#)” on page 95The operating system creates all device files automatically.
- Use `/sbin/hwmgpr` to verify that the devices are configured correctly. For the shared storage options, ensure that the operating system detects the devices on the SAN before you install and configure the option.

Configuring robotic controls

A robotic device in a library moves the media between storage slots and the drives in the library. NetBackup supports SCSI control and API control of robotic devices. You must configure the method of robotic control, as follows:

- To configure SCSI control, see “[Configuring SCSI robotic controls](#)” on page 94.
- To configure API control over a LAN, see:
 - “[ADIC Automated Media Library \(AML\)](#)” on page 123
 - “[IBM Automated Tape Library \(ATL\)](#)” on page 137
 - “[Sun StorageTek ACSLS robots](#)” on page 155

Configuring SCSI robotic controls

Read this topic if you plan to use a robotic storage device that is controlled through an SCSI robotic connection. For supported SCSI robots (vendor models), see the Symantec support Web site.

To communicate with SCSI-controlled robotic peripherals, NetBackup uses the SCSI pass-through capability of the media changer driver. The driver is included in Tru64 by default; therefore, you do not have to change the kernel.

Creating SCSI robotic control device files

NetBackup requires that device files from the `/dev/changer` directory are used to configure SCSI robotic control. The operating system creates the device files at boot time.

To display the 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

The `hwmgr` command output shows an HP C6280 robot that is connected on bus 2 at SCSI ID 3, LUN 0. The corresponding device file is `/dev/changer/mc0`. Specify this file and path when you configure the device in NetBackup.

Configuring tape drives

A standard tape drive is one that is defined in the `ddr.dbase` database.

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

Fast-tape positioning (locate-block)

For most drive types, NetBackup 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/opensv/volmgr/database/NO_LOCATEBLOCK
```

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

Adding standard tape drives

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

`/dev/ntape/tapeID_dDENSITY`

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 the 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

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

After you add a density suffix of `_d1` (for high density), the device file name is `/dev/ntape/tape6_d1`. Specify this file and path when you configure the device in NetBackup.

Adding nonstandard tape drives

A nonstandard tape drive is one that the operating system does not recognize. If the drive is not defined in the `ddr.dbase` database, Tru64 cannot recognize.

To determine if the drive is a standard supported drive, Symantec recommends that you examine the `/etc/ddr.dbase` file. If the drive is not in the file, you must manually configure the device and its drivers in the kernel by using the Tru64 `ddr_config` command. For the `/etc/ddr.dbase` file entry, use one of the examples later in this section of contact the drive vendor for the entry details.

Database example entries are provided for the following drive types:

- HP LTO
- Seagate LTO
- STK 9840
- STK T10000

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. For more information, see [“Device-specific entry for HP Ultrium 448, 460, 920, and 960”](#) on page 97 and the other device entries that follow.
 - 2 Compile the `/etc/ddr.dbase` file by using the `ddr_config` (Dynamic Device Recognition) utility to create the `ddr.db` file.

Device-specific entry for HP Ultrium 448, 460, 920, and 960

```
#
# Matches "Ultrium"
#
Type = tape
Name = "HP" "Ultrium"
#
PARAMETERS:
TypeSubClass      = lto                # Linear Tape Open
BBlockSize        = 262144
TagQueueDepth     = 0
MaxTransferSize   = 0xfffff           # (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 = 0xffffffff
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
TaggedQueueing    = 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
```

Device-specific entry for STK T10000

```
SCSIDEVICE
#
# STK T10000
#
Type = tape
Name = "STK" "T10000"
#
PARAMETERS:
TypeSubClass          = 3480
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 = 0x4a      # default setting
CompressionCode = 0
Buffered = 0x1
#
DENSITY:
#
```

```
# /dev/tape/tapeX_d1
#
DensityNumber = 1
DensityCode = Default           # default setting
CompressionCode = 1
Buffered = 0x1
#
DENSITY:
#
# /dev/tape/tapeX_d2, _d6
#
DensityNumber = 2,6
DensityCode = 0x4a             # default for T10000
CompressionCode = 0
Buffered = 0x1
#
DENSITY:
#
# /dev/tape/tapeX_d3, _d7
#
DensityNumber = 3,7
DensityCode = 0x4a             # default for T10000
CompressionCode = 1
Buffered = 0x1
```

Command summary

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

```
hwmgr -view devices
```

Displays all devices on the system.

Windows

This chapter explains how to configure storage devices and install tape device drivers for use with NetBackup on a platform running a supported Microsoft Windows version. For supported Windows versions, see the *NetBackup Release Notes*.

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

The main topics included in this chapter are the following:

- [“Before you start”](#) on page 104
- [“Installing tape device drivers on 32-bit servers”](#) on page 105
- [“Installing tape device drivers on 64-bit servers”](#) on page 106

Before you start

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

- The Symantec support web site (<http://entsupport.symantec.com>) contains server platform compatibility information for a number of vendors and products (see the NetBackup Product > Compatibility area of the site). Verify that your server platform is supported before configuring devices.
- For NetBackup to recognize and communicate with connected devices and for device discovery to discover devices, NetBackup issues SCSI pass-through commands to the devices in a configuration. A tape driver must exist for each tape device. Attached devices appear in the registry.
- 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 that Windows detects the devices on the SAN before you configure the NetBackup Shared Storage Option.
- 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.
- To configure API robot control over a LAN, see:
 - “[ADIC Automated Media Library \(AML\)](#)” on page 123
 - “[IBM Automated Tape Library \(ATL\)](#)” on page 137
 - “[Sun StorageTek ACSLS robots](#)” on page 155

Attaching devices to a Windows system

The following steps describe a general method for attaching devices to a Windows media server. The Microsoft Windows device applications available on the server that you use in these steps may differ depending on your Windows operating system.

To attach devices to a Windows system

- 1 Use the appropriate Windows application to obtain information on any currently attached SCSI devices.

- 2 If you attach a new robotic library or drive to a NetBackup media server, follow the vendor's instructions for attaching the device.
Shut down the server and physically attach the supported device, ensuring that SCSI targets and termination settings are consistent with adapter card and peripheral vendor recommendations.
- 3 Reboot the server and answer the prompts for adapter card peripheral configuration options. Watch the display to ensure that the adapter card recognizes the attached peripherals.
- 4 If you add drives, install the tape drivers and use the appropriate Windows application to verify that the drive was recognized.
Symantec recommends that you install the Symantec Device Drivers for Veritas NetBackup Windows Servers for 32-bit computers.

Installing tape device drivers on 32-bit servers

Symantec recommends that you install the Symantec Device Drivers for Veritas NetBackup Windows Servers.

The NetBackup installation media includes the device driver installer.

Alternatively, you can download the latest 32-bit tape drivers and installer from the Symantec support site. To run the installer, NetBackup must be installed.

When you install NetBackup for the first time, Symantec 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.

To download the Symantec device driver installer

- 1 Go to the Symantec support web site:
<http://entsupport.symantec.com>
- 2 Search on the keywords *Symantec Device Drivers for Veritas NetBackup Windows Servers*.
- 3 Download the tape driver installer.

To install the Symantec device drivers from the NetBackup installation media

- 1 Log in as Administrator on the server on which NetBackup is installed.
- 2 Insert the NetBackup CD-ROM into 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 NetBackup CD Browser, click **Additional Products > Additional Product Installations > NetBackup Tape Device Drivers**.
- 4 In the Symantec Device Driver Installer wizard, follow the prompts to install device drivers for your storage device.
On the **Choosing tape drivers** screen of the wizard, select **Use Symantec tape drivers for all supported tape devices** and **Use Plug and Play drivers**. Use the **More Information** button for explanations of the available choices.
- 5 On the **Installing Symantec 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.
The warning is a standard Microsoft Windows warning. System and driver performance will not be affected, and you can safely ignore the message. Symantec tests and digitally signs the Veritas device drivers.
- 6 After completing the wizard, reboot the system.
The drivers are installed in the following Windows directory.

```
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).

Installing tape device drivers on 64-bit servers

Symantec does not provide device drivers for 64-bit servers. Contact Microsoft or the tape drive vendor to obtain drivers for 64-bit servers.



Robotic storage devices

- [“Robot overview”](#) on page 109
- [“ADIC Automated Media Library \(AML\)”](#) on page 123
- [“IBM Automated Tape Library \(ATL\)”](#) on page 137
- [“Sun StorageTek ACSLS robots”](#) on page 155
- [“Device configuration examples”](#) on page 177

Robot overview

A robot is a peripheral device that mounts and unmounts media in tape or optical disk drives. NetBackup uses *robotic control software* to communicate with the robot firmware.

NetBackup robot types

NetBackup classifies robots according to one or more of the following characteristics:

- The communication method the robotic control software uses; SCSI and API are the two main methods.
- The physical characteristics of the robot. *Library* usually refers to a larger robot, in terms of slot capacity or number of drives. *Stacker* usually refers to a robot with one drive and low media capacity (6 - 12 media slots).
- The media type commonly used by that class of robots. HCART (1/2-inch cartridge tape) and 8 mm are examples of media types.

[Table 8-1](#) lists the NetBackup robot types, with drive and slot limits for each type.

Visit the Symantec support web site to determine which robot type applies to the model of robot that you use.

Table 8-1 NetBackup robot types

Robot type	Description	Drive limits	Slot limits	Note
ACS	Automated Cartridge System	1680 ^a	No limit	API control
ODL	Optical Disk Library	12	490	SCSI control
TL4	Tape Library 4mm	2	15	SCSI control

Table 8-1 NetBackup robot types (Continued)

Robot type	Description	Drive limits	Slot limits	Note
TL8	Tape Library 8mm	No limit	16000	SCSI control
TLD	Tape Library DLT	No limit	16000	SCSI control
TLH	Tape Library Half-inch	256	No limit	API control
TLM	Tape Library Multimedia	250	No limit	API control
TSH	Tape Stacker Half-inch	1	10	SCSI control

a.Drive limit determined by the ACS Library Software host

For more information about each robot type, see “[Robot attributes](#)” on page 112.

NetBackup media types

NetBackup uses media types to differentiate the media that have different physical characteristics. Each media type may represent a specific physical media type; for example, NetBackup media type of 8MM, 8MM2, or 8MM3 can represent Sony AIT media.

The NetBackup media types are also known as Media Manager media types.

dTable 8-2 describes the NetBackup media types.

Table 8-2 NetBackup media types

Media type	Description
HCART	1/2 inch cartridge tape
HCART2	1/2 inch cartridge tape 2
HCART3	1/2 inch cartridge tape 3
HC_CLN	1/2 inch cleaning tape
HC2_CLN	1/2 inch cleaning tape 2
HC3_CLN	1/2 inch cleaning tape 3
QCART	1/4 inch cartridge tape
4MM	4MM cartridge tape
4MM_CLN	4MM cleaning tape
8MM	8MM cartridge tape
8MM2	8MM cartridge tape 2

Table 8-2 NetBackup media types (Continued)

Media type	Description
8MM3	8MM cartridge tape 3
8MM_CLN	8MM cleaning tape
8MM2_CLN	8MM cleaning tape 2
8MM3_CLN	8MM cleaning tape 3
DLT	DLT cartridge tape
DLT2	DLT cartridge tape 2
DLT3	DLT cartridge tape 3
DLT_CLN	DLT cleaning tape
DLT2_CLN	DLT cleaning tape 2
DLT3_CLN	DLT cleaning tape 3
DTF	DTF cartridge tape
DTF_CLN	DTF cleaning tape
REWR_OPT	Rewritable optical disk
WORM_OPT	WORM optical disk

Alternate media types

.Alternate media types let you define more than one type of tape in the same library, and you want to differentiate between them. The following are examples of alternate media types:

- 8MM, 8MM2, 8MM3
- DLT, DLT2, DLT3
- HCART, HCART2, HCART3

For example, if a robot has DLT4000 and DLT7000 drives, you can specify the following:

- DLT media type for the DLT4000 tapes
- DLT2 media type for the DLT7000 tapes

NetBackup then does not load a tape that was written in a DLT4000 drive into a DLT7000 drive and vice versa.

The drive types must be configured by using the same NetBackup convention.

(When you configure devices in NetBackup, you specify the default media type to use in each drive type.)

In a robot, all of the volumes (of a specific vendor media type) *must* be the same NetBackup media type. For example, for a TLH robot that contains 3490E media, you can assign either NetBackup HCART, HCART2, or HCART3 media type to that media. You cannot assign HCART to some of the media and HCART2 (or HCART3) to other of the media.

Robot attributes

NetBackup configures and controls robots differently depending on the robot type. The following tables list the attributes that dictate how these robot types differ.

For more detailed information about supported devices, firmware levels, and platforms, see the NetBackup release notes or visit the Veritas support web site.

ACS robots

ACS robots are supported on NetBackup Enterprise Server only.

Unlike other robot types, NetBackup does not track slot locations for the media in ACS robots. The ACS library software tracks slot locations and reports them to NetBackup.

[Table 8-3](#) describes the ACS robot attributes.

Table 8-3 ACS robot attributes

Attribute	NetBackup Enterprise Server
API robot	Yes
SCSI control	No
LAN control	Yes
Remote Robot control	No. Each host that has ACS drives that are attached to it has robotic control.
NDMP support	Yes
Shared drives support	Yes
Drive cleaning support	No. The ACS library software manages drive cleaning.
Media access port support	Yes, for eject only.
NetBackup tracks slots	No

Table 8-3 ACS robot attributes (Continued)

Attribute	NetBackup Enterprise Server
Media type support	DLT, DLT2, DLT3, HCART, HCART2, and HCART3.
Hosts Supported	Windows, UNIX, and Linux. Windows servers require STK LibAttach software. See the Veritas support web site for the latest compatibility information and obtain the appropriate LibAttach software from STK.
Barcode Support	Yes. Depends on ACS library software to obtain NetBackup media IDs. Barcodes must be the same as the media ID (1 to 6 characters).
Robot Examples	STK 97xx, STK L180, STK L700, and STK Powderhorn Silo.

ODL robots

[Table 8-4](#) describes the optical disk library attributes.

Table 8-4 ODL robot attributes

Attribute	NetBackup Server and NetBackup Enterprise Server
API robot	No
SCSI control	Yes
LAN control	No
Remote robot control	No
NDMP support	No
Shared drives support	No
Drive cleaning support	No
Media access port support	Yes
NetBackup tracks slots	Yes
Media type support	REWR_OPT and WORM_OPT
Hosts supported	UNIX. Not all UNIX operating systems are supported; see the NetBackup support web site.
Barcode support	No, but the robot has inventory capability and can report if a slot in the robot contains media.

Table 8-4 ODL robot attributes (Continued)

Attribute	NetBackup Server and NetBackup Enterprise Server
Robot examples	HP Optical Disk Libraries and HP SureStore Optical Libraries.

TL4 robots

[Table 8-5](#) describes the tape library 4mm attributes:

Table 8-5 TL4 robot attributes

Attribute	NetBackup Server	NetBackup Enterprise Server
API robot	No	No
SCSI control	Yes	Yes
LAN control	Not Applicable	No
Remote robot control	Not Applicable	No
NDMP support	No	No
Shared drives support	Not Applicable	No
Drive cleaning support	Yes	Yes
Media access port support	No	No
NetBackup tracks slots	Yes	Yes
Media type support	4MM	4MM
Hosts supported	Windows, UNIX, and Linux	Windows, UNIX, and Linux
Barcode support	No, but the robot has inventory capability and can report whether a slot in the robot contains media.	
Robot examples	ADIC 4mm DAT Autochanger and HP DAT Autoloader.	

TL8 robots

[Table 8-6](#) describes the tape library 8mm attributes:

Table 8-6 TL8 robot attributes

Attribute	NetBackup Server	NetBackup Enterprise Server
API robot	No	No

Table 8-6 TL8 robot attributes (Continued)

Attribute	NetBackup Server	NetBackup Enterprise Server
SCSI control	Yes	Yes
LAN control	Not Applicable	No
Remote robot control	Not Applicable	Yes
NDMP support	Yes	Yes
Shared drives support	Not Applicable	Yes
Drive cleaning support	Yes	Yes
Media access port support	Yes	Yes
NetBackup tracks slots	Yes	Yes
Media type support	8MM, 8MM2, 8MM3	8MM, 8MM2, 8MM3
Hosts supported	Windows, UNIX, and Linux	Windows, UNIX, and Linux
Barcode support	Yes. Barcodes can be from 1 to 16 characters. The Media Manager media ID is six or fewer characters.	
Robot examples	IBM 7331, Qualstar 46120, ADIC Scalar 100 AIT, ADIC Scalar 1000 AIT, Overland Data LoaderXpress, and Exabyte X200.	

TLD robots

[Table 8-7](#) describes the tape library DLT attributes:

Table 8-7 TLD robot attributes

Attribute	NetBackup Server	NetBackup Enterprise Server
API robot	No	No
SCSI control	Yes	Yes
LAN control	Not Applicable	No
Remote robot control	Not Applicable	Yes
NDMP support	Yes	Yes
Shared drives support	Not Applicable	Yes
Drive cleaning support	Yes	Yes

Table 8-7 TLD robot attributes (Continued)

Attribute	NetBackup Server	NetBackup Enterprise Server
Media access port support	Yes	Yes
NetBackup tracks slots	Yes	Yes
Hosts supported	Windows, UNIX, and Linux.	Windows, UNIX, and Linux.
Media type support	DLT, DLT2, DLT3, DTF, 8MM, 8MM2, 8MM3, QIC, HCART, HCART2, HCART3	
Barcode support	Yes. Barcodes can be from 1 to 16 characters in length. The Media Manager media ID is six or fewer characters.	
Robot examples	ADIC Scalar 1000 DLT, ATL D7000, STK L Series, and Overland Data Neo series	

TLH robots

TLH robots are supported on NetBackup Enterprise Server only.

Table 8-8 describes the tape library half-inch attributes:

Table 8-8 TLH robot attributes

Attribute	NetBackup Enterprise Server
API robot	Yes
SCSI control	No
LAN control	Yes
Remote robot control	Yes
NDMP support	Yes
Shared drives support	Yes
Drive cleaning support	No. The robotic library manages drive cleaning.
Media access port support	Yes
NetBackup tracks slots	No
Media type support	HCART, HCART2, HCART3
Hosts supported	Windows, UNIX, and Linux.

Table 8-8 TLH robot attributes (Continued)

Attribute	NetBackup Enterprise Server
Barcode support	Yes. Depends on IBM ATL software to obtain the Media Manager media ID. Barcodes must be the same as the media ID (1 to 6 characters).
Robot examples	IBM 3494 and IBM VTS

TLM robots

TLM robots are supported on NetBackup Enterprise Server only.

[Table 8-9](#) describes the tape library multimedia attributes:

Table 8-9 TLM robot attributes

Attribute	NetBackup Enterprise Server
API robot	Yes
SCSI control	No
LAN control	Yes
Remote robot control	No. Each server that has TLM drives that are attached to it has robotic control.
NDMP support	No
Shared drives support	Yes
Drive cleaning support	Yes
Media access port support	Yes
NetBackup tracks slots	No
Media type support	4MM, 8MM, 8MM2, 8MM3, DLT, DLT2, DLT3, DTF, HCART, HCART2, HCART3, REWR_OPT (HP9000-800 only), WORM_OPT (HP9000-800 only).
Hosts supported	Windows, UNIX, and Linux
Barcode support	Yes. Depends on DAS/SDLC software to obtain the Media Manager media ID. Barcodes must be the same as the media ID (1 to 6 characters).
Robot examples	ADIC AML/J, ADIC AML/S, and ADIC Scalar 10000.

TSH robots

Table 8-10 describes the tape stacker half-inch attributes:

Table 8-10 TSH robot attributes

Attribute	NetBackup Server	NetBackup Enterprise Server
API robot	No	No
SCSI control	Yes	Yes
LAN control	Not Applicable	No
Remote robot control	Not Applicable	No
NDMP support	No	No
Shared drives support	Not Applicable	No
Drive cleaning support	Yes	Yes
Media access port support	Yes	Yes
NetBackup tracks slots	Yes	Yes
Media type support	HCART, HCART2, HCART3.	
Hosts supported	UNIX. Not all operating UNIX systems are supported. See the NetBackup support web site.	
Barcode support	No, but the robot has inventory capability and can report whether a slot in a robot contains media.	
Robot examples	IBM 3590 B11 Autoloader. IBM 3590 E11.	

Table-driven robotics

Table-driven robotics provides support for new robotic library devices without the need to modify any library control binary files. This feature uses a device mapping file for supported robots and drives.

You may be able to add support for new or upgraded devices without waiting for a maintenance patch from Symantec. The device mapping file includes the information that relates to the operation and control of libraries. Therefore, you can download an updated mapping file to obtain support for newly NetBackup-certified devices.

Robotic test utilities

You can use robotic test utilities for testing robots already configured in NetBackup. Invoke the test utilities as follows:

- `/usr/opensv/volmgr/bin/robtest` (UNIX and Linux)
- `install_path\VERITAS\volmgr\bin\robtest.exe` (Windows)

From each test utility, you can obtain a list of available test commands by entering a question mark (?).

The following point applies only to NetBackup Enterprise Server.

Use the `drstat` command to determine the drive addressing parameters for ACS, TLH, and TLM robot types. This command is available in the robotic test utilities for these robot types. NetBackup addresses drives as follows:

- For ACS robot types, by ACS, LSM, Panel, and Drive number
- For TLH robot types, by the IBM device number
- For TLM robot types, by the DAS/SDLC drive name
- For other robot types, by the robot drive number

Note: The `robtest` utility is provided “as is” for customer convenience; Symantec does not provide support for `robtest`.

Robotic processes

A NetBackup robotic process and possibly a robotic control process exist on a NetBackup media server for each robot that you install:

- Every media server that has a drive in a robotic library has a robotic process for that robotic library. The robotic process receives requests from the NetBackup Device Manager (`ltid`) and sends necessary information directly to the robotics or to a robotic control process.
- Robotic control processes exist only for the robot types that support library sharing (or robot sharing).

When the NetBackup Device Manager service (Windows) or Media Manager Device daemon (UNIX and Linux) starts on a media server, it starts the robotic processes and the robotic control processes for all of the robots that are configured on that host. When the service or daemon stops, the robotic processes and the robotic control processes stop.

The Daemons (UNIX and Linux) tab or Services (Windows) tab of the NetBackup Activity Monitor has commands to start and stop this daemon or service. You

can also start and stop this daemon or service by using the Device Monitor **Actions** menu or the Media and Device Management **Actions** menu. In addition, the *NetBackup Commands for UNIX and Linux* and *NetBackup Commands for Windows* guide describes commands to control the robotic processes that run on Windows media servers.

When a robotic process or robotic control process is active, the NetBackup Activity Monitor Processes tab shows it in the UP state or DOWN state. When a connection is made to the appropriate robotic library, the corresponding process is in the UP state. It mount or unmount tapes (or platters). If the connection cannot be made or errors exist, the process changes to the DOWN state. In the DOWN state, the process still runs, and it returns to the UP state when the connection is made or problems no longer exist.

Processes by robot type

[Table 8-11](#) describes the robotic processes and robotic control processes for each robot type.

Table 8-11 Robotic processes and robotic control processes

Robot type	Process	Description
Automated Cartridge System (ACS)	acsd	The NetBackup ACS daemon acsd provides robotic control to mount and dismount volumes. It also requests inventories of the volumes that are under the control of ACS library software.
	acsse1 ^a	The NetBackup ACS storage server interface (SSI) event logger acsse1 logs events.
	acsssi ¹	The NetBackup ACS storage server interface (SSI) acssi communicates with the ACS library software host. acssi processes all RPC communications from acsd or from the ACS robotic test utility that are intended for the ACS library software.
Tape Library DLT (TLD)	tldd	The Tape Library DLT daemon tldd runs on a NetBackup server that has a drive in the Tape Library DLT. This process receives NetBackup Device Manager requests to mount and unmount volumes, and sends these requests to the robotic-control process, tldcd.
	tldcd	The Tape Library DLT Control daemon tldcd communicates with the Tape Library DLT robotics through an SCSI interface. For library sharing, tldcd runs on the NetBackup server that has the robotic control.

Table 8-11 Robotic processes and robotic control processes (Continued)

Robot type	Process	Description
Tape Library 4MM (TL4)	tl4d	The Tape Library 4MM daemon tl4d runs on the host that has a Tape Library 4MM. This process receives NetBackup Device Manager requests to mount and unmount volumes and communicates these requests to the robotics through an SCSI interface.
Tape Library 8MM (TL8)	tl8d	The Tape Library 8MM daemon tl8d runs on a NetBackup server that has a drive in the Tape Library 8MM. This process receives NetBackup Device Manager requests to mount and unmount volumes, and sends these requests to the robotic-control process, tl8cd.
	tl8cd	The Tape Library 8MM Control daemon tl8cd communicates with the TL8 robotics through an SCSI interface. For library sharing, tl8cd runs on the NetBackup server that has the robotic control.
Tape Library Half-inch (TLH)	tlhd	The Tape Library Half-inch daemon tlhd runs on each NetBackup server that has a drive in the Tape Library Half-inch. This process receives NetBackup Device Manager requests to mount and unmount volumes and sends these requests to the robotic-control process.
	tlhcd	The Tape Library Half-inch Control daemon tlhcd runs on the NetBackup server that has the robotic control and communicates with the TLH robotics through an SCSI interface
Tape Library Multimedia (TLM)	tlmd	tlmd runs on the NetBackup server and communicates mount and unmount requests to the host that controls the TLM robotics.

a. UNIX and Linux only.

Robotic process example

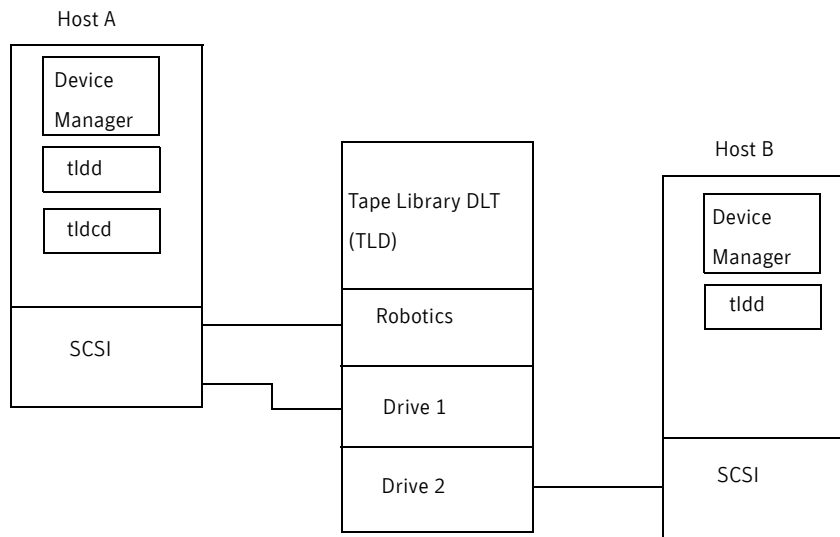
Each drive in a Tape Library DLT (TLD) robot can be attached to a different host, and a `tldd` process runs on each host. However, only one host controls the robotics, and the `tlcdc` robotic control process runs on that host only. To mount a tape, the robotic process (`tldd`) on the host to which the drive is attached sends control information to the robotic control process (`tlcdc`) on the host that controls the robotics.

[Figure 8-1](#) on page 122 shows the processes and where they run for a TLD robot. In this example:

- Each host connects to one drive, and a `t1dd` robotic process runs on each host.
- The robotic control and therefore the robotic control process, `t1dcd`, is on host A.

The NetBackup Device Manager services on host A and B start `t1dd`. The `t1dd` process on host A also starts `t1dcd`. Requests to mount tapes from host B go to `t1dd` on host B, which then sends the robotic command to `t1dcd` on host A.

Figure 8-1 TLD robot control process example



ADIC Automated Media Library (AML)

Applies only to NetBackup Enterprise Server.

ADIC Automated Media Libraries controlled by the following ADIC robotics are NetBackup robot type Tape Library Multimedia (TLM):

- Distributed AML Server (DAS)
- Scalar Distributed Library Controller (DLC)

TLM robots are API robots (a NetBackup robot category in which the robot manages its own media).

Support for these devices is different than for other types of robots. This chapter provides an overview of those differences.

The following are the topics in this chapter:

- [“Sample TLM configuration”](#) on page 124
- [“Media requests for a TLM robot”](#) on page 125
- [“Configuring TLM robotic control”](#) on page 125
- [“Configuring TLM drives on the host”](#) on page 125
- [“Configuring TLM drives in NetBackup”](#) on page 129
- [“Configuring shared TLM drives”](#) on page 130
- [“Providing common access to volumes”](#) on page 133
- [“Adding tapes”](#) on page 133
- [“Removing tapes”](#) on page 134
- [“Robot inventory operations”](#) on page 135

Sample TLM configuration

Figure 9-1 on page 124 shows a configuration that uses Distributed AML Server software. Table 9-1 on page 124 explains the major components in this sample configuration.

Figure 9-1 Typical ADIC DAS configuration

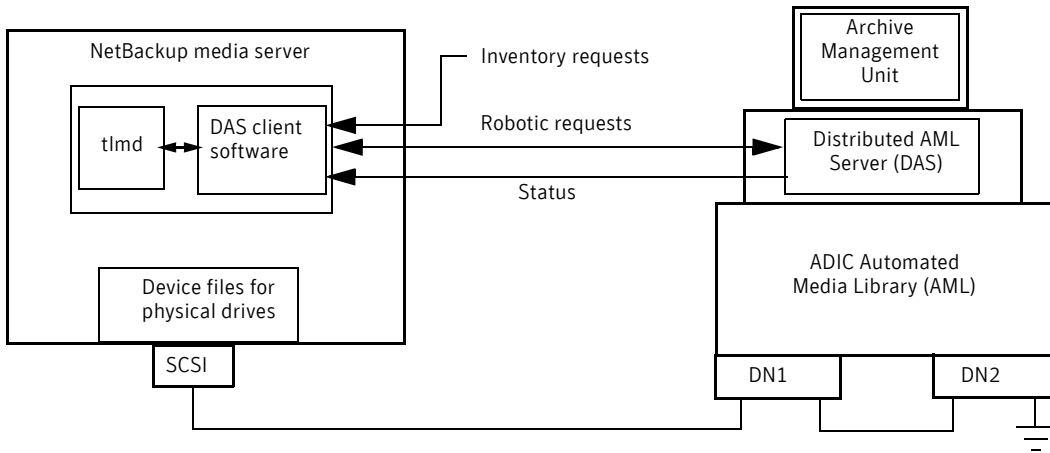


Table 9-1 ADIC configuration component description

Component	Description
NetBackup media server	A host that has NetBackup media server software and is a client to the DAS or Scalar DLC server. The Media Manager device daemon (UNIX) or NetBackup Device Manager (Windows) <code>ltid</code> forwards mount and dismount requests to the TLM daemon (<code>tcmd</code>).
TLM daemon or service (<code>tcmd</code>)	This NetBackup daemon or service uses the ADIC client software to pass mount and dismount requests to the DAS or Scalar DLC server. It also processes return status. <code>tcmd</code> also receives and processes robot inventory requests.
Archive Management Unit (AMU)	A PC that runs an IBM OS/2 or Windows operating system, usually located in or near the AML cabinet. The DAS or Scalar DLC server runs on the AMU.

Table 9-1 ADIC configuration component description

Component	Description
Distributed AML Server (DAS) Scalar Distributed Library Controller (DLC)	These are two ADIC client and server software products that reside in the Archive Management Unit. They provide shared access to the Automated Media Libraries (AML).
Automated Media Library (AML)	An ADIC multimedia robotic library.

Media requests for a TLM robot

The following is the sequence of events for a media request for a TLM robot:

- The Media Manager device daemon (UNIX) or NetBackup Device Manager service (Windows) `ltid` receives the request from `bptm`.
- `ltid` sends a mount request to the TLM daemon `tlmd`. `tlmd` uses the ADIC client software to pass the request to the DAS or Scalar DLC server software that resides in the Archive Management Unit.
- The DAS or Scalar DLC server locates the media and directs the robotics to mount the media in the drive.
- When the NetBackup media server receives a successful response from the server, it allows NetBackup to start sending data to the drive.

Configuring TLM robotic control

Before you add a robot to NetBackup, ensure that the ADIC Automated Media Library has been physically connected and configured.

For information about how to configure the ADIC components of the Automated Media Library, see the ADIC installation and administration guides.

For information on platform support for TLM robotic control, see the *NetBackup Release Notes*.

Configuring TLM drives on the host

Before you configure the drives in NetBackup, you must:

- Install the appropriate ADIC library files on the NetBackup media server that functions as the device host. The libraries provide the client functionality in the ADIC client and server architecture.

- Configure environment variables on that NetBackup media server.
- Allocate the drives on the DAS or Scalar DLC server so they are available to that NetBackup media server. That media server is the DAS or Scalar DLC client.

For more information about how to configure the DAS or Scalar DLC server and client, see the ADIC documentation.

Installing ADIC client software on UNIX

For NetBackup compatibility information for the ADIC client software, see the Compatibility List for NetBackup Enterprise Server. The following is the URL for the Symantec support Web site, from which you can download the Compatibility List:

<http://entsupport.symantec.com>

Ensure that your ADIC client software is compatible with your version of NetBackup.

Use the following procedure to install the ADIC client software on a UNIX NetBackup media server:

To install and configure ADIC software

- 1 Install the ADIC library (`libaci.so`) in the operating system folder `/usr/lib`.

On HP-UX systems, the ADIC library is named `libaci.sl`.

- 2 Set the following system environment variables and values:

`DAS_CLIENT` *name_of_NetBackup_media_server*

`DAS_SERVER` *name_of_DAS_server*

- 3 Set any other environment variables ADIC requires.

Installing ADIC client software on Windows

For NetBackup compatibility information for the ADIC client software, see the Compatibility List for NetBackup Enterprise Server. The following is the URL for the Symantec support Web site, from which you can download the Compatibility List:

<http://entsupport.symantec.com>

Ensure that your ADIC client software is compatible with your version of NetBackup.

Use the following procedure to install ADIC software on a Windows NetBackup media server. Also refer to the ADIC users guide for Windows DAS clients.

To install and configure ADIC software

- 1 Set the following system environment variables and values:

DAS_CLIENT	<i>name_of_NetBackup_media_server</i>
DAS_SERVER	<i>name_of_DAS_server</i>

- 2 Set any other environment variables ADIC requires.
- 3 Copy the following DLLs to `windows\system32` (or *install_path*\Volmgr\bin).

```
aci.dll  
ezrpcw32.dll  
winrpc32.dll
```

- 4 Run `portinst.exe`

This command installs the NobleNet Portmapper for TCP service. Set this service to start automatically when the server is started. NobleNet Portmapper is provided with the Windows DAS client.

Configuring the DAS or Scalar DLC client name

The DAS or Scalar DLC client name is required for the NetBackup media server. The client name is stored in the configuration file on the DAS or Scalar DLC server. This name must be the same name for the server that NetBackup uses, and it must be a valid client name.

By default, the NetBackup server uses as its DAS or Scalar DLC client name the host name that NetBackup obtains from the `gethostname()` system call. This name is usually the one that you use for the client name in the configuration file on the DAS or Scalar DLC server.

However, if this name is invalid for DAS or Scalar DLC clients, you must use another name. For example, DAS 1.30C1 does not allow hyphens in client names.

A similar problem exists if a NetBackup server's short host name is used as the client name but `gethostname()` returns the long host name.

To resolve client name problems

- 1 In the configuration file on the DAS or Scalar DLC server, change the name of the client system that is the NetBackup media server.
For instructions to change a client name, see the ADIC documentation.
- 2 On the NetBackup media server, change the client name. It must be the same as the client name in the configuration file on the DAS or Scalar DLC server. How to do so depends on the operating system type, as follows:

- UNIX. Add the new client name by using a `DAS_CLIENT` entry in the `/usr/opensv/volmgr/vm.conf` file.
These entries are of the form:
`DAS_CLIENT = DASclientname`
Where *DASclientname* is the name that you want the NetBackup media server to use as its DAS or Scalar DLC client name.
 - Windows. Set the `DAS_CLIENT` environment variable to the new client name.
- 3 Stop and start the `ltid` daemon (UNIX) or service (Windows) to enable the TLM daemon to use the new client name.
 - 4 When the client names are correct, restart the DAS or Scalar DLC server and then allocate the drives to the NetBackup media server.

Allocating TLM drives on a DAS server

After you install the ADIC client software and configure client names, allocate the drives to the NetBackup media server. To do so, use the `DASADMIN` administrative command on the DAS server.

To allocate a TLM drive

- 1 Use the `dasadmin listd` command to list the clients and drives available. For example, the following shows two drives and the clients to which they are allocated. `DN1` and `DN2` are the drives, and `grouse` and `mouse` are the clients (`grouse` is a NetBackup media server).

```
./dasadmin listd
==>listd for client: successful
  drive: DN1 amu drive: 01 st: UP type: N sysid:
    client: grouse volser: cleaning 0 clean_count: 17
  drive: DN2 amu drive: 02 st: UP type: N sysid:
    client: mouse volser: cleaning 0 clean_count: 4
```

- 2 Use the `dasadmin allocd` command to allocate the drive. For example, the following two commands deallocate drive `DN2` from client `mouse` and allocate it to client `grouse` (the NetBackup media server):

```
./dasadmin allocd DN2 DOWN mouse
./dasadmin allocd DN2 UP grouse
```

Allocating TLM drives on a Scalar DLC server

Use the following procedure to allocate the drives for the NetBackup media server.

To allocate TLM drives

- 1 Start the Scalar DLC console and choose **Configuration > Clients**.
Enter the client name for the value of **Name**.
Enter the network host name for the value of **Client Host Name**.
- 2 Select the **Drive Reservation** tab on the client and choose **UP** for the drives that you want to allocate to this client.

Configuring TLM drives in NetBackup

A TLM robot can have several different types of drives (UNIX) or half-inch cartridge tape drives (Windows), usually with an SCSI interface.

Before you configure drives in NetBackup, configure the operating system tape drivers and device files for those drives. For information about how to do so, refer to the operating system documentation. For guidance about the NetBackup requirements, see the information about the host operating system in this guide (“[Operating systems](#)” on page 15).

Use the same methods to create device files or add tape drivers for these drives as for other drives. If the drives are SCSI and connect to the robot through a control unit, the drives share the same SCSI ID. Therefore, you must specify the logical unit number (LUN) for each drive.

Symantec recommends that you use the NetBackup Device Configuration wizard to configure robots and drives in NetBackup.

Determining drive designations

You may need to add drives to your configuration manually:

- For older drives
- For the DAS or Scalar DLC servers that do not support serialization

If so, you must determine the drive designations so you know which drives to add to NetBackup.

For instructions about how to add the drives to NetBackup, see “[Devices](#)” in the *NetBackup Administrator’s Guide, Volume I*.

Caution: When you add drives to NetBackup, ensure that you assign the correct DAS or Scalar DLC drive name to each drive. If the drive name is incorrect, tape mounts or backups may fail.

Use the NetBackup TLM test utility to determine the DAS or Scalar DLC drive designations. The following example uses `tlmtest`:

```
tlmtest -r dasos2box
```

The following is the output from this utility (the user entered the `drstat` command on the third line).

```
Current client name is 'grouse'.
Enter tlm commands (? returns help information)
drstat
Drive 1: name = DN1, amu_name = 01, state = UP, type = N,
        client = grouse, volser = , cleaning = NO, clean_count = 17
Drive 2: name = DE3, amu_name = 03, state = UP, type = E,
        client = grouse, volser = , cleaning = NO, clean_count = 480
Drive 3: name = DE4, amu_name = 04, state = UP, type = E,
        client = grouse, volser = , cleaning = NO, clean_count =
378
DRIVE STATUS complete
```

This output shows that you should use DAS or Scalar DLC drive names DN1, DE3, and DE4 should be used. It also shows that you should use `grouse` as the client name of the NetBackup media server.

Configuring shared TLM drives

To share TLM drives, you must configure the ADIC DAS server to allow simultaneously drive allocation to all NetBackup media servers that share the drives. For the ADIC software, the NetBackup media servers are considered clients. The NetBackup Shared Storage Option allows shared drives.

Use one of the following procedures depending on which ADIC robotic control software you use.

Configuring the ADIC DAS server

DAS server software version 3.01.4 or later is required.

To configure the DAS server

- 1 Modify the DAS server's `\ETC\CONFIG` file to create a shared client entry. For example, the following creates a client entry named `NetBackupShared`.

```
client client_name = NetBackupShared
# ip address = 000.000.000.000
hostname = any
```

- 2 Place the IP addresses of all NetBackup media servers that use the shared client entry in the `\MPTN\ETC\HOSTS` file on the DAS server.

For example, the following adds two servers:

```
192.168.100.100 server_1
192.168.100.102 server_2
```

- 3 In the DASADMIN interface, choose **UP** for the drives that you want to allocate to the shared client (NetBackupShared from the example in step 1).
- 4 On each of the NetBackup media servers that share the drives, create an entry in the `vm.conf` file with the shared DAS client name.
 For example, the following adds NetBackupShared as a DAS client:

```
DAS_CLIENT = NetBackupShared
```
- 5 Test the DAS configuration by using the NetBackup `robtest` and `tlmtest` utilities:
 - For example, set the client name (use `client NetBackupshared` in `tlmtest`) and run the drive status command `drstat`.
 - On Windows media servers, the client name is obtained from the `DAS_CLIENT` environment variable so the `client` command is not needed in `tlmtest`.

Configuring the ADIC Scalar DLC server

Scalar DLC software version 2.3 or later is required.

To configure the Scalar DLC server

- 1 In the Scalar DLC console, create a new, shared client by using the following values:

Name	<i>name_of_client</i> (such as NetBackupShared)
Client Host Name	any
- 2 In the Scalar DLC console, select the **Drive Reservation** tab for the shared client (NetBackupShared).
- 3 Choose **UP** for the drives that you want to allocate to the shared client.
- 4 Configure the shared client name on the NetBackup media servers that share the drives, as follows:
 - UNIX. Create an entry in the `vm.conf` file with the shared client name, such as the following:

```
DAS_CLIENT = NetBackupShared
```
 - Windows. Set the `DAS_CLIENT` Windows operating system environment variable to the shared client name, such as NetBackupShared.
- 5 Test the Scalar DLC configuration using `robtest` and `tlmtest`:
 - For example, set the client name (use `client NetBackupshared` in `tlmtest`) and run the drive status command `drstat`.

- On Windows media servers, the client name is obtained from the `DAS_CLIENT` environment variable so the `client` command is not needed in `tlmtest`.

Configuring the drives in NetBackup

Use the NetBackup Device Configuration wizard to configure shared drives in NetBackup. The wizard discovers the tape drives that are available. For the robot types that support serialization, the wizard also discovers the positions of the drives within the library.

If the DAS or Scalar DLC server does not support serialization, use the following procedure to configure shared drives. Usually, the NetBackup Shared Storage Option (SSO) for Tape requires shared drives. This procedure can significantly reduce the amount of manual configuration that is required in an SSO environment. For example, for 20 drives that 30 hosts share, these configuration steps require that you configure only 20 device paths rather than 600 device paths.

To configure shared drives in a nonserialized configuration

- 1 Run the NetBackup Device Configuration wizard on one of the hosts to which drives in an TLM-controlled library are attached. Allow the drives to be added as stand-alone drives.
- 2 Add the TLM robot definition and update each drive to indicate its appropriate position in the robot. Make each drive robotic.
To determine the correct drive addresses and verify the drive paths, see “Correlating device files to physical drives” in the *NetBackup Administrator’s Guide, Volume II*.
- 3 After you verify the drive paths on one host, run the Device Configuration wizard again. Scan all hosts that have TLM drives in the library. The wizard adds the TLM robot definition and the drives to the other hosts and uses the correct device paths.
Note: for this process to work correctly, the following must be true:
 - The wizard discovered the devices and their serial numbers successfully the first time.
 - You configured the drive paths correctly on the first host.

A SAN (including switches rather than direct connection) can increase the possibility of errors. If errors occur, you can define the tape drive configuration manually by using the NetBackup Administration Console or NetBackup commands.

Take care to avoid any errors. With shared drives, the device paths must be correct for each server. Also, ensure that the drives are defined correctly to avoid errors.

Providing common access to volumes

All NetBackup media servers use the same database. Therefore, all media servers that share drives must have access to the same sets of volumes (volsers) in the DAS or Scalar DLC configuration. If they do not have access to the same volsers, NetBackup operational problems may occur. For example, if you update the NetBackup volume configuration from one of the servers, NetBackup moves to stand-alone the volumes that are not configured for that server. Although the volumes are configured correctly for a different server, NetBackup still moves them to stand-alone.

As a test, inventory the robot from each NetBackup media server and compare the results. If any of the reports differ, correct the DAS or Scalar DLC configuration. Then, perform a shutdown and restart of the DAS or Scalar DLC server.

Adding tapes

The following is an overview of how to add tapes to a TLM robot and then add those tapes to NetBackup:

- Add barcode labels to the media and insert the media into the robot by using the media access port (insert area).
- Do one of the following to empty the media access port. The AMU Archive Management Software then reads the barcodes, classifies the media by media type, and tracks storage cell locations for the media.
 - In the NetBackup Administration Console, select the robot inventory update inventory function and select **Empty media access port prior to update**.
 - Issue the DAS `insert` directive from a DAS administrative interface. You can obtain the insert area name from the DAS configuration file.
 - Issue the DAS `insert` directive from the NetBackup `tlmtest` utility. You can obtain the insert area name from the DAS configuration file.
- Define the media in NetBackup by using the DAS or Scalar DLC volsers as media IDs. To define the media, do one of the following:
 - Update the volume configuration by using the robot inventory function. For procedures, see “Robot inventory operations” in the *NetBackup Administrator’s Guide, Volume I*.

- Add new volumes as explained in “Adding new volumes” of the *NetBackup Administrator’s Guide, Volume I*.

Because the DAS or Scalar DLC volumes and barcodes are the same, NetBackup has a record of the barcodes for the media. Note that you do not enter slot locations; the ADIC software manages them.

- To verify your configuration, use **Show Contents** and **Compare Contents with Volume Configuration** from the Robot Inventory dialog box in NetBackup. Also, use these options to update the NetBackup volume configuration when media has moved. The configuration update maintains consistency between the DAS or Scalar DLC database and the NetBackup EMM database.

Removing tapes

You can remove tapes by using a DAS or Scalar DLC administrative interface or by using NetBackup.

To remove media

- 1 Physically remove the media from the library by using one of the following:
 - **Actions > Eject Volumes From Robot** in the NetBackup Administration Console.
 - The `vmchange` command. (For usage, see the *NetBackup Commands* guide.
 - The `eject` command in the NetBackup `tlmtest` utility.
 - A DAS or Scalar DLC administrative interface.
- 2 If you use a DAS or Scalar DLC administrative interface or the NetBackup `tlhctest` utility, update the volume location to stand-alone in NetBackup. To do so, do one of the following:
 - Update the volume configuration by using the robot inventory function. For procedures, see “Robot inventory operations” in the *NetBackup Administrator’s Guide, Volume I*.
 - Move the volumes as explained in “Moving volumes” of the *NetBackup Administrator’s Guide, Volume I*.

If you do not update the EMM database, NetBackup does not know the new location of the media and may issue mount requests for it. The result is an error such as Misplaced Tape.

Robot inventory operations

In NetBackup, a TLM robot type supports barcodes. The following occurs when you inventory a TLM robot in NetBackup:

- NetBackup requests volume information from the DAS server or SDLC server through a DAS or Scalar DLC application library call.
- The server responds by providing a list of volume IDs and associated information from its database. NetBackup filters out the volumes that are not occupied in their home cell locations or in drives. NetBackup then displays a list of the volumes and their media types according to the DAS or Scalar DLC server.

[Table 9-1](#) shows an example of the type of information receives.

Table 9-2 Robot inventory volume information

TLM volume ID	TLM media type
A00250	3480
J03123	3590
DLT001	DECDLT
MM1200	8MM
NN0402	4MM
002455	UNKNOWN

- 3 NetBackup translates the volsers directly into media IDs and barcodes. In the previous table, volser A00250 becomes media ID A00250, and the barcode for that media ID is also A00250.
 - If the operation does not require updating the volume configuration, NetBackup uses the media type defaults for TLM robots when it creates an inventory report.
 - If the operation requires a volume configuration update, NetBackup maps the TLM media types to the default NetBackup media types. For information about the default media type mappings and how to change them, see “Media Type Mappings tab” in the *NetBackup Administrator’s Guide, Volume I*.

IBM Automated Tape Library (ATL)

Applies only to NetBackup Enterprise Server.

The IBM Automated Tape Library (ATL) is NetBackup robot type Tape Library Half-inch (TLH). ATL robots include the IBM Magstar 3494 Tape Library.

TLH robots are API robots (a NetBackup robot category in which the robot manages its own media).

Support for these devices is different than for other types of robots. This chapter provides an overview of those differences.

- [“Sample TLH configurations”](#) on page 137
- [“Media requests for a TLH robot”](#) on page 143
- [“Configuring robotic control”](#) on page 144
- [“Configuring TLH drives”](#) on page 150
- [“Cleaning drives”](#) on page 151
- [“Adding tapes”](#) on page 152
- [“Removing tapes”](#) on page 152
- [“Robot inventory operations”](#) on page 153

Sample TLH configurations

The following sections show example ATL configurations and explain their major components.

UNIX system example configurations

Figure 10-1 on page 138 and Figure 10-2 on page 139 show two possible ATL configurations. Table 10-1 on page 140 explains the major components in these configurations.

Figure 10-1 Robotic control host communicates directly to robot

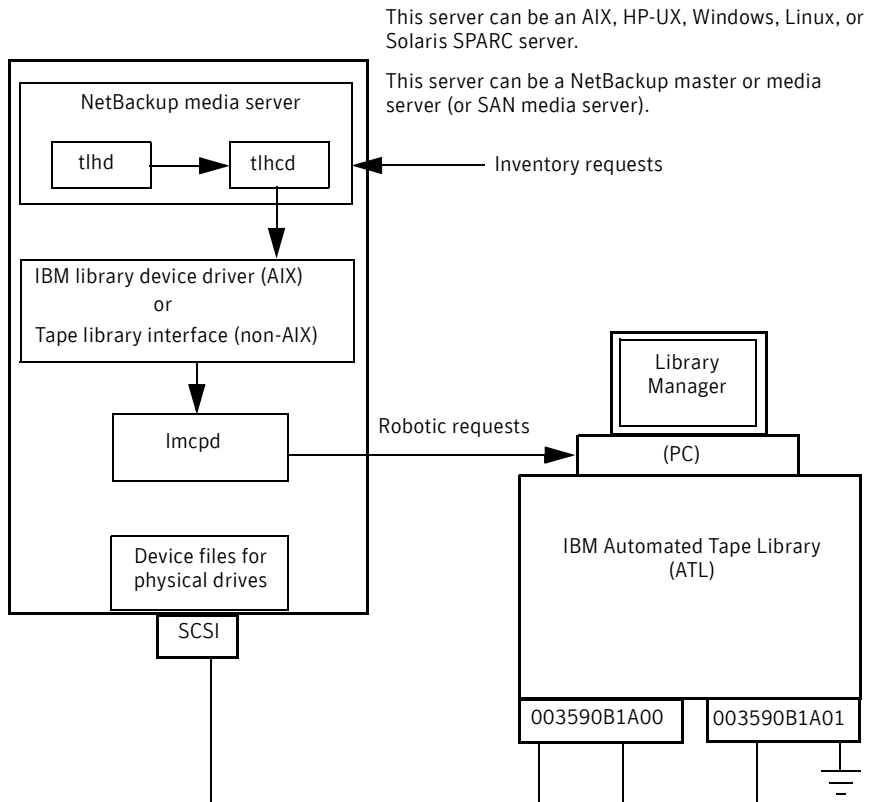


Figure 10-2 Robotic control and robot connection on separate hosts

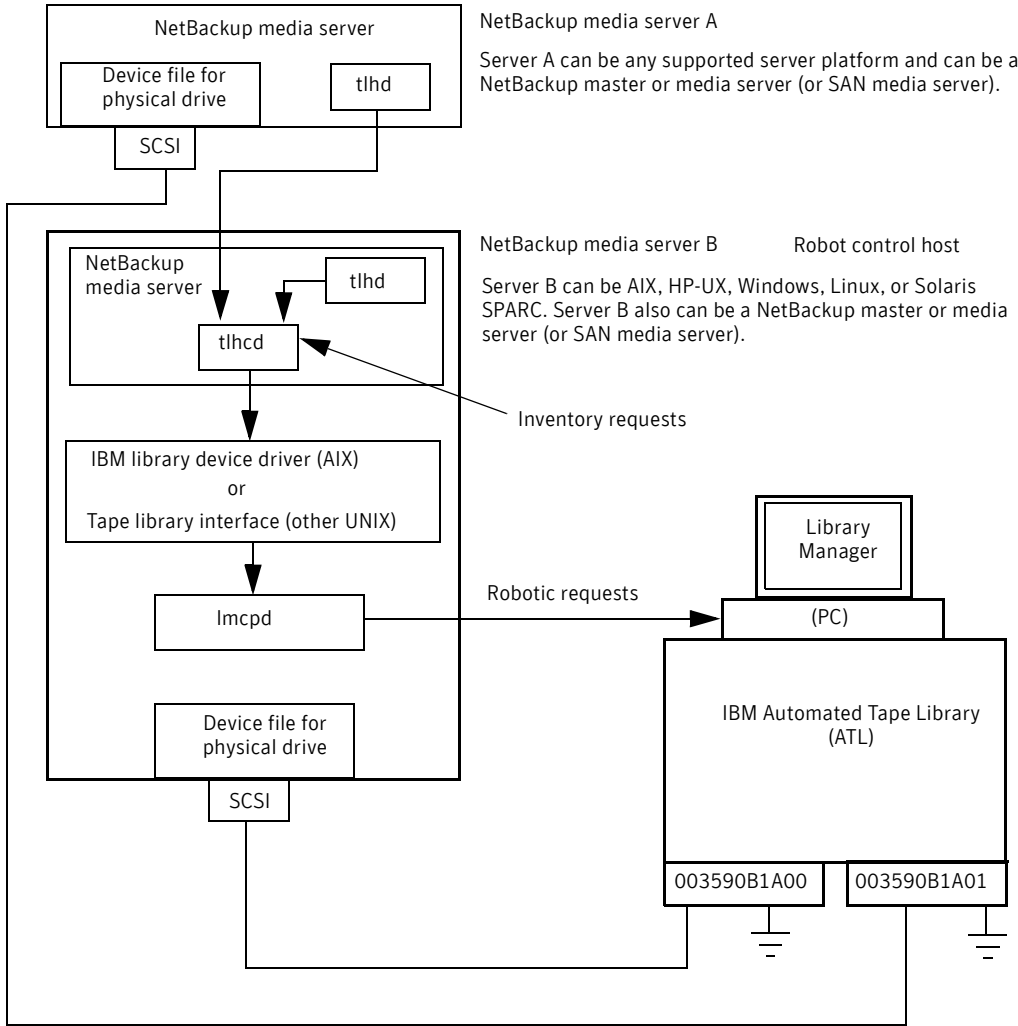


Table 10-1 UNIX TLH configuration component description

Component	Description
NetBackup media server	A host that has NetBackup media server software and is a client to the ATL through the Library Manager Control Point daemon (<code>lmcpd</code>). The NetBackup Media Manager device daemon, <code>ltid</code> , forwards mount and dismount requests to the Tape Library Half-inch daemon (<code>tlhd</code>).
Tape Library Half-inch daemon (<code>tlhd</code>)	This daemon resides on a NetBackup media serve. It passes mount and dismount requests to the tape library half-inch control daemon (<code>tlhcd</code>) on the robotic control host.
TapE Library Half-inch control daemon (<code>tlhcd</code>)	This daemon receives mount or dismount requests from <code>tlhd</code> or robot inventory requests through an external socket interface. <code>tlhcd</code> must reside on the same system that communicates with <code>lmcpd</code> . Communication occurs by using the IBM Library Device Driver interface (on AIX) or IBM Tape Library system calls (other UNIX systems).
Library Manager Control Point daemon (<code>lmcpd</code>)	A component of IBM ATL support. This software handles all communications with the Library Manager and must run on any system from which the Automatic Tape Library is directly controlled.
Library manager	A component of IBM ATL support that provides control of the robotics and the robotic library. The Library Manager is a PC that usually is located within the robot cabinet.
IBM Automated Tape Library (ATL)	An IBM physical library under automated robotic control.

Windows system example configurations

[Figure 10-3](#) on page 141 and [Figure 10-4](#) on page 142 show two possible ATL configurations. [Table 10-2](#) on page 143 explains the major components in these configurations.

Figure 10-3 Robotic control on host with ATL drives

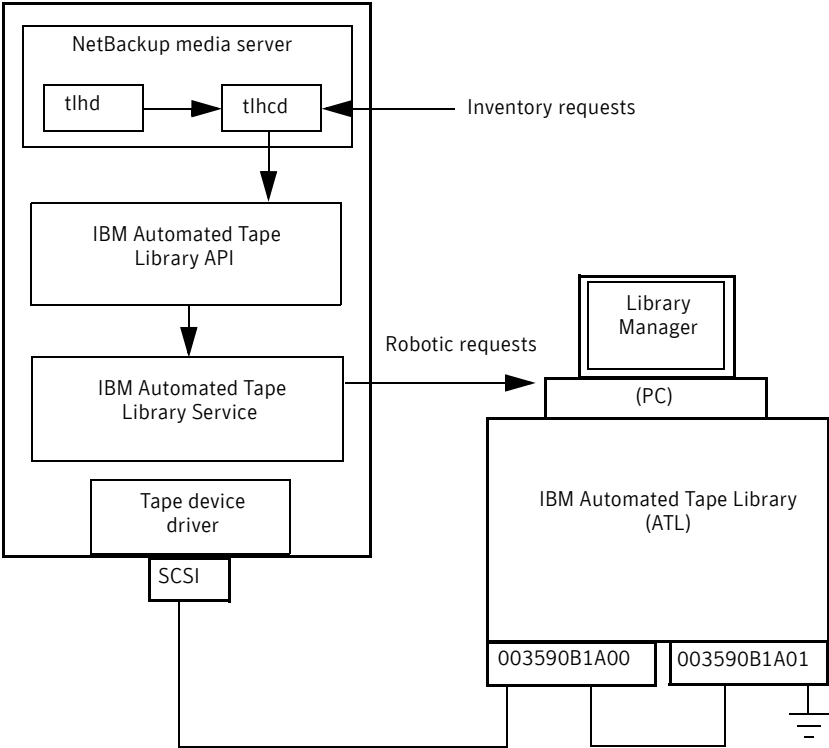


Figure 10-4 Robotic control and robot connection on separate hosts

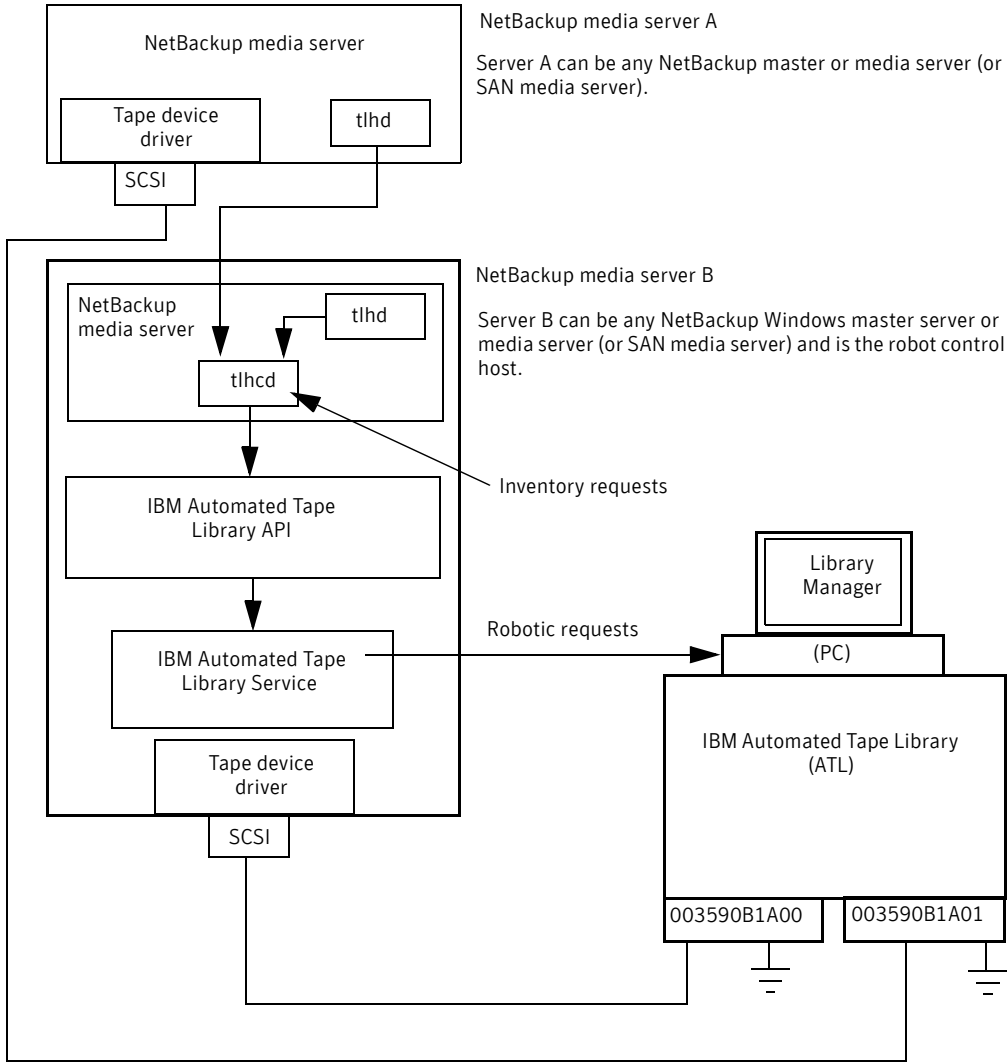


Table 10-2 Windows TLH configuration component description

Component	Description
NetBackup media server	A host that has NetBackup media server software and is a client to the Automated Tape Library through the IBM ATL service. The Netbackup Device Manager service (<code>ltid</code>) forwards mount and dismount requests to the Tape Library Half-inch service (<code>tlhd</code>).
Tape Library Half-inch process (<code>tlhd</code>)	This process resides on a NetBackup media server. It passes mount and dismount requests to the Tape Library Half-inch control process (<code>tlhcd</code>) on the robotic control host.
Tape Library Half-inch control process (<code>tlhcd</code>)	This process receives mount or dismount requests from <code>tlhd</code> or robot inventory requests through an external socket interface. <code>tlhcd</code> must reside on the same system that communicates with the IBM ATL service.
IBM Automated Tape Library service	A component of IBM ATL support. This software handles all communications with the Library Manager and must be running on any system from which the Automatic Tape Library is directly controlled.
Library Manager	A component of IBM ATL support that provides control of the robotics and the robotic library. The Library Manager is a PC that is usually located within the robot cabinet.
IBM Automated Tape Library (ATL)	An IBM physical library under automated robotic control.

Media requests for a TLH robot

The following is the sequence of events for a media request for a TLH robot:

- The Media Manager device daemon (UNIX) or NetBackup Device Manager service (Windows) `ltid` receives the request from the NetBackup `bptm` process.
- `ltid` sends a mount request to the NetBackup TLH daemon `tlhd`.
- `tlhd` passes the request to the NetBackup TLH control daemon `tlhcd`. `tlhcd` resides on the host to which the Automatic Tape Library is connected. This host can be the same host on which `tlhd` is running or another host.
- `tlhcd` communicates with the robotic library as follows:

- AIX. The control daemon communicates with the Library Manager Control Point daemon `lmcpd` by using the Library Device Driver interface.
- UNIX. The control daemon communicates with the Library Manager Control Point daemon `lmcpd` through Tape Library system calls from an application library interface.
- Windows. The control process communicates with the IBM ATL service through Tape Library system calls from an application library interface.
- `lmcpd` (UNIX) or the IBM ATL service (Windows) passes the information to the Library Manager. The Library Manager then locates the media and directs the TLH robotics to mount the media in the drive.
- When the NetBackup media server receives a successful response from the Library Manager, it allows NetBackup to start sending data to the drive.

Configuring robotic control

When you add a TLH robot to NetBackup, ensure the following:

- The IBM Automated Tape Library is physically connected and configured correctly.
For information about how to configure the IBM components of the Automated Tape Library, see the IBM documentation. The documentation includes SCSI Tape Drive, Medium Changer, and Library Device Drivers Installation and User's Guide (or any related publications).
For information on platform support for TLH robotic control, see the NetBackup release notes and the Symantec support Web site.
<http://entsupport.symantec.com>
- You use a recommended version of the Automated Tape Library. To locate the recommended levels, see the Symantec support Web site.

Robotic control on an AIX system

The following subsections explain how to configure robotic control when the NetBackup media server is installed on an AIX system.

Determine the path to the LMCP device file

Use the Library Manager Control Point (LMCP) device file as the robotic device file in NetBackup. This file is set up when the Automated Tape Library is first configured.

Use the `lsdev` command (or `smit`) to determine the LMCP device file.

The following example uses the `lsdev` command:

```
/etc/lsdev -C | grep "Library Management"
```

The following is the output from this command:

```
lmcp0      Available          LAN/TTY Library Management Control
Point
```

Verify library communications

After you determine the path to the LMCP device file, verify library communications through the IBM-provided `mtlib` interface. Resolve all errors before attempting to configure IBM 3494 support in Media Manager.

To verify communications with a specific library, specify the Library Manager Control Point device file with the `mtlib` command. For example, if the LMCP device path is `/dev/lmcp0`, the following command verifies communication with the library:

```
/usr/bin/mtlib -l /dev/lmcp0 -qL
```

The following is the output from this command:

Library Data:

```
state..... Automated Operational State
                Dual Write Disabled

input stations.....1
output stations.....1
input/output status.....ALL input stations empty
                ALL output stations empty

machine type.....3494
sequence number.....11398
number of cells.....141
available cells.....129
subsystems.....2
convenience capacity.....30
accessor config.....01
accessor status.....Accessor available
                Gripper 1 available
                Gripper 2 available
                Vision system operational

comp avail status.....Primary library manager installed.
                Primary library manager available.
                Primary hard drive installed.
                Primary hard drive available.
                Convenience input station installed.
                Convenience input station available.
                Convenience output station installed.
                Convenience output station available.

avail 3490 cleaner cycles..0
avail 3590 cleaner cycles..92
```

Configure the robotic device file

Configure the robotic path as explained in “Devices” in the *NetBackup Administrator’s Guide, Volume I*.

When the configuration is complete, you can view the robotic device information.

The following example uses `tpconfig -d` to view the robotic device information. In this example, the first two drives are stand-alone drives. The drive with drive index 31 is under TLH robotic control and the drive with drive index 78 is under TL4 control.

```
# /usr/opensv/volmgr/bin/tpconfig -d

Id      DriveName          Type      Residence
      Drive Path                               Status
*****
  5      Drive0             hcart    TLH(8) 003590B1A00
        /dev/rmt4.1
13      Drive2             hcart    TLH(8) 003590B1A00
        /dev/rmt8.1
31      Drive1             hcart    TLH(8) 003590B1A00
        /dev/rmt12.1
78      Drive1             4mm      TL4(77) DRIVE=1
        /dev/rmt11.1
                                UP
```

```
Currently defined robotics are:
  TL4(77)   robotic path = /dev/ovpass0
  TLH(8)    LMCP device path = /dev/lmcp0
```

```
EMM Server = maui
```

In this example, note the following lines:

```
TLH(8)    LMCP device path = /dev/lmcp0
EMM Server = maui
```

Where `/dev/lmcp0` is the path to the robotic device file and `maui` is the EMM server for this robot.

Robotic control on a UNIX system

The following subsections explain the steps for configuring robotic control when the NetBackup media server is a UNIX system other than AIX.

Determine the library name

Use the library name instead of the robotic device file when you configure the storage device in NetBackup. This name is set up when the Automated Tape Library is first configured (see your IBM system documentation). The library name is configured in the `/etc/ibmatl.conf` file; determine the library name by viewing the contents of the file.

The following is an example entry in that file:

```
3494AH          176.123.154.141          ibmpc1
```

Where:

- 3494AH is the library name.
- 176.123.154.141 is the IP address of the PC workstation that is running the Library Manager software.
- ibmpc1 is the host name of the PC workstation that is running the Library Manager software.

Verify library communications

After you determine the library name, verify library communications through the IBM-provided `mtlib` interface. Resolve all errors before attempting to configure IBM 3494 (TLH) support in NetBackup.

To verify communications with a specific library, specify the library name with the `mtlib` command. For example, if the library name is 3494AH, the following command verifies communications with the library:

```
/usr/bin/mtlib -l 3494AH -qL
```

The following is the output from this command:

Library Data:

```
state.....Automated Operational State
                Dual Write Disabled
input stations.....1
output stations.....1
input/output status.....ALL input stations empty
                ALL output stations empty
machine type.....3494
sequence number.....11398
number of cells.....141
available cells.....129
subsystems.....2
convenience capacity.....30
accessor config.....01
accessor status.....Accessor available
                Gripper 1 available
                Gripper 2 available
                Vision system operational
comp avail status..... Primary library manager installed.
                Primary library manager available.
                Primary hard drive installed.
                Primary hard drive available.
                Convenience input station installed.
                Convenience input station available.
                Convenience output station installed.
                Convenience output station available.
avail 3490 cleaner cycles..0
avail 3590 cleaner cycles..92
```

Configure the robotic device file

Configure the robotic path as explained in “Devices” in the *NetBackup Administrator’s Guide, Volume I*.

When the configuration is complete, you can view the robotic device information.

The following example uses `tpconfig -d` to view the robotic device information. This example has one TLH drive and one TLD drive.

```
/usr/opensv/volmgr/bin/tpconfig -d
```

Id	DriveName Drive Path	Type	Residence	Status

6	Drive2 /dev/rmt/17cbn	hcart	TLH(0) 003590B1A00	UP
55	Drive1 /dev/rmt/15cbn	dlt	TLD(5) DRIVE=1	UP

Currently defined robotics are:

```
TLH(0)    library name = 3494AH
TLD(5)    robotic path = /dev/sg/c2t0l0
```

```
EMM Server = glozer
```

In this example, note the following lines:

```
TLH(0)    library name = 3494AH
EMM Server = glozer
```

Where 3494AH is the library name and glozer is the EMM server for this robot.

Robotic control on a Windows system

The following subsections explain how to configure robotic control when the NetBackup media server is on a Windows system.

Determine the library name

Use the library name when you configure the robot in NetBackup. This name is set up when the Automated Tape Library is first configured (see the IBM system documentation). The library name is configured in the

`C:\winnt\ibmatl.conf` file; determine the library name by viewing the contents of the file.

The following is an example entry in that file:

```
3494AH          176.123.154.141          ibmpc1
```

Where:

- 3494AH is the library name.

- 176.123.154.141 is the IP address of the PC workstation that is running the Library Manager software.
- `ibmpc1` is the host name of the PC workstation that is running the Library Manager software.

Verify library communications

After you determine the library name, verify library communications through the IBM-provided `mtlib` interface. Resolve all errors before attempting to configure IBM 3494 (TLH) support in NetBackup.

To verify communications with a specific library, specify the library name with the `mtlib` command. For example, if the library name is 3494AH, the following command verifies communications with the library:

```
mtlib -l 3494AH -qL
```

The following is the output from this command:

```
Library Data:
operational state.....Automated Operational State
                        Dual Write Disabled
functional state.....000
input stations.....1
output stations.....1
input/output status.....ALL input stations empty
                        ALL output stations empty
machine type.....3494
sequence number.....11398
number of cells.....141
available cells.....129
subsystems.....2
convenience capacity.....30
accessor config.....01
accessor status.....Accessor available
                        Gripper 1 available
                        Gripper 2 available
                        Vision system operational
comp avail status.....Primary library manager installed.
                        Primary library manager available.
                        Primary hard drive installed.
                        Primary hard drive available.
                        Convenience input station installed.
                        Convenience input station available.
                        Convenience output station installed.
                        Convenience output station available.
library facilities.....00
bulk input capacity.....0
bulk input empty cells....0
bulk output capacity.....0
bulk output empty cells....0
avail 3490 cleaner.....0
```

```
avail 3590 cleaner.....92
```

Configure the robotic library name

Configure the robotic path as explained in “Devices” in the *NetBackup Administrator’s Guide, Volume I*.

When the configuration is complete, you can view the robotic device information.

The following example uses `tpconfig -d` to view the robotic device information. This example has one TLH drive and one TLD drive.

```
tpconfig -d
```

```

Id   DriveName      Type   Residence                               Status
      SCSI coordinates/Path
*****
0   DRIVE2         hcart  TLH(0) IBM Device Number=156700      UP
      <1,0,1,0>
1   DRIVE1         dlt    TLD(5) DRIVE=1                        UP
      <3,1,1,0>

```

Currently defined robotics are:

```

TLH(0)    library name = 3494AH
TLD(5)    SCSI port=3, bus=1, target=6, lun=0

```

```
EMM Server = glozer
```

In this example, note the following lines:

```

TLH(0)    library name = 3494AH
EMM Server = glozer

```

3494AH is the library name, and glozer is the EMM server for this robot.

Configuring TLH drives

TLH robots have half-inch cartridge tape drives.

- On UNIX systems, create or identify device files for these drives. Use the same methods to create or identify device files for these drives as for other drives.
- On Windows systems, you must install a system tape driver according to the appropriate system and vendor documentation.

Before you configure drives in NetBackup, configure the operating system tape drivers and device files for those drives. For information about how to do so, refer to the operating system documentation. For guidance about the NetBackup requirements, see the information about the host operating system in this guide (“[Operating systems](#)” on page 15).

Caution: When you add drives to NetBackup, ensure that you assign the correct IBM device number to each drive. If the IBM device number is incorrect, tape mounts or backups may fail.

Use the NetBackup TLH test utility (`tlhstest`) to determine the TLH drive designations. The following example uses `tlhstest` and shows the drives in the robot that NetBackup controls:

- UNIX: `/usr/openv/volmgr/bin/tlhstest -r /dev/lmcp0`
- Windows: `tlhstest -r 3494AH`

If the robotic control is configured on a UNIX server other than AIX, use the library name as configured in `/etc/ibmatl.conf`. Do not use the LMCP device path on the call to `tlhstest`.

The following is the output from `tlhstest` (the user entered the `drstat` command on the third line). You would use 156700 and 156600 when you add these drives to NetBackup.

```
Opening /dev/lmcp0 (UNIX)
Opening 3494AH (Windows)
Enter tlh commands (? returns help information)
drstat
Drive information:
  device name:          003590B1A00
  device number:       0x156700
  device class:        0x10 - 3590
  device category:     0x0000
  mounted volser:     <none>
  mounted category:    0x0000
  device states:       Device installed in ATL.
                       Dev is available to ATL.
                       ACL is installed.

Drive information:
  device name:          003590B1A01
  device number:       0x156600
  device class:        0x10 - 3590
  device category:     0x0000
  mounted volser:     <none>
  mounted category:    0x0000
  device states:       Device installed in ATL.
                       Dev is available to ATL.
                       ACL is installed.

QUERY DEVICE DATA complete
```

Cleaning drives

The IBM ATL interface does not allow applications to request or configure drive cleaning. Therefore, you cannot assign cleaning tapes to a TLH robot in the

NetBackup. You must configure drive cleaning by using an IBM administrative interface.

Adding tapes

The following is an overview of how to add tapes to a TLH robot and then add those tapes to NetBackup:

- Add barcode labels to the media and insert the media into the robot by using the media access port.
The Library Manager reads the barcodes and classifies the media by media type. A category is assigned to each volume. Some volume categories restrict application access to certain volumes. The Library Manager tracks volume locations.
- Define the media in NetBackup by using the ATL volume IDs as media IDs. To define the media, do one of the following:
 - Update the volume configuration by using the robot inventory function. For procedures, see the “Robot inventory operations” in the *NetBackup Administrator’s Guide, Volume I*.
 - Add new volumes as explained in “Adding volumes” in the *NetBackup Administrator’s Guide, Volume I*.
- Because the ATL volume IDs and barcodes are the same, NetBackup has a record of the barcodes for the media. Note that you do not enter slot locations because the ACS library software manages them.
- Use **Show Contents** and **Compare Contents with Volume Configuration** from the Robot Inventory dialog of **Media** to verify your configuration.

Removing tapes

Use the following procedure to remove tapes. You can move media from one location to another within the robot. The Automated Tape Library finds the media when NetBackup requests it.

To remove volumes

- 1 Physically remove the media from the library by using one of the following:
 - **Actions > Eject Volumes From Robot** in the NetBackup Administration Console.
 - The NetBackup `vmchange` command. (For usage, see the *NetBackup Commands* guide.)
 - The `eject` command in the NetBackup `tlhrest` utility.

- An IBM Library Manager interface.
- 2 If you use the IBM Library Manager interface or the NetBackup `tlhrest` utility, update the volume location to stand-alone in NetBackup. To do so, do one of the following:
- Update the volume configuration by using the robot inventory function. For procedures, see the “Robot inventory operations” in the *NetBackup Administrator’s Guide, Volume I*.
 - Move the volumes as explained in “Moving volumes” of the *NetBackup Administrator’s Guide, Volume I*.

If you do not update the EMM database, NetBackup does not know the new location of the media and may issue mount requests for it. The result is an error such as Misplaced Tape.

Robot inventory operations

In NetBackup, the TLH robot type supports barcodes. The following sequence of events occurs when you inventory a TLH robot in NetBackup:

- NetBackup requests volume information from the Library Manager through the Library Manager Control Point daemon.
- The Library Manager responds by providing a list of volume IDs and volume attributes from its database. NetBackup filters out the volume categories that cannot be used. NetBackup displays a list of the volumes and a translated version of the volume’s media type. The media type is based on the attributes that were returned.

[Table 10-2](#) shows an example of the types of information that NetBackup receives:

Table 10-3 Robot inventory volume information

TLH volume ID	TLH media type
PFE011	3480
303123	3490E
CB5062	3590J
DP2000	3590K

- NetBackup translates the volume IDs into media IDs and barcodes. In the previous table, volume ID PFE011 becomes media ID PFE011, and the barcode for that media ID is also PFE011.

- If the operation does not require updating the volume configuration, NetBackup uses the media type defaults for TLH robots when it creates the inventory report.
- If the operation requires a volume configuration update, NetBackup maps the TLH media types to the default NetBackup media types. For information about the default media type mappings and how to change them, see “Media Type Mappings tab” in the *NetBackup Administrator’s Guide, Volume I*.

Robot inventory filtering

If you want NetBackup to use only a subset of the volumes under library control, you can filter the volume information from the library. The IBM Library Manager maintains the concept of a volume category, which can be used to classify volumes into pools, including pools by application.

On the NetBackup media server from which you invoke the inventory operation, add an `INVENTORY_FILTER` entry in the `vm.conf` file. The following is the usage statement:

```
INVENTORY_FILTER = TLH robot_number BY_CATEGORY value1 [value2 ...]
```

where

- *robot_number* is the number of the robot in NetBackup.
- *value1* is a filter value of type IBM category (if *filter_type* = `BY_CATEGORY`).
- *value2* is a second filter value (up to 10 filter values are allowed).

For example:

```
INVENTORY_FILTER = TLH 0 BY_CATEGORY 0xcdb0
```

Sun StorageTek ACSLS robots

Applies only to NetBackup Enterprise Server.

Note: The access control feature of Sun StorageTek ACSLS controlled robots is not compatible with media sharing. Media sharing restricts volume access by the requesting hosts IP address. Use caution when you implement media sharing in an ACSLS environment.

Sun StorageTek Automated Cartridge System Library Software controlled robots are NetBackup robot type ACS.

ACS robots are API robots (a NetBackup robot category in which the robot manages its own media).

Unlike other robot types, Netbackup does not track slot locations for the media in ACS robots. The Automated Cartridge System Library Software tracks slot locations and reports them to NetBackup.

The term *automated cartridge system (ACS)* can refer to any of the following:

- A type of NetBackup robotic control.
- The Sun StorageTek system for robotic control.
- The highest-level component of the Sun StorageTek ACSLS. It refers to one robotic library or to multiple libraries that are connected with a media pass-through mechanism.

The *ACS library software* component can be either of the following Sun StorageTek products:

- Sun StorageTek Automated Cartridge System Library Software (ACSL)
- Sun StorageTek Library Station

The topics in this chapter include the following:

- [“Sample ACSLS configuration”](#) on page 156
- [“Media requests for an ACS robot”](#) on page 160
- [“Configuring ACS drives”](#) on page 161
- [“Configuring shared ACS drives”](#) on page 162
- [“Adding tapes”](#) on page 163
- [“Removing tapes”](#) on page 164
- [“Robot inventory operations”](#) on page 165
- [“Robotic control, communication, and logging”](#) on page 167
- [“ACS robotic test utility”](#) on page 172
- [“Changing your ACS robotic configuration”](#) on page 173
- [“ACS configurations supported”](#) on page 173
- [“Sun StorageTek ACSLS firewall configuration”](#) on page 175

Sample ACSLS configuration

[Figure 11-1](#) on page 157 (UNIX) and [Figure 11-2](#) on page 158 (Windows) show typical ACSLS configurations. [Table 11-1](#) on page 159 explains the major components in typical configurations.

Figure 11-1 Typical ACSLS configuration on UNIX

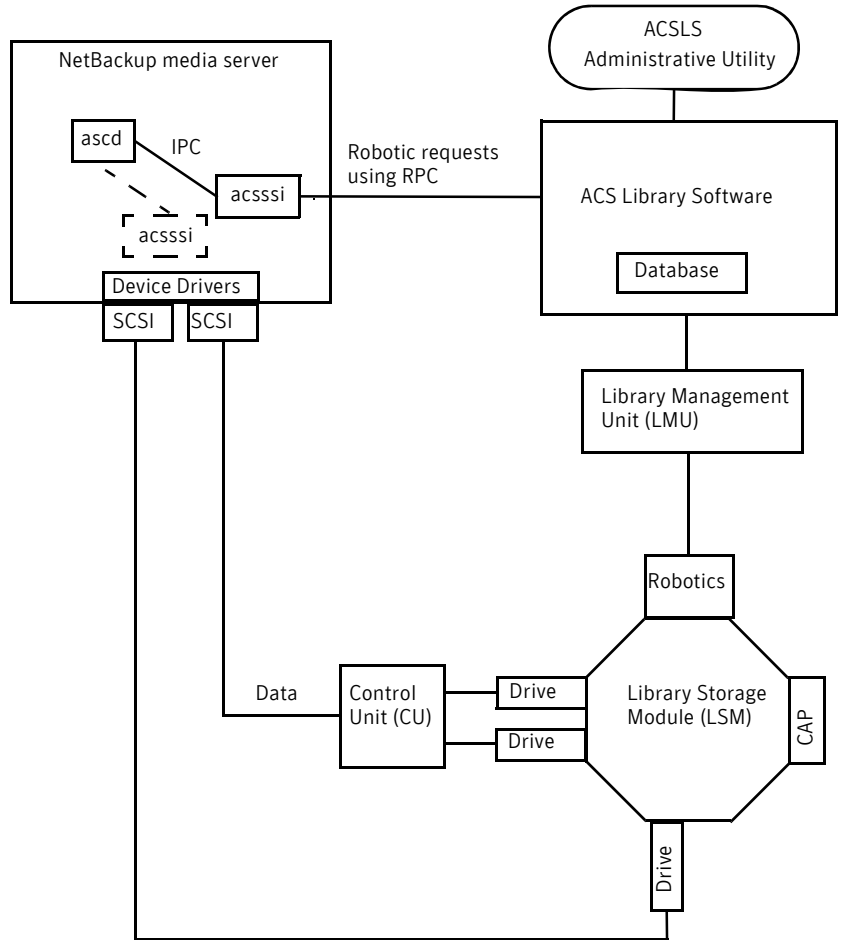


Figure 11-2 Typical ACSLS configuration on Windows

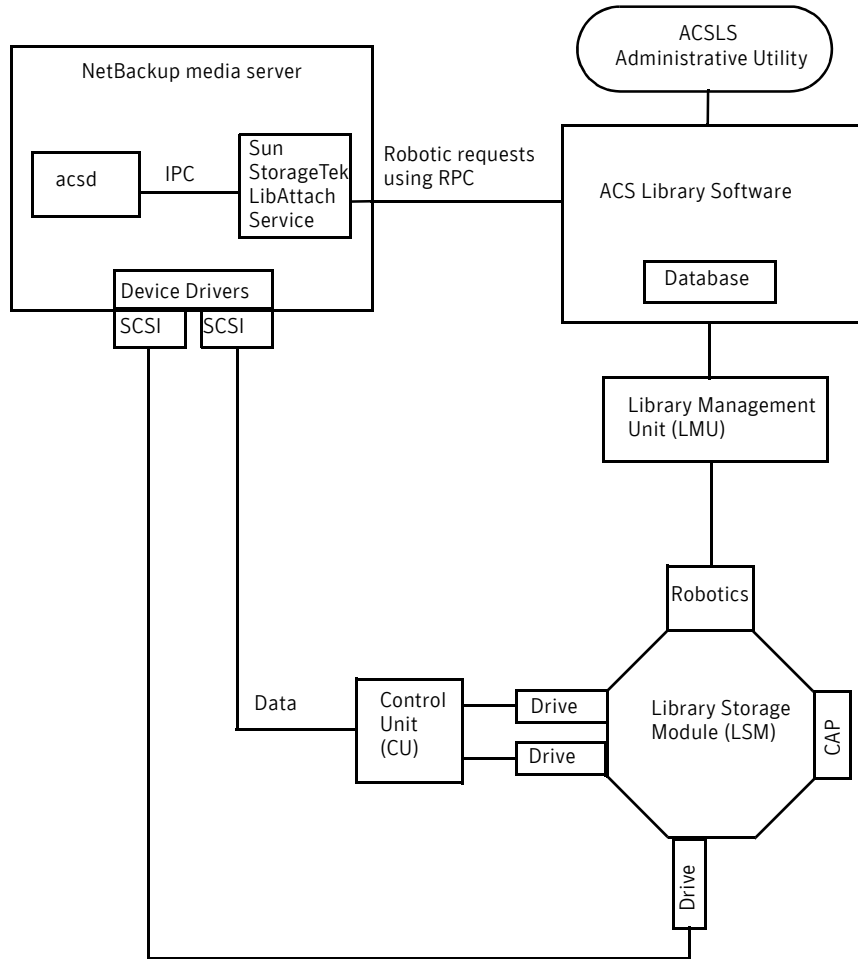


Table 11-1 ACSLS configuration component description

Component	Description
NetBackup media server	<p>A host that has NetBackup media server software and is a client to the ACS library software host.</p> <p>The NetBackup ACS robotic daemon (<code>acsd</code>) formulates requests for mounts, unmounts, and inventories. An API then uses IPC communication to routes these requests to:</p> <ul style="list-style-type: none"> ■ (UNIX) The NetBackup ACS storage server interface (<code>acssi</code>). The requests are converted into RPC-based communications and sent to the ACS library software. ■ (Windows) the Sun StorageTek LibAttach service. This service sends the requests to the ACS library software.
Sun StorageTek LibAttach Service <i>Windows computers only</i>	<p>Library Attach for Windows is an ACS library software client application that enables Windows servers to use the StorageTek Nearline enterprise storage libraries.</p> <p>LibAttach provides the connection between Windows and ACS library software through a TCP/IP network.</p> <p>Obtain the appropriate LibAttach software from Sun. See the Symantec support Web site for the latest compatibility information.</p>
ACS library software (any of the following) <ul style="list-style-type: none"> ■ Automated Cartridge System Library Software (ACSLS) ■ Sun StorageTek Library Station 	<p>Receives the robotic requests from NetBackup and uses the Library Management Unit to find and mount or unmount the correct cartridge on media management requests.</p> <p>On compatible host platforms, you may be able to configure ACS library software and NetBackup media server software on the same host.</p>
Library Management Unit (LMU)	Provides the interface between the ACS library software and the robot. A single LMU can control multiple ACSLS robots.
Library Storage Module (LSM)	Contains the robot, drives, or media.

Table 11-1 ACSLS configuration component description

Component	Description
Control Unit (CU)	<p>The NetBackup media server connects to the drives through device drivers and a control unit (tape controller). The control unit may have an interface to multiple drives. Some control units also allow multiple hosts to share these drives.</p> <p>Most drives do not require a separate control unit. In these cases, the media server connects directly to the drives.</p>
CAP	Cartridge Access Port.

Media requests for an ACS robot

The following is the sequence of events for a media request for an ACS robot:

- The Media Manager device daemon (UNIX) or NetBackup Device Manager service (Windows) `ltid` receives the request from `bptm`.
- `ltid` sends a mount request to the NetBackup ACS process `acsd`.
- `acsd` formulates the request. An API then uses Internal Process Communications (IPC) to send it to:
 - UNIX. The NetBackup ACS storage server interface `acsssi`. The request is then converted into RPC-based communications and sent to the ACS library software.
 - Windows. The Sun StorageTek LibAttach service. This service sends the request to the ACS library software.
- If the Library Storage Module (LSM) in which the media resides is offline, the ACS library software reports this offline status to NetBackup. NetBackup assigns the request a pending status. NetBackup retries the request hourly until the LSM is online and the ACS library software can satisfy the media request.
- The ACS library software locates the media and sends the necessary information to the Library Management Unit (LMU).
- The LMU directs the robotics to mount the media in the drive. When the LibAttach service (Windows) or `acsssi` (UNIX) receives a successful response from the ACS library software, it returns the status to `acsd`.
- The `acsd` child process (that is associated with the mount request) scans the drive. When the drive is ready, `acsd` sends a message to `ltid` that

completes the mount request. NetBackup then begins to send data to or read data from the drive.

Configuring ACS drives

An ACS robot supports DLT or 1/2-inch cartridge tape drives. If an ACS robot contains more than one type of DLT or 1/2-inch cartridge tape drive, you can configure an alternate drive type. Therefore, there can be up to three different DLT and three different 1/2-inch cartridge drive types in the same robot. If you use alternate drive types, configure the volumes by using the same alternate media type. Six drive types are possible: DLT, DLT2, DLT3, HCART, HCART2, and HCART3.

Before you configure drives in NetBackup, configure the operating system tape drivers and device files for those drives. For information about how to do so, refer to the operating system documentation. For guidance about the NetBackup requirements, see the information about the host operating system in this guide (“[Operating systems](#)” on page 15).

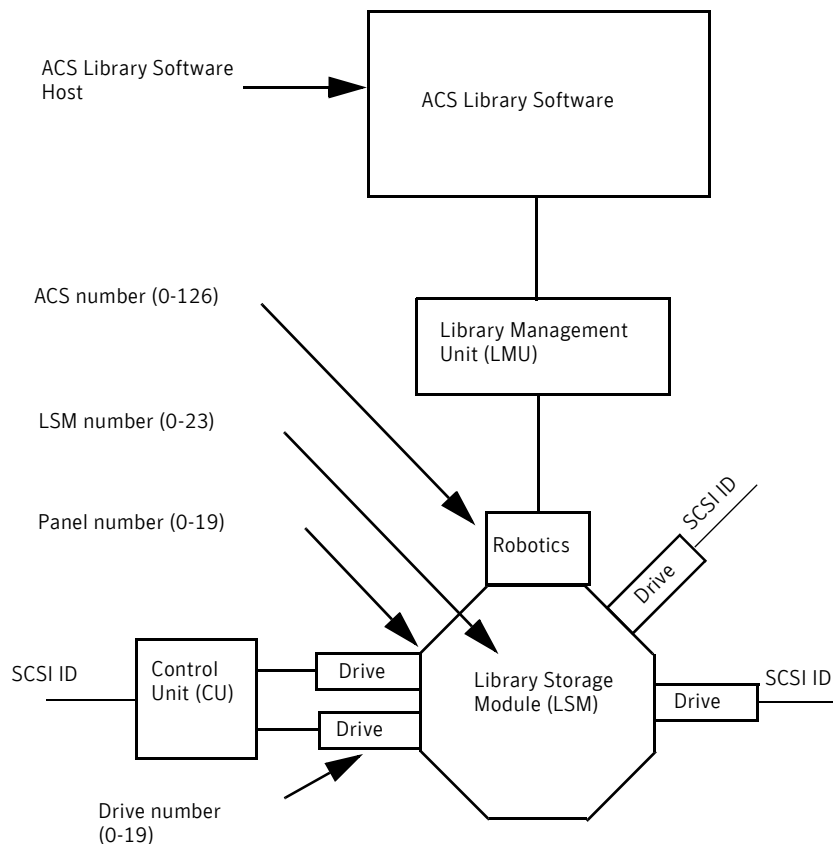
Use the same methods to create or identify device files for these drives as for other drives. If the drives are SCSI and connect to the robot through a shared control unit, the drives share the same SCSI ID. Therefore, you must specify the same logical unit number (LUN) for each drive.

When you configure ACS drives as robotic in NetBackup, you must include the following ACS drive coordinate information.

ACS drive coordinate	Description
ACS number	The index, in ACS library software terms, that identifies the robot that has this drive.
LSM number	The Library Storage Module that has this drive.
Panel number	The panel where the drive is located.
Drive number	The physical number of the drive in ACS library software terms.

[Figure 11-3](#) on page 162 shows the location of this information in a typical ACS robot:

Figure 11-3 ACSLS robot and drive configuration information



Configuring shared ACS drives

If the ACSLS server does not support serialization, use the following procedure to configure shared drives. Shared drives require the NetBackup Shared Storage Option license. (Sun StorageTek ACSLS versions before 6.1 do not support serialization.) If the server supports serialization, use the NetBackup Device Configuration Wizard to configure shared drives.

This procedure can significantly reduce the amount of manual configuration that is required in an SSO environment. For example, for 20 drives that 30 hosts share, these configuration steps require that you configure only 20 device paths rather than 600 device paths.

During the setup phase, the NetBackup Device Configuration wizard tries to discover the tape drives available. The wizard also tries to discover the positions of the drives within the library (if the robot supports serialization).

To configure shared drives in a nonserialized configuration

- 1 Run the NetBackup Device Configuration wizard on one of the hosts to which drives in an ACS-controlled library are attached. Allow the drives to be added as stand-alone drives.
- 2 Add the ACS robot definition and update each drive to indicate its position in the robot. Make each drive robotic and add the ACS, LSM, Panel, and Drive information.

To determine the correct drive addresses and verify the drive paths, see “Correlating device files to physical drives” in the *NetBackup Administrator’s Guide, Volume II*.

- 3 After you verify the drive paths on one host, run the Device Configuration wizard again. Scan all hosts that have ACS drives in the library. The wizard adds the ACS robot definition and the drives to the other hosts and uses the correct device paths.

Note: for this process to work correctly, the following must be true:

- The wizard discovered the devices and their serial numbers successfully the first time.
- You configured the drive paths correctly on the first host.

A SAN (including switches rather than direct connection) can increase the possibility of errors. If errors occur, you can define the tape drive configuration manually by using the NetBackup Administration Console or NetBackup commands.

Take care to avoid any errors. With shared drives, the device paths must be correct for each server. Also, ensure that the drives are defined correctly to avoid errors. (A common error is to define a drive as ACS index number 9 rather than ACS index 0.

Adding tapes

ACS robotic control software supports the following characters in a volume ID that are *not* valid NetBackup media ID characters. (Volume ID is the ACS term for media ID). Therefore, do not use any of the following characters when you configure ACS volumes:

- \$ (dollar sign)
- # (pound sign)

- The yen symbol
- Leading and trailing spaces

The following is an overview of how to add tapes to an ACS robot and then add those tapes to NetBackup:

- Add barcode labels to the media and insert the media into the robot by using the media access port.
- Do one of the following to empty the media access port. The Library Storage Module reads the barcode labels. The ACS library software uses the barcodes for volume IDs and tracks the location of the tapes within the robot.
 - Issue the ACS `enter` command from the ACSLS interface (ACSSA).
 - Issue the ACS `enter` command from the NetBackup `acstest` utility.
- Define the media in NetBackup by using the ACS volume IDs as media IDs. To define the media, do one of the following:
 - Update the volume configuration by using the robot inventory function. For procedures, see the “Robot inventory operations” in the *NetBackup Administrator’s Guide, Volume I*.
 - Add new volumes as explained in “Adding new volumes” on page 135 of the *NetBackup Administrator’s Guide, Volume I*.

Because the ACS volume IDs and barcodes are the same, NetBackup has a record of the barcodes for the media. Note that you do not enter slot locations because the ACS library software manages slot locations.

- To verify your configuration, use **Show Contents** and **Compare Contents with Volume Configuration** from the Robot Inventory dialog.

Removing tapes

You can remove tapes by using the Sun StorageTek utility or by using NetBackup.

Removing tapes using the ACSLS utility

If you remove media from an ACS robot, you must move the media logically to stand-alone in NetBackup. To do so, do one of the following:

- Update the volume configuration by using the robot inventory function. For procedures, see the “Robot inventory operations” in the *NetBackup Administrator’s Guide, Volume I*.
- Move the volumes as explained in “Moving volumes” of the *NetBackup Administrator’s Guide, Volume I*.

If you do not move media logically, NetBackup does not know that the media were moved. NetBackup may issue mount requests for it, which causes a misplaced tape error.

However, you can move media from one location to another within the robot. The ACS library software finds the requested media if its database is current.

Removing tapes using NetBackup

You can remove tapes by using one of the following methods. Either of these methods performs the logical move and the physical move.

- **Actions > Eject Volumes From Robot** in the NetBackup Administration Console.
- ◆ Use the `vmchange` command (see the *NetBackup Commands* manual).

Robot inventory operations

Note: If the ACS library software host is a Sun StorageTek Library Station, an Inventory Robot Filter (`INVENTORY_FILTER`) entry may be required in the `vm.conf` file. Old versions of Library Station do not support queries of all volumes in an ACS robot.

In NetBackup, the ACS robot type supports barcodes. The following sequence of events occurs when you inventory an ACS robot in NetBackup:

- NetBackup requests volume information from the ACS library software.
- The ACS library software provides a listing of the volume IDs, media types, ACS location, and LSM location from its database. The following table is an example of the ACS information that NetBackup receives:

ACS volume ID	ACS media type	ACS	LSM
100011	DLTIV	0	0
200201	DD3A	0	0
412840	STK1R	0	1
412999	STK1U	0	1
521212	JLABEL	0	0
521433	STK2P	0	1
521455	STK2W	0	1

ACS volume ID	ACS media type	ACS	LSM
770000	LTO_100G	0	0
775500	SDLT	0	0
900100	EECART	0	0
900200	UNKNOWN	0	0

- NetBackup maps the volume IDs into media IDs and barcodes. For example in the previous table, volume ID 100011 becomes media ID 100011 and the barcode for that media ID is also 100011.
- If the operation does *not* require a volume configuration update, NetBackup uses the media type defaults for ACS robots when it creates its report.
- If the operation requires a volume configuration update,, NetBackup maps the ACS media types to the default NetBackup media types. NetBackup adds the ACS and the LSM locations for new volumes to the EMM database. This location information is used for media and drive selection.
 For information about the default media type mappings and how to change them, see “Media Type Mappings tab” in the *NetBackup Administrator’s Guide*.

Robot inventory filtering

If you want NetBackup to use only a subset of the volumes under ACS library control, you can filter the volume information from the library. To do so, you use the ACSLS administrative interface to assign the volumes you want to use to a scratch pool or pools. Then you configure NetBackup to use only the volumes in those scratch pools.

A NetBackup robot inventory includes the volumes that exist in the ACS scratch pool. The ACS library software moves each volume from the scratch pool after it is mounted.

A partial inventory *also* includes those volumes that NetBackup can validate exist in the robotic library, including volumes *not* in the ACS scratch pool. To prevent losing track of previously mounted volumes, the library reports the complete list of volumes that exist in the robotic library.

Inventory filtering example

The following is an example of how to configure an inventory filter:

- 1 Use the ACSLS administrative interface (ACSSA) command to create a scratch pool. Assign ID 4 and 0 to 500 as the range for the number of volumes, as follows:

```
ACSSA> define pool 0 500 4
```

- 2 Use the ACSLS administrative interface (ACSSA) command to define the volumes in scratch pool 4:

```
ACSSA> set scratch 4 600000-999999
```

- 3 On the NetBackup media server from which you invoke the inventory operation, add an `INVENTORY_FILTER` entry to the `vm.conf` file. The following is the usage statement:

```
INVENTORY_FILTER = ACS robot_number BY_ACS_POOL  
acs_scratch_pool1 [acs_scratch_pool2 ...]
```

The following define the options and arguments:

- *robot_number* is the number of the robot in NetBackup.
- *acs_scratch_pool1* is the scratch pool ID as configured in the ACS library software.
- *acs_scratch_pool2* is a second scratch pool ID (up to 10 scratch pools are allowed).

For example, the following entry forces ACS robot number 0 to query scratch volumes from Sun StorageTek pool IDs 4 and 5.

```
INVENTORY_FILTER = ACS 0 BY_ACS_POOL 4 5
```

Robotic control, communication, and logging

NetBackup Enterprise Server only.

How NetBackup uses robotic control, communication, and logging during tape operations depends on the host system type:

- [Windows systems](#)
- [UNIX systems](#)

Windows systems

The NetBackup `acsd` process provides robotic control to mount and dismount volumes. It also requests inventories of the volumes that are under the control of ACS library software. The NetBackup Device Manager service `ltid` starts the `acsd` process and communicates with it.

The `acsd` process requests SCSI tape unloads through the device host's tape driver before it uses the ACS API to request tape dismounts. This request process accommodates the configurations that have SCSI multiplexors. Loaded tapes are not ejected forcibly when a dismount operation occurs.

UNIX systems

On UNIX systems, several NetBackup daemons and processes provide robotic control, communication, and logging.

NetBackup ACS daemon (acsd)

The NetBackup ACS daemon `acsd` provides robotic control to mount and dismount volumes. It also requests inventories of the volumes that are under the control of ACS library software. The Media Manager device daemon `ltid` starts the `acsd` daemon and communicates with it. If `ltid` is active already, you can start `acsd` manually.

The `acsd` daemon requests SCSI tape unloads through the device host's tape driver before it uses the ACS API to request tape dismounts. This control process accommodates the configurations that have SCSI multiplexors. Loaded tapes are not ejected forcibly when a dismount operation occurs.

When `acsd` starts, it first starts the NetBackup `acsse1` process and then starts the `acsssi` process. When it starts `acsssi`, `acsd` passes the ACS library software host name to `acsssi`. One copy of `acsssi` starts for each ACS library software host that appears in the NetBackup device configuration for the media server. If multiple media servers share drives in an ACS robot, `acsssi` must be active on each media server.

NetBackup ACS SSI event logger (acsse1)

The NetBackup ACS storage server interface (SSI) event logger `acsse1` is modeled after the Sun StorageTek `mini_el` event logger. Therefore, its functional model differs from other NetBackup robotic controls.

The NetBackup `acsd` daemon starts `acsse1` automatically. You also can start it manually. Event messages are logged to the `/usr/opensv/volmgr/debug/acsssi/event.log` file.

Note: Symantec recommends that `acsse1` run continuously because it tries to connect on the event logger's socket for its message logging. If `acsssi` cannot connect to `acsse1`, NetBackup cannot process requests immediately. Therefore, retry and error recovery situations then occur.

On UNIX systems, only the `kill` command stops `acsse1`. The NetBackup `bp.kill_all` utility (UNIX) stops the `acsse1`. On Windows systems, the `bpdown.exe` program stops the `acsse1`.

The full path to the event logger is `/usr/opensv/volmgr/bin/acsse1`. The usage format is as follows:

```
acsse1 [-d] -s socket_name
```


where

- `-d` displays debug messages (by default, debug messages are disabled).
- `socket_name` is the socket name (or IP port) to listen on for messages.

Using `acssel` with a different socket name

If the `vm.conf` file does not contain an `ACS_SEL_SOCKET` entry, `acssel` listens on socket name 13740 by default. You can change this default by using one of the following methods:

To change the default by modifying the Media Manager configuration file

- 1 Edit `vm.conf` and add an `ACS_SEL_SOCKET` entry.

For example:

```
ACS_SEL_SOCKET = 13799
```

- 2 Use `/usr/opensv/netbackup/bin/goodies/bp.kill_all` to stop the `acsd`, `acsssi`, and `acssel` processes. (This script stops all NetBackup processes.)
- 3 Restart the NetBackup daemons and processes:
`/usr/opensv/netbackup/bin/goodies/netbackup start`

To change the default by using environment variables

This method assumes that one ACS robot is configured and that the SSI default socket name has not been changed. (The `vm.conf` `ACS_SEL_SOCKET` entry can change the default).

`acssel` also has a command line option to specify the socket name. However, because `acsssi` needs to know the event logger socket name, setting an environment variable is preferred.

- 1 Use `/usr/opensv/netbackup/bin/goodies/bp.kill_all` to stop the `acsd`, `acsssi`, and `acssel` processes. (This script stops all NetBackup processes.)
- 2 Set the wanted socket name in an environment variable and export it.
`ACS_SEL_SOCKET = 13799`
`export ACS_SEL_SOCKET`
- 3 Start the event logger in the background.
`/usr/opensv/volmgr/bin/acssel &`
- 4 Set the ACS library software host name for `acsssi` in an environment variable.
`CSI_HOSTNAME = einstein`
`export CSI_HOSTNAME`

- 5 Start `acsssi`:

```
/usr/opensv/volmgr/bin/acsssi 13741 &
```

- 6 Optionally, start `acstest` by using the `robtest` utility or by using the following command line:

```
/usr/opensv/volmgr/bin/acstest -r einstein -s 13741
```

Note: If you request SCSI unloads, you must also specify drive paths on the `acstest` command line (see “[ACS robotic test utility](#)” on page 172). The `robtest` utility specifies drive paths automatically if ACS drives have been configured.

- 7 Start `ltid`, which starts `acsd`. You can use the `-v` option for verbose message output.

```
/usr/opensv/volmgr/bin/ltid
```

During initialization, `acsd` obtains the SSI Event Logger socket name from `vm.conf` and sets `ACS_SEL_SOCKET` in the environment before starting `acssel`. If `acsssi` is started manually, it has to use (listen on) the same SSI socket that `acsd` uses to send data.

NetBackup ACS storage server interface (`acsssi`)

The NetBackup ACS storage server interface (SSI) `acsssi` communicates with the ACS library software host. `acsssi` processes all RPC communications from `acsd` or from the ACS robotic test utility that are intended for the ACS library software.

One copy of `acsssi` must run for each unique ACS library software host that is configured on a NetBackup media server. `acsd` tries to start copies of `acsssi` for each host. However, if an `acsssi` process for a specific ACS library software host exists already, the new `acsssi` processes for that host fails during initialization.

In normal operations, `acsssi` runs in the background and sends log messages to `acssel`.

You can specify the socket name (IP port) used by `acsssi` in any of the following ways:

- On the command line when you start `acsssi`.
- By using an environment variable (`ACS_SSI_SOCKET`).
- Through the default value.

Note: If you configure `acsssi` to use a nondefault socket name, you also must configure the ACS daemon and ACS test utility to use the same socket name.

The ACS library software host name is passed to `acsssi` by using the `CSI_HOSTNAME` environment variable.

`acsssi` is based on the Sun StorageTek storage server interface and supports similar features, such as using environment variables to control most aspects of operational behavior. For the environment variables that are supported, see “[Optional environment variables](#)” on page 171.

Using the ACS_SSI_SOCKET configuration option

By default, `acsssi` listens on unique, consecutive socket names; the socket names begin at 13741. To specify socket names on an ACS library software host basis, you can add a configuration entry in `vm.conf`.

Use the following format:

```
ACS_SSI_SOCKET = ACS_library_software_hostname socket_name
```

The following is an example entry (do not use the IP address of the ACS library host for this parameter):

```
ACS_SSI_SOCKET = einstein 13750
```

Starting acsssi manually

This method is not the recommended method to start `acsssi`. Normally, `acsd` starts `acsssi`.

Before you can start `acsssi` manually, you must configure the `CSI_HOSTNAME` environment variable. The following is a Bourne shell example:

```
CSI_HOSTNAME=einstein
export CSI_HOSTNAME
/usr/opensv/volmgr/bin/acsssi 13741 &
```

To start acsssi

- 1 Start the event logger, `acssel`.
- 2 Start `acsssi`. The format is `acsssi socket_name`.

Optional environment variables

If you want individual `acsssi` processes to operate differently, you can set environment variables before the `acsssi` processes are started.

The following are the optional environment variables:

- `SSI_HOSTNAME`
Specifies the name of the host where ACS library software RPC return packets are routed for ACS network communications. By default, the local host name is used.
- `CSI_RETRY_TIMEOUT`
Set this variable to a small positive integer. The default is 2 seconds.

- `CSI_RETRY_TRIES`
Set this variable to a small positive integer. The default is 5 retries.
- `CSI_CONNECT_AGETIME`
Set this variable to a value between 600 seconds and 31536000 seconds. The default is 172800 seconds.

ACS robotic test utility

NetBackup Enterprise Server only.

The `acstest` utility allows you to verify ACS communications and provides a remote system administrative interface to an ACS robot. It can also be used to query, enter, eject, mount, unload, and dismount volumes. In addition, `acstest` allows you to define, delete, and populate ACS library software scratch pools.

While `acsd` services requests, do not use `acstest`. Communication problems may occur if `acsd` and `acstest` process ACS requests at the same time.

acstest on Windows systems

`acstest` depends on the Sun StorageTek LibAttach service being started successfully. You can verify that this service is started by using the **Services** tool available in **Administrative Tools** in the Windows control panel. `acstest` attempts to communicate with ACS library software by using the LibAttach service.

The usage format follows:

```
acstest -r ACS_library_software_hostname [-d device_name ACS, LSM,  
panel, drive] ... [-C sub_cmd]
```

The following example assumes that the LibAttach service has been started:

```
install_path\volmgr\bin\acstest -r einstein -d Tape0 0,0,2,1
```

acstest on UNIX systems

`acstest` depends on `acsssi` being started successfully. You can use the UNIX `netstat -a` command to verify that a process listens on the SSI socket.

`acstest` attempts to communicate with ACS library software using `acsssi` and connects on an existing socket.

The usage format follows. You can pass the socket name on the command line. Otherwise, the default socket name (13741) is used.

```
acstest -r ACS_library_software_hostname [-s socket_name]  
[-d drive_path ACS, LSM, panel, drive] ... [-C sub_cmd]
```

The following example assumes that the `acsssi` process has been started by using socket 13741:

```
/usr/opensv/volmgr/bin/acstest -r einstein -s 13741
```

Changing your ACS robotic configuration

UNIX and Linux systems only.

NetBackup Enterprise Server only.

If you change your ACS robot configuration, you should update NetBackup so that `acsssi` can successfully communicate with `acsd`, `acstest`, and ACS library software.

Any `acsssi` processes must be cancelled after your changes are made and before the Media Manager device daemon, `ltid`, is restarted. Also, for the `acstest` utility to function, `acsssi` for the selected robot must be running.

To update NetBackup after changing your configuration

- 1 Make your configuration changes.
- 2 Use `bp.kill_all` to stop all running processes.
- 3 Restart all processes.

```
/usr/opensv/netbackup/bin/goodies/netbackup start
```

ACS configurations supported

UNIX and Linux systems only.

NetBackup Enterprise Server only.

NetBackup supports the following ACS configurations:

- Multiple robots that are controlled from a single ACS host
- Multiple robots that are controlled from multiple ACS hosts

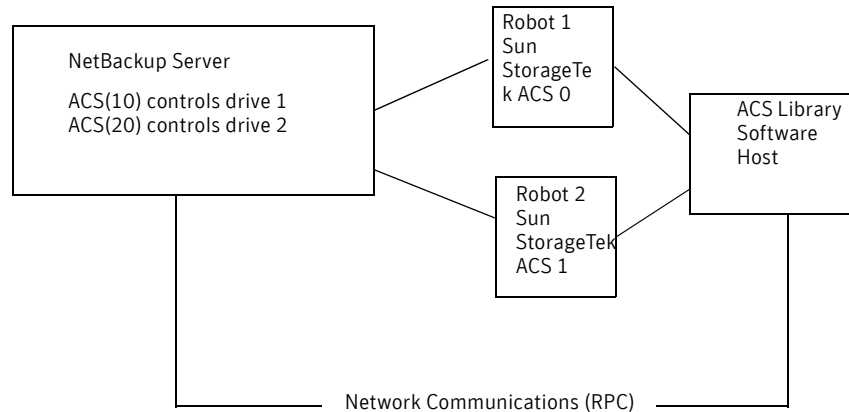
Multiple ACS robots with one ACS library software host

NetBackup supports the following configuration:

- A NetBackup server is connected to drives in multiple ACS robots
- The robots are controlled from a single ACS library software host

See [Figure 11-4](#) on page 174.

Figure 11-4 Multiple ACS robots, one ACS library software host



Inventory requests include: the volumes that are configured on the ACS library software host that resides on the ACS robot that is designated in the drive address.

In this example, assume that drive 1:

- Has an ACS drive address (ACS, LSM, panel, drive) of 0,0,1,1 in the NetBackup device configuration
- Is under control of robot number 10 (ACS(10)).

If any other robot ACS(10) drives have a different ACS drive address (for example, 1,0,1,0), the configuration is invalid.

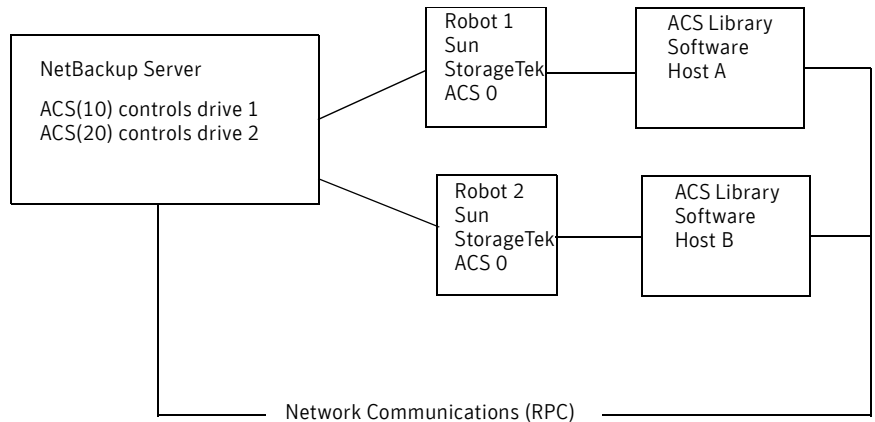
NetBackup supports configurations of multiple LSMs in a single ACS robot if a pass-through port exists.

Multiple ACS robots and ACS library software hosts

NetBackup supports the following configuration:

- A NetBackup server is connected to drives in multiple ACS robots
- The robots are controlled from separate ACS library software hosts

See [Figure 11-5](#) on page 175.

Figure 11-5 Multiple ACS robots, multiple ACS library software hosts

Inventory requests include the volumes that are configured on the ACS library software hosts (Host A for Robot 1 and Host B for Robot 2). The software hosts reside on the robot (ACS 0 for each) that is designated in the Sun StorageTek drive address.

In this example, assume drive 1:

- Has an ACS drive address (ACS, LSM, panel, drive) of 0,0,1,1 in the NetBackup device configuration
- Is under control of robot number 10 (ACS(10))

If any other robot ACS(10) drives have a different ACS drive address (for example, 1,0,1,0), the configuration is invalid.

NetBackup supports configurations of multiple LSMs in a single ACS robot if a pass-through port exists.

Sun StorageTek ACSLS firewall configuration

NetBackup Enterprise Server only.

To configure an ACS robot in an Sun StorageTek ACSLS firewall environment, use the following `vm.conf` file configuration entries to designate TCP port connections:

- `ACS_CSI_HOSTPORT`
- `ACS_SSI_INET_PORT`
- `ACS_TCP_RPCSERVICE`

For information about `vm.conf` entries and examples, see “`vm.conf` options for media servers” in the *NetBackup Administrator’s Guide for UNIX and Linux, Volume II* or the *NetBackup Administrator’s Guide for Windows, Volume II*.

The Sun StorageTek ACSLS server configuration options must match the entries in the `vm.conf` file. For example, in a typical ACSLS firewall configuration, you would change the following settings as shown:

- **Changes to alter use of TCP protocol...**
Set to **TRUE** - Firewall-secure ACSLS runs across TCP.
- **Changes to alter use of UDP protocol...**
Set to **FALSE** - Firewall-secure ACSLS runs across TCP.
- **Changes to alter use of the portmapper...**
Set to **NEVER** - Ensures that the ACSLS server does not query the portmapper on the client platform.
- **Enable CSI to be used behind a firewall...**
Set to **TRUE** - Allows specification of a single port for the ACSLS server.
- **Port number used by the CSI...**
The port that the user chooses. The 30031 default value is used most often. This port number must match the port number that you specify in the NetBackup `vm.conf` file.

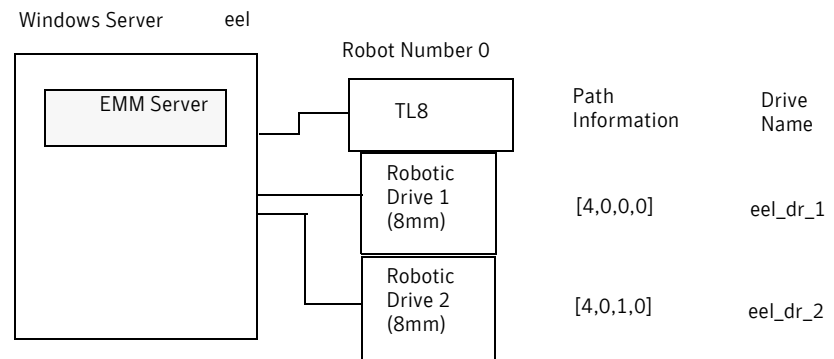
For complete information about setting up a firewall-secure ACSLS server, refer to your vendor documentation.

Device configuration examples

See the following robot and drive configuration examples:

- [“Configuring a robot on a server”](#) on page 177
- [“Configuring stand-alone drives on a server”](#) on page 180
- [“Configuring a robot and multiple servers”](#) on page 183
- [“Configuring an ACS robot on a Windows server”](#) on page 187
- [“Configuring an ACS robot on a UNIX server”](#) on page 190
- [“Configuring a TLH robot on a UNIX server”](#) on page 192
- [“Configuring a TLM robot on a UNIX server”](#) on page 194

Configuring a robot on a server



This configuration has a tape library that contains two 8mm tape drives. The robot and drives are connected to a server running Microsoft Windows.

Table 12-1 Add Robot dialog entries (local host)

Device Host	eel
Robot Type	TL8 (Tape Library 8MM)
Robot Number	0
Robot is controlled locally by this device host	Set (cannot be changed for this robot type)
Robot Device	When you select a robot, the SCSI Port, Bus, Target, and LUN numbers are propagated to the Add Robot dialog for Windows servers.

Table 12-2 Add Drive dialog entries (drive1)

Device Host	eel
Drive Name	eel_dr_1
Drive Type	8mm Cartridge (8mm)
Path Information	[4,0,0,0]
Cleaning Frequency	0 (hours)
Drive is in a Robotic Library	Yes
Robotic Library	TL8(0) - eel
Robot Drive Number	1

Table 12-3 Add Drive dialog entries (drive2)

Device Host	eel
Drive Name	eel_dr_2
Drive Type	8mm Cartridge (8mm)
Path Information	[4,0,1,0]
Cleaning Frequency	0 (hours)
Drive is in a Robotic Library	Yes

Table 12-3 Add Drive dialog entries (drive2) (Continued)

Robotic Library	TL8(0) - eel
Robot Drive Number	2

If eel was a UNIX server, you would complete the following dialog entries.

Table 12-4 Add Robot dialog entries (local host)

Device Host	eel
Robot Type	TL8 (Tape Library 8MM)
Robot Number	0
Robot is controlled locally by this device host	Set (cannot be changed for this robot type)
Robotic Device File	/dev/sg/c0t4l0

Table 12-5 Add Drive dialog entries (drive1)

Device Host	eel
Drive Name	eel_dr_1
Drive Type	8mm Cartridge (8mm)
No Rewind Device	/dev/rmt/5cbn
Cleaning Frequency	25 (hours)
Drive Status	UP
Drive is in a Robotic Library	Yes
Robotic Library	TL8(0) - eel
Robot Drive Number	1

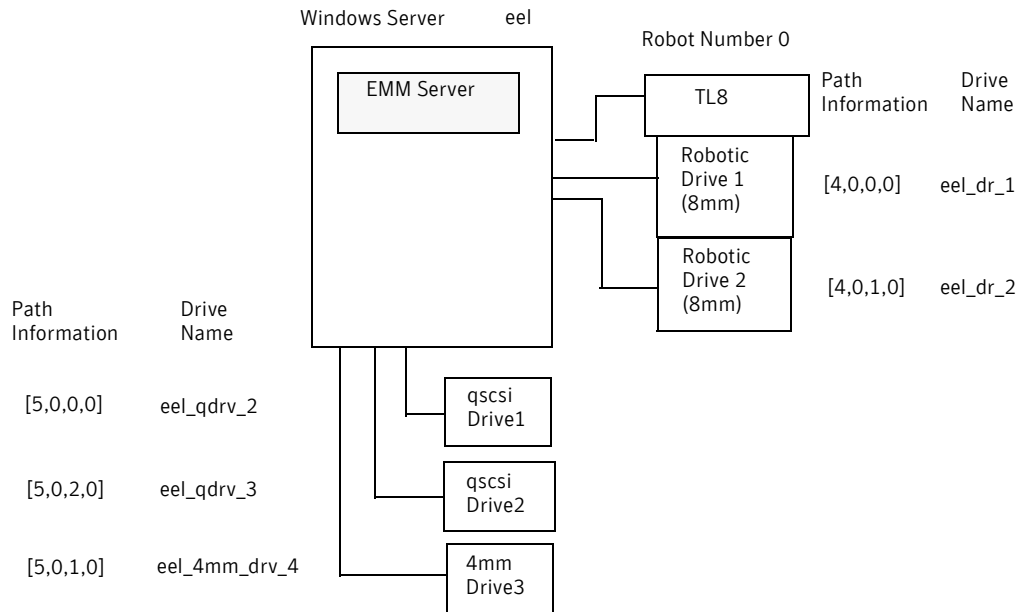
Table 12-6 Add Drive dialog entries (drive2)

Device Host	eel
Drive Name	eel_dr_2
Drive Type	8mm Cartridge (8mm)
No Rewind Device	/dev/rmt/6cbn

Table 12-6 Add Drive dialog entries (drive2) (Continued)

Cleaning Frequency	25 (hours)
Drive Status	UP
Drive is in a Robotic Library	Yes
Robotic Library	TL8(0) - eel
Robot Drive Number	2

Configuring stand-alone drives on a server



This example adds three stand-alone drives to the device configuration for the host eel that was shown in Example 1. Configuration information for the robot and its two drives is the same as in “[Configuring a robot on a server](#)” on page 177. That configuration information is not repeated here.

Table 12-7 Add Drive dialog entries (drive1)

Device Host	eel
Drive Name	eel_qdrv_2
Drive Type	1/4” Cartridge (qscsi)

Table 12-7 Add Drive dialog entries (drive1) (Continued)

Path Information	[5,0,0,0]
Drive is in a Robotic Library	No

Table 12-8 Add Drive dialog entries (drive2)

Device Host	eel
Drive Name	eel_qdrv_3
Drive Type	1/4" Cartridge (qscsi)
Path Information	[5,0,2,0]
Drive is in a Robotic Library	No

Table 12-9 Add Drive dialog entries (drive3)

Device Host	eel
Drive Name	eel_4mm_drv_4
Drive Type	4mm Cartridge (4mm)
Path Information	[5,0,1,0]
Cleaning Frequency	0 (hours)
Drive is in a Robotic Library	No

If eel was a UNIX server, you would complete the following dialog entries.

Table 12-10 Add Drive dialog entries (drive1)

Device Host	eel
Drive Name	eel_qdrv_2
Drive Type	1/4" Cartridge (qscsi)
No Rewind Device	/dev/rmt/2cbn
Drive Status	UP
Drive is in a Robotic Library	No

Table 12-11 Add Drive dialog entries (drive2)

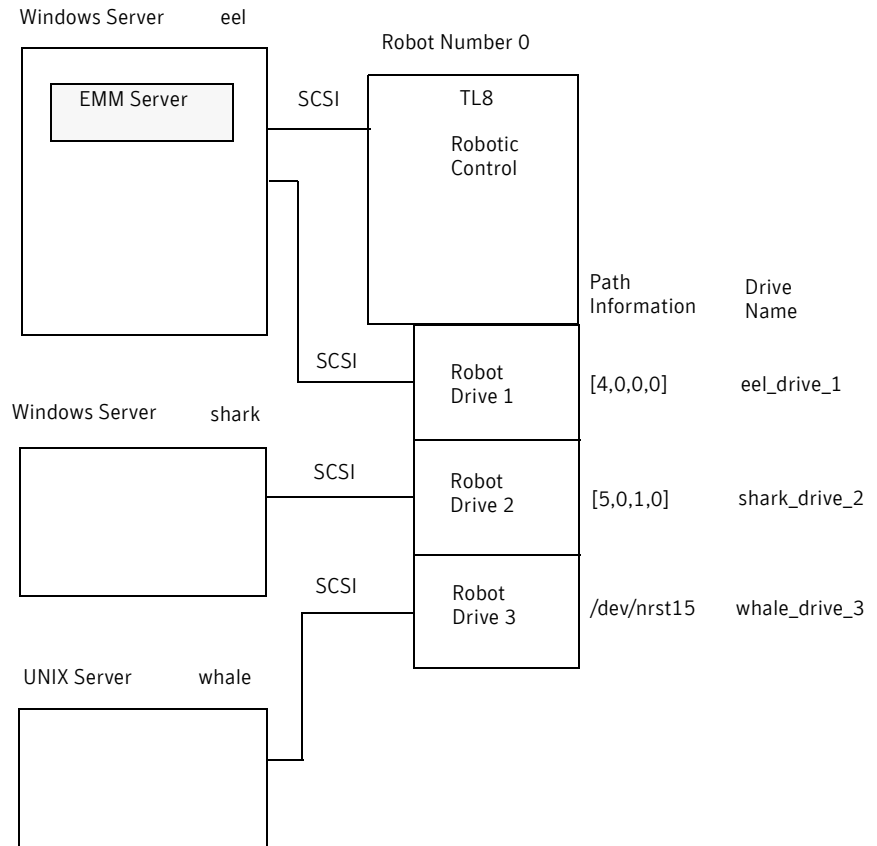
Device Host	eel
Drive Name	eel_qdrv_3
Drive Type	1/4" Cartridge (qscsi)
No Rewind Device	/dev/rmt/3cbn
Drive Status	UP
Drive is in a Robotic Library	No

Table 12-12 Add Drive dialog entries (drive3)

Device Host	eel
Drive Name	eel_4mm_drv_4
Drive Type	4mm Cartridge (4mm)
No Rewind Device	/dev/rmt/4cbn
Cleaning Frequency	25 (hours)
Drive Status	UP
Drive is in a Robotic Library	No

Configuring a robot and multiple servers

The following example applies only to NetBackup Enterprise Server.



This example is a more complex configuration than the previous examples because:

- The robotic control is on one NetBackup media server server
- Two other media servers use the drives.

Some things to note when you review this example are:

- Media for all devices is configured in an EMM server, which is located on server eel.
- The Robot Number is 0 in all three cases because the three servers refer to the same physical robot. In this case, robotic control is on host eel.

- Robot Drive Numbers correlate to the physical drive assignment within the robot.
- When you add volumes, add them to host eel because the EMM server is on that server.

Configuration on the Windows server eel

Use the following entries in the Add Robot and Add Drive dialogs:

Table 12-13 Add Robot dialog entries (local host)

Device Host	eel
Robot Type	TL8 (Tape Library 8MM)
Robot Number	0
Robot is controlled locally by this device host	Set
Robot Device	When you select a robot, the SCSI Port, Bus, Target, and LUN numbers are propagated to the Add Robot dialog for Windows servers.

Table 12-14 Add Drive dialog entries (drive 1)

Device Host	eel
Drive Name	eel_drive_1
Drive Type	8mm Cartridge (8mm)
Path Information	[4,0,0,0]
Cleaning Frequency	0 (hours)
Drive is in a Robotic Library	Yes
Robotic Library	TL8(0) - eel
Robot Drive Number	1

Configuration on the Windows server shark

Use the following entries in the Add Robot and Add Drive dialogs:

Table 12-15 Add Robot dialog entries (remote host)

Device Host	shark
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Table 12-15 Add Robot dialog entries (remote host) (Continued)

Robot Type	TL8 (Tape Library 8MM)
Robot Number	0
Robot control is handled by a remote host	Set
Robot Control Host	eel

Table 12-16 Add Drive Dialog Entries (Drive 2)

Device Host	shark
Drive Name	shark_drive_2
Drive Type	8mm Cartridge (8mm)
Path Information	[5,0,1,0]
Cleaning Frequency	0 (hours)
Drive is in a Robotic Library	Yes
Robotic Library	TL8(0) - eel
Robot Drive Number	2

Configuration on the UNIX server whale

Use the following entries in the Add Robot and Add Drive dialogs:

Table 12-17 Add Robot Dialog Entries (remote host)

Device Host	whale
Robot Type	TL8 (Tape Library 8MM)
Robot Number	0
Robot control is handled by a remote host	Set
Robot Control Host	eel

Table 12-18 Add Drive Dialog Entries (Drive 3)

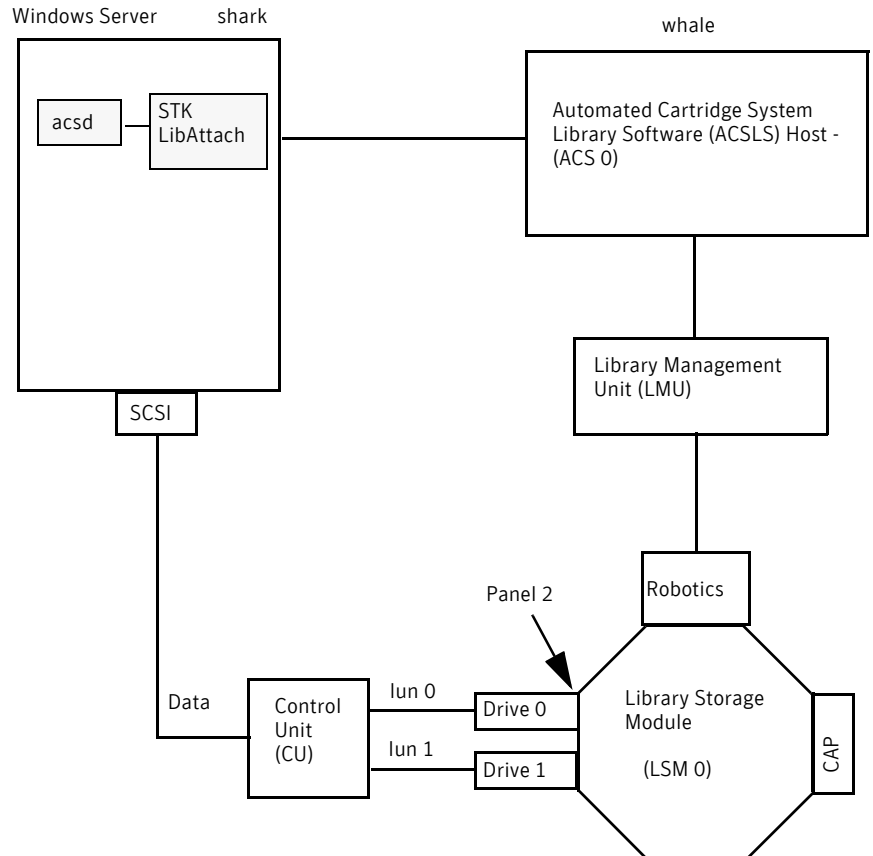
Device Host	whale
Drive Name	whale_drive_3

Table 12-18 Add Drive Dialog Entries (Drive 3) (Continued)

Drive Type	8mm Cartridge (8mm)
No Rewind Device	/dev/nrst15
Cleaning Frequency	20 (hours)
Drive Status	UP
Drive is in a Robotic Library	Yes
Robotic Library	TL8(0) - eel
Robot Drive Number	3

Configuring an ACS robot on a Windows server

The following example applies only to NetBackup Enterprise Server.



This configuration uses an Automated Cartridge System (ACS) robot for storage. Server shark can be a Windows NetBackup master server or media server. Items to note when you review this example are:

- The Sun StorageTek ACSLS host (in the Add Robot dialog) is host whale, where the ACS library software resides. In this example, Automated Cartridge System Library Software (ACSL) is installed as the ACS library software.

On some server platforms, you can run NetBackup media server software and ACS library software on the same server. Therefore, you need only one server.

- The ACS, LSM, PANEL, and DRIVE numbers are part of the ACS library software configuration and must be obtained from the administrator of that host.
- Robot number and ACS number are different terms. Robot number is the robot identifier used in NetBackup. ACS number is the robot identifier in ACS library software. These numbers can be different, although they both default to zero.
- If you connect the drives through an independent control unit, you must use the correct Logical Unit Numbers (LUNs) so that the correct tape name is used.
- The Add Robot dialog entries include an **ACSLs Host** entry so that the ACS library software host communicates by using STK LibAttach software. This software must be installed on each Windows server that has the ACS drives attached to it.

Table 12-19 Add Robot dialog entries (remote host)

Device Host	shark
Robot Type	ACS (Automated Cartridge System)
Robot Number	0
Robot control is handled by a remote host	Set (cannot be changed for this robot type)
ACSLs Host	whale

Table 12-20 Add Drive dialog entries (drive 0)

Device Host	shark
Drive Type	1/2" Cartridge (hcart)
Drive Name	shark_drive_0
Path Information	[5,0,1,0]
Drive is in a Robotic Library	Yes
Robotic Library	ACS(0) - whale

Table 12-20 Add Drive dialog entries (drive 0) (Continued)

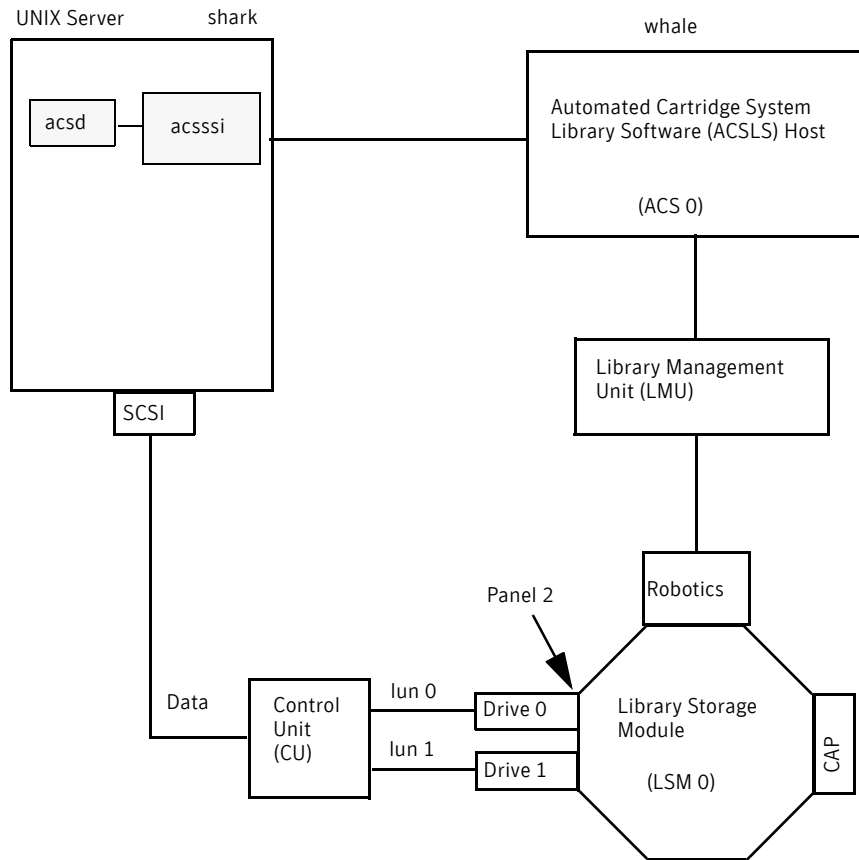
ACS	ACS: 0
	LSM: 0
	PANEL: 2
	DRIVE: 0

Table 12-21 Add Drive dialog entries (drive 1)

Device Host	shark
Drive Type	1/2" Cartridge (hcart)
Drive Name	shark_drive_1
Path Information	[4,0,1,1]
Drive is in a Robotic Library	Yes
Robotic Library	ACS(0) - whale
ACS	ACS: 0
	LSM: 0
	PANEL: 2
	DRIVE: 1

Configuring an ACS robot on a UNIX server

The following example applies only to NetBackup Enterprise Server.



This configuration uses an Automated Cartridge System (ACS) robot for storage. Host shark can be a UNIX NetBackup master server or media server. Some items to note when you review this example are:

- The **ACSL Host** (in the Add Robot dialog) is server whale, where the ACS library software resides. In this example, Automated Cartridge System Library Software (ACSL) is installed as the ACS library software. On some server platforms, you can run NetBackup media server software and ACS library software on the same server. Therefore, you need only one server.
- The ACS, PANEL, LSM, and DRIVE numbers are part of the ACS library software configuration and must be obtained from that system.

- Robot number and ACS number are different terms. Robot number is the robot identifier used in NetBackup. ACS number is the robot identifier in ACS library software. These numbers can be different, although they both default to zero.
- If you connect the drives through an independent control unit, you must use the correct Logical Unit Numbers (LUNs) so that the correct tape name is used.
- The Add Robot dialog entries include an **ACSL Host** entry. That entry configures NetBackup to use the ACS Storage Server Interface (`acsssi`) to communicate with the ACS library software host.

Table 12-22 Add Robot dialog entries (remote host)

Device Host	shark
Robot Type	ACS (Automated Cartridge System)
Robot Number	0
Robot control is handled by a remote host	Set (cannot be changed for this robot type)
ACSL Host	whale

Table 12-23 Add Drive dialog entries (drive 0)

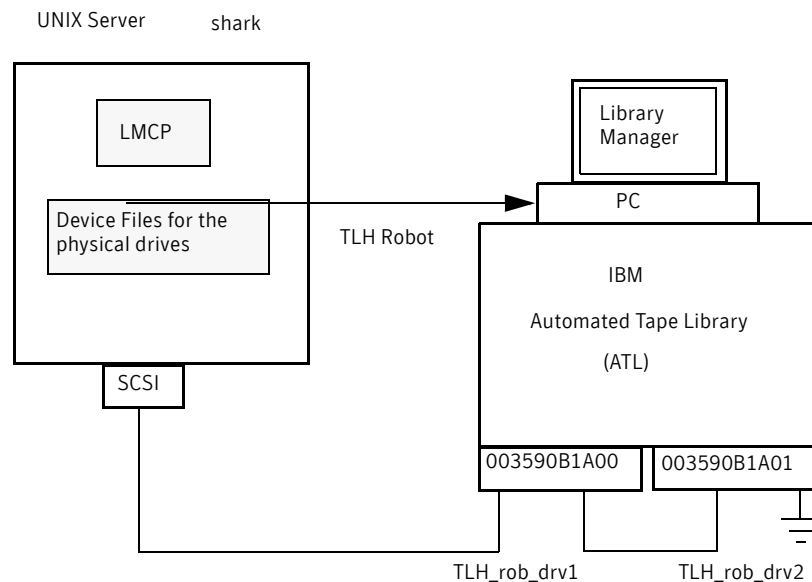
Device Host	shark
Drive Name	shark_drive_0
Drive Type	1/2" Cartridge (hcart)
No Rewind Device	/dev/rmt1.1
Drive is in a Robotic Library	Yes
Robotic Library	ACS(0) - whale
ACS	ACS Number: 0 LSM Number: 2 PANEL Number: 0 DRIVE Number: 0

Table 12-24 Add Drive dialog entries (drive 1)

Device Host	shark
Drive Name	shark_drive_1
Drive Type	1/2" Cartridge (hcart)
No Rewind Device	/dev/rmt1.1
Drive is in a Robotic Library	Yes
Robotic Library	ACS(0) - whale
ACS	ACS Number: 0 LSM Number: 2 PANEL Number: 0 DRIVE Number: 1

Configuring a TLH robot on a UNIX server

The following example applies only to NetBackup Enterprise Server.



This configuration adds a TLH robot to the configuration. The server shark can be a UNIX (AIX, Solaris SPARC, HP-UX), Linux, or Windows server, and can be a

NetBackup master server or media server. Some things to note when you review this example are:

- The robot control host is the server shark. The robotic control (`tlhcd`) also can exist on a different server.
- The main difference between TLH robot configuration and other robot types is the robotic device file. The robotic device file is the Library Manager Control Point (LMCP) file on AIX systems and is the library name on non-AIX systems.
In this example, shark is a AIX server, so the LMCP file is specified for the robotic device file.
If shark was a UNIX server that was not AIX or a Windows server, you would specify the library name (for example 3494AH).
- The drive configuration uses the IBM device number. You cannot assign a cleaning frequency in NetBackup.

Table 12-25 Add Robot dialog entries (local host)

Device Host	shark
Robot Type	TLH (Tape Library Half-inch)
Robot Number	0
Robot is controlled locally by this device host	Set
LMCP Device File	/dev/lmcp0

Table 12-26 Add Drive dialog entries (drive 1)

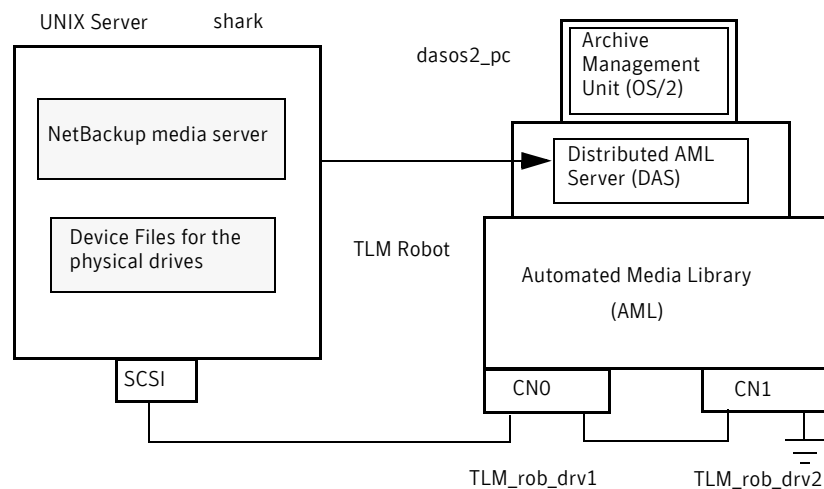
Device Host	shark
Drive Name	TLH_rob_drv1
Drive Type	1/2" Cartridge (hcart)
No Rewind Device	/dev/rmt4.1
Drive Status	UP
Drive is in a Robotic Library	Yes
Robotic Library	TLH(0) - shark
Vendor Drive Identifier	003590B1A00

Table 12-27 Add Drive dialog entries (drive 2)

Device Host	shark
Drive Name	TLH_rob_drv2
Drive Type	1/2" Cartridge (hcart)
No Rewind Device	/dev/rmt1.1
Drive Status	UP
Drive is in a Robotic Library	Yes
Robotic Library	TLH(0) - shark
Vendor Drive Identifier	003590B1A01

Configuring a TLM robot on a UNIX server

The following example applies only to NetBackup Enterprise Server.



This configuration adds a TLM robot. The device configuration for this robot is similar to the TL8 robot explained in [“Configuring a robot on a server”](#) on page 177.

However with a TLM robot, you specify the DAS/SDLC server instead of a robot control host. This server may reside on an IBM OS/2 system, usually in or near the robot cabinet, or on a Windows server.

In this example, the DAS Server entry is `dasos2_pc`. You must configure the DAS/SDLC server to recognize server `shark` as a client and allocate the AML drives to `shark`.

Table 12-28 Add Robot dialog entries (remote host)

Device Host	shark
Robot Type	TLM (Tape Library Multimedia)
Robot Number	0
Robot control is handled by a remote host	Set (cannot be changed for this robot type)
DAS Server	dasos2_pc

Table 12-29 Add Drive dialog entries (drive 1)

Device Host	shark
Drive Name	TLM_rob_drv1
Drive Type	1/2" Cartridge (hcart)
No Rewind Device	/dev/rmt/rmt0h
Cleaning Frequency	25 (hours)
Drive Status	UP
Drive is in a Robotic Library	Yes
Robotic Library	TLM(0) - shark
Vendor Drive Identifier	CN0

Table 12-30 Add Drive dialog entries (drive 2)

Device Host	shark
Drive Name	TLM_rob_drv2
Drive Type	1/2" Cartridge (hcart)

Table 12-30 Add Drive dialog entries (drive 2) (Continued)

No Rewind Device	/dev/rmt/rmt1h
Cleaning Frequency	25 (hours)
Drive Status	UP
Drive is in a Robotic Library	Yes
Robotic Library	TLM(0) - shark
Vendor Drive Identifier	CN1

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