

NetBackup™ NAS Administrator's Guide

Release 10.3



NetBackup™ NAS Administrator's Guide

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About NAS backups

- [Chapter 1. Introduction](#)

Introduction

This chapter includes the following topics:

- [About NAS backups](#)
- [Backups using NAS-Data-Protection policy](#)
- [Backups using NDMP policy](#)

About NAS backups

NetBackup Snapshot Manager and NDMP V4 snapshot extension can make snapshots of client data on a NAS host. A NAS snapshot is a point-in-time disk image. You can retain the Snapshots on the disk for any duration. Using the Instant Recovery feature in NetBackup, you can efficiently restore the data from the disk. Broadly, in NetBackup, snapshot-based data protection for NAS can be performed using NAS-Data-Protection policy and NDMP policy.

Backups using NAS-Data-Protection policy

NAS-Data-Protection policy is a robust approach to backup the data residing on NAS storage. It is also known as dynamic NAS or D-NAS policy. NetBackup Snapshot Manager and the storage array plug-ins can make snapshots of NAS volumes and shares. The dynamic data streams can access the snapshots on the backup hosts and read them to create point-in-time backup copies. For more details about D-NAS policy, see *Section 2* of this guide.

Backups using NDMP policy

NetBackup can make snapshots of client data on a NAS (NDMP) host using NDMP V4 extension. The snapshot data is read over NDMP and backup copies are created

per configured target. For more details about NDMP policy, see *Section 3: Using NDMP* of this guide.

Using NAS-Data-Protection (D-NAS)

- [Chapter 2. D-NAS overview](#)
- [Chapter 3. D-NAS Planning and Tuning](#)
- [Chapter 4. Pre-requisites for D-NAS configuration](#)
- [Chapter 5. Configure D-NAS policy for NAS volumes](#)
- [Chapter 6. Using accelerator](#)
- [Chapter 7. Using Vendor Change Tracking](#)
- [Chapter 8. Replication using D-NAS policy](#)
- [Chapter 9. Restoring from D-NAS backups](#)
- [Chapter 10. Troubleshooting](#)

D-NAS overview

This chapter includes the following topics:

- [Dynamic data streaming for D-NAS Policy](#)
- [Understanding the features of D-NAS](#)
- [Dynamic streaming parameter](#)
- [Limitations and considerations](#)

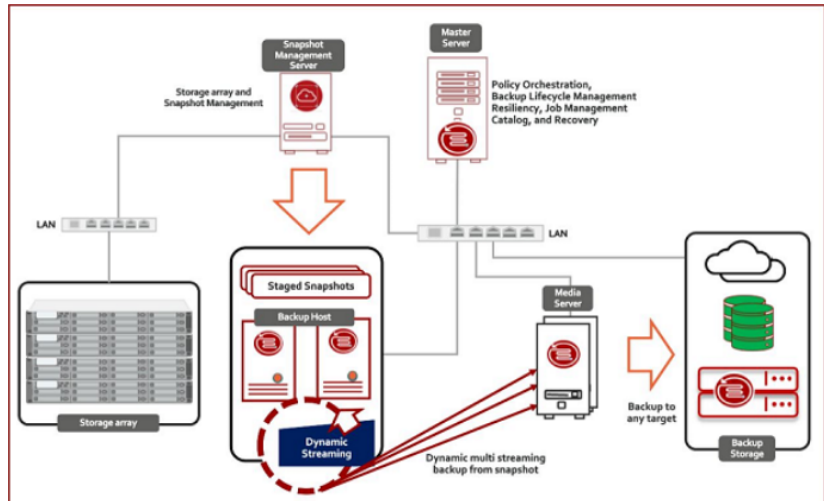
Dynamic data streaming for D-NAS Policy

Dynamic NAS (D-NAS): By means of Snapshot management server and the storage array plug-ins, NetBackup can make snapshots of NAS volumes and shares. The snapshots are accessed on backup hosts and read by dynamic streams to create point in time backup copies.

You can perform a snapshot enabled, off-host backup of NAS volumes, where a volume is backed up using dynamic backup streams.

Each NAS volume or share is read over NFS or SMB, and backed up using a configured number of backup streams. Files of these NAS volumes or shares are optimally distributed in real-time across streams to realize the full potential of backup streams. You cannot mix NAS volumes or shares of different storage array vendors in a single policy. In other words, using a single policy you can only protect assets for a single vendor and a single NAS protocol.

Dynamic streaming is built on the NetBackup client framework and uses NAS-Data-Protection policy type for snapshot and backup orchestration of NAS data. This policy supports SLP only for the data lifecycle.



Understanding the features of D-NAS

This table explains the salient features of data protection using D-NAS.

Table 2-1

Feature	Description
Integration with NetBackup Role-based Access Control (RBAC)	NetBackup web UI provides the Default NAS Administrator RBAC role to control which NetBackup users can perform backup and restore of NAS volumes using NAS-Data-Protection policy. The user need not be a NetBackup administrator to perform these operations on NAS volumes using NAS-Data-Protection policy.
Convenience of backup host pool	Backup host pool is a group of NetBackup backup hosts where the snapshot of the volume is staged for the backup process to read. These hosts can be NetBackup client, media, or primary server.
Vendor change tracking	Vendor Change Tracking (VCT) is a mechanism to get the difference in the content of the volume or share between two points-in-time snapshots. See “About Vendor Change Tracking” on page 37.

Table 2-1 (continued)

Feature	Description
Exclude volumes	You can exclude the volumes from the backup selection list that you do not want to backup. For example, if <code>/prodVol*</code> is the backup selection, and there may be a volume <code>/prodVol-Scratch</code> which you do not want to backup.
NetBackup accelerator	You can use NetBackup's robust accelerator feature along with dynamic streaming for optimized and fast backups.
Checkpoint restart	You can leverage NetBackup's checkpoint restart feature along with dynamic streaming. By taking checkpoints periodically during the backup, NetBackup can retry a failed backup from the beginning of the last checkpoint without restarting the entire job.

Dynamic streaming parameter

Dynamic streaming is a group of backup streams running in parallel which dynamically distributes the files for backups amongst them. This feature optimizes and speeds up the backup of dense NAS volumes or shares.

Maximum number of streams per volume: The value determines the number of backup streams that are deployed for backing up each volume. For example, If a policy contains 10 volumes, and the value of this parameter is set to 4, then you see a group of four backup streams for each volume. So, a total of 40 child backup streams and 10 parent backup streams run during the backup.

Limitations and considerations

You can set up a NAS-Data-Protection policy for your workloads.

Note: If you use cloud as a storage unit, you must configure appropriate buffer size. Refer to the *NetBackup Cloud Administrator's Guide*.

Note the following important points about NAS-Data-Protection policy.

- The NAS-Data-Protection is not supported in the DNAT environment.

- This policy does not support copy-based retention for Snapshot images. Ensure that you carefully plan your policy scheduling and snapshot retention in SLP.
- Client side deduplication is not supported for the NAS-Data-Protection policy.
- Vendor Change Tracking (VCT) enabled backup with incremental schedule requires base snapshot copy to determine the difference between current snapshot copy and base snapshot copy. Differential incremental schedule refers to base snapshot copy from a previous differential incremental or cumulative incremental or full schedule. Cumulative incremental schedule refers to base snapshot copy from the full schedule. During VCT enabled backup with incremental schedule, if the base snapshot copy is not available then the backup operation might fail with the error shown in Activity Monitor Detailed status.
- NAS-Data-Protection policy is a snapshot-enabled data protection policy. You can configure only Storage Lifecycle Policy (SLP) for the policy's storage destination. Additionally, the SLP should always have Snapshot as the primary job and Backup from Snapshot as the secondary job.
- If the NAS-Data-Protection policy is used in a backup host that is running antivirus software, the parent backup from snapshot job might hang.
The antivirus software may block NetBackup process interactions causing the processes to hang. In this particular scenario, the nbcs process on the backup host might hang resulting in the backup-from-snapshot job to hang. Create an antivirus exclusion for nbcs on the backup host.
To cancel the hung job:
 - Note down the process ID of the nbcs process which is running on the backup host. This can be obtained from the job details section.
 - Log on to the backup host and manually kill the nbcs process.
 - Refer to the Technote for more details regarding how to exclude the NetBackup processes from virus scanning:
https://www.veritas.com/support/en_US/article.100004864
 - If the above steps cannot resolve the issue (and the nbcs hang persists), uninstall the network component from the antivirus. On Symantec Endpoint Protection, this is called the "Network and Host Exploit Mitigation" component.
- For NAS-Data-Protection policy, multiple images are created for a single volume that is backed up. The number of images is equal to the value configured for the **Maximum number of streams per volume** in the policy. Since a single image cannot be referred from a single volume, NetBackup groups the images associated with a volume. When an operation is performed on one of the images in a volume, the same operation is also performed on the other grouped images in the volume. For example, if the **Maximum number of streams per volume** parameter is set as four and you select one image for a volume to expire, the

other three images also expire. The image grouping is applicable for the following operations:

- Browse and Restore
- Image expiration
- Image import
- Image duplication
- Image verification
- Set primary copy

Note: Image grouping is not applicable for importing images as part of the Image Sharing operation.

- To enable checkpoint restart for NAS-Data-Protection policies created before upgrading to version 9.0, you must select the **Take checkpoints every** check box and enter a value in minutes.

D-NAS Planning and Tuning

This chapter includes the following topics:

- [Tuning parameters for Server Message Block \(SMB\)](#)
- [Tuning parameters for Network File System \(NFS\)](#)
- [NetBackup tuning parameters for the backup host](#)

Tuning parameters for Server Message Block (SMB)

You must verify that the SMB 3 is enabled to gain the SMB Multichannel capabilities. SMB Multichannel enables the file servers to use multiple network connections simultaneously.

Configure the parameters as specified in the [Table 3-1](#) table, on the backup host to gain better throughput. Note that the mentioned values for the parameters are from the test environment. You can set these values based on the configuration of the backup hosts.

NetBackup administrators can also refer to the SMB vendor's documentation to configure the parameters in the [Table 3-1](#) table.

Table 3-1 SMB tuning parameters

Parameters	Values
Set-SmbClientConfiguration -ConnectionCountPerRssNetworkInterface	8
Set-SmbClientConfiguration -DirectoryCacheEntriesMax	4096

Table 3-1 SMB tuning parameters (*continued*)

Parameters	Values
Set-SmbClientConfiguration -DirectoryCacheLifetime	60
Set-SmbClientConfiguration -EnableBandwidthThrottling	0
Set-SmbClientConfiguration -FileInfoCacheEntriesMax	32768
Set-SmbClientConfiguration -FileInfoCacheLifetime	60
Set-SmbClientConfiguration -FileNotFoundCacheEntriesMax	32768
Set-SmbClientConfiguration -FileNotFoundCacheLifetime	60
Set-SmbClientConfiguration -MaxCmds	32768

Tuning parameters for Network File System (NFS)

Using the *nconnect* mount option you can specify the number of connections (network flows) that must be established between the NFS client and the NFS endpoint. You can specify up to 16 connections. By default, NFS clients use a single connection between itself and the endpoint. You can set the *nconnect* value for mount command in the `/etc/nfsmount.conf` file.

[NFSMount_Global_Options]: set default options for each mount command run. The recommended setting for *nconnect* is 2, for the NFS volume backups to gain backup performance.

NetBackup tuning parameters for the backup host

Following are the NetBackup tuning parameters for the backup host:

- **DNAS_LOOKAHEAD_CACHE_SIZE_PER_VOLUME_MB**: The crawler uses the `DNAS_LOOKAHEAD_CACHE_SIZE_PER_VOLUME_MB` memory for cache purpose during each volume's backup job.

The default value is 100 MB per volume. During a backup, the crawler looks ahead on the snapshot file system, and uses this additional cache space to store information for the backup job.

You can configure the parameters in the `bp.conf` file for the backup hosts of NetBackup 10.3 onwards. You must set this configuration on all the backup hosts that are associated with the backup host pool.

Example, if you configure the value to 512; then it means that 512-MB memory per volume is used as cache.

- **IGNORE_FILE_ACLS:** Set this parameter in the `bp.conf` file to 1, to ignore the backup of file level ACLs and user group information. Note that only the directory ACLs are backed up, the file level ACLs are not backed up.
During restore operation, the *Directory* permissions are inherited. You can configure the parameters in the `bp.conf` file for backup hosts of NetBackup 10.3 onwards. Administrators must set this configuration on all the backup hosts that are associated with the backup host pool.

Pre-requisites for D-NAS configuration

This chapter includes the following topics:

- [Prerequisites for D-NAS configuration](#)
- [Domain user requirement for SMB share backups](#)
- [Minimum supported backup host versions for different features](#)
- [Configuring a backup host pool](#)
- [Configuring storage lifecycle policies](#)

Prerequisites for D-NAS configuration

You need to meet the following pre-requisites.

- Ensure that you have installed the NetBackup Snapshot Manager component. For more details, see the *Veritas NetBackup Snapshot Manager Install and Upgrade Guide*.
- Prepare the plug-in that you want to use for the NetBackup D-NAS configuration. For more details, refer to the *NetBackup™ Snapshot Manager for Data Center Administrator's Guide*.
- Identify the backup host that you want to use for the configuration.
- If the NAS data protection policy uses TAPE storage unit in SLP for protecting NAS volumes, then the number of tape drives must be greater than or equal to the maximum number of streams per volume, otherwise backups fail. The other parameters of TAPE, like Media multiplexing and maximum concurrent write drives, do not have any effect on NetBackup D-NAS backups.

- For SMB backups using NAS-Data-Protection policy the primary, media and backup host version should be 9.1 onwards.

Domain user requirement for SMB share backups

This step is required for Windows backup hosts for SMB share backups only. You must log on to the NetBackup client service and the NetBackup legacy network service as a domain user to perform the tasks described in the following sections.

Note: The Windows domain user must be a part of the local administrators group.

To log on to the NetBackup services as a domain user:

- 1 Make sure that the NetBackup client service and the NetBackup legacy network service are running.
- 2 In Windows Services, double-click the NetBackup service.
- 3 Check the **Log on** tab: if any of these services is not logged on as the domain user, change the logon to the domain account and restart the service. If both the services are not logged on as the domain user, you must do it in the following sequence:
 - Log on to the first service as domain user and restart the service.
 - Log on to the second service as a domain user and restart the service.
- 4 Make sure that all NetBackup services are running.
- 5 Relaunch the NetBackup UI.

Minimum supported backup host versions for different features

Different features of NAS data protection policy require a backup host with NetBackup version greater than or equal to the minimum supported backup host version. The following table specifies which feature is supported from which NetBackup version.

Table 4-1 NAS data protection policy features

Supported features	Minimum supported backup host version
Only NFS backup	8.3
NFS and Vendor change tracking	8.3

Table 4-1 NAS data protection policy features (*continued*)

Supported features	Minimum supported backup host version
NFS and Checkpoint restart enabled backups	9.0
NFS and Accelerator enabled backups	9.0.1
SMB backups (including CPR, accelerator, Vendor change tracking)	9.0.1
NFS and SMB backups with Vendor Change Tracking (VCT) and accelerator	10.2
Multi-stream Restore	10.2
Replication	10.0
VCT support for Indexing jobs	10.3
Forever incremental	10.3

Configuring a backup host pool

Backup hosts and backup host pools are used for NAS-Data-Protection policy based on dynamic multistreams.

You can use a NetBackup primary server, media server, or a standalone client as a backup host. For the hosts that you add to the backup host pool, their volumes are distributed for backup purposes on the backup hosts. This configuration results in a better backup performance.

Note: A NetBackup primary server running on Veritas Flex Appliance is not supported as a backup host for a NAS-Data-Protection policy.

You can create a backup host pool with different versions of NetBackup hosts. You can create Windows backup host pools only with version 9.0.1 or later. Windows hosts with a version earlier than 9.0.1 are not displayed.

Note the following important points:

- In a backup host pool you can either have Linux hosts or Windows hosts only. A pool does not support hosts with both platforms.
- If you want to backup SMB shares along with the SMB ACLs, use Windows hosts in the backup host pool.

- All the hosts in the backup host pool must use the same Linux OS version. This way each host has the same version of NFS for consistent backups.
- For backup hosts with a multi-NIC setup, add the host name that is already used on the NetBackup primary server. Do not add an alias name or any other host names in the backup host pool.

To configure a backup host pool

- 1 In the web UI, click **Host > Host properties**.
- 2 Select and connect to the primary server that you want to configure, and click **Edit primary server**.
- 3 Click **Backup Host Pools**.
- 4 Click **Add**.
- 5 Enter the backup host pool name.
- 6 (Conditional) This step is applicable only for the clients that you want to add to the list. In the **Enter hostname to add to the list** field, add the client name and click **Add to list**.
- 7 Select the **OS Type**.
- 8 Select the backup hosts that you want to add to the list.
- 9 Click **Save**.

Note: You cannot delete a backup host pool, if it is configured with an existing NAS-Data-Protection policy.

Configuring storage lifecycle policies

To perform backup of NAS volumes using D-NAS policy, you need to specify a Storage Lifecycle Policy (SLP) as the policy storage destination. You must configure the SLP to use snapshot.

For more details, see the *Configuring storage lifecycle policies for snapshots and snapshot replication* chapter in the *NetBackup™ Snapshot Manager for Data Center Administrator's Guide*.

Configure D-NAS policy for NAS volumes

This chapter includes the following topics:

- [Configure D-NAS policy for NAS volumes](#)
- [Setting up a NAS-Data-Protection policy](#)
- [Ordering of backup from snapshot jobs](#)
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- [Auto-resume backup for incomplete backup jobs](#)

Configure D-NAS policy for NAS volumes

Using the NetBackup Snapshot Manager for Data Center you can perform hardware snapshots of NFS and SMB shares. The snapshots are accessed on backup hosts and read by dynamic streams to create point in time backup copies. The following procedure describes how to configure a D-NAS policy to use hardware snapshots of NAS volumes.

Table 5-1 Configuration steps

Step	Description	Reference topic
1	Configure the NetBackup Snapshot Manager server in NetBackup	For more details, refer to the <i>Configure NetBackup snapshot manager for Data Center</i> chapter of the <i>NetBackup™ Snapshot Manager for Data Center Administrator's Guide</i> .

Table 5-1 Configuration steps (*continued*)

Step	Description	Reference topic
2	Configure the NAS storage array plug-in.	For more details, refer to the <i>Configure NetBackup snapshot manager for Data Center</i> chapter in the <i>NetBackup™ Snapshot Manager for Data Center Administrator's Guide</i> .
3	Add the backup hosts to a backup host pool. The backup hosts are responsible for data streaming.	See "Configuring a backup host pool " on page 24.
4	Configure the SLP to use snapshot	For more details, see <i>Configuring storage lifecycle policies for snapshots and snapshot replication</i> chapter in the <i>NetBackup™ Snapshot Manager for Data Center Administrator's Guide</i> .
5	Configure a NAS-Data-Protection policy to perform the operations that are specified in the SLP.	See "Setting up a NAS-Data-Protection policy " on page 27.

Note: For all the supported NAS storage arrays, refer to the *NetBackup Snapshot Manager* section, under *Snapshot Solutions* in the *NetBackup Hardware and Cloud Storage Compatibility List (HCL)*.

Setting up a NAS-Data-Protection policy

You must set up NAS data protection policy to protect your assets.

While configuring the D-NAS policy the **Use Accelerator** and **Take checkpoints every** policy attributes are enabled by default. The default value of **Take checkpoints every** is 30 minutes.

To set up a policy for NAS data protection in the web UI

- 1 On the left, click **Policies**, under **Protection**.
- 2 In the **Policies** page, click **Add**.
- 3 On the **Attributes** tab, enter the policy name.
- 4 From the **Policy type** list, select **NAS-Data-Protection**.
- 5 From the **Data classification** list, select the preferred classification.

- 6 From the **Policy Storage** list, select a storage lifecycle policy.
For more details, refer to *NetBackup Administrator's Guide, Volume I*.
- 7 From the **Policy volume pool** list, select the preferred pool.
- 8 By default **Take checkpoints every** check box is selected with 30-minutes interval. You can configure the time interval as required.

Optionally, clear the check box to disable periodic checkpoints.
- 9 If required, select the **Limit jobs per policy** check box and enter the value.
- 10 Enter a numerical value for **Job priority**.
- 11 From the **Media owner** list, select the preferred owner.
- 12 If required, select **Enable vendor change tracking for incremental backups** check box.
- 13 The **Perform snapshot backups** option is selected by default. Click **Options** to configure the snapshot options:
 - **Snapshot Type:** Select the appropriate snapshot type. By default, the **Auto** option is selected which enables NetBackup to automatically determine the snapshot type to be used for an array snapshot.
 - **Snapshot Manager:** Select the NetBackup Snapshot Manager host which communicates with the storage array to perform the snapshot operations.
- 14 If required, select **Go into effect at** check box and select the date and time.
- 15 Optionally, clear the **Use Accelerator** check box to disable accelerator for the policy.

See "[Accelerator for D-NAS](#)" on page 34.
- 16 If required, enter the phrase in **Keyword phrase (optional)**.
- 17 Under **Dynamic data streaming attributes**, **Allow dynamic streaming** is auto-selected. If required change the value for **Maximum number of streams per volume**. The maximum number of streams per volume determines the number of backup streams that are deployed for backing up each volume. For example, if a policy contains 5 volumes and the value of this parameter is set to 4, then a group of 4 backup streams for each volume is seen, thereby a total of 20 child backup streams and 10 parent backup streams as part of backup execution of the policy.
- 18 On the **Schedules** tab, select the backup schedules. To add a new schedule, click **Add**.

For more details about adding schedules, refer to *NetBackup Administrator's Guide, Volume I*.

- 219 On the **Clients** tab, from the **NAS supported vendor** list, select the preferred vendor.
- 220 To add a client, click **Add**.
 - Select the array on the left, and the required array heads for the array from the list on the right.
 - Click **Save**.
- 221 On the **Backup Selections** tab, select the preferred protocol.
 - NFS
 - SMB
- 222 If you have not created a backup host pool already, the **Backup selections** dialog box appears. Click **Yes** to configure.
 - In the **Add backup host pool** dialog box, enter the **Backup host pool name**.
 - From the **OS type** list, select the preferred OS type.
 - Enter the name in **Enter host name to add to list** and click **Add to list**.
 - Select the required backup host(s).
 - Click **Save**.
- 223 To enable mixed volume support, select the **Include Mixed Volume** check box.
- 224 From the **Backup Host Pool** list, select the preferred pool, and select the required volume(s) from the table.
- 225 To add a new volume, click **Add**.
 - In **Add backup selection** dialog box, do one of the following:
 - From the **Pathname or directive** list, select the preferred and click **Add to list**.
 - Click **Browse** and select the preferred.
 - Click **Add**.
- 226 On the **Exclude Volumes** tab, in the **Volume to exclude** field, enter keyword for the preferred volumes that you do not want to backup and click **Add to list**.

 The volume entered to exclude appears in the below table. To edit or delete, select the **Volume name**.
- 227 Click **Create**.

Ordering of backup from snapshot jobs

With the NetBackup 9.1 release, all SLP initiated backup from snapshot jobs for Policy, Client, or Backup selection are scheduled in a sequential manner. One scheduled backup from snapshot job must complete before the subsequent job can start. This behavior applies to the NAS-Data-Protection policy also. For example: If there are two scheduled snapshot jobs T1 and T2, and T1 is scheduled before T2. The ordering ensures that the backup from snapshot job for T1 must complete before the backup from snapshot job for T2 is started.

For NAS-Data-Protection policy, if checkpoint restart is enabled and the backup from snapshot job is in suspended or incomplete state, then that job must be resumed first, so that the next backup from snapshot job can run.

About mixed mode volumes

Mixed mode volumes are the volumes having multi-protocol access. Storage array vendors allow both NFS and SMB access to a NAS volume. D-NAS policy allows backup of volumes having multi-protocol access. The protocol used for backup of these volumes depends on the type of backup host pool specified in the policy. If a Linux backup host pool is specified in the policy, these volumes get backed up using NFS protocol. If a Windows backup host pool is specified in the policy, these volumes get backed up using SMB protocol.

This mechanism can be used to backup SMB share data using a Linux backup host. For this to happen, enable NFS and SMB access to the NAS volumes.

Note: When a Linux backup host is used to backup an SMB share, the backup of SMB ACLs does not happen. Only the SMB share data is backed up. Similarly, when a Windows backup host is used to backup an NFS share, the NFS ACLs are not backed up. Only the NFS share data is backed up.

Configuring include and exclude lists

With D-NAS backups, you can create include and exclude lists of the directories and the files that you want to protect in the client. NetBackup uses the include or exclude lists to skip or include files and directories during backups.

These lists are verified against the backup selections that you made for the client.

The exclude list indicates the files and directories to exclude from a backup.

The include list specifies the exceptions to the exclude list. This list indicates the excluded files that you want to back up from the client. You can use the include list

when you want to backup only a few files from a large number of excluded files in a directory. Use the include list to add back the files that you eliminate with the exclude list.

Both the exclude and include lists must be configured on all backup hosts inside the backup host pool that you use for the DNAS policy.

For syntax guidelines for the lists and more information, see *Exclude List properties* under the section *Configuring hosts* in *Veritas NetBackup Administrator's Guide, Volume I*.

Note the following:

- To exclude any folder, use the format: `\vol_name\dir`. Do not use a slash at the end of the path for the directory.
- To backup only the “dir” folder inside “\vol”. In the exclude lists section add path = `\vol\*`

In the include list, to create the exception to the exclude list, add path =

`\vol\dir` [Do not add slash at the end]

`\vol\dir\*`

This configuration backs up only the data of the `\vol\dir` folder. Note that if you add only one rule of the two to the include list, the rule does not work and everything on `\vol\dir` are excluded. You must add both the rules to the include list.

Examples for NFS:

Suppose that we have six directories from d1 to d6 inside `volume1`.

`/volume1/d1`

`/volume1/d2`

`/volume1/d3`

`/volume1/d4`

`/volume1/d5`

`/volume1/d6`

Here is the exclude list:

`/volume1/*`

Here is the include list:

```
/volume1/d1
```

```
/volume1/d1/*
```

After successful back up the following directories are skipped from backup.

```
/volume1/d2
```

```
/volume1/d3
```

```
/volume1/d4
```

```
/volume1/d5
```

```
/volume1/d6
```

Only /volume1/d1 is backed up successfully.

Examples for SMB:

Consider the directory structure:

```
\volume\d1\file1
```

```
\volume\d2\folder1\file1
```

```
\volume\d2\folder2\file2
```

```
\volume\d2\folder2\file3
```

```
\volume\d3\folder3\file3
```

```
\volume\d3\folder3\file2
```

Here is the exclude list:

```
file1
```

```
\volume\d2\folder2\file2
```

```
file3
```

Here is the include list:

```
\volume\d1\file1
```

```
\volume\d3\folder3\file3
```

After successful backup, the following directories are skipped from the backup:

```
\volume\d2\folder1\file1
```

```
\volume\d2\folder2\file2
```

```
\volume\d2\folder2\file3
```

```
\volume\d3\folder3\file2
```

These are the directories that are backed up:

```
\volume\d1\file1
```

```
\volume\d3\folder3\file3
```

Auto-resume backup for incomplete backup jobs

With this feature, whenever a backup job having Checkpoint restart enabled, goes to an incomplete state, the job auto-resumes after a configured time interval. If the resumed job fails again, it is marked as incomplete, until a scheduled retry job runs again. The job is marked as failed, when all the scheduled retry attempts have completed running. You can configure the number of retries for each job and the delay between two retry attempts.

To configure the number of retries and the interval between two retries:

- 1 On the left, click **Host properties**, under **Hosts**.
- 2 Select the host that you want to configure. If the host is not connected, click **Connect**. Once the host is connected, click **Edit primary sever**. Click **Global attributes**.
- 3 To set the interval between two retries, specify a value in minutes in the **Job retry delay** field.
- 4 To set the number of retries for each job, enter values in the **Schedule backup attempts** field. You can specify the number of retries that NetBackup should attempt for the specified time interval in hours.

For more details, see *Veritas NetBackup Administrator's Guide, Volume I*.

Using accelerator

This chapter includes the following topics:

- [Accelerator for D-NAS](#)
- [About the track logs for accelerator](#)
- [Track log sizing considerations](#)
- [Notes on accelerator for D-NAS](#)

Accelerator for D-NAS

NetBackup accelerator provides faster full backups at the cost of incremental backups, eventually reducing the backup window for customers. With this solution, more data is protected in the specified backup window and less bandwidth consumption.

After an initial full backup that protects all data from the filer, NetBackup accelerator backs up only the changed data from the filer to the media server. The media server combines the changed data with any previous backup images to create a new full backup image. If a file or portion of a file is already in storage and has not been changed, the media server uses the copy in storage, rather than reading it from the filer to complete the backup image. The result is a faster NetBackup NAS backup.

To configure accelerator for D-NAS, select the **Use Accelerator** check box that is found on the policy **Attributes** tab.

Benefits of accelerator for D-NAS policy

Here are some benefits of using accelerator with D-NAS:

- Creates a compact backup stream that uses less network bandwidth between the filer and NetBackup servers.
- Reduces the I/O and CPU overhead on the media server and backup host.

- Independent of storage arrays. Works with all the supported NAS storage arrays.

About the track logs for accelerator

NetBackup accelerator uses track log to detect the new, change, and modify files in the subsequent Full and Increment backups. The track log is a binary file that you should not attempt to edit. For D-NAS policy each backup stream maintains its own track log. The number of backup streams depend on the policy attribute

Maximum no of streams per volume.

Track log location on the backup host:

Windows:

`Install_path\NetBackup\track\master_server\storage_server
\client\policy_name\backup selection\S1\`

Linux:

`Install_path/netBackup/track/master_server/storage_server
/client/policy_name/backup_selection/S1/`

Track log location on the primary server:

Windows:

`Install_path\NetBackup\db\track\master_server\storage_server\
client\policy_name\backup selection\S1\`

Linux:

`Install_path/NetBackup/db/track/master_server/storage_server/
client/policy_name/backup_selection/S1/`

Where *s1*, *s2*... *sn* are the number of streams.

You can manually delete track logs safely if any of the following situations occur:

- You can disable the **Use Accelerator** option.
- The backup selections are changed.
- The policy is renamed.
- The storage server that is used to perform the backup is changed.
- The primary server that is used to control the backups is changed.

Track log sizing considerations

The accelerator track log stores file system metadata, and the unique fingerprints of files (128KiB segments). The track log size is relative to the size of the file system, and the number of backup files. Different track logs are created for each policy, client, and stream combination.

Here are some general guidelines, but the requirements in a specific environment might be different. Environments with a high rate of data change may require a larger track log size.

For D-NAS policy, the track log is stored on the backup host, and transferred to the primary server in-line during the backup operation. You can use the following formula to calculate the approximate size:

Total Track log size in Bytes for a NAS volume backup job = $2 * ((\text{Number of files} * 200) + ((\text{Total used disk space in KiB} / 128\text{KiB}) * 20))$

For example, 1 TB NAS volume with one million files = ~ 701 MiB total track log size. If four streams are configured for backup and one million files are equally distributed amongst four streams, then each stream's track log can be of ~175 MiB in size.

Notes on accelerator for D-NAS

In-line track log persistence on the primary server:

- The track log contents are synced in-line with the primary server.
- If the backup host changes for subsequent backup, the track log is copied from the primary server to the current backup host.

If the number of backup streams are changed [policy attribute **Maximum no of streams per volume**] then in the next backup, the existing track logs are not used. A new baseline is created for the subsequent backups. After changing the number of backup streams the accelerator optimization becomes "0" in the next backup and all the contents of the volume is backed up.

Using Vendor Change Tracking

This chapter includes the following topics:

- [About Vendor Change Tracking](#)
- [About NetApp SnapDiff support](#)
- [Using VCT with accelerator for D-NAS](#)
- [Using VCT for indexing](#)
- [Changing the number of backup streams when VCT and accelerator are enabled](#)
- [Index from snapshot \(indexing\) for D-NAS](#)
- [Using VCT with NetBackup client exclude list](#)

About Vendor Change Tracking

Several NAS storage array vendors have a difference engine that identifies the list of changed files and directories between two snapshot copies of the same volume. When Vendor Change Tracking (VCT) is enabled for a D-NAS policy, NetBackup does not perform any file system tracking for backup of NAS volumes. Instead it relies only on the change-list from the difference engine of the storage array to perform backup of files and directories. This process optimizes the backup process.

To use this feature, ensure that the storage that array provides this capability. D-NAS policy supports VCT enabled backups and index operations for Dell EMC PowerScale (Isilon), NetApp, Nutanix Files, and Qumulo NAS arrays.

VCT is not applicable in the following conditions:

- Full schedule is only supported when accelerator is enabled along with VCT.

- The base snapshot is not available.
- Expire after copy retention option is selected for the snapshot in SLP.

About NetApp SnapDiff support

NetBackup integrates NetApp SnapDiff technology to enable indexing and backup of NetApp NAS volumes and shares. You can use NetApp SnapDiff v2 or v3 to perform VCT enabled backups for NetBackup NAS-Data-Protection policy type. To enable NetApp SnapDiff, set the `USE_SNAPDIFF_FOR_NETAPP_DNAS_BACKUPS` parameter in the `bp.conf` file to 1, on the NetBackup primary server.

Refer to the NetApp communication [CPC-00352](#) regarding the effect on third-party applications.

Consider the following for SnapDiff enabled backups of NetApp NAS volumes and shares:

- The destination storage that you use for the backup copies must reside on NetApp storage. This condition does not apply to the snapshot or replica copies.
- Use only NetApp storage for the NAS share backups, and any other copies that are created using duplication or Auto Image Replication (AIR).
- NetBackup supports the following storage units for storing backup, duplicate, and replicate copies:
 - MSDP storage residing on NetApp
 - NetApp StorageGRID (LAN)
 - NetApp StorageGRID (WAN)

Using VCT with accelerator for D-NAS

With NetBackup 10.2 onwards, you can enable accelerator along with VCT in the D-NAS policy for NAS backups. VCT along with accelerator technology is supported with Dell EMC PowerScale (Isilon), NetApp, Nutanix Files, and Qumulo NAS arrays.

With NetBackup 10.3, you can enable this feature for full schedule also, that enables the forever-incremental backup capability. After the initial full backup, no more full backups are required.

During full or incremental backups, NetBackup leverages the storage array vendor's technology to get the change-list (added, modified, and deleted files) between the two point-in-time snapshots. In the subsequent incremental or accelerator backups, NetBackup need not do a complete scan of the NAS volumes to determine the change-list.

After an initial full backup that protects all data from the filer, NetBackup accelerator backs up only the changed data from the filer to the media server.

Combining both these functions in a single backup policy, the backup window is reduced to full and incremental backups.

- A regular full scan of the volume is performed for the full schedule with forced re-scan enabled in the schedule. NetBackup do not use the VCT information in this scenario.
- Irrespective of the schedule, the change-list is obtained using VCT. This change-list is used as the source for backup.

Using VCT for indexing

When Vendor Change Tracking (VCT) is enabled for a D-NAS policy, NetBackup does not perform any file system traversal for indexing a NAS volume. Instead, NetBackup uses the change-list from the difference engine of the storage array to perform indexing of files and directories.

D-NAS policy supports the VCT enabled index backups for NetApp, Dell EMC PowerScale (Isilon), Nutanix Files, and Qumulo NAS arrays.

Consider the following before using the index from snapshot with VCT for D-NAS policy:

- Index job for the first full schedule:
 - When the index from snapshot for the first full schedule runs for a NAS volume. Then, NetBackup performs the file system traversal and generates an image catalog file.
 - File system traversal happens as the array vendors do not have any previous snapshot to get the change-list.
- Index job for the subsequent full schedule using VCT:
 - When VCT is enabled in the policy and a subsequent full schedule is run, NetBackup uses the following:
 - Previous full image catalog.
 - Change-list provided by the array vendor's difference engine from NBSM.
 - Using the previous catalogs, a synthetic catalog is created for subsequent full schedule.
- Index job for an incremental schedule using VCT:

When VCT is enabled in the policy and incremental schedule runs:

Changing the number of backup streams when VCT and accelerator are enabled

- Differential incremental schedule: Change-list is identified using current snapshot and snapshot of the last successful index job.
- Cumulative incremental schedule: Change-list is identified using a current snapshot and snapshot of the last successful full index job.
- Following are the file entries that are added to the image catalog for index operation as per the schedule:
 - Full schedule: The full set of files.
 - Differential incremental schedule: Files that are added or modified after the last index job run for any schedule.
 - Cumulative incremental schedule: Files that are added or modified after the index job run for the last full schedule.
- For a VCT enabled D-NAS policy, the Snapshot or Replication retention period in SLP must be greater than the policy's schedule frequency.
- VCT is not applicable if the base snapshot is not available.
- The expiration period of the previous full and subsequent incremental snapshots is postponed until the next full schedule is completed.
- For non-VCT supported arrays, the index job continues to use mount and file system crawl method.

Changing the number of backup streams when VCT and accelerator are enabled

When you enable both VCT and accelerator in a policy, new tracklogs are created based on the previous tracklogs and VCT data. If you change the number of backup streams in the policy attributes, then in the next backup, the existing tracklogs are discarded. In this case, NetBackup does not use the VCT mechanism for the backup, and performs regular incremental backup. The accelerator optimization is also discarded and all the contents of the volume is backed up.

Index from snapshot (indexing) for D-NAS

The index from snapshot operation indexes the contents of the existing snapshots. When NetBackup indexes a snapshot, it creates an image catalog file in the NetBackup catalog for each snapshot. This image catalog file assists you when you restore a file from the snapshot.

Note: The index of a NAS share that uses NFS protocol on a Linux host is faster as compared to the SMB protocol on Windows hosts. It is recommended to enable mixed protocols for the NAS share on the storage array and use NFS protocol (using Linux host) for the index operation.

The backup from snapshot operation also creates an image catalog file. If a backup from snapshot occurs frequently for the restore job in the environment, then an index from snapshot is not required.

For example, if the backup from snapshot runs once per week but the file restores are required daily, consider to use index from snapshot.

Consider the following items before using the index from snapshot operation for D-NAS policy:

- The index from snapshot operation can run from a full or an incremental schedule.
- For non-VCT based index, the entries that are added to the image catalog file for any of the schedules, are the full set of files.
- For index from snapshot operations a single stream is used per volume, unlike backup from snapshot operation.
- A single SLP can have either index from snapshot or backup from snapshot operation, but not both.
- Location of image catalog (. f) is: `<NetBackup Installation directory>/db/images/<StorageArrayFiler>/<directory>`
- To dump or check the contents of the image catalog, use the `cat_convert` utility as follows:

```
: /usr/opensv/netbackup/bin/cat_convert -dump <. f file name>
```

Note: The index of a NAS share uses the NFS protocol, which is faster than the SMB protocol for indexing operations. It is recommended to enable mixed protocols for the NAS share on the storage array and use NFS protocol (using Linux host) for the index operation.

Using VCT with NetBackup client exclude list

You can configure the exclude lists for excluding files, directories, or patterns for VCT, from backup and index operations of D-NAS policy. See [“Configuring include and exclude lists”](#) on page 30.

In the policies using VCT, NetBackup uses array vendor's change list capabilities to avoid explicit file system traversal during backup or index operations. Once you run a backup or index operation with an exclude list, do not modify the exclude or include list for the subsequent backup or index operation. If you modify the include or exclude lists, the associated files may not get backed up or indexed in the subsequent operations.

To remove or modify the exclude list; remove VCT from the policy and perform the index or backup operation.

Replication using D-NAS policy

This chapter includes the following topics:

- [Replication using D-NAS policy](#)

Replication using D-NAS policy

Using the NetBackup Snapshot Manager for Data Center you can replicate the hardware snapshots of NFS and SMB shares. The replicated snapshots are accessed on backup hosts and read by dynamic streams to create point in time backup copies. The following procedure describes how to configure a NAS-Data-Protection policy to use hardware snapshots and replication of NAS volumes.

Note: For all the supported NAS storage arrays for replication, refer to the *NetBackup Snapshot Manager* section, under *Snapshot Solutions* in the *NetBackup Hardware and Cloud Storage Compatibility List (HCL)*.

Table 8-1 Configuration steps

Step	Description	Reference topic
1	Configure the NetBackup Snapshot Manager server in NetBackup.	For more details, refer to the <i>Installation and Upgrade</i> chapter of the <i>NetBackup™ Snapshot Manager for Data Center Administrator's Guide</i> .

Table 8-1 Configuration steps (*continued*)

Step	Description	Reference topic
2	Configure the NAS storage array plug-in.	For more details, see the <i>Configure NetBackup snapshot manager storage array plug-ins</i> chapter of the <i>NetBackup™ Snapshot Manager for Data Center Administrator's Guide</i> .
3	Add the backup hosts to a backup host pool. The backup hosts are responsible for data streaming.	See "Configuring a backup host pool " on page 24.
4	Configure the SLP to use snapshot and replication	For more details about replication, refer to these chapters in the <i>NetBackup™ Snapshot Manager for Data Center Administrator's Guide</i> : ■ Storage array replication ■ Configuring storage lifecycle policies for snapshots and snapshot replication ■ Supported storage arrays in data center
5	Configure a NAS-Data-Protection policy to perform the operations that are specified in the SLP.	See "Setting up a NAS-Data-Protection policy " on page 27.

Restoring from D-NAS backups

This chapter includes the following topics:

- [Multi-stream restores from D-NAS backups](#)
- [Point in time rollback](#)

Multi-stream restores from D-NAS backups

Starting with NetBackup version 10.2, you can perform restore of a NAS volume using multiple restore streams. Each restore stream runs in parallel, and the restored files are dynamically distributed to each of these restore streams. This helps in achieving optimal performance during restore job. The result is a faster NAS volume restores. Ensure that the primary and media servers, along with the NetBackup client is upgraded to 10.2 to use multi-stream restore.

Each NAS volume restore has a separate parent-child job hierarchy. The parent job is a controller job for the NAS volume and the child job(s) perform the actual restore of the data. Each child restore job represents one restore stream.

Considerations for restoring from D-NAS backups

You can use the NetBackup web UI to restore individual files or directories, or a volume.

Points to remember before restoring:

- Original location restore is not supported for NAS-Data-Protection policy.
- The destination client for restore must be a NetBackup host. For example, a media server or backup host.

- If you select either of the following rename options, ensure that you change the destination path:
 - Rename hard links.
 - Rename soft links.
- Checkpoint restart is currently not supported for multi-stream restores.
- Multi-stream restore is supported from NetBackup created backup images. It is not supported for restore from snapshot or replica copies. To restore from a snapshot or replica copy, specify the number of restore streams as *1*.
- For a NAS volume, if there are multiple copies of NetBackup created backup images, then NetBackup restores data from the first non-snapshot or non-replica copy. To restore from a specific backup copy, set that copy as the primary copy in the NetBackup catalog.

RBAC role for D-NAS restores

Starting with NetBackup 10.2, you can use the NetBackup web UI to perform D-NAS restores. There is a default NAS Administrator role which you can use to perform restores of the NAS volume backups.

For more information, see *NetBackup Web UI Administrator's Guide*.

Scanning for malware

NetBackup lets you scan the backed-up images for malware and determines the last good-known image that is malware free. If any malware is detected during the scanning, you can see a notification in the web UI.

If you try to recover a malware-affected backup image, NetBackup shows you a warning message and confirmation is required for proceeding. You need special user privileges to restore from malware-affected images.

For more information about malware scanning, see the *Malware detection* chapter in the *NetBackup™ Security and Encryption Guide*.

Restore everything to a different location

You can restore the entire backup to a different location, or restore individual files and folders to different locations.

Restoring from D-NAS backups

- 1 On the left, click **Recovery**. In the Recover page, under **Regular recovery**, click **Start recovery**.
- 2 In the **Basic properties** tab, select policy type as **NAS-Data-Protection**. Select **Restore type** as **Normal Backups**. Select the **Source client** from where you want to recover, and click **Next**.
- 3 In the **Recovery details** tab, select a volume on the left to recover. You can click the volume on the left to see the contents of that volume on the right-side, and select the required folder(s) or file(s) on the right to restore. You can click a folder on the left to see the individual files and folders inside, on the right. Select any file(s) or folder(s) to recover.

Click **Edit** to change the date range of the displayed images. Click **Use date picker** to provide the start and end time of the required interval. Click **Use backup history**, to see the entire backup history of the image. Select the required image(s) and click **Apply**.

- 4 In the **Recovery options** tab, select **Restore everything to a different location**. Select the NetBackup host for the target location. Specify the **Target location** for the restore in the host. In the **Target location** dialog, click the drive on the left to see the locations on the right. Select a location and click **Add**.
- 5 (Optional) **Select Allow overwrite of existing files, Restore directories without crossing mount points, Rename hard links, and Rename soft links** as required.
- 6 Specify the number of simultaneous data streams that you want to use during restore, in the **Number of restore streams per volume** field. You can specify a value from 1 to 20. A higher number might affect network performance.

Note: If you specify the number of restore streams as 1, then all the backup streams of a NAS volume are restored sequentially.

- 7 Use the default media server for the restore, or specify a new one. Specify a job priority and click **Next**.
- 8 In the **Review** tab, review all the parameters. To go back and change a parameter, click **Previous**. Click **Start recovery**.

Restore individual files and folders to different locations

You can restore the individual files and folders in the backup to different locations.

Restoring file and folders from D-NAS backups

- 1 On the left, click **Recovery**. In the Recover page, under **Regular recovery**, click **Start recovery**.
- 2 In the **Basic properties** tab, select policy type as **NAS-Data-Protection**. Select **Restore type** as **Normal Backups**. Select the **Source client** from where you want to recover, and click **Next**.
- 3 In the **Recovery details** tab, select a volume on the left to recover. You can click the volume on the left to see the contents of that volume on the right-side, and select the required folders(s) or files on the right to restore. You can click a folder on the left to see the individual files and folders inside, on the right. Select any file(s) or folder(s) to recover.

Click **Edit** to change the date range of the displayed images. Click **Use date picker** to provide the start and end time of the required interval. Click **Use backup history**, to see the entire backup history of the image. Select the required image(s) and click **Apply**.

- 4 In the **Recovery options** tab, select **Restore individual directories and files to different locations**. Select the NetBackup host for the target location. In the **Specify destinations for the selected item(s)** table, click **Browse** in the **Destination** column to specify destinations to the items that you want to recover.
- 5 (Optional) **Select Allow overwrite of existing files, Restore directories without crossing mount points, Rename hard links, and Rename soft links** as required.
- 6 Specify the number of simultaneous data streams that you want to use during restore, in the **Number of restore streams per volume** field. You can specify a value from 1 to 20. A higher number might affect network performance.

Note: If you specify the number of restore streams as 1, then all the backup streams of a NAS volume are restored sequentially.

- 7 Use the default media server for the restore, or specify a new one. Specify a job priority and click **Next**.
- 8 In the **Review** tab, review all the parameters. To go back and change a parameter, click **Previous**. Click **Start recovery**.

Original location restores for D-NAS Policy

Even though the **Restore everything to its original location** option is disabled for D-NAS policy, it is possible to restore data to the original location. Use the following methods:

- **NFS Shares:** Manually mount the NFS share to one of the NetBackup hosts. Use that host as the destination client and the mount path as the destination location.
- **SMB Shares:** Specify the UNC path of the SMB share as the destination and one of the NetBackup hosts as the destination client. For example: `\\<IP or FQDN>\<SMB_Share_Name>`

Subsequently, you can perform a Point in time rollback. See [“Point in time rollback”](#) on page 49.

Point in time rollback

You can also restore a snapshot of an entire file system, volume, or share with minimal I/O. This type of restore is called point in time rollback. All the data in the snapshot is restored. Single file restore is not available in a rollback.

Warning: Rollback deletes all files that were created after the creation-date of the snapshot that you restore. Rollback returns a file system or volume to a given point in time. Any data changes or snapshots that were made after that time are lost.

Also, if there are multiple logical volumes on a single disk or volume group and if you perform a Point in Time Rollback of a specific logical volume, the entire disk or volume group is restored to the point in time.

Rollback is available only when you restore the file system, volume, or share to the original location on the client.

Performing rollback using snapshot:

- 1 On the left, click **Recovery**. In the Recover page, under **Regular recovery**, click **Start recovery**.
- 2 In the **Basic properties** tab, select policy type as **NAS-Data-Protection**. Select **Restore type** as **Point In Time Rollback**. Select the **Source client** from where you want to recover, and click **Next**.
- 3 **Recovery details** tab, the backups are displayed in the **Backup History** table, select the image for restore. Click **Edit** to search for the list of snapshot images, for all dates (you cannot set a date range).

- 4 Select an image from the list, and click **Next**.
Under **Restore target options**, select **Restore everything to original location**. You need to specify a NetBackup host.
- 5 (Optional) under **Recovery options**, select **Force rollback even if it deletes the snapshot(s) taken after that backup point**. If you do not select this option, recovery does not run, if any snapshots taken after the selected backup point exists.
- 6 If you do not want to use the default media server for recovery, select the required media server. Set a priority for the recovery job.
- 7 In the **Review** tab, review all the selections that you made. To change any setting, click **Previous**. Click **Start recovery** to start the recovery.

Troubleshooting

This chapter includes the following topics:

- [Troubleshooting](#)
- [Setting the log level](#)
- [Logging directories for Linux platforms](#)
- [Logging folders for Windows platforms](#)
- [Logging folders for multi-stream restore](#)
- [Restore from a snapshot fails with status 133](#)
- [Backup from snapshot fails with error 50](#)
- [Backup from snapshot parent job fails with error 4213: Snapshot import failed](#)
- [Backup host pool creation fails with the error "Failed to fetch host list"](#)
- [Snapshot job fails and the snapshot command does not recognize the volume name](#)
- [Accelerator enabled incremental backup of NetApp NAS volume](#)
- [Snapshot method: Auto](#)
- [Backup from snapshot jobs for NAS-Data-Protection policy fail with error 4213](#)
- [A full VCT-enabled indexing job runs, when followed by a non-VCT indexing job with a backup host prior to version to 10.3](#)
- [Backup from snapshot jobs for NAS data protection policy fail with error 927](#)

Troubleshooting

You can resolve many problems on your own by creating logging directories, reproducing the problem, and checking the logs. For an in-depth description of NetBackup logs, refer to the *NetBackup Troubleshooting Guide*.

For explanations of NetBackup job status codes, refer to the *NetBackup Status codes Reference Guide*.

Setting the log level

To create detailed log information, place a **VERBOSE** entry in the `bp.conf` file on the NetBackup primary and client server. Alternatively, set the Global logging level to a high value in the **Logging** dialog, under both **Master Server Properties** and **Client Properties**.

These directories can eventually require a lot of disk space. Delete them when you are finished troubleshooting and remove the **VERBOSE** option from the `bp.conf` file. Alternatively, reset the Global logging level to a lower value.

Logging directories for Linux platforms

To create logging directories use the `/usr/opensv/netbackup/logs/mklogdir` script. You can also create the directories using an access mode of 755 so NetBackup can write to the logs.

Table 10-1 Linux logging directories for snapshot operation

Path of log directory	Where to create the directory?
<code>/usr/opensv/netbackup/logs/bprd</code>	NetBackup primary server
<code>/usr/opensv/logs/nbjm</code>	NetBackup primary server
<code>/usr/opensv/netbackup/logs/bpbrm</code>	NetBackup media server
<code>/usr/opensv/netbackup/logs/bpfis</code>	NetBackup backup host client

Table 10-2 Linux logging directories for backup operation

Path of log directory	Where to create the directory?
/usr/opensv/netbackup/logs/bprd	NetBackup primary server
/usr/opensv/logs/nbjm	NetBackup primary server
/usr/opensv/logs/nbstserv	NetBackup primary server
/usr/opensv/netbackup/logs/bpdbm	NetBackup primary server
/usr/opensv/netbackup/logs/bptm	NetBackup media server
/usr/opensv/netbackup/logs/bpbrm	NetBackup media server
/usr/opensv/netbackup/logs/bpfis	NetBackup backup host client
/usr/opensv/netbackup/logs/bppfi	NetBackup backup host client
/usr/opensv/netbackup/logs/bpbkar	NetBackup backup host client
/usr/opensv/logs/ncfnbcs	NetBackup backup host client

Table 10-3 Linux logging directories for index from operation

Path of log directory	Where to create the directory?
/usr/opensv/netbackup/logs/bprd	NetBackup primary server
/usr/opensv/logs/nbjm	NetBackup primary server
/usr/opensv/logs/bpdbm	NetBackup primary server
/usr/opensv/netbackup/logs/bptm	NetBackup primary server
/usr/opensv/netbackup/logs/bpbrm	NetBackup media server
/usr/opensv/netbackup/logs/bpcd	NetBackup backup host client
/usr/opensv/netbackup/logs/bppfi	NetBackup backup host client

Table 10-3 Linux logging directories for index from operation (*continued*)

Path of log directory	Where to create the directory?
/usr/opensv/logs/ncfnbcs	NetBackup backup host client

Table 10-4 Linux logging directories for single file restore from snapshot copy

Path of log directory	Where to create the directory?
/usr/opensv/netbackup/logs/bprd	NetBackup primary server
/usr/opensv/logs/bpbm	NetBackup primary server
/usr/opensv/netbackup/logs/bpcd	Restore host client
/usr/opensv/netbackup/logs/bpbkar	Restore host client
/usr/opensv/netbackup/logs/bpfis	Restore host client
/usr/opensv/netbackup/logs/bppfi	Restore host client
/usr/opensv/logs/tar	Destination client where the files are restored.

Table 10-5 Linux logging directories for point-in-time rollback

Path of log directory	Where to create the directory?
/usr/opensv/netbackup/logs/bprd	NetBackup primary server
/usr/opensv/netbackup/logs/bpbm	NetBackup primary server
/usr/opensv/netbackup/logs/bpcd	Restore host client
/usr/opensv/netbackup/logs/bpbkar	Restore host client
/usr/opensv/netbackup/logs/bpfis	Restore host client
/usr/opensv/netbackup/logs/bppfi	Restore host client

Table 10-6 Linux logging directories for create replication operation

Path of log directory	Where to create the directory?
/usr/opensv/logs/nbjm	NetBackup primary server
/usr/opensv/logs/nbstserv	NetBackup primary server
/usr/opensv/logs/nbrb	NetBackup primary server
/usr/opensv/netbackup/logs/bpdm	NetBackup media server

Table 10-7 Linux logging directories for delete replication operation

Path of log directory	Where to create the directory?
/usr/opensv/netbackup/logs/bpdm	NetBackup media server
/usr/opensv/netbackup/logs/admin	NetBackup media server (for bppficorr logs)

Logging folders for Windows platforms

Table 10-8 Windows logging directories for snapshot operation

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\bprd	NetBackup primary server
install_path\NetBackup\logs\nbjm	NetBackup primary server
install_path\NetBackup\logs\bpbrm	NetBackup primary server if Instant Recovery backup is set to snapshot only; otherwise, on media server
install_path\NetBackup\logs\bpfis	Backup host client

Table 10-9 Windows logging directories for backup operation

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\bprd	NetBackup primary server

Table 10-9 Windows logging directories for backup operation (*continued*)

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\nbjm	NetBackup primary server
install_path\NetBackup\logs\nbstserv	NetBackup primary server
install_path\NetBackup\logs\bpdbm	NetBackup primary server
install_path\NetBackup\logs\bptm	NetBackup primary server
install_path\NetBackup\logs\bpbrm	NetBackup primary server
install_path\NetBackup\logs\bpfis	Backup host client
install_path\NetBackup\logs\bppfi	Backup host client
install_path\NetBackup\logs\bpbkar	Backup host client
install_path\NetBackup\logs\ncfnbcs	Backup host client

Table 10-10 Windows logging directories for index from snapshot operation

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\bprd	NetBackup primary server
install_path\NetBackup\logs\nbjm	NetBackup primary server
install_path\NetBackup\logs\bpdbm	NetBackup primary server
install_path\NetBackup\logs\bptm	NetBackup primary server
install_path\NetBackup\logs\bpbrm	NetBackup primary server
install_path\NetBackup\logs\bpcd	Backup host client
install_path\NetBackup\logs\bppfi	Backup host client
install_path\NetBackup\logs\ncfnbcs	Backup host client

Table 10-11 Windows logging directories for single file restore from snapshot copy

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\bprd	NetBackup primary server

Table 10-11 Windows logging directories for single file restore from snapshot copy *(continued)*

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\bpbrm	NetBackup primary server
install_path\NetBackup\logs\bpcd	Remote host client
install_path\NetBackup\logs\bpbkarr	Remote host client
install_path\NetBackup\logs\bpfis	Remote host client
install_path\NetBackup\logs\bppfi	Remote host client
install_path\NetBackup\logs\tar	Destination client where the files are restored.

Table 10-12 Windows logging directories for single file restore from point in time rollback

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\bprrd	NetBackup primary server
install_path\NetBackup\logs\bpbrm	NetBackup primary server
install_path\NetBackup\logs\bpcd	Remote host client
install_path\NetBackup\logs\bpbkarr	Remote host client
install_path\NetBackup\logs\bpfis	Remote host client
install_path\NetBackup\logs\bppfi	Remote host client

Table 10-13 Windows logging directories for single file restore from create replication operation

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\nbjm	NetBackup primary server
install_path\NetBackup\logs\nbstserv	NetBackup primary server
install_path\NetBackup\logs\nbrb	NetBackup primary server Remote host client

Table 10-13 Windows logging directories for single file restore from create replication operation (*continued*)

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\bpdm	NetBackup media server

Table 10-14 Windows logging directories for single file restore from delete replication operation

Path of log directory	Where to create the directory?
install_path\NetBackup\logs\bpdm	NetBackup media server
install_path\NetBackup\logs\admin	NetBackup media server (for bppficorr logs)

Logging folders for multi-stream restore

Table 10-15 Logging directories for multi-stream restore

Operation	VxUL logs	Non-VxUL logs	Hosts
Recovery API	nbweb service		Primary server
Recovery backend		bprd on primary server, bpbrm on media server, and tar on the client	Primary server, media server, and client

Restore from a snapshot fails with status 133

Restore from snapshot fails with status code 133 and displays the Invalid request message.

Explanation

The restore fails if you select a path other than the path mentioned in the backup selection.

For example, say that the backup selection contains `/ifs/voll/parent/dir1`. During a restore if you select only `/ifs/voll/parent`, which is the parent directory of the path mentioned for backup selection, the restore fails with status code 133.

Workaround

For a successful restore from the snapshot copy, you must select the original path mentioned in the **Backup selections** tab; that is `/ifs/voll/parent/dir1` or the subdirectory or file inside the backup selection.

Backup from snapshot fails with error 50

This error occurs when the NetBackup Client and NetBackup Legacy Network services are not restarted properly after configuration for the domain user.

Workaround

If you use primary or media as backup host then follow these steps to troubleshoot:

- 1 Stop all NetBackup services using the `bpdown.exe`.
- 2 Log on to the NetBackup Client and NetBackup Legacy Network services as the domain user. But, do not start these services immediately after logon.
- 3 Start all the services together using `bpup.exe`.

Backup from snapshot parent job fails with error 4213: Snapshot import failed

Job details in the UI shows an error like:

"Snapshot export failed. Failed to export share: data_lif is not online. Check the data_lif status on vserver: VSERVER_1."

Where, VSERVER_1 is the vserver that is offline.

Explanation:

For a NAS-Data-Protection policy, all the vservers are listed in the client's section of the policy, irrespective of their state. So, you can include backup selection from offline SVM, and policy validation succeeds. However, the backup-from-snapshot export operation for those shares fails if the corresponding vserver is offline.

Workaround

To overcome this error, check the status of the vserver. The vserver must be reachable and the SLP retries must be successful.

Backup host pool creation fails with the error "Failed to fetch host list"

Explanation:

This issue appears if the NetBackup services are not started properly with the domain user.

Workaround:

- 1 Make sure that the NetBackup client service is running.
- 2 Log on as the domain user to the NetBackup client service.
- 3 Restart the NetBackup Client service.
- 4 Make sure that the NetBackup Legacy Network service is running.
- 5 Log on as the domain user to the NetBackup Legacy Network service.
- 6 Restart the NetBackup Legacy Network service.
- 7 Make sure that all NetBackup services are running.
- 8 Relaunch the NetBackup UI.

Snapshot job fails and the snapshot command does not recognize the volume name

Explanation:

A snapshot job fails if the volume name exceeds 15 characters.

When you create and name a volume, a prefix or a suffix is added to the volume name. If the volume name contains more than 15 characters, addition of a prefix or suffix may make the volume name exceed the limit of 27 characters. When you run the `vxassist snapshot`, command, it does not recognize the lengthy snapshot volume name and the snapshot job fails.

For example, if the primary volume name is **PFItest123456789vol** and the suffix **00043c8aaa** is added to it, the volume name exceeds the limit. The command `vxassist snapshot` does not recognize the name **PFItest123456789vol_00043c8aaa** and the snapshot job fails.

Workaround:

Veritas recommended that you limit the primary volume names to up to 15 characters to create the VxVM mirror snapshots.

Accelerator enabled incremental backup of NetApp NAS volume

Accelerator enabled NAS-Data-Protection policy backups complete volume instead of only the incremental data. This also affects the run optimization.

This issue occurs under the following conditions:

- The policy type is NAS-Data-Protection.
- In the policy's Snapshot options, the value of Access Protocol is Default or NFS3.
- Backup selection has NetApp NAS volumes.

The Accelerator technology optimizes a backup by sending only changed blocks over a network for backup. A two-step process is used to identify the changed files and changed blocks in these files. File attributes and index node (inode) are the key parameters to identify a change. If the files are accessed over NFS version 3, a file on a NetApp NAS volume behaves differently because of the inode numbers. The same file has different inode numbers across snapshots of the volume if accessed over NFS3. All schedules of backup are based on the snapshot that is created for the run of the policy. New snapshots with different inode numbers than the previous ones helps the accelerator to identify these files as new files. Because of this issue, all files are backed up instead of incremental data only.

To resolve this issue, avoid using NFS version 3 to access the snapshot for accelerator-enabled backups. You can change the Access Protocol to NFS4 for the affected policy. For more details, refer to the [NetApp documentation](#).

Snapshot method: Auto

Error scenario 1: Policy validation fails after a primary server upgrade, if you create a policy with VSO FIM for older clients and select Snapshot Method as Auto in the NetBackup 10.0 UI.

Error scenario 2: Snapshot jobs fail if you configure D-NAS policy with backup host pool containing older version backup hosts and select Snapshot Method as Auto in the NetBackup 10.0 UI.

The Snapshot Method, Auto is supported only in NetBackup 10.0 onwards. If your environment contains older version backup hosts, select another snapshot method.

Backup from snapshot jobs for NAS-Data-Protection policy fail with error 4213

Backup from snapshot jobs for NAS-Data-Protection policy fail with error 4213.

```
---Activity monitor detailed status--- Oct 13, 2022 12:44:00 PM -
end SnapDupe Mount:Read File List; elapsed time 0:00:00 Oct 13, 2022
12:44:00 PM - begin SnapDupe Mount:Import Snapshot Oct 13, 2022
12:44:00 PM - Info RUNCMD (pid=13508) started Oct 13, 2022 12:44:14
```

A full VCT-enabled indexing job runs, when followed by a non-VCT indexing job with a backup host prior to version 10.3

```
PM - Info RUNCMD (pid=13508) exiting Operation Status: 4213 Oct 13,
2022 12:44:14 PM - end SnapDupe Mount:Import Snapshot; elapsed time
0:00:14 Oct 13, 2022 12:44:14 PM - Error nbjm (pid=3792)
ImportSnapshot failed, snapshotid=10.84.69.235@dsemc02dm_1665644972
Operation Status: 4213 Oct 13, 2022 12:44:14 PM - end Parent Job;
elapsed time 0:00:14 Snapshot import failed (4213)
```

Explanation:

This issue occurs if any one of your backup hosts in the backup host pool is at a lower version than 10.1.1, and the protected NAS volumes reside on Dell EMC Unity, Dell EMC PowerStore, or Hitachi NAS storage array.

Workaround:

Remove the backup hosts from the backup host pool that have a lower NetBackup version than 10.1.1. Alternatively, for these policies, use a different backup host pool that has only NetBackup 10.1.1 hosts.

A full VCT-enabled indexing job runs, when followed by a non-VCT indexing job with a backup host prior to version 10.3

Workaround:

Do the following:

- For a VCT-enabled policy to support index from snapshot operation, ensure that the policy, primary server, media server, and backup hosts are of NetBackup version 10.3 or higher.
- For a non-VCT index operation, if you use a backup host prior to version 10.3 earlier; before running a VCT-based indexing job, run the non-VCT index job with full schedule using a NetBackup version 10.3 or higher client.

Backup from snapshot jobs for NAS data protection policy fail with error 927

Explanation:

This issue occurs if the backup host pool does not contain a host that is of the same or lower version of NetBackup than the media server.

Workaround:

Ensure that all media servers associated with the storage unit, specified in the Storage Lifecycle Policy (SLP), have a higher version NetBackup than the lowest version of backup host in the backup host pool.

To exclude a media server, go to the storage unit properties for the STU specified in the SLP. Select the **Only use the following media servers** option. Then select the media servers with a NetBackup version higher or equal to the lowest NetBackup version of the hosts in the backup host pool.

Using NDMP

- [Chapter 11. Introduction to NetBackup for NDMP](#)
- [Chapter 12. Installation Notes for NetBackup for NDMP](#)
- [Chapter 13. Configuring NDMP backup to NDMP-attached devices](#)
- [Chapter 14. Configuring NDMP backup to NetBackup media servers \(remote NDMP\)](#)
- [Chapter 15. Configuring NDMP DirectCopy](#)
- [Chapter 16. Accelerator for NDMP](#)
- [Chapter 17. Remote NDMP and disk devices](#)
- [Chapter 18. Using the Shared Storage Option \(SSO\) with NetBackup for NDMP](#)
- [Chapter 19. NAS appliance information for NDMP](#)
- [Chapter 20. Backup and restore procedures](#)
- [Chapter 21. Troubleshooting](#)
- [Chapter 22. Using NetBackup for NDMP scripts](#)

Introduction to NetBackup for NDMP

This chapter includes the following topics:

- [About NetBackup for NDMP](#)
- [About Network Data Management Protocol \(NDMP\)](#)
- [Types of NDMP backup](#)
- [About NDMP policies in NetBackup](#)
- [About NetBackup storage units](#)
- [About assigning tape drives to different hosts](#)
- [About the NDMP backup process](#)
- [About the NDMP restore process](#)
- [About Direct Access Recovery \(DAR\)](#)
- [Snapshot Client assistance](#)
- [About NDMP multiplexing](#)
- [About NDMP support for Replication Director](#)
- [Limitations of Replication Director with NDMP](#)
- [About NDMP support for NetApp clustered Data ONTAP \(cDOT\)](#)

About NetBackup for NDMP

NetBackup for NDMP is an optional NetBackup application. It enables NetBackup to use the Network Data Management Protocol (NDMP) to initiate and control backups and restores of Network Attached Storage (NAS) systems.

NetBackup for NDMP features

The following table describes the NetBackup for NDMP features.

Table 11-1 NetBackup for NDMP features

Feature	Description
Support for NDMP protocol	Supports the NDMP protocol versions V2, V3, and V4.
Centralized backup policy management	Scheduling, catalog management, and other backup tasks are managed from a NetBackup primary server. NetBackup for NDMP can be installed on a NetBackup primary or media server.
Accelerator for NDMP	NetBackup's Accelerator option makes NDMP backups for NetApp and Isilon filers run faster than normal NDMP backups. NetBackup Accelerator increases the speed of full backups by using the filer's change detection techniques to identify the modifications that occurred since the last backup. More information about the feature is available: See "About NetBackup Accelerator for NDMP" on page 134.
Support for NetApp cDOT filers	NetBackup for NDMP supports NetApp clustered Data on Tap (cDOT) filers. More information about configuring NetBackup to work with NetApp cDOT filers is available: See "Using the Device Configuration Wizard to configure an NDMP filer" on page 102.
Support for wildcards in NDMP backup policy selections	Wildcard characters in regular expressions or directives are valid for streaming and non-streaming NDMP backups.
Device and media management	NetBackup software provides complete management and control of the devices and media that are used for backups and restores of NDMP hosts. The NetBackup Device Configuration Wizard discovers and configures the storage devices that are attached to an NDMP host. (This function requires NDMP protocol V3 or V4.) Note that wizard-based discovery depends upon a number of device-specific features, such as SCSI inquiry and serialization, which some NAS vendors may not support.
High-speed local backup of NDMP hosts	Backup data travels between the disk drives and tape drives that are directly attached to the same NDMP host. This transfer provides high-speed backup but does not slow network throughput.

Table 11-1 NetBackup for NDMP features (*continued*)

Feature	Description
Backup of network-attached NDMP hosts to a tape device on another NDMP host or to advanced tape libraries with an embedded NDMP server	Backup data travels across the network from a disk on an NDMP host to tape on another NDMP host. This backup is referred to as a three-way backup. This data movement option requires support from the NAS/NDMP host.
Backup of a network-attached NDMP host to a tape device on a NetBackup media server	Backup data travels across the network from a disk on an NDMP host to tape on a NetBackup media server. This backup is a form of three-way backup also known as remote NDMP. This feature supports NDMP V2, V3, and V4 on the NDMP hosts.
Shared tape libraries	Tape libraries can be shared between NDMP hosts and NetBackup servers or between multiple NDMP hosts. Robotic control can be on an NDMP host or on a NetBackup server.
Shared tape drives with the Shared Storage Option	Tape drives can be shared between servers (both NetBackup servers and NDMP hosts). This setup requires the Shared Storage Option (SSO) license. For a list of the features and software releases for each NAS vendor, for SSO support, and for the NetBackup versions that support these vendors, see the NetBackup Compatibility List for all Versions.
Snapshots of data on NDMP hosts	NetBackup can take point-in-time data snapshots on an NDMP (NAS) host without interrupting client access to data, using the NDMP V4 snapshot extension. The snapshot is stored on the same device that contains the NDMP client data. From the snapshot, you can restore individual files or roll back a file system or volume by means of Snapshot Client Instant Recovery. A NetBackup Snapshot Client license is required, in addition to the NetBackup for NDMP license. This Snapshot Client feature uses the NAS_Snapshot method and the NDMP method. For more information about the NDMP snapshot method, refer to the NetBackup Replication Director Solutions Guide
NDMP DirectCopy	NetBackup can copy virtual tape library (VTL) images directly from the VTL to physical tape or to another VTL. This function occurs without using media server I/O resources or network bandwidth. NetBackup can copy NDMP backup images directly from one NDMP-attached tape drive to another NDMP tape drive that is attached to the same NDMP host. Note that the operation does not use media server I/O. Note: The VTL must have an embedded NDMP tape server.
Direct Access Recovery (DAR)	For NDMP hosts that support DAR, this feature greatly reduces the time to restore a directory, a single file, or a small number of files.

Table 11-1 NetBackup for NDMP features (*continued*)

Feature	Description
Path-based file history	The NDMP server can send catalog information consisting of complete path names to NetBackup. Some vendors do not support this feature. Up-to-date information is available on the vendors that support path-based history. For a list of the features and software releases for each NAS vendor, for SSO support, and for the NetBackup versions that support these vendors, see the NetBackup Compatibility List for all Versions .
Support for NetBackup for NDMP servers in a NetBackup-clustered environment	The NetBackup for NDMP servers are supported in a NetBackup-clustered environment.
Enhanced ability to run customized scripts during a backup	The enhanced ability to run customized scripts during a backup, especially for relational databases residing on NAS devices.
NDMP multiplexing	NDMP multiplexing enables NDMP backups to be multiplexed to Media Manager storage units. Only remote NDMP multiplexing is supported.
NDMP to disk	NetBackup can write NDMP backups to disk storage units.
IPv6 support	NDMP supports 128-bit IPv6 address data connections in addition to the 32-bit IPv4 address data connections. NDMP data connections are made between filers or between a NetBackup media server and a filer that is used to transfer the backup image. By default the NetBackup media server is enabled for IPv6 data communication. Consider the following general items when using NDMP IPv6 address data connections. ■ The filer needs to be enabled for IPv6 data communication. ■ The filer vendor must support connection address extension or full IPv6.
NDMP support for Replication Director	NDMP support for Replication Director enables NetBackup to use NDMP for the following functions: backup from snapshots, restore from snapshot backups, live browse snapshots, and restore from snapshots (for copy back method). For more information about Replication Director, refer to the NetBackup Replication Director Solutions Guide.

NetBackup for NDMP terminology

The following table describes the NetBackup for NDMP terminology. For explanations of other NetBackup terms, consult the NetBackup online glossary in NetBackup Help.

Table 11-2 Terminology

Term	Definition
DAR (Direct Access Recovery)	DAR is an optional capability of NDMP data and tape services where only relevant portions of the secondary media are accessed during recovery operations. The NDMP host positions the tape to the exact location of the requested file(s), reading only the data that is needed for those files. Restore times can be reduced from hours to minutes.
NDMP (Network Data Management Protocol)	NDMP is a widely used protocol through which an NDMP-conformant backup application can control the backups and restores for an NDMP host.
NDMP client	An NDMP client is an NDMP-compliant backup application (also known as a Data Management Application or DMA) that is an NDMP server application client. An NDMP client sends commands to the NDMP server application to control the backups and restores on an NDMP host. NetBackup for NDMP allows NetBackup to act as an NDMP client.
NetBackup for NDMP server	A NetBackup for NDMP server is a NetBackup primary or media server on which NetBackup for NDMP software is installed.
NDMP host	An NAS system that serves files to clients using HTTP, FTP, CIFS, or NFS protocols. It also runs an NDMP server application that communicates with NDMP client backup software to configure and perform backup and restore tasks. NAS systems provide fast, multi-protocol file access and cost effective data storage to workstations and servers in the network or across the Internet. In a NetBackup configuration, the NDMP host is considered a client of NetBackup. However, NetBackup client software is never installed on an NDMP host.
NDMP multiplexing	NDMP multiplexing concurrently writes multiple backup streams to the same Media Manager tape storage device from the same client or different clients. NDMP multiplexing improves overall NetBackup performance by more efficient use of the storage unit drives. State of the art storage devices can typically stream data faster than client agents can create backup streams. Therefore, multiple data streams can be sent to and effectively processed by a given storage unit. Only remote NDMP multiplexing is supported.

Table 11-2 Terminology (*continued*)

Term	Definition
NDMP server application	An NDMP server application runs on an NDMP host and runs backup, restore, and device control commands that it receives from an NDMP-conformant backup application. The backup application (NetBackup) is considered an NDMP client. A separate instance of an NDMP server process exists for each connection to an NDMP client. That is, if two backups are in progress, an NDMP server process exists for each backup.
NDMP storage unit	An NDMP storage unit stores the backup data for an NDMP host. The tape drives in this storage unit attach directly to the NDMP host or can be configured on a SAN. Note that NDMP storage units cannot be used to store data for non-NDMP hosts, and NetBackup disk storage units cannot be used for NDMP tasks.
Redirected restore (to a different client)	In a redirected restore, files are restored to a client other than the one from which they were originally backed up. In NetBackup for NDMP, the restore data travels from an NDMP host (or NetBackup media server) with a locally attached storage device to another NDMP host on the network.
Remote NDMP	A form of three-way backup and restore also known as NDMP backup to Media Manager storage units. Data travels from an NDMP host to a tape drive that is attached to a NetBackup media server. See “Configuring NDMP backup to Media Manager storage units” on page 125.
Three-way backup and restore	In a three-way backup or restore, data travels between an NDMP host and a storage device that is attached to another NDMP host or to a NetBackup media server. This backup contrasts with local NDMP backup or restore where the data travels between an NDMP host’s disk and a storage device directly attached to the same NDMP host.
Virtual Tape Library (VTL)	A virtual tape library is a storage system that uses disk-based technology to emulate a tape library and tape drives. For secondary storage, NetBackup can copy VTL images directly to a physical tape or to another VTL by means of NDMP DirectCopy.

About Network Data Management Protocol (NDMP)

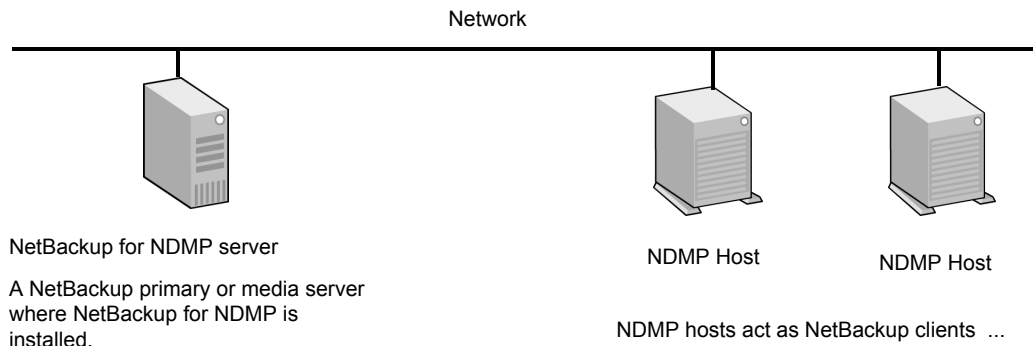
NDMP is a widely used protocol through which an NDMP-conformant backup application controls the backups and restores of any NDMP host that runs an NDMP server application.

NDMP architecture follows the client and server model:

- The NetBackup primary or media server where NetBackup for NDMP is installed is called a NetBackup for NDMP server.
- The host where the NDMP server application resides is called an NDMP host.
- The NetBackup software is a client of the NDMP server application. NetBackup for NDMP lets NetBackup act as an NDMP client. The NDMP hosts, on the other hand, act as NetBackup clients.

The following figure shows an example of NDMP and NetBackup hosts as clients of each other.

Figure 11-1 NDMP and NetBackup hosts as clients of each other



The NetBackup for NDMP server acts as an NDMP client.

NOTE: NetBackup software is NOT installed on NDMP hosts.

Types of NDMP backup

The NDMP server application on the NDMP host performs backups and restores of the NDMP host, directed by commands from an NDMP client (NetBackup). Backups can be conducted in any of the following ways:

- NDMP local backup
 See [“NDMP local backup”](#) on page 72.

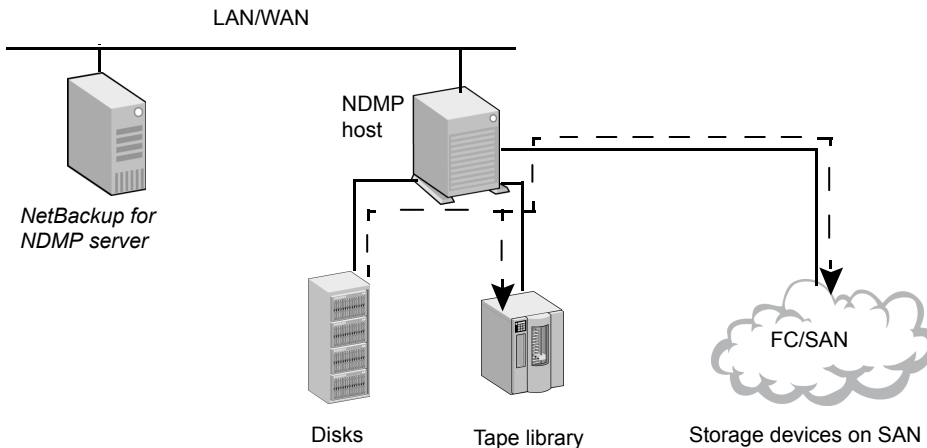
- NDMP three-way backup
See [“NDMP three-way backup”](#) on page 72.
- Backup to a Media Manager storage unit on the NetBackup server
See [“Backup to Media Manager storage units \(remote NDMP\)”](#) on page 73.

NDMP local backup

If you use the NDMP local backup, the NetBackup for NDMP server initiates the backup. The data travels from the NDMP host's disk to a storage device that is attached to the same host or is available on a SAN.

The following figure shows an example of an NDMP local backup and restore.

Figure 11-2 NDMP local backup and restore



Local NDMP backup

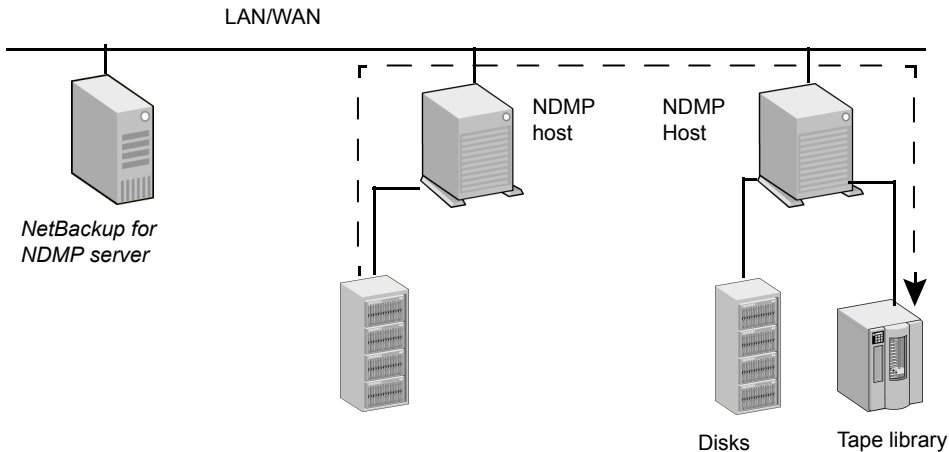
Data travels from disk to tape on same NDMP host, or from disk to tape device on SAN. *Backup data is NOT sent over local network.*

The tape drives must be in NDMP-type storage units.

NDMP three-way backup

If you use the NDMP three-way backup, the NetBackup for NDMP server initiates the backup. Data travels over the network by going from an NDMP host to a storage device that is attached to another NDMP host on the local network or is available on a SAN.

The following figure shows an example of an NDMP three-way backup and restore.

Figure 11-3 NDMP three-way backup and restore

Three-Way NDMP backup

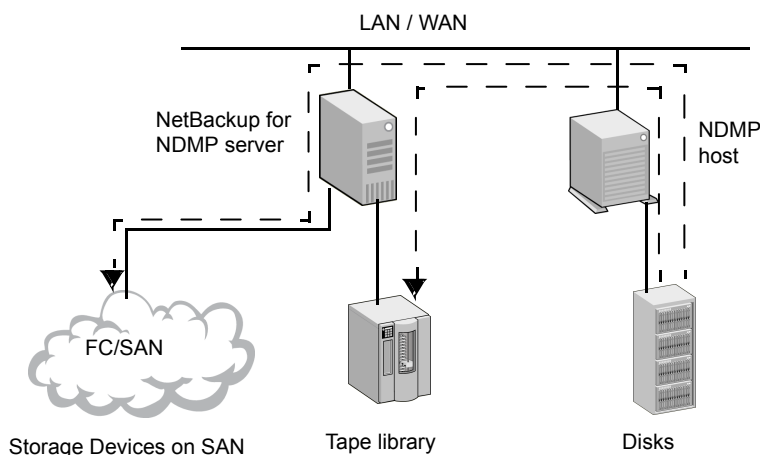
Data travels from disk on an NDMP host to tape device on another NDMP host. *Backup data is sent over the local network.*

The tape drives must be in NDMP-type storage units.

Backup to Media Manager storage units (remote NDMP)

With this backup method, the data travels over the network by going from an NDMP host to a Media Manager-type storage device that is attached to a NetBackup media server or is available on the SAN. The NetBackup drives must be in Media Manager storage units not in NDMP storage units.

The following figure shows an example of an NDMP backup to a Media Manager device (remote NDMP).

Figure 11-4 NDMP backup to a media manager device (remote NDMP)

To NetBackup Server-Attached Media Manager Storage Units

Data travels from NDMP host to a drive on a NetBackup media server or on a SAN. *Backup data is sent over the local network.*

NOTE: The NetBackup drive(s) must be in Media Manager type storage units.

About NDMP policies in NetBackup

After you install and configure NetBackup for NDMP, you can schedule backups by creating an NDMP policy in NetBackup.

An NDMP policy can have one or more NetBackup clients. Each NetBackup client must be an NDMP host.

See [Figure 11-1](#) on page 71.

Note that you do not install any NetBackup software on the NDMP hosts.

The allowable backup types for schedules in an NDMP policy are: Full, Cumulative Incremental, or Differential Incremental. User-initiated backups and archives are not allowed because the NDMP protocol does not permit these tasks.

Restores of NDMP host backups can be initiated from any NetBackup media server that meets the following criteria:

- Resides within the same overall NetBackup storage domain
- Uses the same NetBackup primary server that the media server uses to perform the backup

The data can be restored to the NDMP host where it was backed up, or to another NDMP host.

NDMP policies can use either NDMP storage units or Media Manager storage units.

About NetBackup storage units

NetBackup uses either one of the following storage units:

- NDMP-type storage units (for local or three-way backup)

NetBackup requires NDMP-type storage units when you back up NDMP host data to the devices that are as follows:

- Attached to an NDMP host
- Available to the NDMP host on a SAN

An NDMP storage unit can contain standalone or robotic drives. Robotic controls can be in a TLD (tape library DLT) or ACS robot type.

- Media Manager storage units (for backup to devices that are attached to a NetBackup media server)

You can use the drives that were configured in Media Manager-type storage units when you back up NDMP host data to devices that are as follows:

- Attached to a NetBackup for NDMP server
- Available to the server on a SAN

For NDMP backup, drives in Media Manager-type storage units do not have to be dedicated to NDMP data. They can store backups of regular (non-NDMP) NetBackup clients as well as of NDMP clients.

About assigning tape drives to different hosts

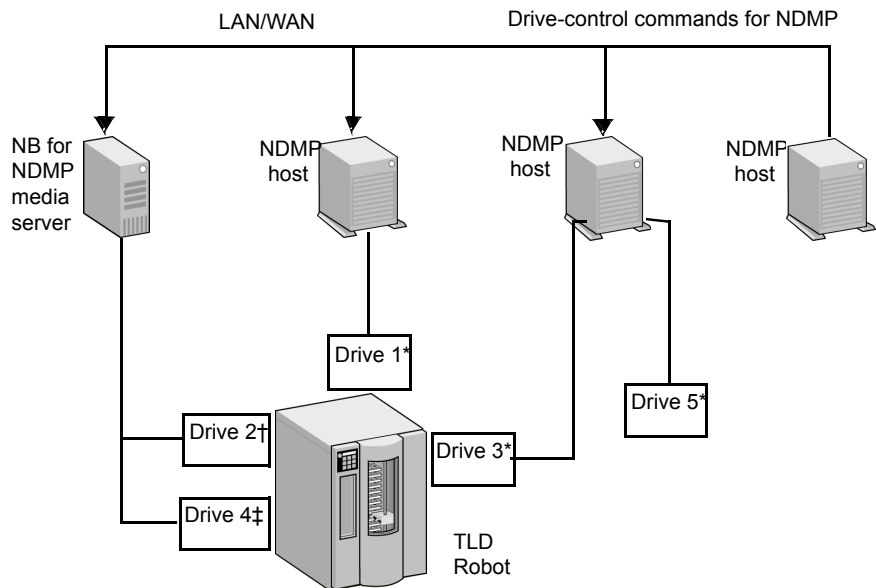
The robotic tape drives can be divided up among NDMP hosts and NetBackup servers.

The following figure shows the NDMP and non-NDMP storage units with the following configuration:

- Tape drives 1, 3, and 5 are attached to NDMP hosts. They are in the NDMP storage units that can be used for NDMP backups (local or three-way). The commands that control these drives originate on the NetBackup for NDMP server and are sent through the NDMP connection on the network. The NDMP server application on each NDMP host translates the NDMP commands into SCSI commands for the local drives.

- Tape drives 2 and 4 are attached to a NetBackup server. They are in non-NDMP storage units and are controlled in the same way as other drives on NetBackup servers. Depending on the type of storage unit, these drives can be used for the following:
 - Non-NDMP clients of NetBackup
 - In the case of tape drives in Media Manager storage units, they can be used for both NDMP (local or three-way) and non-NDMP backups.
- In the following figure, all of the tape drives are used for NDMP backup except drive 4.

Figure 11-5 NDMP and non-NDMP storage units



- * In NDMP storage unit
- † In NetBackup Media Manager storage unit
- ‡ In another type of NetBackup storage unit (not NDMP or Media Manager)

Drives 1, 3, and 5 (in NDMP storage units) can be used for NDMP backups.

Drive 2 (in Media Manager storage unit) can be used for NDMP or non-NDMP backup.

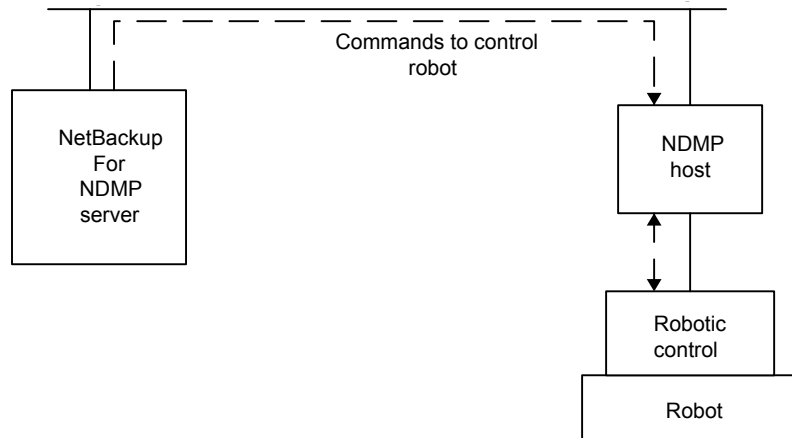
Drive 4 (in different type of NetBackup storage unit) cannot be used for NDMP backup.

About robotics control

Robotics control can be attached to an NDMP host or to a NetBackup server.

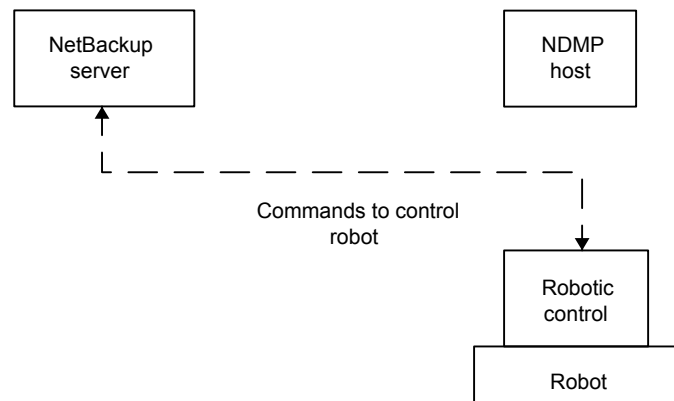
The following figure shows how NetBackup sends commands over the network to the NDMP host, which in turn sends them to the robot.

Figure 11-6 Robotics control that is attached to an NDMP host



The following figure shows how the robot is controlled in the same way as the other robots on NetBackup servers.

Figure 11-7 Robotics control that is attached to a NetBackup server



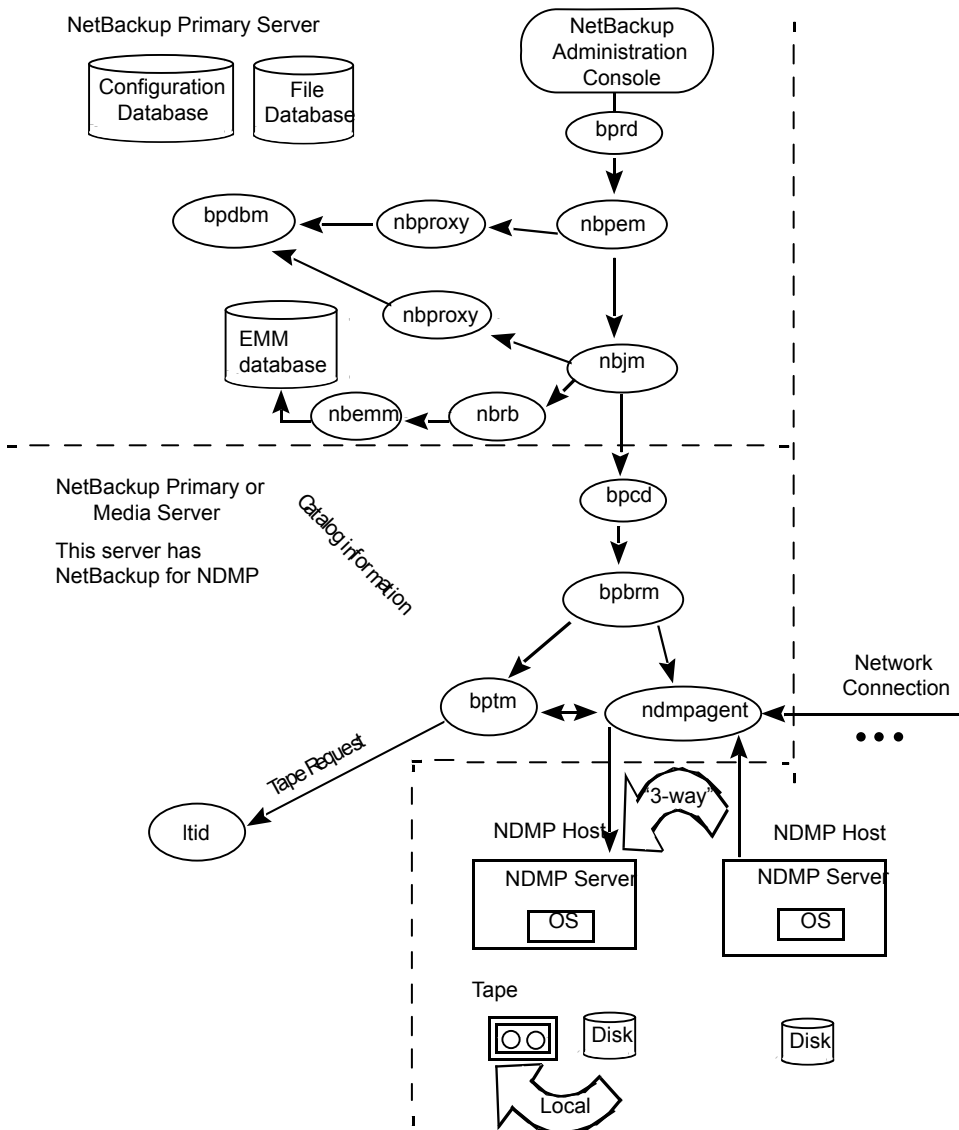
About the NDMP backup process

During a backup, the following events occur in this order:

- From the Enterprise Media Manager (EMM), NetBackup obtains a media ID for the tape that is used for the backup. It then sends a tape-mount request to `ltid`.
- `ltid` on the NetBackup for NDMP server sends the necessary NDMP (SCSI robotic) commands to mount the requested tape on the storage device.
- NetBackup sends the NDMP commands that are necessary to have the NDMP server application perform a backup to the tape. The backup data travels in one of two ways:
 - Between the local disk and tape drives on an NDMP host.
 - Over the network, data travels from an NDMP host without its own storage device to an NDMP host (or NetBackup media server) with a locally attached storage device (three-way back up).
- The NDMP server application sends information to the NetBackup for NDMP server about the files that were backed up. This information is stored in the NetBackup file database.
- The NDMP server application sends status about the backup operation to the NetBackup for NDMP server.

The following figure shows the NetBackup processes that are involved in the NDMP backups.

Figure 11-8 NetBackup backup processes



About the NDMP restore process

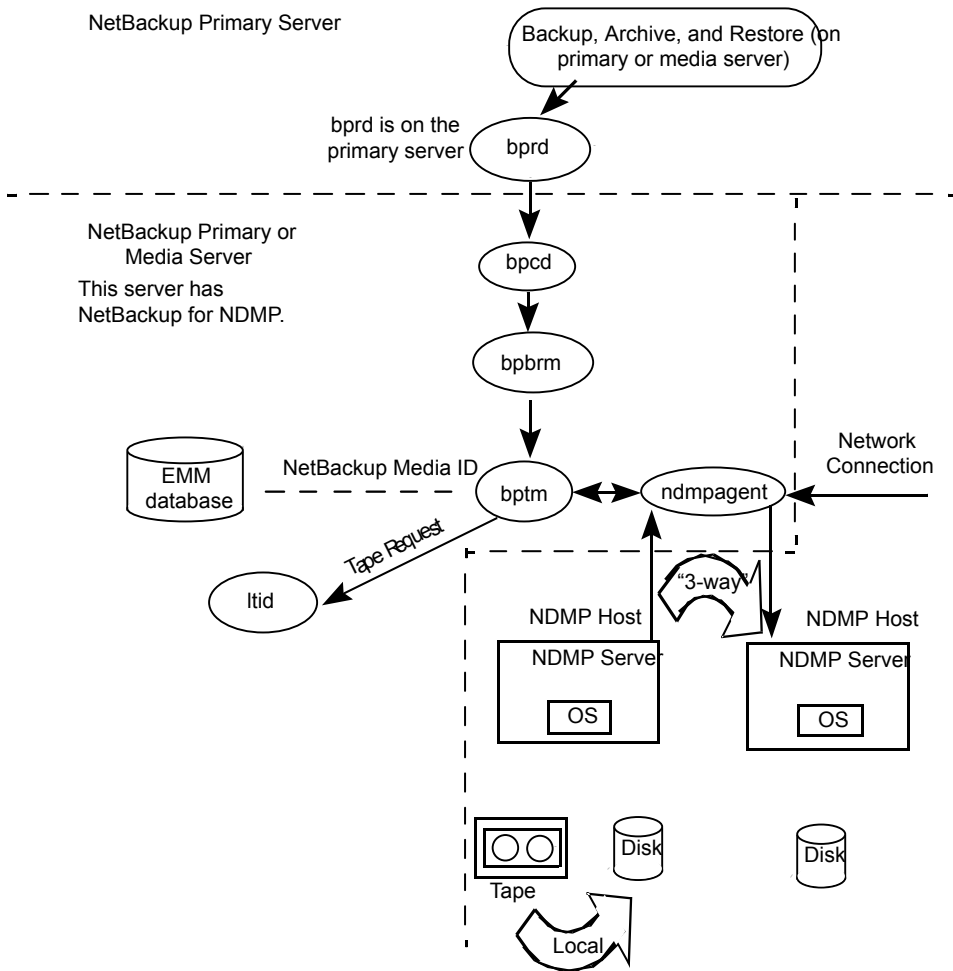
Because of the design of the NDMP protocol, only an administrator on a NetBackup server (primary or media) can restore files from NDMP backups. During a restore,

the administrator browses the file catalog and selects files from NDMP images in the same manner as for standard backup images.

The following events occur during a restore, in this order:

- The NetBackup for NDMP server looks in its Enterprise Media Manager (EMM) database for the tape that contains the backup, and asks `ltid` to mount that tape.
- `ltid` on the NetBackup for NDMP server sends the necessary NDMP commands to load the requested tape on the storage device.
- NetBackup sends the NDMP commands that are necessary to have the NDMP server application perform a restore operation to the disk. The restore data travels in one of two ways:
 - From a tape drive to a local disk (tape drive and disk are on the same NDMP host)
 - Over the network, from an NDMP host (or NetBackup media server) with a locally attached storage device to another NDMP host (three-way backups or restores)
- The NDMP server application sends status about the restore operation to the NetBackup for NDMP server.

The following figure shows the NetBackup processes involved in NDMP restores.

Figure 11-9 NetBackup restore processes

About Direct Access Recovery (DAR)

NetBackup uses Direct Access Recovery (DAR) to restore a directory or individual files from a backup image. DAR can greatly reduce the time it takes to restore files and directories. DAR is enabled by default. No configuration is required.

DAR enables the NDMP host to position the tape to the exact location of the requested files. It reads only the data that is needed for those files. For individual file restore, NetBackup automatically determines whether DAR shortens the duration of the restore. It activates DAR only when it results in a faster restore.

The following prerequisites are necessary for using DAR with NetBackup for NDMP:

- The NDMP host must support DAR where the NDMP server application resides.
- NetBackup 4.5 GA or later, with the catalog in binary format (binary format is the default).

Further details are available as to when DAR is used and how to disable it.

See [“About enabling or disabling DAR”](#) on page 120.

Snapshot Client assistance

The Snapshot Client Configuration document includes the following information:

- An up-to-date list of supported operating systems and peripherals
- A list of NAS vendors that are supported for the NAS_Snapshot method
- Sections on SAN device configuration and on setting up NetBackup for off-host data mover backups (including instructions on creating `3pc.conf` and `mover.conf` files).

About NDMP multiplexing

NDMP multiplexing concurrently writes multiple backup streams to the same tape storage device from the same client or different clients. NDMP multiplexing supports only remote NDMP and improves overall NetBackup performance by better using tape storage devices. State-of-the-art tape storage devices can typically stream data faster than client agents can create backup streams. Therefore multiple data streams can be sent to and effectively processed by a given tape storage unit.

A network-attached storage (NAS) device with an NDMP server is an agent that produces a backup stream that is similar to a NetBackup client. Multiplexing is desired for NDMP backups because NAS devices are limited in the rate at which they create backup streams. These backup streams are often much slower than the tape storage device consuming and writing the stream.

NDMP multiplexing provides the following benefits:

- Several backups can be run at the same time writing to the same tape. This process can reduce the need for many tape devices.
- Backup time is reduced by writing concurrent backups to a single tape storage device.
- Many tape storage devices require that data is streamed to them at high transfer rates. When data is not streamed fast enough, they do not work efficiently and are subject to possible excessive wear.

Consider the following general items when implementing NDMP multiplexing:

- Only media manager tape storage units can be used for NDMP multiplexing.
- Multiplexing of NDMP backups and restores supports only remote NDMP. The remote NDMP processes backup streams by going through the media server.
- NDMP local and NDMP three-way backups and restores are not supported for NDMP multiplexing. Each method processes backup streams without going through the media server.
- Synthetic backups are not supported.
- Only tape devices are supported.
- Disk storage devices are not supported.
- A mix of NDMP and non-NDMP backups can be present in the same MPX backup group.
- File and directory DAR are allowed.
- NDMP multiplexing works with both VTL and PTL. However, VTL users typically do not use NDMP multiplexing because they can add more virtual tape devices to accommodate additional streams.
- For NDMP multiplexed backups the storage unit and policy schedule multiplex value must be set to a value greater than one.

About NDMP support for Replication Director

NDMP can be used to back up, browse, and restore snapshots. The advantage to using Replication Director and creating a backup policy that uses NDMP is that NetBackup needs to mount only the primary data to perform these actions.

For additional information about NDMP with Replication Director, see the [NetBackup Replication Director Solutions Guide](#).

Limitations of Replication Director with NDMP

Consider the following limitations before configuring NDMP to be used with Replication Director:

- The Solaris_x86 operating system is not supported.
- The **Multiple copies** NetBackup policy option is not supported for image copies in the NDMP data format.
- The **Restore the file using a temporary filename** restore option is not supported on Windows clients.

- Restores to a local file system are not supported with an **MS-Windows** or a **Standard** policy that has the NDMP **Data Mover** enabled.
- Do not include both the qtree and the volume on which the qtree resides in the same **Backup Selection** list.
- Only one NDMP backup of a snapshot per `backupid` is allowed.
- The **Index From Snapshot** operation is supported only in a Replication Director configuration, however, a Standard or MS-Windows policy with NDMP Data Mover enabled is also not supported.

Note: The **Index From Snapshot** operation is not supported for NetApp ONTAP 7-mode.

- When you make changes to the NDMP policy after the last full or incremental schedule (for example, if you add or delete a backup selection), the content for the next incremental retrieves the entire content of the snapshot rather than retrieving only the content that has changed. The next incremental schedule however, after only retrieves content that has changed as expected.

About NDMP support for NetApp clustered Data ONTAP (cDOT)

The following table describes the terminology that is used in this topic.

Table 11-3 NetApp cDOT terminology

Term	Definition
CAB	Specifies the Cluster Aware Backup (CAB) NDMP API extension. The CAB enables support of a NetApp cDOT system for optimal, node-transparent backups.
cDOT	Specifies the clustered Data ONTAP (cDOT); the NetApp clustered filer storage solution.
Cluster-management LIF	Specifies a single management interface for the entire cluster. This is the only logical interface (LIF) that NetBackup supports for device configuration.
Data LIF	Specifies the data logical interface (LIF) that is associated with the Vserver.

Table 11-3 NetApp cDOT terminology (continued)

Term	Definition
Intercluster LIF	Specifies a logical interface (LIF) that is used for intercluster communication.
LIF	Specifies a logical interface (LIF); an IP address and port that is hosted on a node of a NetApp cDOT system.
Node-management LIF	Specifies a dedicated IP address that is used to manage a node.
SVM	Specifies the Storage Virtual Machine (SVM); a NetApp clustered Data ONTAP construct that is a virtualization layer that includes volumes and LIFs. This allows for non-disruptive user and NDMP operations when the physical cluster resources change. Multi-tenancy is achieved by multiple SVMs (see the data LIF). The cluster itself is also an SVM (see cluster-management LIF).
Vserver	Specifies the virtual storage server; contains data volumes and one or more LIFs through which it serves data to the clients.

It is recommended to run a NetApp cDOT cluster in SVM-scoped NDMP mode (also called Vserver aware mode).

NetBackup supports optimal backup, restore, and duplication of NetApp cDOT FlexVol volumes using the CAB extension. The NetApp cDOT server (that runs in Vserver aware mode) provides unique location information (affinity) about volumes and tape drives. Using this affinity information, NetBackup performs a local backup instead of a three-way or remote backup if a volume and a tape drive share the same affinity. If multiple volumes that are hosted on different nodes are backed up or restored using the same job, NetBackup may switch drive paths if necessary (and possible) to perform the local backup.

Note: The NetApp Infinite volumes can be backed up and restored by using the standard policy types.

Note: There should be at least one intercluster LIF for each node of the cluster that does not host a cluster-management LIF. This is required for three-way and remote backups. If you do not specify an intercluster LIF, all of the three-way and remote backups for volumes that are not hosted on the same node as the cluster-management LIF fail. NetBackup does not access these LIFs directly, so it does not need credentials for them.

Installation Notes for NetBackup for NDMP

This chapter includes the following topics:

- [NetBackup for NDMP installation prerequisites](#)
- [Adding the NetBackup for NDMP license key on UNIX servers](#)
- [Adding the NetBackup for NDMP license key on Windows servers](#)
- [About existing NetApp cDOT configurations before you upgrade](#)

NetBackup for NDMP installation prerequisites

Note the following items before installing NetBackup and adding the NetBackup for NDMP license:

- NetBackup for NDMP functionality installs when the NetBackup server software is installed. No separate installation procedure is required. However, you must enter a valid license to use NetBackup for NDMP.

Note: If your NetBackup for NDMP server is not your primary server, install your NDMP license on the primary server.

In a clustered environment, perform the steps to add the license on each node in the cluster. First, freeze the active node so that migrations do not occur during installation. Unfreeze the active node after the installation completes. For information about freezing or unfreezing a service group, see the clustering section in the [NetBackup High Availability Administrator's Guide](#) for the cluster software you are running.

For more information about administering licenses, see the [NetBackup Administrator's Guide, Volume I](#).

Note: NetBackup for NDMP cannot be uninstalled separately from the full NetBackup product.

If you uninstall the full NetBackup product, make sure that no NetBackup for NDMP backups are active or running for the client. On the primary server, check the Activity Monitor in the **NetBackup web UI**. If the **Job State** for the backups indicates `Done`, you can then perform the uninstall procedure that is described in the [NetBackup Installation Guide](#).

- For lists of supported operating systems, hardware platforms, and NAS vendor features and software releases, see the [NetBackup Compatibility List for all Versions](#).

For a list of NAS platforms that NetBackup for NDMP supports, see the [NetBackup for NDMP: NAS Appliance Information](#) document.

- The drives and robots that are attached to the NDMP host must be the types that the NDMP host and NetBackup support. A list of supported robot types is available.

See [“About robotics control”](#) on page 76.

For more information about storage devices, see the [NetBackup Administrator's Guide, Volume I](#).

Adding the NetBackup for NDMP license key on UNIX servers

NetBackup for NDMP installs on a UNIX or Linux system when the NetBackup server software is installed. No separate installation procedure is required. However, you must enter a valid license key to use NDMP. Perform the following procedure on the UNIX host that you want to be the NetBackup for NDMP server.

Note: If you install in a clustered environment, first freeze the active node so that migrations do not occur during installation. For information about freezing a service group, see the clustering section in the [NetBackup High Availability Administrator's Guide](#) for the cluster software you are running.

To add the NetBackup for NDMP license key on UNIX servers

- 1 Log on as root.
- 2 Install NetBackup server and client software as explained in the [NetBackup Installation Guide for UNIX and Linux](#).
- 3 To make sure a valid license key for NetBackup for NDMP is registered, enter the following command to list and add keys:

```
/usr/openv/netbackup/bin/admincmd/get_license_key
```

- 4 If this NetBackup for NDMP server is not your primary server, install your NDMP license key on the primary server.
- 5 In a clustered environment, perform these steps on each node in the cluster.
- 6 If you install in a clustered environment, unfreeze the active node after the installation completes.

For information about unfreezing a service group, see the clustering section in the [NetBackup High Availability Administrator's Guide](#) for the cluster software you are running.

Adding the NetBackup for NDMP license key on Windows servers

NetBackup for NDMP installs on a Windows system when the NetBackup server software is installed. No separate installation procedure is required. However, you must enter a valid license key to use NDMP. Use the following procedure on the Windows host that you want to be the NetBackup for NDMP server.

Note: If you install in a clustered environment, first freeze the active node so that migrations do not occur during installation. For information about freezing a service group, see the clustering section in the [NetBackup High Availability Administrator's Guide](#) for the cluster software you are running.

To add the NetBackup for NDMP license key on Windows servers

- 1 Install NetBackup server and client software as explained in the [NetBackup Installation Guide for Windows](#).
- 2 NetBackup for NDMP is part of the core NetBackup product. To make sure a valid license key for NetBackup for NDMP is registered, do the following to list and add keys:
 - In the **NetBackup Administration Console**, select **Help**.

- On the **Help** menu, select **License Keys**.
- Existing keys are listed in the lower part of the window.
- To register a new key, click the star icon to open the **Add a new License Key** dialog box. Type the new license key in the **New license key** field and click **Add**.

The new license key appears in the lower part of the dialog box.

- 3** If this NetBackup for NDMP server is not your primary server, install your NDMP license key on the primary server.
- 4** In a clustered environment, perform these steps on each node in the cluster.
- 5** If you install in a clustered environment, unfreeze the active node after the installation completes.

For information about unfreezing a service group, see the clustering section in the [NetBackup High Availability Administrator's Guide](#) for the cluster software you are running.

About existing NetApp cDOT configurations before you upgrade

This topic describes how to upgrade NetBackup with a NetApp cDOT system. If you use a NetApp cDOT system, review the following information before you upgrade to NetBackup 7.7 or later.

If your NetApp cluster is set to **node-scope-mode** and you have not yet installed NetBackup 7.7 or later, your environment should be set up as follows before the upgrade:

- The client name that is used in the backup policy is the node-management LIF.
- Only the volumes that are hosted by the node that hosts the LIF are available for backup or restore. Each node must have a node-management LIF in the client list of the policy.
- Tape devices that are attached to a node are available for backup or restore.
 - The NDMP host name that is used for the device configuration is the node name (node-management LIF).
 - The tape devices are available only to the nodes to which they are connected.

After you upgrade to NetBackup 7.7 or later, everything works as it did before the upgrade until you enable the NetBackup cDOT capabilities by disabling node-scope mode.

To start using the NetBackup cDOT capabilities, do the following:

1. Back up the catalog.
2. (Optional) Create a detailed image catalog report that provides the following:
 - Collects information, such as NDMP host names, policies, and backup selections, that can be used when you create the new cDOT backup policies.
 - Determines the client names to search for when you restore the pre-cDOT backups in the new cDOT environment.
3. Upgrade all of the NetBackup media servers that are authorized to access the cluster. Upgrades do not have to occur at the same time, but must be done before the following step.
4. Enable the Vserver aware mode on the cluster by disabling node-scope-mode. Please see your specific cluster documentation.
5. If there are tape devices attached to the cluster, you must reconfigure your tape devices to use the cluster-management LIF as the NDMP host for the device configuration. See [“About Media and Device Management configuration”](#) on page 99.

Caution: NetBackup only supports the use of the cluster-management LIF for device configurations.

Note: For each node in the cluster that will have tape devices, be sure to configure all of the tape devices available to the cluster on that node. Any node that has access to a tape device should also have access to all of the tape devices.

6. Enable the NDMP service on the cluster for each data LIF that will be used for backups. See the NetApp documentation for more information.
7. Authorize the data LIF as needed for NetBackup access. See [“Authorizing NetBackup access to a NAS \(NDMP\) host”](#) on page 96.
8. Add, delete, or update the old storage units that are using the node names of the cluster.
9. Add, delete, or update the old policies that back up the cluster.
 - You must use either the data LIF or the cluster-management LIF as the client name. NetBackup does not support use of the node name for the client name.
 - Backup selections may also need to be adjusted.

Note: The use of the data LIF as a client will protect and catalog all volumes associated with the data LIF's Vserver under this client. The use of the cluster-management LIF as a client will protect and catalog all volumes on the entire cluster under this client.

10. To read the old images, you may have to use alternate client restore. For more information about alternate client restores, see the [NetBackup Administrator's Guide for UNIX, Windows, and Linux, Volume I](#)

If your NetApp cluster is set to **Vserver aware mode**, and you have not yet installed NetBackup 7.7 or later, your environment should be set up as follows before the upgrade:

- The cluster is in Vserver aware mode. The Cluster Aware Backup (CAB) extension is enabled on the filer. NetBackup does not use the CAB extension.
- The client name used in the backup policy is the data LIF associated with a Vserver or the cluster-management LIF.
- Only volumes (that belong to the Vserver) hosted by a node that hosts the data LIF are available for backup or restore.
- The tape devices that are attached to the cluster are not available for backup or restore.

After you upgrade to NetBackup 7.7 or later, the behavior is different and you need to make some changes. NetBackup now uses the CAB extension and enables it by default. Because of this, the following occurs:

- NetBackup uses all of the volumes that belong to the Vserver.
- NetBackup uses the volume affinities.

As a result of this change, the following occurs:

- When the `ALL_FILESYSTEMS` directive is in use by multiple policies for the same Vserver, NetBackup may back up the same volume multiple times under different policies. And further incremental backups may not be reliable.
- Multi-streamed backup jobs will start failing with status code 99. The following message is displayed in the job details for the failed jobs:

```
12/10/2014 14:42:11 - Error ndmpagent (pid=29502) NDMP backup failed,
path = /vs02/vol1:PARAMETER:AFFINITY=4ac6c4b6-7e99-11e4-b3b6-1779f43af917
```

This happens because some components of NetBackup are not told to use the cluster in the Vserver aware mode. It is highly recommended to upgrade and enable the cDOT capabilities as soon as possible.

To start using the cDOT capabilities, you must do the following:

1. Back up the catalog.
2. Create a detailed image catalog report (it can be referenced later for read operations).
3. Upgrade all of the NetBackup media servers that are authorized to access the cluster. All media servers should be upgraded at the same time to avoid inconsistent behavior.
4. Run the `tpautoconf -verify ndmp_host` command for each pre-existing LIF that is configured in NetBackup. This command must be run from the media servers that have credentials to the LIF. After the command is successfully run, the `nbemmcmd` command should display output similar to the following example:

```
servername1@/>nbemmcmd -listsettings -machinename machinename123 -machinetype ndmp
NBEMMCMD, Version: 7.7
The following configuration settings were found:
NAS_OS_VERSION="NetApp Release 8.2P3 Cluster-Mode"
NAS_CDOT_BACKUP="1"
Command completed successfully.
```

NAS_OS_VERSION displays the NetApp Version.

NAS_CDOT_BACKUP tells us if NetBackup uses the new cDOT capabilities.

Note: The `tpautoconf -verify ndmp_host` command is not required when a new Vserver is added.

5. You can now add devices to the NDMP cluster and access them using the cluster-management LIF. If you add devices, you must discover the devices.
6. Add storage units for the newly discovered devices.
7. Add, delete, or update the policies that reference the cluster as needed. Start using the cluster in Vserver aware mode.

If you do not want to enable the cDOT functionality immediately; for example, you want to upgrade the media servers in phases, you can disable the cDOT capabilities by doing the following:

1. Create the following touch file on all of the media servers that are authorized to access the NDMP host. This causes NetBackup to disable the CAB extension for all of the NDMP hosts for that media server.
 - On Windows: `install_path\NetBackup\db\config\DISABLE_NDMP_CDOT`
 - On UNIX: `/usr/opensv/netbackup/db/config/DISABLE_NDMP_CDOT`

2. You can disable the CAB extensions for specific NDMP hosts by creating the following file on the media servers with one or more NDMP host names (one per line):

- On Windows:

```
install_path\NetBackup\db\config\DISABLE_NDMP_CDOT_HOST_LIST
```

- On UNIX:

```
/usr/opensv/netbackup/db/config/DISABLE_NDMP_CDOT_HOST_LIST
```

An example of the content of the file is as follows. NetBackup disables the CAB extension only for Filer_1 and Filer_2.

```
Filer_1
```

```
Filer_2
```

To enable the cDOT functionality, these files must be deleted and you must follow all of the steps explained in the previous upgrade procedure.

Configuring NDMP backup to NDMP-attached devices

This chapter includes the following topics:

- [About configuring NDMP-attached devices](#)
- [Authorizing NetBackup access to a NAS \(NDMP\) host](#)
- [About access for three-way backups and remote NDMP](#)
- [About Media and Device Management configuration](#)
- [Using the Device Configuration Wizard to configure an NDMP filer](#)
- [About adding volumes](#)
- [About verifying NDMP password and robot connection](#)
- [Adding NDMP storage units](#)
- [About creating an NDMP policy](#)
- [About environment variables in the backup selections list](#)
- [About appropriate host selection for NetApp cDOT backup policies](#)
- [About backup types in a schedule for an NDMP policy](#)
- [About enabling or disabling DAR](#)
- [Configuring NetBackup for NDMP in a clustered environment](#)

About configuring NDMP-attached devices

This topic explains how to configure backups on the storage devices that are attached to NDMP hosts. Only the NDMP-specific steps are described.

You can also use the NetBackup **Device Configuration Wizard** to discover and configure the robots and drives that are attached to an NDMP host. The wizard requires NDMP protocol versions V3 or V4.

To configure and use the NAS_Snapshot method, see the [NetBackup Snapshot Client Administrator's Guide](#).

See [“About adding volumes”](#) on page 106.

Authorizing NetBackup access to a NAS (NDMP) host

Before NetBackup can perform backups using NDMP, it must have access to the NAS (or NDMP) host.

Note: Perform the following procedure on the primary server (not media server) if you plan to create snapshots using Replication Director.

To authorize NetBackup access to the NDMP host

- 1 On the NetBackup server **NetBackup Administration Console**, expand **Media and Device Management > Credentials > NDMP Hosts**.
- 2 Under the **Actions** menu, select **New > New NDMP Host**.

- 3 In the **Add NDMP Host** dialog box, enter the name of the NDMP server for NetBackup to back up.

If you are using NetApp's Clustered Data ONTAP, the NDMP host must be a Storage Virtual Machine (SVM).

The NDMP host name is case-sensitive. The name must match the name that is entered here whenever this host name is used.

Note: If you do not plan to use Replication Director and you add NDMP host credentials using the fully qualified domain name (FQDN), you must also indicate the fully qualified domain name on the client for lookups. That is, the server list in the **Backup, Archive, and Restore** client interface must list the NDMP host by the FQDN as well.

If you add NDMP host credentials using a short name, you can use either the short name or the FQDN in the client server list.

- 4 Click **OK**.
- 5 In the **New NDMP Host** dialog box, specify the following:

(The term credentials refers to the user name and password that NetBackup uses to access the NDMP host.)

Use global NDMP credentials for this NDMP host

Note: The **Use global NDMP credentials for this NDMP host** option is not available from the NetBackup web UI.

Enables all NetBackup media servers under the primary server to access this NDMP host using a predefined global NDMP logon.

To create this logon, click **Host Properties > Master Server > Properties > NDMP** in the **NDMP Global Credentials** dialog box.

Note: Because NetApp generates a separate, encrypted password for each SVM, this option cannot be used with NetApp's Clustered Data ONTAP.

Use the following credentials for this NDMP host on all media servers

Enables all NetBackup media servers that are connected to the NDMP host to access the NDMP host using the logon you specify:

- **User name:** The user name under which NetBackup accesses the NDMP server. This user must have permission to run NDMP commands.
You can find out whether your NDMP host vendor requires a particular user name or access level.
- **Password and Confirm Password:** Enter the password for this user.
See [“About NAS appliances support”](#) on page 152. for information about passwords for NAS devices.

Use different credentials for this NDMP host on each media server

Specifies NDMP logons for particular NetBackup servers. Then click **Advanced Configuration**.

- In the **Advanced NDMP Credentials** dialog box, click **Add**.
- In the **Add Credentials** dialog box, select a NetBackup server and specify the user name and password it uses to access the NDMP host.
- Click **OK**. NetBackup validates the user name and password.
- The NetBackup server and user name appear in the **Advanced NDMP Credentials** dialog box.
- If necessary, click **Add** again to specify other servers and user

6 Repeat this procedure for each NDMP host that NetBackup backs up.

See [“About configuring NDMP-attached devices”](#) on page 96.

About access for three-way backups and remote NDMP

To perform three-way backups, you must authorize access to the NDMP host as described in the previous section.

Note the following points:

- Three-way backups; for the **NDMP host name**, specify the NDMP host that has no attached tape drive.

- NDMP to Media Manager storage units (remote NDMP); for the **NDMP host name**, specify the NDMP host to back up to the Media Manager storage unit that is defined on the NetBackup server.
See [“About remote NDMP”](#) on page 124.

See [“About configuring NDMP-attached devices”](#) on page 96.

About Media and Device Management configuration

On the **NetBackup web UI**, use **Storage > Devices** to add drives and robots.

Note: It is recommended to connect any tape drive that is attached to a NetApp cDOT system to all of the cluster nodes. If you do not follow this recommendation, NetBackup may not be able to find the optimal path for data transfer.

The following procedures and examples treat NDMP configuration issues only.

- See [“Using the Device Configuration Wizard to configure an NDMP filer”](#) on page 102.
- See [“Adding a robot directly attached to an NDMP host”](#) on page 100.
- See [“Adding a tape drive”](#) on page 100.
- See [“Checking the device configuration”](#) on page 101.

See the [NetBackup Administrator's Guide for UNIX, Windows, and Linux, Volume I](#), for general information on configuring NetBackup media.

More information on configuring storage devices for specific NDMP hosts is available.

- See [“About NAS appliances support”](#) on page 152. for information about supported NDMP operating systems and NAS vendors.
- For a list of the features and software releases for each NAS vendor, for SSO support, and for the NetBackup versions that support these vendors, see the [NetBackup Compatibility List for all Versions](#).

These procedures do not apply to setting up the devices that are attached to the NetBackup media server. To back up NDMP data to media servers, you must configure storage units in the same way as ordinary NetBackup (non-NDMP) devices. More information is available:

See [“About remote NDMP”](#) on page 124.

See [“About adding volumes”](#) on page 106.

See [“About configuring NDMP-attached devices”](#) on page 96.

Adding a robot directly attached to an NDMP host

This procedure describes how to configure a robot that is attached to an NDMP host.

To add a robot directly attached to an NDMP host

- 1 In the **NetBackup web UI**, select **Storage > Devices**.
- 2 On the **Actions** menu, select **New**. Then select **New Robot** from the pop-up menu.
- 3 In the **Add Robot** dialog box, select the following:

Media Manager host	Specify the host that manages the Enterprise Media Manager (EMM) data in the NetBackup database. (By default, this host is the NetBackup primary server.)
Device host	Use the pull-down to select the NetBackup media server.
Robot type	Specify type.
Robot number	Specify number.
Robot control	Select Robot control is attached to an NDMP host .
Robot device path	Enter the device name of the robot. You do not need to include the NDMP host name as part of the device path.
NDMP host name	Enter the name of the NDMP host to which the robot is attached
Bus, Target, and LUN values	Specify these values if the NDMP host requires them. By default, the bus, target, and LUN values are 0.

For further assistance with the **Add Robot** dialog box, refer to the online Help. The following steps explain the portions that are unique to configuring NetBackup for NDMP.

- 4 Click **Save**.

See [“About configuring NDMP-attached devices”](#) on page 96.

Adding a tape drive

This procedure describes how to configure a tape drive.

To add a tape drive

- 1 In the **NetBackup Administration Console**, expand **Media and Device Management > Devices > Drives**.
- 2 Select **Add a New Drive**. In the dialog box, click **Add**.
- 3 In the **Add a New Drive** dialog box, enter the name of the drive in the **Drive Name** box.
- 4 Click **Add** to specify a drive path.
- 5 In the **Add Path** dialog box, select the host and the path information as follows:

Device host Select the name of the NetBackup media server. Use the pull-down to select media servers already defined, or click **Add** to enter a new one.

Path Enter the device file name of the tape drive, such as `nrst2a`. Refer to the NAS vendor documentation for your drive for the correct format of the device file name.

An alternate method is to use the following command to find the device file name for the drive, if the NDMP host is running NDMP protocol V3 or later:

```
tpautoconf -probe ndmp_host_name
```

- 6 Click **This path is for a Network Attached Storage device**.
- 7 In the **NDMP Host** drop-down list, select the name of the NAS filer to which the drive is attached.
- 8 Click **OK**.
- 9 Return to the **Add a New Drive** dialog box and enter the drive information as required. Repeat this procedure for each drive that must be added.

When you are prompted to restart the Media Manager device daemon and all robotic daemons, click **Yes**.

See [“About configuring NDMP-attached devices”](#) on page 96.

Checking the device configuration

On the NetBackup for NDMP server, use the following procedure to check the device configuration.

To check the device configuration

- ◆ On UNIX:

- Execute `/usr/opensv/volmgr/bin/vmps`.
- Verify that `ltid`, `vmd`, `avrd`, and any required robotic daemons are active.

On Windows:

- From the **NetBackup web UI**, select **Activity Monitor**.
- In the right pane, select the **Processes** tab.
- Verify that `ltid`, `vmd`, `avrd`, and any required robotic daemons processes are active.

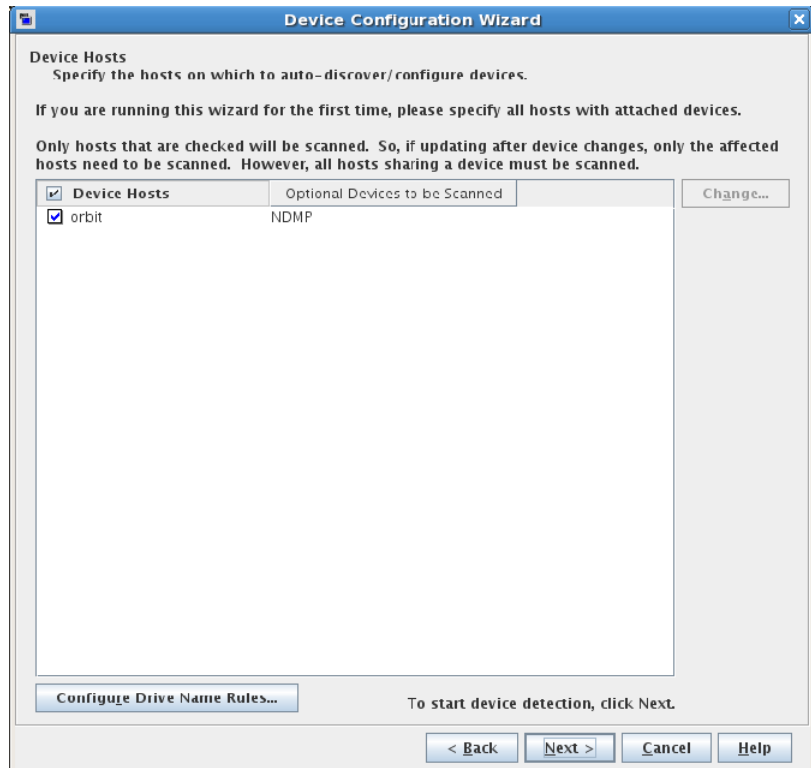
See [“About configuring NDMP-attached devices”](#) on page 96.

Using the Device Configuration Wizard to configure an NDMP filer

This procedure shows how to use the **Device Configuration Wizard** of the NetBackup Administration Console to configure NetBackup to an NDMP filer. This wizard provides the most convenient way to configure devices and storage units for NDMP hosts.

To use the Device Configuration Wizard

- 1 In the **NetBackup Administration Console**, click **Configure Storage Devices** in the right panel to launch the **Device Configuration Wizard**.
- 2 Click **Next** on the **Welcome** window. The **Device Hosts** window appears.



- 3 Under **Device Hosts**, put a check by the NetBackup media server that accesses the NDMP host.
- 4 Select the server name and click **Change**.

- 5 In the **Change Device Host** window, place a check beside **NDMP server**, then click **OK**.

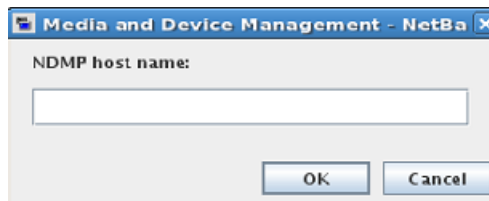


In the **Device Hosts** window, NDMP is now listed in the **Optional Devices to be Scanned** column for the media server.

- 6 Click **Next** to display the **NDMP Hosts** panel.

Note: For a NetApp cDOT system, the NDMP host must be a cluster-management LIF. NetBackup does not support any other LIF type as the NDMP host name for storage device configuration.

- 7 To add a new NDMP host, click **New**. The following window appears:



- 8 Enter the new NDMP host name and click **OK**. The **NDMP Host Credentials** window appears.

Change NDMP Host - na3250cm1cl

NDMP host: na3250cm1cl

NDMP Host Credentials

☐ Use global NDMP credentials for this NDMP host

☒ Use the following credentials for this NDMP host on all media servers

User name:
admin

Password:

Confirm Password:

☐ Use different credentials for this NDMP host on each media server
(Use Advanced Configuration)

To configure individual media server credentials or to override global and NDMP host level credentials, use Advanced Configuration.

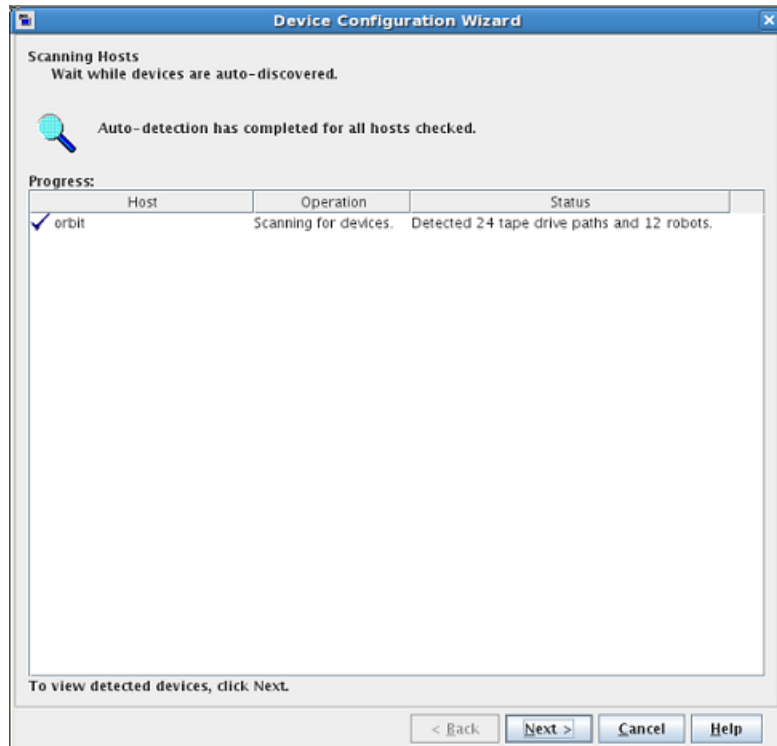
Advanced Configuration...

OK Cancel Help

- 9 Select **Use the following credentials for this NDMP host on all media servers**. Enter the User name and password for the desired NDMP filer.

See [“About NAS appliances support”](#) on page 152. for information about supported NDMP operating systems and NAS vendors.

The **Scanning Hosts** window appears. NetBackup scans the host to discover all attached tape and disk devices. When completed, the **Scanning Hosts** window looks like the following example:



- 10 Follow the remaining prompts in the wizard to complete the configuration.

About adding volumes

Use the NetBackup **Media and Device Management** utility to add the volumes that you plan to use for the NDMP host backups.

See the [NetBackup Administrator's Guide, Volume I](#), for instructions.

When you specify the **Robot control host** for a volume that is in a robot, specify the host name for the NetBackup for NDMP server. Do not specify the NDMP host.

See [“About configuring NDMP-attached devices”](#) on page 96.

About verifying NDMP password and robot connection

When you authorize NetBackup access to the NDMP host and configure robots using the **NetBackup web UI**, NetBackup automatically verifies the NDMP credentials and the robotic configuration. If you want, you can re-verify them. For example:

```
tpautoconf -verify ndmp_host_name
```

A successful verification looks like the following:

```
Connecting to host "stripes" as user "root"...
Waiting for connect notification message...
Opening session--attempting with NDMP protocol version n...
Opening session--successful with NDMP protocol version n
    host supports MD5 authentication
Getting MD5 challenge from host...
Logging in using MD5 method...
Host info is:
    host name "stripes"
    os type "NetApp"
    os version "NetApp Release n.n.n.n"
    host id "0033625811"
Login was successful
Host supports LOCAL backup/restore
Host supports 3-way backup/restore
```

Adding NDMP storage units

On the NetBackup primary server, add an NDMP-type storage unit for the devices that contain the backup data. Most of the requirements are the same as for adding a Media Manager storage unit. The following procedure explains how to add an NDMP storage unit.

See the [NetBackup Administrator's Guide, Volume I](#), for more information on storage units.

The NDMP-type storage units are not used for backups to devices that are attached to NetBackup media servers. Use a non-NDMP storage unit instead.

See [“About remote NDMP”](#) on page 124.

To add NDMP storage units

- 1 In the **NetBackup Administration Console**, select **NetBackup Management > Storage**.
- 2 On the **Actions** menu, select **New > New Storage Unit**.
- 3 In the **New Storage Unit** dialog box, enter the following:

Storage unit name	Enter a unique name for the storage unit.
Storage unit type	Select NDMP .
On demand only	Specify whether the storage unit is available only when a policy or schedule specifically requests it. If this option is not used, the storage unit is available to any NDMP policy or schedule.
Storage Device	Select the type of device for this storage unit.
NDMP Host	Specify the NDMP host; for NetApp cDOT systems, you must specify a cluster-management LIF. NetBackup does not support any other LIF type as the NDMP host name for storage device configuration.
Media server	Select the media server associated with this storage unit.
Maximum concurrent write drives	Select the maximum number of drives for concurrent writing.
Reduce fragment size to	Enter the minimum fragment size for this storage unit.
Enable multiplexing	Enter 1 as multiplexing is not allowed with NDMP storage units.
Maximum streams per drive	Select the maximum number of data streams to use with NDMP multiplexing.
Note: You must select at least two data streams.	

The remaining fields are described in the [NetBackup Administrator's Guide, Volume I](#) and the online Help.

See [“About configuring NDMP-attached devices”](#) on page 96.

About creating an NDMP policy

On the NetBackup primary server, you must create an NDMP policy to configure backups of the NDMP host.

Note: You can use the **Backup Policy Configuration Wizard** to create NDMP policies.

Creating an NDMP policy is very similar to creating other NetBackup policy types. The following topics explain the differences when creating NDMP policies.

- See [“Attributes tab options for an NDMP policy”](#) on page 109.
- See [“Schedules tab options for an NDMP policy with Accelerator for NDMP enabled”](#) on page 110.
- See [“Clients tab options for an NDMP policy”](#) on page 111.
- See [“Backup selection options for an NDMP policy”](#) on page 111.
- See [“About appropriate host selection for NetApp cDOT backup policies”](#) on page 119.

See the [NetBackup Administrator's Guide, Volume I](#), for more information on NetBackup policies and the Policy utility.

To configure an NDMP policy for the NDMP Snapshot and Replication method, see the [NetBackup Replication Director Solutions Guide](#).

To configure a policy for the NAS_Snapshot method, see the [NetBackup Snapshot Client Administrator's Guide](#).

Attributes tab options for an NDMP policy

The following policy attributes are applicable when you create an NDMP policy:

Policy Type: NDMP Do not select any other policy type.

Policy Storage Unit	■ To direct backups for this policy to a specific storage unit if the NDMP host has multiple storage units, specify that storage unit name. ■ For policies that use Accelerator for NDMP, the storage unit groups are supported only if the storage unit selection in the group is Failover. See the Use Accelerator attribute. ■ For a three-way backup , specify a storage unit that was defined for the target NDMP host with attached tape. ■ For NDMP backup to Media Manager storage units, specify a Media Manager storage unit that is defined for a device that is connected to a NetBackup media server. See “About remote NDMP” on page 124.
Use Accelerator	Select Use Accelerator to enable Accelerator for NDMP. See the Policy Storage Unit attribute. See “About NetBackup Accelerator for NDMP” on page 134. for more information.
Replication Director	Select the Replication Director to configure an NDMP policy for Replication Director.
Allow multiple data streams	Set the value to a number greater than 1.

Schedules tab options for an NDMP policy with Accelerator for NDMP enabled

In the schedules list under the **Attributes** tab, the following parameter is optional for an NDMP policy with Accelerator for NDMP enabled.

Accelerator forced rescan

Select this option to enable an Accelerator forced rescan. This option is available only for the NDMP policies that use Accelerator for NDMP.

An Accelerator forced rescan provides a safety net by establishing a new baseline for the next Accelerator backup. When you include this option, all the data on the filer is backed up. This backup is similar to the first full Accelerator backup: it provides a new baseline for the backups that follow. If you set up a weekly full backup schedule with the **Use Accelerator** option, you can supplement the policy with another schedule that enables **Accelerator forced rescan**. You can set the schedule to run every 6 months or whenever it is appropriate for your environment. Expect backups with **Accelerator forced rescan** to run slightly longer than accelerated full backups.

More information about Accelerator for NDMP is available:

See [“About NetBackup Accelerator for NDMP”](#) on page 134.

Clients tab options for an NDMP policy

In the client list, the following options are required for each client in an NDMP policy:

Hostname

Name of the NDMP host. If you use a NetApp cDOT system, the NDMP host name can only be a Vserver (a data LIF or a cluster-management LIF). NetBackup does not support any other LIF type as the NDMP host name.

Hardware and operating system

NDMP NDMP. If you use a NetApp cDOT system, NetBackup changes the operating system name from NDMP to cDOT.

Backup selection options for an NDMP policy

The backup selections list must specify directories from the perspective of the NDMP host.

For example:

```
/vol/home/dir1/  
/vol/vol1
```

If you have a Windows primary server or media server, you cannot specify a directory that contains unsupported characters in its name. For example, Windows does not support the following characters in file and folder names and therefore they cannot be used in backup selection specifications:

- ~ (tilde)

- # (number sign)
- % (percent)
- & (ampersand)
- * (asterisk)
- [] (braces)
- / (backslash)
- : (colon)
- < > (angle brackets)
- ? (question mark)
- \ (slash)
- | (pipe)
- " (quotation mark)

Refer to your Windows documentation for a complete list of unsupported characters.

You can also use wildcard characters in regular expressions or the directive `ALL_FILESYSTEMS` to specify path names in NDMP policy backup selections.

See [“Wildcard characters in backup selections for an NDMP policy”](#) on page 112.

See [“ALL_FILESYSTEMS and VOLUME_EXCLUDE_LIST directives”](#) on page 115.

See [“About environment variables in the backup selections list”](#) on page 117.

See [“About configuring NDMP-attached devices”](#) on page 96.

Wildcard characters in backup selections for an NDMP policy

You can use wildcard characters in regular expressions or the directive `ALL_FILESYSTEMS` to specify path names in NDMP policy backup selections.

Wildcard characters in regular expressions or directives are valid for streaming and non-streaming NDMP backups.

Note: Directory-level expansion is not supported for some NDMP servers. Some NDMP filer vendors do not have the APIs that NetBackup uses to support wildcard characters lower than the volume level.

If you specify a backup selection using wildcard characters lower than the volume level for these filers, status code 106 is generated. The following message is displayed: **Invalid file pathname found, cannot process request.**

Currently, only NetApp filers support wildcard characters for backup selections lower than the volume level. This support is not available in NetApp clustered Data ONTAP version 8.2.

To see the versions of NetApp Data ONTAP that support wildcard characters for backup selections lower than the volume level, refer to the [NetBackup Compatibility List for all Versions](#).

You cannot use any wildcard characters that also match file names. For example, a backup selection might include `/vol/vol_archive_01/autoit*`. This specification might match a path name such as `/vol/vol_archive_01/autoit_01/`. However, if this specification also matches a file name like `/vol/vol_archive_01/autoit-v1-setup.exe`, the backup job fails with status code 99 because wildcards can specify only path names. The following message is displayed: **NDMP backup failure (99).**

Table 13-1 Valid wildcard characters for NDMP policy backup selections

Wildcard character	Description
*	Specifies a string match. For example: <pre>/vol/vol_archive_*</pre> This form of the path specification matches all paths that begin with the literal characters <code>/vol/vol_archive_</code> and end with any characters. The string match wildcard can also specify multiple variable characters between literal characters as in the following examples: <pre>/vol/ora_*archive or /vol/ora_*archive*</pre> <pre>/vol/ora_vol/qtrees_*archive or /vol/ora_vol/qtrees_*archive*</pre>
?	Specifies a single-character match. <pre>/fs?</pre> This path specification matches all paths that begin with the literal characters <code>/fs</code> and end with any single character. For example, <code>/fs1</code>, <code>/fs3</code>, <code>/fsa</code>, <code>/fsd</code> and so on match the specified pattern <code>/fs?</code>.

Table 13-1 Valid wildcard characters for NDMP policy backup selections
(continued)

Wildcard character	Description
[...]	Specifies an alphanumeric pattern match. For example: <pre>/fs[1-9]</pre> This path specification matches all paths that begin with the literal characters <code>/fs</code> and end with any single numeric character from 1 through 9. For example, <code>/fs1</code>, <code>/fs2</code>, and so on up to <code>/fs9</code> match the specified pattern <code>/fs[1-9]</code>. However, <code>/fs0</code> and <code>/fsa</code> do not match the specified pattern; 0 is out of the specified numeric range, and <code>a</code> is a non-numeric character. The pattern match wildcard can also specify alphanumeric patterns such as <code>/fs[1-5a]</code>. This specification matches <code>/fs1</code>, <code>/fs2</code>, and so on up to <code>/fs5</code> as well as <code>/fsa</code>. Similarly, the pattern match wildcard can also specify patterns like <code>/fs[a-p4]</code>. This specification matches <code>/fsa</code>, <code>/fsb</code>, and so on up to <code>/fsp</code> as well as <code>/fs4</code>. You must use multiple backup selection specifications if the pattern can match more than 10 volume names in a numeric series. For example, you may want to back up 110 volumes that begin with the literal characters <code>/vol/ndmp</code> and are numbered 1 through 110. To include these volumes in a backup selection with wildcards, specify three backup selections with the following wildcard patterns: ■ <code>/vol/ndmp[0-9]</code> This pattern matches any volume name that begins with <code>/vol/ndmp</code> and ends with a single numeric character 0 through 9. ■ <code>/vol/ndmp[0-9][0-9]</code> This pattern matches any volume name that begins with <code>/vol/ndmp</code> and ends with the two-digit numeric characters 00 through 99. ■ <code>/vol/ndmp[0-9][0-9][0-9]</code> This pattern matches any volume name that begins with <code>/vol/ndmp</code> and ends with the three-digit numeric characters 000 through 999. Do not specify <code>/vol/ndmp[1-110]</code> in this example. This pattern produces inconsistent results.
{...}	Curly brackets can be used in the backup selection list and the <code>VOLUME_EXCLUDE_LIST</code> directive for NDMP policies. A pair of curly brackets (or braces) indicates multiple volume or directory name patterns. Separate the patterns by commas only; no spaces are permitted. A match is made for any or all entries. For example: <pre>{*volA,*volB} or {volA*,volB*}</pre>

Note the following restrictions and behaviors regarding wildcard expressions:

- It is not recommended that you use a single forward-slash character (/) in an NDMP policy backup selection. This method of including all the volumes on an NDMP filer in the selection is not supported. Instead, use the `ALL_FILESYSTEMS` directive:

See “[ALL_FILESYSTEMS and VOLUME_EXCLUDE_LIST directives](#)” on page 115.

- Nested wildcard expressions can result in recursive path name expansion operations that can impact performance, especially for directories that have a very large number of files or directories. An example of nested wildcard expansion is as follows:

```
/vol/fome06/*/*private
```

- Wildcard expressions do not span or include a path separator (/).
- All backup selections that contain a wildcard expression must start with a path separator (/). An example of a correct wildcard expression is as follows:

```
/vol/archive_*
```

An example of an incorrect wildcard expression is as follows:

```
vol/archive_*
```

ALL_FILESYSTEMS and VOLUME_EXCLUDE_LIST directives

The `ALL_FILESYSTEMS` directive provides a method to include all file systems and volumes on an NDMP filer in an NDMP backup policy.

You can exclude specific volumes from an `ALL_FILESYSTEMS` backup selection if you do not want to back up every volume on an NDMP filer. Use the `VOLUME_EXCLUDE_LIST` directive for this purpose. You may use valid wildcard characters in the `VOLUME_EXCLUDE_LIST` statement.

Note: The following examples use selections that are specific to NetApp Data ONTAP 7-mode. For specific examples of backup selections for other configurations, refer to the appropriate documentation.

The `VOLUME_EXCLUDE_LIST` statements must precede `ALL_FILESYSTEMS` statement. For example:

```
VOLUME_EXCLUDE_LIST=/vol/Hr_allfiles_vol01  
ALL_FILESYSTEMS
```

or

```
VOLUME_EXCLUDE_LIST=/vol/testvol*
ALL_FILESYSTEMS
```

To specify multiple values in a `VOLUME_EXCLUDE_LIST` statement, separate the values with a comma. For example:

```
VOLUME_EXCLUDE_LIST=/vol/Hr_allfiles_vol01,/vol/testvol*
ALL_FILESYSTEMS
```

You can also specify more than one `VOLUME_EXCLUDE_LIST` statement with an `ALL_FILESYSTEMS` directive. For example:

```
VOLUME_EXCLUDE_LIST=/vol/Hr_allfiles_vol01
VOLUME_EXCLUDE_LIST=/vol/testvol*
ALL_FILESYSTEMS
```

A `VOLUME_EXCLUDE_LIST` statement may include a maximum of 256 characters. Create multiple `VOLUME_EXCLUDE_LIST` statements if necessary to avoid exceeding the limit of 256 characters. If you specify more than 256 characters, the volume list is truncated. A truncated statement may result in a backup job failure, and the error message `Invalid command parameter(20)` is displayed.

If the backup selection includes read-only volumes or full volumes, an NDMP backup job fails with the status code 20 (`Invalid command parameter(20)`). If you encounter a similar NDMP backup job error, review the `ostfi` logs to identify the volumes for which the failure occurred. You can use `VOLUME_EXCLUDE_LIST` statements with the `ALL_FILESYSTEMS` statement to exclude the read-only volumes and the volumes with insufficient space.

In a NetBackup Replication Director environment where snapshots are replicated to a secondary filer, it is recommended that you use storage lifecycle policies to control backups on the secondary filer.

On NetApp 7-mode storage systems, it is generally not recommended for users to store files in `/vol/vol0` because the volume contains filer system files. For this reason, `vol0` should be excluded from the backup if the `ALL_FILESYSTEMS` directive is used in the backup policy. The following is a backup selection list that excludes `/vol/vol0`:

```
VOLUME_EXCLUDE_LIST=/vol/vol0
ALL_FILESYSTEMS
```

- Do not use `ALL_FILESYSTEMS` to backup all volumes on a secondary filer. Inconsistencies may occur when automatically created NetApp FlexClone volumes are backed up or restored. Such volumes are temporary and used as

virtual copies or pointers to actual volumes and as such do not need to be backed up.

- If you must back up all volumes on a secondary filer, it is recommended that you exclude the FlexClone volumes as well as replicated volumes. For example:

```
VOLUME_EXCLUDE_LIST=/vol/Clone_*
VOLUME_EXCLUDE_LIST=/vol/*_[0-9]
VOLUME_EXCLUDE_LIST=/vol/*_[0-9][0-9]
VOLUME_EXCLUDE_LIST=/vol/*_[0-9][0-9][0-9]
ALL_FILESYSTEMS
```

This example assumes all FlexClone volumes and only FlexClone volumes begin with `/vol/Clone_`. Adjust the volume specifications appropriately for your environment.

- `VOLUME_EXCLUDE_LIST` applies only to `ALL_FILESYSTEMS`. It does not apply to explicit backup selections or wildcard-based backup selections. If you use the `ALL_FILESYSTEMS` directive in an NDMP policy for Clustered Data ONTAP, you must exclude each selected SVM's root volume using the `VOLUME_EXCLUDE_LIST` directive. Otherwise the backups fail.

Backups from snapshots for NDMP policies fail when the import of a snapshot fails for volumes where logical unit numbers (LUNs) reside with status code 4213 (Snapshot import failed). To avoid this error, use the `VOLUME_EXCLUDE_LIST` directive to exclude any volumes that are used to create LUNs accessed through a storage area network (SAN).

About environment variables in the backup selections list

NDMP lets you use environment variables to pass configuration parameters to an NDMP host with each backup. NDMP environment variables can be one of the following types:

- Defined as optional by the NDMP protocol specification.
You can set these variables.
- Specific to an NDMP host vendor.
You can set these variables.
See [“About NAS appliances support”](#) on page 152. for up-to-date information on environment variables relating to particular NAS vendors. The topic also contains configuration and troubleshooting help for particular NAS systems.

For Isilon filers only, note the following behaviors with environmental variables:

- With Isilon filers, if you set the `HIST` environment variable in a NetBackup NDMP backup policy with Accelerator enabled, you may specify only the value `D` (that is, `SET HIST=D`). `D` specifies a directory/node file history format. If you specify any other value for the `HIST` variable, NetBackup generates a message that asks you to change the value to `D`. If you do not use a `HIST` variable in the policy, the backup should complete successfully.
- If you change any of the variables in a NetBackup NDMP backup policy with Accelerator enabled, the Accelerator optimization will be 0% until you run a second full backup with the same variables. When the policy's variables change, a new baseline image is created with the first full backup. You will see Accelerator optimization only after the second full backup with the same variables.
- Reserved for use by NetBackup:
 - `FILESYSTEM`
 - `DIRECT`
 - `EXTRACT`
 - `ACL_START`

In NetBackup, environment variables can be set within the backup selections list by specifying one or more `SET` directives.

Note: In the backup selections list, the `SET` directive must be the first in the list, followed by the file systems or volumes to back up.

In general, the syntax of a `SET` directive is as follows:

```
SET variable = value
```

Where *variable* is the name of the environment variable and *value* is the value that is assigned to it. The value can be enclosed in single or double quotes, and must be enclosed in quotes if it contains a space character. For example:

```
SET ABC = 22
SET DEF = "hello there"
```

Setting a variable equal to no value removes any value that was set previously for that variable. For example:

```
SET ABC =
SET DEF =
```

Variables accumulate as the backup selections list is processed. For example, a backup selection may contain the following entries:

```
/vol/vol1  
SET HIST = N  
/vol/vol2  
SET DEF = 20  
SET SAMPLE = all  
/vol/vol3
```

In this example, directory `/vol/vol1` is backed up without any user-specified environment variables. The second directory (`/vol/vol2`) is backed up with the variable `HIST` set to `N`. The third directory (`/vol/vol3`) is backed up with all three of the environment variables set (`HIST = N`, `DEF = 20`, and `SAMPLE = all`).

Note: You cannot restore a single file if `HIST = N` is set. Only full volume restores are available when the `HIST` variable is set to `N`.

If an environment variable appears again later in the list, the value of this variable overrides the previous value of the variable.

The values that each backup uses are saved and provided to subsequent restores of the directory. The NDMP host may have some environment variables that are set internally and these are also saved for restores.

See [“About configuring NDMP-attached devices”](#) on page 96.

About appropriate host selection for NetApp cDOT backup policies

When configuring a backup policy to protect NetApp cDOT systems, use either the cluster-management LIF or the data LIF. Consider the following when using the cluster-management LIF as the backup policy client.

Advantages:

- Everything is cataloged under the cluster-management LIF.
- You only have to validate the cluster-management LIF.
- It is easier to back up everything using a few policies.

Disadvantages:

- If the cluster is in use by multiple departments in the same organization, it may be difficult to isolate the data between divisions. This may also be a security concern for some organizations if they want to share data between divisions.

- There is a limited granularity in the choice of volume pools and destination storage.
- Finding the appropriate data may be more difficult at the time of restore.

Consider the following when using the data LIF as the backup policy client.

Advantages:

- Everything is cataloged under the data LIF.
- If the cluster is in use by multiple departments in the same organization, it is very easy to isolate data between divisions.
- Data from different divisions can go to different volume pools and destination storage.
- Finding the appropriate data is easier at the time of restore.

Disadvantages:

- You need to add credentials for each data LIF.
- You need multiple policies to backup up the entire cluster.

About backup types in a schedule for an NDMP policy

You can specify any of the following backup types in a schedule for an NDMP policy:

- Full
- Cumulative Incremental
- Differential Incremental

Specify **Override policy storage unit** only if the client of NetBackup (the NDMP host) has more than one storage unit and you want to use a specific storage unit for this schedule. In this case, the client must be the only client in this NDMP policy.

See [“About configuring NDMP-attached devices”](#) on page 96.

About enabling or disabling DAR

By default, NetBackup for NDMP is configured to use Direct Access Recovery (DAR) to restore files or directories. DAR is used somewhat differently for file restore than for directory restore.

The following table describes how DAR is used for file and directory restores.

Table 13-2 How DAR is used for file and directory restores

Type of restore	Description
File restore	For each restore of files (not of directories), NetBackup automatically determines if the use of DAR speeds up the restore. NetBackup uses DAR only when it results in a faster restore.
Directory restore	For restore of directories, by default DAR is always used to restore a subdirectory but never used to restore the directory containing an entire image. For example, if <code>/vol/vol0</code> contains the entire image, and <code>/vol/vol0/dir1</code> is a subdirectory, DAR is used by default to restore <code>/vol/vol0/dir1</code>. But it is not used to restore <code>/vol/vol0</code>. For restore of subdirectories, NetBackup does not attempt to gauge the effectiveness of using DAR. Unless DAR is manually disabled, NetBackup always uses DAR to restore subdirectories. See “Disabling DAR for file and directory restores” on page 121.

Note: You may have to disable DAR if you have problems with DAR and your NDMP host is an older computer or is not running the latest NAS OS version.

See [“About configuring NDMP-attached devices”](#) on page 96.

Disabling DAR for file and directory restores

This procedure disables DAR for both file and directory restores, for all NDMP policies.

To disable DAR

- 1 In the **NetBackup web UI**, select **Hosts > Host properties**.
- 2 Select the server name and click **Edit media server**.
- 3 Select the General server.
- 4 Uncheck the **Use direct access recovery for NDMP restores** box.
This action disables DAR on all NDMP restores.
- 5 Click **Save**.

See [“About configuring NDMP-attached devices”](#) on page 96.

Disabling DAR for directory restores only

This procedure disables DAR for directory restores only. It leaves DAR enabled for individual file restores.

To disable DAR on restores of directories only, for all NDMP policies

- 1 Enter the string `NDMP_DAR_DIRECTORY_DISABLED` in the following file:

```
/usr/opensv/netbackup/db/config/ndmp.cfg
```

- 2 To turn on directory DAR, remove (or comment out) the `NDMP_DAR_DIRECTORY_DISABLED` string from the `ndmp.cfg` file.

See [“About configuring NDMP-attached devices”](#) on page 96.

Configuring NetBackup for NDMP in a clustered environment

The following must be installed on each node of the cluster before you can configure NetBackup for NDMP in a clustered environment:

- The NetBackup server
See the [NetBackup Installation Guide](#).
- NetBackup for NDMP software.
See [“NetBackup for NDMP installation prerequisites”](#) on page 87.
For Windows servers, only the NetBackup for NDMP license has to be installed.

To configure NetBackup for NDMP in a clustered environment

- 1 Configure NDMP-attached robots and drives. Then configure storage units and policies as in a normal, non-clustered environment:
 - You can use the NetBackup **Device Configuration Wizard**, or configure the devices manually.
See [“Authorizing NetBackup access to a NAS \(NDMP\) host”](#) on page 96.
 - To use the same robotic libraries throughout a cluster, the robot numbers must be consistent. The **Device Configuration Wizard** attempts to ensure this configuration. If you configure robots manually, be sure to use the same robot number for a given robot, from one host to another in the cluster.
- 2 When you finish configuring devices and policies for NetBackup for NDMP, failover to the next node in the cluster and configure the drives and robots.

Select the same robot number that you used when configuring the robot for the first node.

After NetBackup is configured in a clustered environment, most configuration information is available to all nodes in the cluster. The information is available by means of a shared hard drive. However, in the **NetBackup web UI**, if you make changes to **Host > Host properties**, they are not available on the shared drive. Such changes apply only to the active node. You must manually duplicate on each node the changes to **Host Properties** that are made on the active node. This action lets NetBackup perform exactly the same way in case of failover to another node.

Refer to the [NetBackup High Availability Guide](#) for further assistance.

See [“About configuring NDMP-attached devices”](#) on page 96.

Configuring NDMP backup to NetBackup media servers (remote NDMP)

This chapter includes the following topics:

- [About remote NDMP](#)
- [Configuring NDMP backup to Media Manager storage units](#)

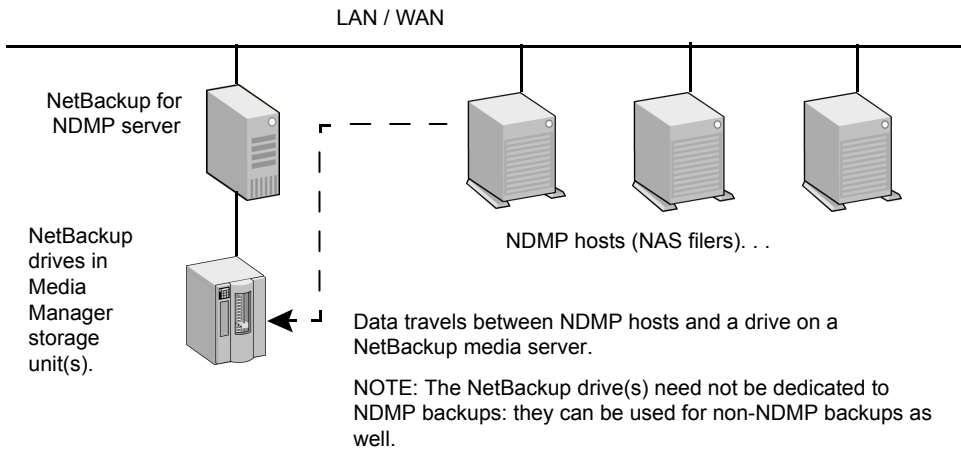
About remote NDMP

This topic describes how to configure NetBackup for NDMP to make backups to Media Manager storage units (remote NDMP). Only NDMP-specific steps are described.

Using remote NDMP, you can back up NDMP data to a configured drive in a Media Manager storage unit on a NetBackup media server. The drive can be used for both NDMP backups and for non-NDMP backups.

An added feature to remote NDMP is NDMP multiplexing. NDMP multiplexing works with remote NDMP. It concurrently writes multiple backup streams to the same storage device from the same client or different clients.

Figure 14-1 NDMP backup to a Media Manager storage unit



Configuring NDMP backup to Media Manager storage units

This section describes how to configure NDMP backups to Media Manager storage units.

To configure NDMP backups to Media Manager storage units

- 1 Authorize the NetBackup server to access the NDMP hosts you want to back up.
 Perform the following steps on the primary server (not media server) if you plan to create snapshots using the Snapshot Client NAS_Snapshot method:
 - Under **Media and Device Management > Credentials**, click **NDMP Hosts**. From the **Actions** menu, choose **New > New NDMP Host** to display the **Add NDMP Host** dialog.
 - Fill in the values.
 See [“Authorizing NetBackup access to a NAS \(NDMP\) host”](#) on page 96.
 - Repeat these steps for each NDMP host that the NetBackup server backs up.
- 2 Use the NetBackup **Device Configuration Wizard** to configure the drive(s) and robot(s).

Note the following:

- Do not use the "Configuring NDMP backup to NDMP-attached devices" topic in this guide. Configure the robots and drives as ordinary NetBackup devices, not as NDMP-attached devices.
See the [NetBackup Administrator's Guide, Volume I](#).
 - Drives can be shared using the NetBackup Shared Storage Option (SSO). The drives can be shared as both NDMP drives and non-NDMP drives.
See "[About the Shared Storage Option \(SSO\) with NetBackup for NDMP](#)" on page 148.
- 3** Create a Media Manager storage unit for the drive(s). The storage unit type must be Media Manager, not NDMP.
- For NDMP multiplexing, do the following steps:
- Select the **Enable Multiplexing** check box on the **New Storage Unit** menu.
 - Set the **Maximum streams per drive** entry to a value greater than one.
- For details on storage units, refer to the [NetBackup Administrator's Guide, Volume I](#).
- 4** Create an NDMP-type policy. On the **New/Change Policy** display, be sure to specify the storage unit that was created in the previous step.
- Note the following for NDMP multiplexing:
- Set the **Media multiplexing** attribute on the **Add New Schedule** menu to a value greater than one.

Configuring NDMP DirectCopy

This chapter includes the following topics:

- [About NDMP DirectCopy](#)
- [Configuring NDMP DirectCopy](#)
- [Using NDMP DirectCopy to duplicate a backup image](#)

About NDMP DirectCopy

NetBackup supports virtual tape libraries (VTLs). A virtual tape library uses disk-based technology to emulate a tape library (robot) and drives. The backup image is written to one or more disks in the VTL. The VTL allows the image to be treated as though it resides on tape, but with the access speed of a disk.

For additional storage (such as for disaster recovery), NetBackup copies backup images from the VTL disk to a physical tape in an NDMP storage unit. It copies without using media server I/O or network bandwidth. NetBackup can also copy NDMP images directly between NDMP tape drives attached to an NDMP host.

In both cases, this function is called NDMP DirectCopy. This function also enables NetBackup to restore data directly from either the image in the VTL or from the physical NDMP tape. NDMP DirectCopy supports backup to tape and restore from tape for NDMP data as well as non-NDMP data. Tape-to-tape duplications of backup images are also supported.

NDMP DirectCopy does not support multiplexed backup, synthetic backup, or multiple copies. It also does not support storage unit groups for the destination device. If you select a storage unit group, NDMP DirectCopy is disabled. The data transfer takes place over the network by means of the NetBackup server.

To initiate the NDMP DirectCopy, you can use the NetBackup duplication feature in the **NetBackup web UI**, the `bpduplicate` command, or NetBackup Vault.

NDMP DirectCopy operates in the following environments:

- A NetBackup media server that is connected to a VTL that has access to a physical tape library. The steps for configuring NDMP DirectCopy are described in this topic.
- A NetBackup for the NDMP server that is connected to an NDMP host that has access to a tape library (no VTL). This NDMP backup environment is described in other topics of this guide. In this environment, no additional configuration is required for NDMP DirectCopy.

If your NDMP host and storage devices are correctly configured, NetBackup uses NDMP DirectCopy when you duplicate an NDMP backup that NetBackup had created.

Prerequisites for using NDMP DirectCopy

Note the following prerequisites for using NDMP DirectCopy:

- NetBackup for NDMP software must be installed. NetBackup for NDMP is enabled by the Enterprise Disk Option license. It requires the NDMP protocol version V4 or higher.
- The [NetBackup Compatibility List for all Versions](#) indicates which VTL software supports this functionality.
- If your environment includes a VTL, the VTL must be installed and set up according to the vendor's instructions. The NetBackup Enterprise Disk Option license(s) are required. The Enterprise Disk Option license enables NDMP DirectCopy functionality.
- The VTL must have the NDMP capabilities needed to support NDMP DirectCopy.
- To make direct copies from one NDMP tape drive to another (no VTL), the NetBackup for NDMP license is required.

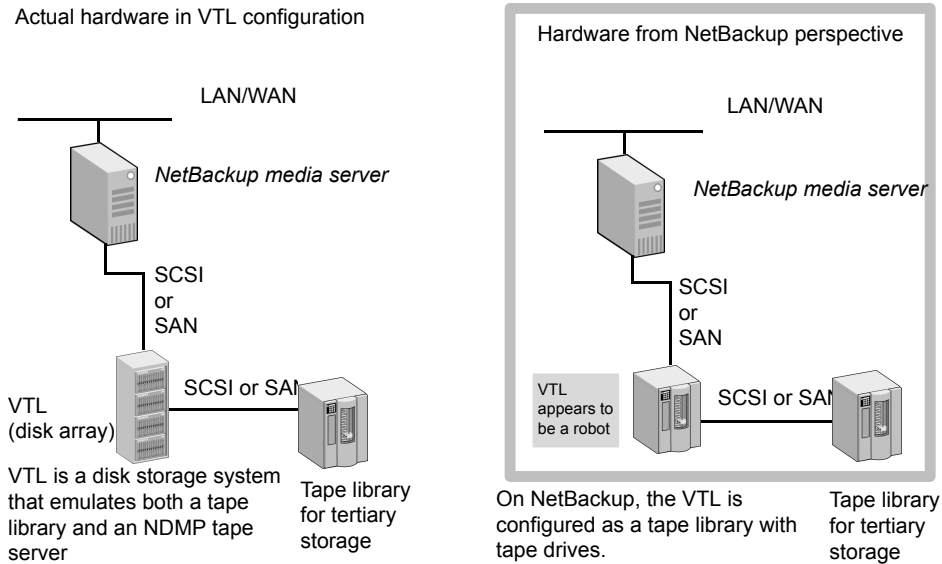
NDMP DirectCopy with VTL

The NDMP DirectCopy feature uses a VTL that has an embedded NDMP tape server using the NDMP protocol. The embedded NDMP tape server moves the image from the VTL disk directly to a physical tape. The image does not pass through the NetBackup media server or travel over the network.

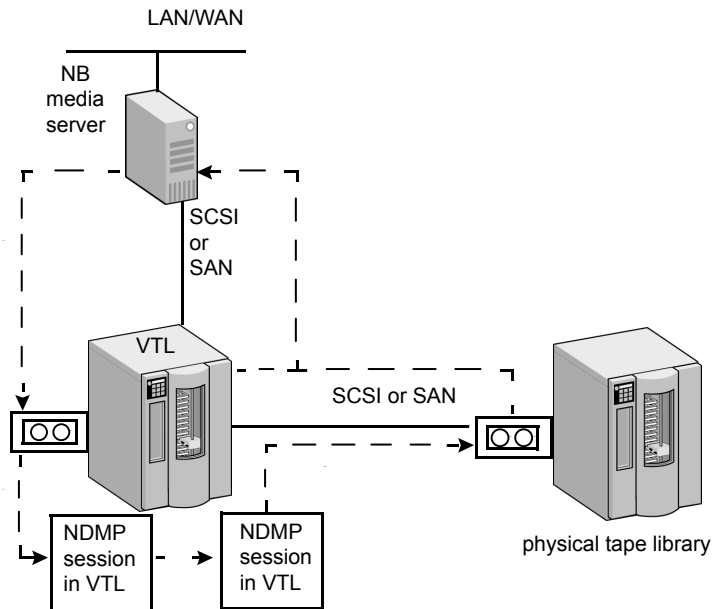
Note: In a VTL environment, a NAS appliance is not required. The VTL emulates a NAS (NDMP) host. The VTL requires NDMP tape server functionality.

The following figure represents a VTL from two perspectives. It shows the actual hardware present in a VTL configuration and the configuration from the perspective of NetBackup.

Figure 15-1 Overview of NDMP DirectCopy with VTL



The following figure shows the data flow and control for a VTL.

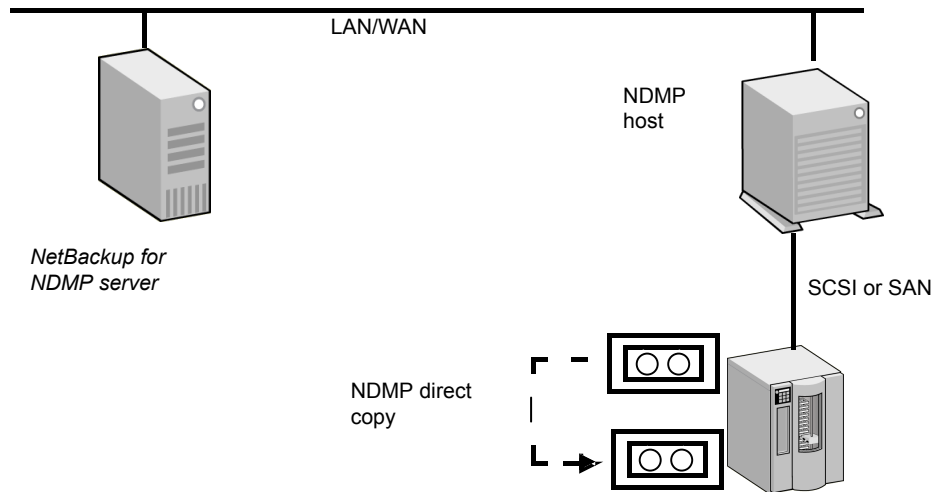
Figure 15-2 NDMP DirectCopy with VTL data flow and control

1. NetBackup media server sends the backup over a direct device path (SCSI or SAN) to the VTL.
2. NetBackup selects an NDMP device path to the VTL and creates an NDMP control session for the device.
3. NetBackup selects a tape volume from the physical tape library. It then selects an NDMP device path from the library and creates a second NDMP control session for the device.
4. By means of the NDMP protocol, the backup image in the VTL is copied directly to the physical tape library (not sent over the network).
5. The image can be restored directly to the media server from either the VTL or the physical tape.

NDMP DirectCopy without VTL

By means of the NetBackup duplication feature, NetBackup can copy NDMP images between tape drives attached to an NDMP host. A typical usage is to copy images between tape drives within the same tape library. (Images can also be copied between tape libraries.) Like NDMP DirectCopy with a VTL, the copied data does not pass through the NetBackup media server or travel over the network.

Figure 15-3 NDMP DirectCopy between tape drives accessible to an NDMP host



Configuring NDMP DirectCopy

Use the following procedure to configure NDMP DirectCopy from the backups that were made to a VTL.

To configure NDMP DirectCopy from the backups that were made to a VTL

- 1 Configure the VTL as an NDMP host. You can use the NetBackup **Device Configuration Wizard**, as follows. In the **NetBackup Administration Console**, click **Media and Device Management** and, in the right panel, click **Configure Storage Devices**.
 - In the **Device Hosts** dialog box of the wizard, choose the device host, then click **Change**.
 - In the **Change Device Host** dialog box, select **NDMP server** and click **OK**.
 - Click **Next**. The VTL appears in the **NDMP Host** window of the **NDMP Hosts** dialog box.
 See ["Using the NetBackup Device Configuration Wizard for NDMP hosts"](#) on page 150.
- 2 Authorize NetBackup access to the VTL. Note that the VTL emulates an NDMP host.
 See ["Authorizing NetBackup access to a NAS \(NDMP\) host"](#) on page 96.

- 3 Configure the VTL as a robot, then configure one or more tape drives in a Media Manager storage unit.

You can use the NetBackup **Device Configuration Wizard**. Additional help configuring devices and Media Manager storage units is also available.

See the [NetBackup Administrator's Guide Volume I](#).

- 4 Configure one or more tape drives in the VTL as Network Attached Storage devices, and create one or more NDMP storage units for the drives.

See ["Adding a tape drive"](#) on page 100.

See ["Adding NDMP storage units"](#) on page 107.

The drives can be the same as those that were selected in the previous step. NetBackup supports sharing of drives among media servers and NDMP hosts.

- 5 Configure one or more NDMP tape drives in the physical tape library, and add the drives to NDMP storage units. Use the same procedures as those mentioned in the previous step.

You can also use these drives in Media Manager storage units, if they are shared on a SAN.

Using NDMP DirectCopy to duplicate a backup image

NetBackup uses NDMP DirectCopy when you duplicate a backup image. To run a duplication, you can use any of the following methods:

- Initiate the duplication from the **NetBackup web UI**. In the **NetBackup web UI**, select **Catalog**.
Select **Duplicate** option.
See ["Initiating NDMP DirectCopy with the NetBackup web UI"](#) on page 133.
- NetBackup Vault
Refer to the [NetBackup Vault Administrator's Guide](#) for more information.
- The `bpduplicate` command
Refer to the [NetBackup Commands Guide](#) for detailed information about this command.
- A storage lifecycle policy (SLP)
In the **NetBackup web UI**, select **Storage > Storage lifecycle policies**.
Refer to the [NetBackup Administrator's Guide, Volume I](#) for more information about SLPs.

If you use a NetApp cDOT system in SVM-scoped NDMP mode, NetBackup tries to match the affinity for the source and the destination tape drive path, if possible, so the duplication can be performed optimally.

Requirements to use NDMP DirectCopy for image duplication

When NetBackup uses NDMP DirectCopy to duplicate an image, note the following:

- For the destination for the duplication, you must designate an NDMP storage unit in a VTL or in a physical tape library.
- An NDMP tape drive must be available to mount the source image. The NDMP tape drive can be one that was defined in the VTL, or it can be a physical tape drive in a tape library.

Setup instructions are available.

See [“About NDMP DirectCopy”](#) on page 127.

If these two requirements are met, NDMP DirectCopy is enabled. NetBackup copies the image directly to the designated storage unit without using media server I/O or network bandwidth.

NetBackup policy type for image duplication

You can duplicate an image that any NetBackup policy created. The policy need not be an NDMP policy.

See [“About NDMP DirectCopy”](#) on page 127.

The backup can be made to a storage unit in the VTL or to a storage device that is attached to an NDMP host. You can then copy the backup directly to a tape drive using the NetBackup Duplicate feature, as follows.

Initiating NDMP DirectCopy with the NetBackup web UI

Use the following procedure to initiate NDMP DirectCopy.

To initiate NDMP DirectCopy

- 1 In the **NetBackup web UI**, select **Catalog**.
- 2 Set up the search criteria for the image that you want to duplicate. Click **Search**.
- 3 Select the want to duplicate and select **Duplicate** from the shortcut menu.

You must designate an NDMP storage unit as the destination for the duplication. Use the **Storage unit** field in the **Setup Duplication Variables** dialog box.

Accelerator for NDMP

This chapter includes the following topics:

- [About NetBackup Accelerator for NDMP](#)
- [About the track log for Accelerator for NDMP](#)
- [Accelerator messages in the NDMP backup job details log](#)
- [NetBackup logs for Accelerator for NDMP](#)

About NetBackup Accelerator for NDMP

Note: Currently only NetApp filers and Isilon filers are supported with the NetBackup Accelerator for NDMP option. (See the [NetBackup Compatibility List for all Versions](#) for the most recent list of supported versions of each NAS vendor.)

For NetApp filers, Accelerator for NDMP supports only the DUMP format. Consult your NetApp documentation for specific details about its DUMP format.

NetBackup's Accelerator option makes NDMP backups for NetApp and Isilon filers run faster than normal NDMP backups. NetBackup Accelerator increases the speed of full backups by using the filer's change detection techniques to identify the modifications that occurred since the last backup. After an initial full backup that protects all data from the filer, NetBackup Accelerator backs up only the changed data from the filer to the media server. The media server combines the changed data with any previous backup images to create a new full backup image; if a file or portion of a file is already in storage and has not been changed, the media server uses the copy in storage rather than reading it from the filer to complete the backup image. The end result is a faster NetBackup NDMP backup.

Note: For NetApp filers, you can expect to see Accelerator optimization in both full backups (regular and forced rescan) and incremental backups. For Isilon filers, you can expect to see Accelerator optimization only in full backups (regular – not forced rescan).

Accelerator for NDMP has the following advantages:

- Supports all NetBackup NDMP features, such as replication, DAR restores, and multiplexing.
- Creates a compact backup stream that uses less network bandwidth between the filer and NetBackup servers.
- Reduces the I/O and CPU overhead on the media server.

To configure Accelerator for NDMP, select the **Use Accelerator** check box that is found on the NDMP policy **Attributes** tab. No change to the filer is required.

Note: For Isilon filers only, note the following behaviors with environmental variables:

With Isilon filers, if you set the `HIST` environment variable in a NetBackup NDMP backup policy with Accelerator enabled, you may specify only the value `D` (that is, `SET HIST=D`). `D` specifies a directory/node file history format. If you specify any other value for the `HIST` variable, NetBackup generates a message that asks you to change the value to `D`. If you do not use a `HIST` variable in the policy, the backup should complete successfully.

If you change any of the variables in a NetBackup NDMP backup policy with Accelerator enabled, the Accelerator optimization will be 0% until you run a second full backup with the same variables. When the policy's variables change, a new baseline image is created with the first full backup. You will see Accelerator optimization only after the second full backup with the same variables.

More information about environmental variables in NDMP policies is available:

See [“About environment variables in the backup selections list”](#) on page 117.

Note: If you include the `smtape` environment variable for NetApp filers in an NDMP backup policy, no optimization is seen with Accelerator for NDMP enabled. The `smtape` environment variable always backs up an entire volume as if it is a full backup of a single file. Consult your NetApp filer documentation for specific details about `smtape`. See [“About NAS appliances support”](#) on page 152. for information about `smtape` in a NetBackup backup policy is available in the NetApp section.

If your NDMP policies include combinations of filers from NetApp, Isilon, and filers from other vendors, only the NetApp and Isilon filers use the Accelerator option. Messages in the job details identify which filers use the Accelerator option and when the option is used. More information about these job detail messages is available:

See [“Accelerator messages in the NDMP backup job details log”](#) on page 140.

Note: Unlike non-accelerated NDMP backups, accelerated NDMP backups do not use NDMP dump levels 0-9 to determine changed files. Instead, `BASE_DATE` and `DUMP_DATE` are used to determine changed files. `BASE_DATE` provides the timestamp of the most recent full or incremental backup. `DUMP_DATE` provides the timestamp of the currently running backup. Only the data that has changed between the `BASE_DATE` and the `DUMP_DATE` is backed up when Accelerator for NDMP is enabled.

Dump level messages from the filer continue to be included in the job detail log. However, the message `please ignore references to LEVEL in future messages` also appears in the job details as a reminder that dump levels are not used with Accelerator for NDMP.

How Accelerator works with NDMP backups:

- **First full backup with Accelerator**
The first full NDMP backup job with the Accelerator option enabled is similar to a normal full backup. It may run slightly longer than a non-Accelerator backup. It backs up all of the data from the filer, provides a baseline backup image, and creates an initial track log.

Note: If you first enable Accelerator when the next scheduled backup is an incremental backup, NetBackup does not automatically trigger a full backup image, as is the case with NetBackup Accelerator for non-NDMP policies. With Accelerator for NDMP, incremental backups continue to run as scheduled. An initial track log is also created after the **Use Accelerator** option is enabled, and with NetApp filers, you should see faster incremental backups. The next full backup runs only when it is scheduled.

- **Incremental backups with Accelerator**
Subsequent incremental backup jobs back up only the data that changed since the last backup job.
- **Next full backups with Accelerator**

Subsequent full backup jobs back up only the data that changed since the last backup job. The track log is used to determine what data can be included from previous backups, including the previous full backup and all of the incremental backups that follow it. NetBackup then creates a full backup image that includes all of the filer's data.

- Forced rescan full backups with Accelerator
The **Accelerator forced rescan** option provides a safety net by establishing a new baseline for the next Accelerator backup. When you include this option, which is found on the policy's **Schedules** tab, all the data on the filer is backed up. This backup is similar to the first full backup with Accelerator; it provides a new baseline for the backups that follow. If you set up a weekly full backup schedule with the **Use Accelerator** option, you can supplement the policy with another schedule that enables **Accelerator forced rescan**. You can set the schedule to run every 6 months or whenever it is appropriate for your environment. With NetApp filers, expect backups with **Accelerator forced rescan** to run slightly longer than accelerated full backups. With Isilon filers, backups with **Accelerator forced rescan** may run as long as a first full backup with Accelerator. More information about these options is available:
 - See [“Attributes tab options for an NDMP policy”](#) on page 109.
 - See [“Schedules tab options for an NDMP policy with Accelerator for NDMP enabled”](#) on page 110.

About the track log for Accelerator for NDMP

The track log is a binary file that you should not attempt to edit. On occasion, Veritas Technical Support may request the track log for troubleshooting purposes. Two copies of the track log exist in the following locations:

- Primary server:
UNIX: `/usr/opensv/netbackup/db/track`
Windows: `install_path\NetBackup\db\track`
- Media server:
UNIX: `/usr/opensv/netbackup/track`
Windows: `install_path\NetBackup\track`

You can manually delete track logs safely if any of the follow situations occur:

- You disable the **Use Accelerator** option.
- The backup selections are changed.
- The policy is renamed.

- The NDMP filer is removed from the policy.
- The storage server that is used to perform the backup is changed.
- The primary server that is used to control the backups is changed.

Navigate to the following locations to manually delete track logs for specific backup selections:

- Primary server:

UNIX:

```
/usr/opensv/netbackup/db/track/primary_server/storage_server/filer_name/  
policy/backup_selection
```

Windows:

```
install_path\NetBackup\db\track\primary_server\storage_server\filer_name\  
policy\backup_selection
```

- Media server:

UNIX:

```
/usr/opensv/netbackup/track/primary_server/storage_server/filer_name/  
policy/backup_selection
```

Windows:

```
install_path\NetBackup\track\primary_server\storage_server\filer_name\  
policy\backup_selection
```

How to redirect track logs for Accelerator for NDMP

Track log size is relative to the size and number of files in a backup. In some cases, you may need to relocate the track logs to a different volume because of space issues. In these cases, it is recommended that you "redirect" the track logs to a volume where there is sufficient disk space.

One copy of the track log exists on the primary server and another copy exists on a media server in the following directories:

- Primary server:

UNIX: `/usr/opensv/netbackup/db/track`

Windows: `install_path\NetBackup\db\track`

- Media server:

UNIX: `/usr/opensv/netbackup/track`

Windows: `install_path\NetBackup\track`

To redirect these directories, complete the appropriate procedures in this topic. After completion, the next Accelerator-enabled backup that is executed redirects the track logs it creates to the directory you specified.

To redirect the track log directories on UNIX systems:

1 Rename the track log directories to make backup copies:

- On the primary server:

```
# mv /usr/opensv/netbackup/db/track  
/usr/opensv/netbackup/db/track.sv
```

- On the media server:

```
# mv /usr/opensv/netbackup/track /usr/opensv/netbackup/track.sv
```

2 Copy the backup to a new location:

- On the primary server:

```
# cp -rp /usr/opensv/netbackup/db/track.sv/* <path to new  
destination directory for track logs>
```

- On the media server:

```
# cp -rp /usr/opensv/netbackup/track.sv/* <path to new  
destination directory for track logs>
```

3 Create symbolic links from track log directories to the desired locations. For example, if the desired directory is /voll/track, enter the following command:

- On the primary server:

```
# ln -s /voll/track /usr/opensv/netbackup/db/track
```

- On the media server:

```
# ln -s /voll/track /usr/opensv/netbackup/track
```

4 After you have verified that everything works properly, you can remove the backup track.sv directory to free up space on the original volume.

To redirect the track log directories on systems with Windows Server:

1 Rename the track log directories to make backup copies:

- On the primary server:

```
> move "install_path\NetBackup\db\track"  
"install_path\NetBackup\db\track.sv"
```

- On the media server:

```
> move "install_path\NetBackup\track"  
"install_path\NetBackup\track.sv"
```

2 Copy the backup to a new location:

- On the primary server:

```
> xcopy /e "install_path\NetBackup\db\track.sv" "<path to new destination directory for track logs>"
```
- On the media server:

```
> xcopy /e "install_path\NetBackup\track.sv" "<path to new destination directory for track logs>"
```
- 3 Before performing an Accelerator-enabled backup, use `mklink` to link the `<install_dir>\NetBackup\track` directory to the desired directory. For example, if the desired directory is `E:\track`, enter the following command:

```
> mklink /D "<install_dir>\NetBackup\track" E:\track
```
- 4 After you have verified that everything works properly, you can remove the backup `track.sv` directory to free up space on the original volume.

More information about Accelerator for NDMP is available:

See [“About NetBackup Accelerator for NDMP”](#) on page 134.

See [“About the track log for Accelerator for NDMP”](#) on page 137.

Accelerator messages in the NDMP backup job details log

This topic provides explanations of some specific messages that appear in an NDMP job details log when Accelerator for NDMP is enabled.

The messages in the NetBackup job details include messages that are generated directly from the filer. To find the messages from the filer, look for the NDMP host name in the message following the PID number as in the following example:

```
mm/dd/yyyy hh:mm:ss - Info ndmpagent (pid=10780) [NDMP_host_name]:  
Filetransfer: Transferred 146841088 bytes in 2.855 seconds  
throughput of 50231.929 KB/s
```

Note: Some messages that are generated directly from the filer, such as `filer volume is full`, may require your immediate attention. Consult the documentation for the filer to determine how to resolve any issues with the filer that are indicated by a message from the filer in the job details.

First Accelerator-enabled full backup

Messages similar to the following appear in the job details log for the first full NDMP backup that uses Accelerator for NDMP.

```
mm/dd/yyyy 1:28:47 PM - Info bpbrm(pid=3824) accelerator enabled
...
...
mm/dd/yyyy 1:28:53 PM - Info ndmpagent(pid=10556) accelerator
optimization is <off>, unable to locate accelerator tracklog
...
...
mm/dd/yyyy 1:29:05 PM - Info ndmpagent(pid=10556) accelerator sent
1310720 bytes out of 1310720 bytes to server, optimization 0.0%
```

Note the following items about messages for the first Accelerator-enabled full backup:

- `accelerator enabled`
This message indicates that the Accelerator option is being used.
- `accelerator optimization is <off>, unable to locate accelerator tracklog`
Because this is the first full backup, NetBackup creates a new track log. More information about the locations of the track log is available:
See [“NetBackup logs for Accelerator for NDMP”](#) on page 143.
- `accelerator sent 1310720 bytes out of 1310720 bytes to server, optimization 0.0%`
Because this is the first full backup, all data is backed up and no optimization occurs yet.

Subsequent Accelerator-enabled incremental backup

Messages similar to the following appear in the job details log for subsequent incremental NDMP backups that use Accelerator for NDMP.

```
mm/dd/yyyy 2:01:58 PM - Info ndmpagent(pid=8652) accelerator
optimization is <on>
mm/dd/yyyy 2:01:58 PM - Info ndmpagent(pid=8652) BASE_DATE will be
used to determine changed files for accelerator
mm/dd/yyyy 2:01:58 PM - Info ndmpagent(pid=8652) please ignore
references to LEVEL in future messages
...
...
mm/dd/yyyy 2:14:14 PM - Info ndmpagent(pid=10044) accelerator sent
1104896 bytes out of 100310720 bytes to server, optimization 15.7%
```

Note the following items about messages for the subsequent incremental accelerator backups:

- `accelerator optimization is <on>`

This message indicates that a track log exists and the backup shall perform with the Accelerator option.

- `BASE_DATE` will be used to determine changed files for accelerator and please ignore references to `LEVEL` in future messages

These messages are a reminder that Accelerator for NDMP uses `BASE_DATE` and `DUMP_DATE` rather than dump levels to identify changed data. Messages that refer to dump levels come from the filer. However, the message to ignore references to `LEVEL` also appears in the job detail logs as a reminder that dump levels are not used with Accelerator for NDMP.

- `accelerator sent 1104896 bytes out of 100310720 bytes to server, optimization 15.7%`

This message provides the amount of data that was sent to the server and the percentage of optimization that was realized.

Next Accelerator-enabled full backups

Messages similar to the following appear in the job details log for subsequent full NDMP backups that use Accelerator for NDMP.

```
mm/dd/yyyy 2:01:58 PM - Info ndmpagent(pid=8652) accelerator
optimization is <on>
mm/dd/yyyy 2:01:58 PM - Info ndmpagent(pid=8652) BASE_DATE will be
used to determine changed files for accelerator
mm/dd/yyyy 2:01:58 PM - Info ndmpagent(pid=8652) please ignore
references to LEVEL in future messages
...
...
mm/dd/yyyy 1:40:27 PM - Info ndmpagent(pid=12244) accelerator sent
887296 bytes out of 1159725056 bytes to server, optimization 99.9%
```

Note the following items about messages for the subsequent incremental accelerator backups:

- `accelerator optimization is <on>`
This message indicates that a track log exists and the backup shall perform with the Accelerator option.
- `BASE_DATE` will be used to determine changed files for accelerator and please ignore references to `LEVEL` in future messages

These messages are a reminder that Accelerator for NDMP uses `BASE_DATE` and `DUMP_DATE` rather than dump levels to identify changed data. Messages that refer to dump levels come from the filer. However, the message to ignore references to `LEVEL` also appears in the job detail logs as a reminder that dump levels are not used with Accelerator for NDMP.

- accelerator sent 887296 bytes out of 1159725056 bytes to server, optimization 99.9%
 This message provides the amount of data sent to the server and the percentage of optimization that was realized.

Accelerator-enabled forced rescan full backup

Messages similar to the following appear in the job details log for full NDMP backups that use Accelerator for NDMP with the **Accelerator forced rescan** option.

```
mm/dd/yyyy 2:13:43 PM - Info bpbrm(pid=8628) Accelerator enabled
backup with "Accelerator forced rescan", all data will be scanned and
processed.Backup time will be longer than a normal Accelerator enabled
backup.
...
...
mm/dd/yyyy 2:13:46 PM - Info ndmpagent(pid=10044) accelerator
optimization is <on> but 'forced rescan' is enabled
```

Note the following items about messages for accelerator forced rescan backups:

- Accelerator enabled backup with "Accelerator forced rescan", all data will be scanned and processed. Backup time will be longer than a normal Accelerator enabled backup **and** accelerator optimization is <on> but 'forced rescan' is enabled
 These messages indicate that a forced rescan is enabled and that the job shall run longer than a normal Accelerator full backup. Though accelerator optimization is on, the job may run slightly longer than accelerated full backups.

NetBackup logs for Accelerator for NDMP

Accelerator for NDMP does not require its own log directory. Instead, messages appear in standard NetBackup log files. [Table 16-1](#) lists the standard NetBackup log files in which messages for Accelerator for NDMP appear.

Table 16-1 NetBackup logs that may contain Accelerator for NDMP information

Log directory	Resides on
UNIX: /usr/opensv/netbackup/logs/ndmpagent Windows: install_path\NetBackup\logs\ndmpagent	NetBackup media server

Table 16-1 NetBackup logs that may contain Accelerator for NDMP information (*continued*)

Log directory	Resides on
UNIX: /usr/opensv/netbackup/logs/bpbrm Windows: <i>install_path</i> \NetBackup\logs\bpbrm	NetBackup media server
UNIX: /usr/opensv/netbackup/logs/bptm Windows: <i>install_path</i> \NetBackup\logs\bptm	NetBackup media server
UNIX: /usr/opensv/netbackup/logs/bpfis Windows: <i>install_path</i> \NetBackup\logs\bpfis	NetBackup media server
UNIX: /usr/opensv/netbackup/logs/bpcd Windows: <i>install_path</i> \NetBackup\logs\bpcd	NetBackup primary server
UNIX: /usr/opensv/netbackup/logs/bprd Windows: <i>install_path</i> \NetBackup\logs\bprd	NetBackup primary server
UNIX: /usr/opensv/netbackup/logs/bpdbm Windows: <i>install_path</i> \NetBackup\logs\bpdbm	NetBackup primary server

To create the log directories, run the following command on the NetBackup servers and backup host:

On Windows:

```
install_path\NetBackup\logs\mklogdir.bat
```

On UNIX/Linux:

```
/usr/opensv/netbackup/logs/mklogdir
```

Remote NDMP and disk devices

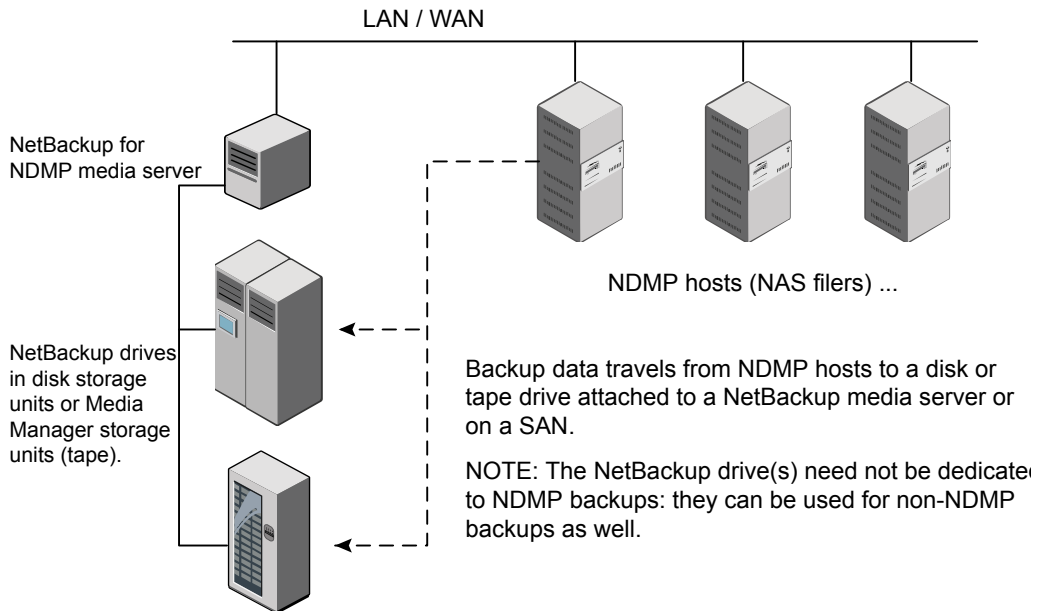
This chapter includes the following topics:

- [About remote NDMP and disk devices](#)
- [Configuring remote NDMP](#)

About remote NDMP and disk devices

This remote NDMP feature involves backing up NAS data (Network Attached Storage) to a storage device that is configured on a NetBackup media server. NetBackup supports disk devices on the media server.

The following figure shows the main components for NDMP backup to disk storage.

Figure 17-1 NDMP backup to a storage unit on media server (remote NDMP)

Configuring remote NDMP

Configure NetBackup to back up data to either disk storage or tape storage units that are attached to a NetBackup media server. Only NDMP-specific steps are described.

To configure NDMP backups to disk storage or tape storage units

- 1 Authorize the NetBackup server to access the NDMP hosts that you want to back up.

Do the following on the NetBackup media server:

- Expand **Media and Device Management > Credentials > NDMP Hosts**. Under the **Actions** menu, choose **New > New NDMP Host** to display the **Add NDMP Host** dialog box.
- Enter the name of the NDMP server (NAS filer) to back up. This NDMP host name is case-sensitive.

- Repeat the previous step for each NDMP host that the NetBackup server backs up.
 - If you plan to create snapshots using the Snapshot Client NAS_Snapshot method, do the previous step on the primary server (not on the media server).
- 2** Use the NetBackup **Device Configuration Wizard** to configure devices for remote NDMP (disks, or tape drives and robots, on the media server).

Note the following items:

- Do not use the device configuration procedure that is described for configuring NDMP-attached devices. Instead, configure the disk, robots, and drives the same way as the ordinary NetBackup devices are configured. See the [NetBackup Administrator's Guide, Volume I](#).
 - Tape drives can be shared using the Shared Storage Option (SSO) of NetBackup. The drives can be shared as both NDMP drives and non-NDMP drives. See [“About the Shared Storage Option \(SSO\) with NetBackup for NDMP”](#) on page 148.
- 3** Create a disk or Media Manager storage unit for the drive(s). The storage unit type must be Disk or Media Manager, not NDMP.
- For details on storage units, refer to the [NetBackup Administrator's Guide, Volume I](#).
- 4** Create an NDMP-type policy.
- See [“About creating an NDMP policy”](#) on page 109.

Using the Shared Storage Option (SSO) with NetBackup for NDMP

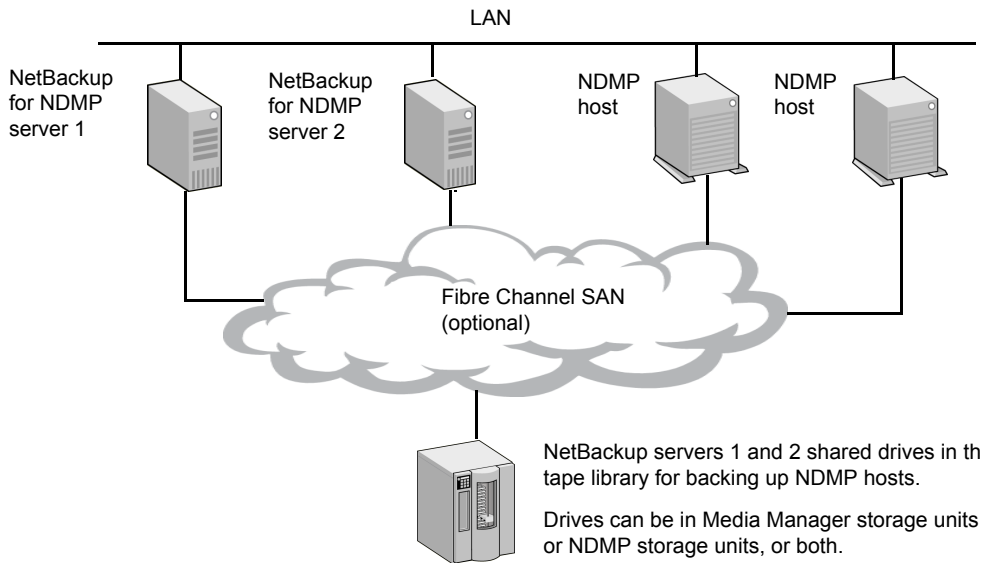
This chapter includes the following topics:

- [About the Shared Storage Option \(SSO\) with NetBackup for NDMP](#)
- [Setting up SSO with NetBackup for NDMP](#)
- [Using the NetBackup Device Configuration Wizard for NDMP hosts](#)

About the Shared Storage Option (SSO) with NetBackup for NDMP

The following figure shows a robotic library on a SAN that can share its drives between two NetBackup for NDMP servers and two NDMP hosts. Drive sharing requires a license for the Shared Storage Option. A SAN is not required.

Figure 18-1 NDMP backup using Shared Storage Option



For each robot, either a NetBackup media server or an NDMP server (not both) can handle robotic control.

Setting up SSO with NetBackup for NDMP

This topic describes the steps for setting up access to a drive that is shared between NDMP and NetBackup servers.

For a more complete discussion of SSO, refer to the [NetBackup Administrator's Guide, Volume II](#).

This procedure assumes that the following conditions are true:

- The prerequisites for SSO have been met, as described in the [NetBackup Administrator's Guide, Volume II](#).
- All physical devices, including the NDMP host, are correctly connected to the network.
- NetBackup for NDMP supports the NDMP host.
 See “[About NAS appliances support](#)” on page 152. for information about supported NDMP operating systems and NAS vendors. The topic also contains configuration and troubleshooting help for particular NAS systems.
 The [NetBackup Compatibility List for all Versions](#) indicates which versions of vendor software support SSO for NDMP. The NAS systems (hardware) do not

provide the support; the proper software version provides it. For a list of the features and software releases for each NAS vendor, for SSO support, and for the NetBackup versions that support these vendors, refer to the *NetBackup Compatibility List for all Versions*.

To set up an SSO with NetBackup for NDMP

- 1 Configure NetBackup access to the NDMP host.

See [“Authorizing NetBackup access to a NAS \(NDMP\) host”](#) on page 96.

- 2 Verify that the NDMP host can access the required robots and drives.

To verify NDMP host access to the required devices, run the following commands on a NetBackup media server that is authorized to access the host:

```
tpautoconf -verify ndmp_host_name
tpautoconf -probe ndmp_host_name
```

The `-verify` option verifies that the NetBackup server can access the NDMP host. The `-probe` option lists the devices that are visible to the NDMP host.

- 3 From the **NetBackup web UI**, use the **Device Configuration Wizard** to configure the devices and storage units.

See [“Using the NetBackup Device Configuration Wizard for NDMP hosts”](#) on page 150.

You must define an NDMP storage unit for each NDMP host that shares a drive. If all hosts have access to the shared drive(s), the **Device Configuration Wizard** can create these storage units automatically.

Using the NetBackup Device Configuration Wizard for NDMP hosts

The NetBackup **Device Configuration Wizard** provides the most convenient way to configure devices and storage units for NDMP hosts (with or without SSO).

To use the Device Configuration Wizard

- 1 In the **NetBackup Administration Console**, click **Configure Storage Devices** in the right panel to launch the **Device Configuration Wizard**.
- 2 Click **Next** on the **Welcome** window. The **Device Hosts** window appears.
- 3 Under **Device Hosts**, place a check beside the NetBackup media server that accesses the NDMP host.
- 4 Select the server name and then click **Change**.

- 5 In the **Change Device Host** window, place a check beside **NDMP server**.
- 6 Click **OK**.
- 7 In the **Device Hosts** window, NDMP is now listed in the **Optional Devices to be Scanned** column for the media server.
- 8 Click **Next** to continue.
- 9 In the **NDMP Hosts** window that shows the NDMP host(s) where you can configure devices, click **Next** to configure the NDMP-attached devices.
- 10 Follow the remaining prompts in the wizard to complete the configuration.

NAS appliance information for NDMP

This chapter includes the following topics:

- [About NAS appliances support](#)
- [Non-vendor-specific information](#)
- [Vendor-specific information](#)

About NAS appliances support

Here you can find information on the Network Attached Storage (NAS) appliances supported by NetBackup for NDMP. Also included are configuration tips and restrictions for each supported NAS appliance.

Note: Device configuration is described in the *NetBackup Device Configuration Guide*. Special notes on some configurations are included, but full device configuration is not included here.

Non-vendor-specific information

Supported operating systems

The NetBackup operating systems compatibility lists provide the most up-to-date list of supported operating systems, with notes on supported hardware platforms. NDMP compatibility is listed as a column in the NetBackup Server section for each operating system in the compatibility list:

<http://www.netbackup.com/compatibility>

Note: NetBackup for NDMP is installed on a master or media server, not on a client.

NAS appliance versions

The information in this document may apply to many different NetBackup releases. To find if your device and its features are supported at a particular NetBackup level, refer to the NetBackup Hardware Compatibility List (HCL) for the version of NetBackup that you are running:

<http://www.netbackup.com/compatibility>

Authorizing NetBackup access to the NDMP host

Use the `tpconfig` and `tpautoconf` commands as described under “Example Configuration Sequence” in each of the following sections of this document for particular NDMP hosts.

For NAS hosts that support Direct Access Recovery (DAR), NetBackup enables DAR by default.

About file restores to a different location

When restoring files from NetBackup backups of NAS filers that use older versions of the NDMP protocol (V2 and V3), the destination path for the restore must end with the original folder and file name, even if you are restoring the files to a different location. (This restriction does not apply to NAS filers that use the NDMP protocol V4.)

If the original backup path was `/vol/vol1/mydir/myfile`, the destination path for restore to a different location must end with `/mydir/myfile`. Otherwise, NetBackup appends `/mydir/myfile` to the end of the destination path.

For example, to restore `/vol/vol1/mydir/myfile` to a folder under `/vol/vol2/`, specify `/vol/vol2/mydir/myfile` as the destination.

For NAS filers that use NDMP V4, you can specify a different subfolder or file name. For example, `/vol/vol1/mydir/myfile` can be restored to `/vol/vol2/mydir2/myfile_restored`.

For any restrictions unique to a particular NAS filer, see the appropriate section in this document for your filer.

About NDMP Environment Variables

The NDMP protocol specification uses environment variables to control backup and restore operations. These variables are defined by each vendor individually, with some amount of adherence to a common, defined set. NetBackup controls the setting of some of those variables without the ability for a user to change them (such as `LEVEL` and `USER`), and some of them are modified by NetBackup settings and

policy configuration (such as `DIRECT` and `FILESYSTEM`). It is possible to change some of the variables in the include list of a NetBackup policy, such as variables for which NetBackup just passes a default value (`HIST`, `TYPE`) and for those variables that are vendor-specific.

With such a large set of possibly vendor-specific implementations of environment variables, it is impossible to provide an exhaustive list in this document. An attempt has been made to document those variables that were found during testing to have the most impact. Refer to vendor documentation for more information.

Vendor-specific information

This section includes the following topics:

- [Dell EMC Isilon](#)
- [Dell EMC VNX](#)
- [Dell EMC Unity](#)
- [EMC Celerra](#)
- [Hitachi HDI/VFP](#)
- [Hitachi NAS \(HNAS\)](#)
- [HP X9000 NAS](#)
- [Huawei OceanStor V3](#)
- [IBM System Storage Nxxxx](#)
- [NEC Storage NV series](#)
- [NetApp](#)
- [Nexenta](#)
- [Nexsan](#)
- [Oracle Axiom Series](#)
- [Oracle Solaris Server](#)
- [Stratus V Series](#)

Dell EMC Isilon

General Information

This information is provided to help you use NetBackup for NDMP with an Isilon system.

For further details, contact Dell.

Access Configuration

To enable NDMP

- 1 Access the management browser to sign in to the system.
- 2 Select **Backup > Configuration**, then select the user name and password, and enable the NDMP service state.

NetBackup configuration

OneFS 7.1 introduced two new features for NDMP backups: Snapshot-based incrementals and unlimited incremental backups. These are enabled and disabled through the use of environment variables set in the **Backup Selections** list in a NetBackup policy:

- `set BACKUP_MODE=SNAPSHOT`
Enables snapshot-based incrementals.
- `set LEVEL=10`
In OneFS 7.1, Isilon implemented a feature enabling unlimited incremental backups. This feature is enabled by setting the `LEVEL` environment variable to 10.
Starting with NetBackup 7.7, you may set the `LEVEL` environment for Differential Incremental backup schedules only. For Full or Cumulative Incremental schedules, the value is ignored.

Note: In OneFS 8.0, Isilon introduced NDMP restartable backups (checkpoints). This feature is not supported by NetBackup.

Troubleshooting

The NDMP logs can be found at `/var/log/isi_ndmp_d` on each node.

To monitor system status from the management browser, go to **Alerts** to view alert activity.

Dell EMC VNX

General Information

This information is provided to help you use NetBackup for NDMP with a EMC VNX Network Server.

- Documentation

For more information on your VNX Network Server, refer to the *EMC VNX series - Configuring NDMP Backups on VNX* guide, which can be downloaded from Dell's support site.

Access Configuration

To assign a user account name and password to one or more data movers

- 1 Log in to the Celerra Network Server Control Station as `nasadmin` and switch user to `root` by typing the following command:

```
$ su
```

You must use the `su` command. The `su -` command will fail.

Type the root password when prompted.

- 2 Choose one for the following methods to assign a user account and password to a data mover. Replace `<movernamename>` with the name of the data mover for which you want to assign a user account and password.

- Text method

```
# /nas/sbin/server_user <movernamename> -add -password ndmp
```

For example:

```
# /nas/sbin/server_user server_2 -add -password ndmp
```

- MD5 password encryption method

```
# /nas/sbin/server_user <movernamename> -add -md5 -password ndmp
```

For example:

```
# /nas/sbin/server_user server_2 -add -md5 -password ndmp
```

The output from the command that you entered should look similar to the following example, in which the data mover is `server_2`:

```
Creating new user ndmp
User ID: 1000
Group ID: 1000
Home directory:
Changing password for user ndmp
New passwd:
Retype new passwd:
server_2 : done
```

Enter a new password when prompted, then retype the new password to confirm it. The password you assign to the data mover can contain between six and eight characters. The user name must be `ndmp`. You can accept the default values for the other settings.

In the output, the two mandatory fields, `User ID` (UID) and `Group ID` (GID), are integers. The Celerra Network Server uses UNIX-style UIDs and GIDs to record the ownership of files and directories. The UID of the root user is 0.

- 3 Repeat the preceding steps for each NDMP-host data mover.

Device configuration

Tips for control and configuration:

- After logging on to the Celerra Network Server Control Station, you can use the following commands:
 - `nas_version`
(Displays the Celerra version number.)
 - `server_devconfig`
(Queries the device configuration of the specified data mover.)
- Make sure that the backup is created from a snapshot. See the following section: See [“Specifying snapshot-based backups in an NDMP policy”](#) on page 162.

Tips for robot and media discovery:

- Check that each Data Mover is recognizing the robot/media devices by entering the `server_devconfig` command from the Control Station.

For example, the following command queries the device configuration of the specified data mover (`server_2`):

```
server_devconfig server_2 -list -probe -scsi -nondisks
```

Example output:

```
server_2 :
SCSI non-disk devices :
chain= 0, scsi-0
symm_id= 0 symm_type= 0
tid/lun= 15/15 type= disk val= -99 info= 52658653C310 diskerr=
-1
chain= 1, scsi-1
symm_id= 0 symm_type= 0
tid/lun= 15/15 type= disk val= -99 info= 52686043C320 diskerr=
-1
chain= 2, scsi-2 : no devices on chain
chain= 3, scsi-3
symm_id= 0 symm_type= 0
tid/lun= 0/0 type= jbox info= HP C5173-7000 3.04
tid/lun= 1/0 type= tape info= QUANTUM DLT7000 2560q`
tid/lun= 2/0 type= tape info= QUANTUM DLT7000 2560q`
```

Troubleshooting

EMC VNX logs are located on each data mover. For example, to access the server_2 data mover log file, enter the following at the VNX Network Server Control Station:

```
server_log server_2
```

Other

Known restrictions

- The user name used with the `tpconfig` command must be defined as `ndmp` for each data mover.
While `tar`, `dump`, and `vbb` are all supported data types, Veritas recommends the use of `dump` or `vbb` instead of `tar`. Refer to the following tech note for more information:
<http://www.veritas.com/docs/000095049>
- If you specify an incorrect path name in the NetBackup policy's Backup Selections list (file list), the entire backup fails with status code 99, "NDMP backup failure."

Dell EMC Unity

General Information

This information is provided to help you use NetBackup for NDMP with the Dell EMC Unity system.

For further details, consult the Help within the administration console, or contact Dell.

Access Configuration

After a NAS server is created, or during the NAS server creation, the **Protection & Events** tab on the **Edit NAS Server** page allows the user to **Enable NDMP** and **Change Password**.

Device configuration

1 Log in to command processor over SSH as service.

This will show the attached devices.

```
> svc_nas [NAS_server|ALL] -devconfig -probe -nondisks -all
```

An example:

```
> svc_nas dsunity001dm01 -devconfig -probe -nondisks -all
dsunity001dm01 :
SCSI devices :
chain=0, scsi-0 : no devices on chain
chain=1, scsi-1 : no devices on chain
chain=2, scsi-2
tid/lun= 0/0, type= tape, info=
tid/lun= 0/1, type= jbox, info=
chain=3, scsi-3 : no devices on chain
chain=4, scsi-4 : no devices on chain
chain=5, scsi-5 : no devices on chain
chain=6, scsi-6 : no devices on chain
chain=7, scsi-7 : no devices on chain
chain=8, scsi-8 : no devices on chain
chain=9, scsi-9 : no devices on chain
chain=10, scsi-10 : no devices on chain
chain=11, scsi-11 : no devices on chain
chain=12, scsi-12 : no devices on chain
chain=13, scsi-13 : no devices on chain
chain=14, scsi-14 : no devices on chain
chain=15, scsi-15 : no devices on chain
```

2 Using the information shown, configure the devices to 1|ALL NAS_servers:

```
> svc_nas {<NAS_server_name> | ALL} -devconfig -create
-scsi [<chain_number>] {-nondisks|-all}
```

3 It is necessary to enable scsi reservations, as it is not enabled by default (as of version 4.4):

```
> svc_nas {<NAS_server_name> | ALL} -param -f NDMP -m
scsiReserve -v 1
```

4 The NAS_server will need to be rebooted to have the setting take effect:

```
> svc_shutdown -r now
```

EMC Celerra

General Information

This information is provided to help you use NetBackup for NDMP with an EMC Celerra Network Server.

- Documentation
For more information on your Celerra Network Server, refer to the Celerra Network Server Version 5.5 Documentation CD, which can be downloaded from EMC's Powerlink website.

Device configuration

Tips for control and configuration:

- After logging on to the Celerra Network Server Control Station, you can use the following commands:
 - `nas_version`
(Displays the Celerra version number.)
 - `server_devconfig`
(Queries the device configuration of the specified data mover.)
- Make sure that the backup is created from a snapshot. See the following section: See [“Specifying snapshot-based backups in an NDMP policy”](#) on page 162.

Tips for robot and media discovery:

- Check that each Data Mover is recognizing the robot/media devices by entering the `server_devconfig` command from the Control Station.
For example, the following command queries the device configuration of the specified data mover (`server_2`):

```
server_devconfig server_2 -list -probe -scsi -nondisks
```

Example output:

```
server_2 :  
SCSI non-disk devices :  
chain= 0, scsi-0  
symm_id= 0 symm_type= 0  
tid/lun= 15/15 type= disk val= -99 info= 52658653C310 diskerr=  
-1  
chain= 1, scsi-1  
symm_id= 0 symm_type= 0  
tid/lun= 15/15 type= disk val= -99 info= 52686043C320 diskerr=  
-1  
chain= 2, scsi-2 : no devices on chain
```

```
chain= 3, scsi-3
symm_id= 0 symm_type= 0
tid/lun= 0/0 type= jbox info= HP C5173-7000 3.04
tid/lun= 1/0 type= tape info= QUANTUM DLT7000 2560q`
tid/lun= 2/0 type= tape info= QUANTUM DLT7000 2560q`
```

Troubleshooting

EMC Celerra logs are located on each data mover. For example, to access the server_2 data mover log file, enter the following at the Celerra Network Server Control Station:

```
server_log server_2
```

Other

Known restrictions

- The user name used with the `tpconfig` command must be defined as `ndmp` for each data mover.
While `tar`, `dump`, and `vbb` are all supported data types, Veritas recommends the use of `dump` or `vbb` instead of `tar`. Refer to the following tech note for more information:
<http://www.veritas.com/docs/000095049>
- If you specify an incorrect path name in the NetBackup policy's Backup Selections list (file list), the entire backup fails with status code 99, "NDMP backup failure."

Information for Celerra Network Server version 5.5 software and later

EMC Celerra Network Server version 5.5 and later software supports file and directory exclude lists with wild cards, in the NetBackup policy's Backup Selections list (file list).

Celerra Network Server version 5.5 and later software also supports NDMP Volume Backup.

File and directory exclusion statements

In the policy's Backup Selections list, file and directory exclusion statements can be used with the `set` directive. The statements are named `EMC_EFILE[01-05]` for file exclusion, and `EMC_EDIR[01-05]` for directory exclusion, in the following form (see examples below):

```
set EMC_EFILExx=file_exclusion_statement
set EMC_EDIRxx=directory_exclusion_statement
```

where *xx* is a two-digit number. For restrictions in the use of these statements and other details such as the use of wildcards, refer to the Celerra Network Server Version 5.5 Documentation CD.

In the following examples of file and directory exclude statements in a NetBackup Backup selections list, the backup of */fs2* will not include the files and directories specified by the `EMC_EDIR` and `EMC_EFILE` statements:

```
set HIST=y
set TYPE=tar
set EMC_EDIR01=/fs2/l*
set EMC_EDIR02=/fs2/Ndmp*
set EMC_EDIR03=/fs2/NAS*
set EMC_EDIR05=/fs2/j*
set EMC_EFILE01=*tar
set EMC_EFILE03=*dat
set EMC_EFILE02=*dat
set EMC_EDIR04=/fs2/Millions
set UPDATE=y
/fs2
```

Specifying snapshot-based backups in an NDMP policy

To make sure that the backup is based on data that is transactionally consistent, the following statement should be the first entry in the NetBackup policy Backup Selections list:

```
set snapsure=yes
```

The Celerra Server creates a snapshot, and the backup is created from the snapshot. The snapshot is managed by the EMC Celerra, not by NetBackup.

Specifying NDMP volume backups (VBB)

The NetBackup policy's Backup Selections list can specify that the backup is performed using EMC's NDMP volume backup.

In the following example of NDMP volume backup entries in the Backup Selections list, */testfs* will be backed up using NDMP Volume Backup.

```
set snapsure=yes
set type=vbb
/testfs
```

For restrictions and other information on NDMP Volume Backup, refer to the “Configuring NDMP Backups on Celerra” technical module on the Celerra Network Server Version 5.5 Documentation CD. This CD is downloadable from the EMC Powerlink website.

Hitachi HDI/VFP

General Information

This information is provided to help you use NetBackup for NDMP with the Hitachi HDI/VFP system.

For further details, consult the Help within the administration console, or contact Hitachi Corporation.

Access Configuration

Using SSH to access one of the processing nodes using the service account, run the following command:

```
sudo ndmppasswd root oldpasswd newpasswd newpasswd
```

Device configuration

- For a list of the devices that are attached to the system, run the following command:

```
sudo tapelist
```
- For a list of tape drives that are not yet configured for NDMP, run the following command:

```
sudo tapelist -D
```
- To add those drives for NDMP access, run the following command:

```
sudo tapeadd -a
```

NetBackup configuration

Note: The HDI/VFP system only supports the tar backup type. However, the default type that NetBackup uses is dump. Therefore, you must add the following variable to the NetBackup policy:

```
set TYPE=tar
```

Hitachi NAS (HNAS)

General Information

This information is provided to help you use NetBackup for NDMP with the Hitachi NAS (HNAS) system.

For further details, consult the Help within the administration console, or contact Hitachi Corporation.

Access Configuration

For access configuration options, including setting the NDMP username and password, and enabling and disabling NDMP access, select **Home > Data Protection > NDMP Configuration** within the administration console.

Device configuration

Once devices are attached to the HNAS, use the following sequence to configure them for use with NDMP:

- 1 Allow access to the devices:

```
backup-device-allow-access all
```

- 2 Assign the devices to an EVS:

```
•backup-device-set-evs <device #> [<EVS_Name|Any]
```

- 3 Refresh the list of devices that are available through NDMP:

```
ndmp-devices-update
```

- 4 If the drives are shared between multiple hosts, enable SCSI reservations on the devices with the following command:

```
ndmp-option reserve_devices all
```

NetBackup configuration

You may use the following supported environment variables in the file list:

- EXCLUDE

For example: `set EXCLUDE="*mp3,core"`

- FUTURE_FILES

For example: `set FUTURE_FILES=y`

- HIST

For example: `set HIST=n`

- `set LEVEL=i`

For Hitachi NAS, setting `LEVEL=i` instructs the device to take an incremental based off the most recent previous backup of any level.

Starting with NetBackup 7.7, you may set the `LEVEL` environment for Differential Incremental backup schedules only. For Full or Cumulative Incremental schedules, the value is ignored.

HP X9000 NAS

General Information

This information is provided to help you use NetBackup for NDMP with an HP StorageWorks X9000 NAS system.

- Documentation
 - For further details, refer to the following documentation:
 - *X9000 File Serving CLI Reference*
 - *X9000 Administration Guide*

Access Configuration

Once the tape libraries are detected and listed, the HP X9000 should be configured to be the NDMP server.

To configure NDMP parameters on the management console GUI

- 1** Select **Cluster Configuration** from the **Navigator**
- 2** Select **NDMP Backup**.

The **NDMP Configuration Summary** shows the default values for the parameters.
- 3** Click **Modify** on the **Configure NDMP** dialog box to configure the parameters for your cluster. See online Help for a description of each field.

To configure NDMP parameters from the CLI, use the following command:

```
ibrix_ndmpconfig -c [-d IP1,IP2,IP3,...] [-m MINPORT] [-x MAXPORT]
[-n LISTENPORT] [-u USERNAME] [-p PASSWORD] [-e {0=disable,1=enable}]
-v {0=10} [-w BYTES] [-z NUMSESSIONS]
```

The NDMP server starts automatically if NDMP sessions are enabled on the cluster. You can use the following command to start, stop, or restart the NDMP server on one or more file serving nodes:

```
ibrix_server -s -t ndmp -c { start | stop | restart} [-h SERVERNAMES]
```

Device configuration

Once the connection between HP X9000 and tape library is completed, it is essential that HP X9320 detect and list the tape libraries connected to it.

To view the tape and media changer devices currently configured for backups

- 1** Select **Cluster Configuration** from the **Navigator**.
- 2** Select **NDMP Backup > Tape Devices**.
- 3** If you add a tape or media changer device to the SAN, click **Rescan Device** to update the list. If you remove a device and want to delete it from the list, you will need to restart all of the servers to which the device is attached.

To view tape and media changer devices from the CLI, use the following command:

```
ibrix_tape -l
```

To rescan for devices, use the following command:

```
ibrix_tape -r
```

For more information, refer to the *HP StorageWorks X9320 Network Storage System Administration Guide*.

Troubleshooting

All X9000 IBRIX commands on CLI can be ran in the following path:

```
/usr/local/ibrix/bin.
```

The following logs are available for troubleshooting:

- Errors warning and configuration events:
`/usr/local/ibrix/log/fusionserver.log`
- Cluster events:
`/usr/local/ibrix/log/events.log`
- Configuration messages from IAD and statistic reporting:
`/usr/local/ibrix/log/iad.log`
- Kernel messages from IDE:
`/var/log/messages`
- NDMP logs
`/usr/local/ibrix/logs/ndmp/tracelog`

Huawei OceanStor V3

General Information

This information is provided to help with using NetBackup for NDMP with a Huawei OceanStor V3 system. For further details contact Huawei.

Access Configuration

NDMP Settings are found in the Device Manager for the Huawei system: **Settings > Storage Settings > File Storage Service > NDMP Settings.**

Device configuration

Once devices are connected to the system, run the following from the command line on the Huawei system to rescan for devices:

```
admin:/> change service ndmp_scanbus
```

Then, restart the NDMP service from the NDMP Settings window in the Device Manager.

NetBackup configuration

File systems are presented over NDMP as `/fs?`, where `"?"` is the file system ID. To determine the available file systems use the following command:

```
admin:/>show file_system general
```

				Available	
ID	Name	...	Capacity	...	Capacity
--	-----	...	-----	...	-----
0	NFS100G1	...	100.000GB	...	79.632GB
1	CIFS100G1	...	100.000GB	...	79.576GB
2	NFS100G2	...	100.000GB	...	79.632GB

Note: The `ALL_FILESYSTEMS` feature that was introduced in NetBackup 7.6 uses the `NDMP_CONFIG_GET_FS_INFO NDMP` command to get a list of file systems that the system presents over NDMP. The Huawei system supports this command, but it reports `"/"` as the only available file system. This is not a valid file system for use with NDMP. This means that the `ALL_FILESYSTEMS` and `VOLUME_EXCLUDE_LIST` file list directives are not supported with this system.

IBM System Storage Nxxxx

General Information

This information is provided to help you use NetBackup for NDMP with an IBM System Storage Nxxxx filer.

For further details, refer to the following documentation:

- *Data ONTAP Command Reference Guide*
- *Data ONTAP System Administrator's Guide*

Device configuration

Tips for robotic devices

- To display the robot device file, sign on to the IBM Nxxxx host and enter the following command:

```
sysconfig -m
```

The device names in the output are in the format `mcN`, where `N` is 0 or higher.

Example `sysconfig` output:

```
Medium changer (6a.4) HP C6280-7000
mc0 - medium changer device
```

Tips for tape drives

- To display tape device files, sign on to the IBM Nxxxx host and enter the following command:

```
sysconfig -t
```

Always use the drive names that begin with `nr` (such as `nrst0a`) because these are the non-rewinding devices.

Example `sysconfig` output:

```
Tape drive (6a.5) Quantum DLT7000
rst0l - rewind device,          format is: 81633 bpi 40 GB (w/comp)
nrst0l - no rewind device,      format is: 81633 bpi 40 GB (w/comp)
urst0l - unload/reload device, format is: 81633 bpi 40 GB (w/comp)
rst0m - rewind device,          format is: 85937 bpi 35 GB
nrst0m - no rewind device,      format is: 85937 bpi 35 GB
urst0m - unload/reload device, format is: 85937 bpi 35 GB
rst0h - rewind device,          format is: 85937 bpi 50 GB (w/comp)
nrst0h - no rewind device,      format is: 85937 bpi 50 GB (w/comp)
urst0h - unload/reload device, format is: 85937 bpi 50 GB (w/comp)
rst0a - rewind device,          format is: 85937 bpi 70 GB (w/comp)
```

```
nrst0a - no rewind device,      format is: 85937 bpi 70 GB (w/comp)
urst0a - unload/reload device, format is: 85937 bpi 70 GB (w/comp)
```

Troubleshooting

The logs on the IBM Nxxxx filer must be viewed through an NFS or CIFS mount point. On the IBM filer, general messages appear in `/etc/messages`.

Other

- The NDMP service is controlled by the Data ONTAP administrative interface or the following commands:

```
ndmpd on(Starts the NDMP service.)
```

```
ndmpd off(Stops the NDMP service.)
```

```
ndmpd status(Displays the status of the NDMP service including any active NDMP sessions.)
```

```
ndmpd probe session-number(Displays details about the specified session.)
```

- By default, the NDMP service is not started at boot time. To start it, add the following line to the end of the `/etc/rc` file on the IBM system:

```
ndmpd on
```

- To determine the number of objects in a volume, enter the following command:

```
maxfiles
```

Known restrictions

- The user name used with the `tpconfig` command must be defined as **root** for each data mover.
- If you eject a tape from an IBM Nxxxx-attached drive and then try to open the device, it will reload the tape. This happens when the device is still UP and the NetBackup automatic-volume-recognition daemon (`avrd`) polls it.

NEC Storage NV series

General Information

This information is provided to help you use NetBackup for NDMP with an NEC Storage NV Series file server.

For more information on the NEC Storage NV Series, refer to the following documentation:

- *NEC Storage NV Series Software - Users Guide*
- *NEC Storage NV Series Software - Maintenance Manual*

For further details, contact NEC Corporation.

Access Configuration

To enable the NDMP option Program Package (PP), use a browser to start the package installer. See the *NEC Storage NV Series Software - Maintenance Manual* for more details.

Device configuration

■ Robot

To find the robot device name, use the `telnet` command to log in to the NEC Storage NV system. Then run the following command:

```
dmesg | grep "scsi generic"
```

Example output:

```
Attached scsi generic sg0 at scsi0, channel 0, id 0, lun 0, type
8
```

The robot device is `/dev/sg0`.

■ Drives

To find the tape device names, log in to the NEC Storage NV system. Then enter the following:

```
dmesg | grep "scsi tape"
```

Example output:

```
Attached scsi tape st0 at scsi0, channel 0, id 1, lun 0
Attached scsi tape st1 at scsi0, channel 0, id 2, lun 0
```

The tape device names, to be entered on the **Add Drive** display in the NetBackup Administration Console, are `/dev/nst0` for tape drive 1 and `/dev/nst1` for tape drive 2. Always use the drive names that begin with "n" because these are the non-rewinding devices.

NetBackup configuration

The following directive must be placed at the start of the NetBackup policy's **Backup Selections** tab (file list):

```
set XFS=yes
```

This directive must be specified for all NetBackup backups of the NEC Storage NV Series, otherwise the backup will fail. Note that the `set XFS=yes` directive must be specified for both XFS and XFSFW file systems.

To use snapshots for NDMP backups, add the following directive to the file list:

```
set SANPSHOT=y
```

Troubleshooting

To enable debugging for NDMP, log in to the NEC Storage NV Series and add the following lines to the `/etc/sysconfig/ndmpd` file:

```
LOGFILE=/var/dumpfile/ndmpd  
DEBUG=yes  
LEVEL=65535
```

Debug logs are located in the `/var/dumpfile/ndmpd` directory.

Other

Known restrictions

- The NEC Storage NV Series supports the NDMP protocol version V2 only.
- The NEC Storage NV Series can back up only file systems, not subdirectories.
- Only one backup or restore can be running per file system. For example, if a backup job is currently backing up `/export/sxfs/vol1`, another attempt to back up or restore `/export/sxfs/vol1` at the same time will fail.
- A second backup of the same file system could fail if started too soon after the first backup of that file system. This is because a backup job needs time to delete the snapshot after completion of the backup. Until the snapshot is deleted, the second backup of the same file system cannot start. The same is true for restores: a restore of a file system could fail if started too soon after a previous restore of that file system.

NetApp

General Information

This information is provided to help you use NetBackup for NDMP with a NetApp Network Attached Storage (NAS) filer.

For further details, refer to the following documentation or contact NetApp.

- *Data ONTAP Command Reference Guide*
- *Data ONTAP System Administrator's Guide*
- Models
- Documentation

Device configuration

Tips for control and configuration

- For NDMP devices to share tape drives, tape reservation must be enabled in the ONTAP software on the filer and on NetBackup. You can use either SCSI persistent reservation or SCSI reservation. If you want to share tape drives, note that the drive itself must support one of these types of reservation. To enable SCSI reservation in Data ONTAP, enter either of the following at the ONTAP command line on the filer:

```
options tape.reservations scsi
options tape.reservations persistent
```

To enable SCSI reservation in the NetBackup Administration Console, go to **Host Properties > Media Servers > *double-click the media server* > Properties > Media**. Ensure that you select the same type of SCSI reservation as you set on the filer.

- In ONTAP 8.0, both ONTAP 7 mode and ONTAP 10 mode are combined into a single release. You cannot run both modes on the same filer concurrently.
- The NDMP service is controlled by means of the Data ONTAP administrative interface or the following commands:


```
ndmpd on (Starts the NDMP service)
ndmpd off (Stops the NDMP service)
ndmpd status (Displays the status of the NDMP service including any active NDMP sessions)
ndmpd probe session-number (Displays details about the specified session)
```
- By default, the NDMP service is not started at boot time. To start it, add the following line to the end of the `/etc/rc` file on the NetApp system:


```
ndmpd on
```
- To determine the number of objects in a volume, enter the following command:


```
maxfiles
```

Tips for robotic devices

- To display the robot device file, sign on to the NetApp host and enter the following command:


```
sysconfig -m
```

The device names in the output are in the format `mcN`, where `N` is 0 or higher.

Example `sysconfig` output:

```
Medium changer (6a.4) HP C6280-7000
mc0 - medium changer device
```

Tips for tape drives

- To display tape device files, sign on to the NetApp host and enter the following command:

```
sysconfig -t
```

Always use the drive names that begin with `nr` (such as `nrst0a`) because these are the non-rewinding devices.

Example `sysconfig` output:

```
Tape drive (6a.5) Quantum DLT7000
  rst0l - rewind device,          format is: 81633 bpi 40 GB (w/comp)
  nrst0l - no rewind device,      format is: 81633 bpi 40 GB (w/comp)
  urst0l - unload/reload device,  format is: 81633 bpi 40 GB (w/comp)
  rst0m - rewind device,          format is: 85937 bpi 35 GB
  nrst0m - no rewind device,      format is: 85937 bpi 35 GB
  urst0m - unload/reload device,  format is: 85937 bpi 35 GB
  rst0h - rewind device,          format is: 85937 bpi 50 GB (w/comp)
  nrst0h - no rewind device,      format is: 85937 bpi 50 GB (w/comp)
  urst0h - unload/reload device,  format is: 85937 bpi 50 GB (w/comp)
  rst0a - rewind device,          format is: 85937 bpi 70 GB (w/comp)
  nrst0a - no rewind device,      format is: 85937 bpi 70 GB (w/comp)
  urst0a - unload/reload device,  format is: 85937 bpi 70 GB (w/comp)
```

NetBackup configuration

- If you eject a tape from a NetApp-attached drive and then try to open the device, it will reload the tape. This happens when the device is still UP and the NetBackup automatic-volume-recognition daemon (`avrd`) polls it.
- Image Backup (formerly referred to as SnapMirror to Tape or SMTape) is a Data ONTAP 8.0 feature that backs up an entire volume as a single file. Before Data ONTAP 8.0, the feature was called SMTape, and it required the customer to obtain a Product Variance Request from NetApp.

Note: Because Image Backup backs up an entire volume as though it is a single file, only the entire volume can be restored, not individual files within that volume.

To enable Image Backup, enter the following environment variables in the **Backup Selections** tab (file list) of the NetBackup policy:

```
SET type = smtape
SET SMTAPE_DELETE_SNAPSHOT = Y
/volume_to_back_up
```

Explanation of the variables

- `SET type = smtape`
Specifies the image backup feature.
- `SET SMTAPE_DELETE_SNAPSHOT = Y`
Deletes the snapshot after the backup completes. A snapshot is taken of the volume before the backup is written to tape. Deleting the snapshot saves storage space.
- `/volume_to_back_up`
Specifies the volume you want to back up, such as `/vol/vol1`.

Note: This feature is not currently supported with NDMP backups from NetApp storage configured with NetBackup Replication Director.

Troubleshooting

The logs on the NetApp filer must be viewed through an NFS or CIFS mount point. On the NetApp filer, general messages appear in `/etc/messages`.

Other

Known restrictions

- The user name used with the `tpconfig` command must be defined as `root` for each data mover.
- When restoring files, if the NetApp filer does not use Direct Access Recovery (DAR), the destination path that you specify for the restore must end with the original folder and file name. If the original backup path was `/vol/vol1/mydir/myfile`, the destination path for the restore must end with `/mydir/myfile`. Otherwise, NetBackup appends `/mydir/myfile` to the end of the destination path.
For more details on DAR, and to determine whether DAR has been disabled in NetBackup, refer to the *NetBackup for NDMP Administrator's Guide*.

Using NetBackup with NetApp's Data ONTAP 8.2 cluster mode

In the Clustered Data ONTAP (cDOT) 8.2 release, NetApp released an NDMP extension called Cluster Aware Backup (CAB). This extension allows backing up a Vserver (virtual server) or storage virtual machine (SVM) as an NDMP host (client) in a NetBackup policy. It is the default in new installs of ONTAP 8.2 and beyond. In environments where a cluster is upgraded from an older version of ONTAP, or in environments running multiple ONTAP versions, the behavior is to use node

names as the NDMP host name. This is configurable using the following ONTAP command:

```
system services ndmp node-scope-mode [on|off]
```

Where *on* is Node-scope NDMP mode, and *off* is Vserver Aware NDMP mode.

ONTAP 8.2 C-mode (cluster mode) allows volumes to be moved from one node to another node in a cluster. Movement of volumes is performed to provide non-disruptive operations, high availability (failover), and resource balancing. NetApp automatically moves volumes during a failover. However, moving volumes to another node for maintenance or to provide load balancing will be performed by the NetApp storage admin.

NetBackup supports the CAB extension with the NetBackup 7.7 release. There are important considerations when configuring NetBackup to protect a NetApp Clustered Data ONTAP environment running in either node-scope NDMP mode or Vserver Aware NDMP mode.

In NetBackup, data is tracked by client name, which is the NDMP hostname that is used to access the data. In cDOT, data is associated with a Vserver and hosted on a physical node. These things need to be considered when configuring NetBackup.

Another consideration is the availability of resources from the cluster, as illustrated in [Table 19-1](#):

Table 19-1 Availability of resources from the cluster

Interface Type	Volume Visibility			Tape Drive Visibility		
	Node-scope-mode	Vserver-mode		Node-scope-mode	Vserver-mode	
		Non-CAB Aware NetBackup	CAB-Aware NetBackup		Non-CAB Aware NetBackup	CAB-Aware NetBackup
Cluster Management	N/A	All volumes on the same node as LIF	All volumes in cluster	N/A	N/A	All tape drives in cluster
Intercluster	N/A	All volumes on the same node as LIF	All volumes in cluster	N/A	N/A	All tape drives in cluster

Table 19-1 Availability of resources from the cluster (*continued*)

Interface Type	Volume Visibility			Tape Drive Visibility		
	Node-scope-mode	Vserver-mode		Node-scope-mode	Vserver-mode	
		Non-CAB Aware NetBackup	CAB-Aware NetBackup		Non-CAB Aware NetBackup	CAB-Aware NetBackup
Vserver	N/A	Volumes in Vserver and hosted on same node as LIF	All volumes in Vserver	N/A	N/A	N/A
Node Name	All volumes on node	N/A	N/A	All tape drives on node	N/A	N/A

An Intercluster LIF is very similar to a Cluster Management LIF, but needs to be configured on each node of a cluster.

Using a node name as the NDMP client name in all versions of NetBackup

With this method, node-scope-mode is enabled on the cluster, and the name of each node is provided as a client name in an NDMP policy in NetBackup.

Pros

- Volumes can be backed up to locally attached tape drives, instead of over a network connection (3-way).
- Using NetBackup 7.6 and higher, with the introduction of the `ALL_FILESYSTEMS` file list directive, it is not necessary to modify the NetBackup policy if a volume moves to another node.

Cons

- When a volume moves to another node, the moved volume and data is now tracked by that other node name in NetBackup. When performing a restore, NetBackup will display all backups from the current selected node. However, to restore data from backups taken when the volume was under a different node, you will need either to maintain a list of those prior nodes or search the other nodes in the cluster for that specific nodename and volume combination.
- Once a volume has been moved, three-way backups from the current node to the original node may occur depending on policy and storage unit configuration.
- If using a version of NetBackup before 7.6, or not using the `ALL_FILESYSTEMS` file list directive, and if a volume moves to a different node in the cluster, the

NDMP host name in the NetBackup policy must be modified to that of the node now hosting the volume, using the following command:

```
/usr/opensv/netbackup/bin/admincmd/bpplclients policy_name -rename  
old_host_name new_host_name
```

Using a data Vserver LIF as the NDMP client name in non-CAB-aware versions of NetBackup

With this method, node-scope-mode is disabled on the cluster and a data Vserver name is configured as the client name in an NDMP policy in NetBackup

Pros

- Because the NetBackup catalog tracks backups by client name, it is easier to track down data from that Vserver when restoring.
- Assuming that care has been taken if a volume moves to another node, all volumes backed up using a Vserver name will be displayed when performing a restore.

Cons

- The cDOT filer will only send data from volumes that are associated with a Vserver and are hosted on the same node as the data Vserver LIF. Therefore, if only a volume moves to another node without its corresponding LIF, it will not be backed up. This is not an error. Users will need to very carefully monitor backups to ensure that all of their data was backed up.
- If a volume moves to another node, the vsver LIF must be moved to the other node as well using the following command:

```
net int migrate -vsver <vsver_name> -lif <vsver-LIF>  
-dest-node <dest-node> -dest-port <dest-port>
```
- Because a data Vserver cannot see any tape drives attached to the cluster, every backup of a data Vserver will be a three-way backup.

Using a cluster_mgmt vsver LIF as the NDMP client name in non-CAB-aware versions of NetBackup

With this method, node-scope-mode is disabled on the cluster and a cluster_mgmt Vserver LIF name(s) are configured in an NDMP policy in NetBackup.

Pros

- A cluster_mgmt LIF can see every volume on the node, so with the proper configuration it is not necessary to change either the NetBackup policy or move a LIF if a volume moves to another node.
- This method is most like previous versions of ONTAP and non-CAB-aware versions of NetBackup.

Cons

- There is no visibility to tape drives in this configuration, so backups will still be 3-way.
- A cluster_mgmt LIF has to be created on each node for the admin vserver.
- It is still necessary to carefully track data when requesting a restore to ensure the desired data is restored.

Using a cluster_mgmt Vserver LIF as the NDMP client name in CAB-aware versions of NetBackup

With this method, node-scope-mode is disabled on the cluster and a cluster_mgmt Vserver name is configured in an NDMP policy in NetBackup.

All volumes and all attached tape drives will be available through a single interface on the cluster.

Regardless of where a volume is located on the cluster a backup of that volume will be directed to a tape drive (if available) attached to the same node, resulting in a performance improvement

Nexenta

General Information

This information is provided to help you use NetBackup for NDMP with a NexentaStor system.

For further details, contact Nexenta.

Access Configuration

To enable NDMP

- 1 Log in to **Nexenta Management View**.
- 2 Go to **Settings > Misc. Services > NDMP Server**.
- 3 Enable NDMP service.

Troubleshooting

- To enable debugging, edit the `/lib/svc/method/svc-ndmp` file in line 43 to add `-d`. For example:

```
/usr/lib/ndmp/ndmpd -d 2>&1 &
```
- The NDMP logs can be found at `/var/log/ndmp` on each node.
- To monitor system status from the **Nexenta Management View**, go to **Alerts** to view alert activity.

Other

To enable NDMP DAR

- 1 Connect to the Nexenta host with a secure shell (SSH).
- 2 Run `!bash`.
- 3 Enter the following command:

```
ndmpadm set dar-support=yes
```
- 4 To verify the NDMP properties, run the following command:

```
ndmpadm get
```

In 4.0, DAR can also be enabled from the NDMP Configuration page of the user interface.

To enable NDMP DAR from the Nexenta Management View (4.0 only)

- 1 Log in to **Nexenta Management View**.
- 2 Go to **Settings > Misc. Services > NDMP Server > Configure**.
- 3 Select the DAR support option.

Nexsan

General Information

This information is provided to help you use NetBackup for NDMP with a Nexsan system.

For further details, contact Imation.

Access Configuration

To enable NDMP and set the user name and password

- 1 Log in to the Nexsan administration console.

Note: The Nexsan administration console requires Adobe Flash.

- 2 Click the system name on the top of the window, then expand the options pane by clicking the arrows in the bottom right of the window.
- 3 In the options pane, click on the **NDMP** tab
- 4 Click **Enable NDMP**.

- 5 Set the user name and password
- 6 Click **Apply**.

Troubleshooting

To enable debugging for NDMP

- 1 Log in to the Nexsan system.
- 2 Run the following command:

```
nstndmp set debug-enable=true
```

Logs can be viewed in the Nexsan administration console, under **System Events > View**.

Oracle Axiom Series

General Information

This information is provided to help you use NetBackup for NDMP with the Axiom system from .

For further details on the Axiom storage system, consult the Oracle website:

<http://www.oracle.com/us/corporate/Acquisitions/pillardata/index.html>

Access Configuration

NDMP settings should be checked on the Oracle Axiom system and verified to correspond to the NetBackup defined configuration. From the Axiom Storage Manager GUI, navigate to **Data Protection > NDMP Backup Settings > Modify NDMP Backup Settings**. This location also turns the NDMP port on and off on the Axiom system.

Device configuration

To manually detect locally attached tape devices on the Axiom system, use the Axiom Storage Manager GUI to navigate to **Data Protection > Tape Devices**, and then select **Check for Tape Devices** from the **Actions** pull-down menu in the middle of the window.

Troubleshooting

To access Axiom system logs

- 1 Log on to the Axiom Storage Manager GUI.
- 2 Click the **Support** button and then select **Collect System Information** under the **Tools** menu on the left.

- 3 From the **Actions** pull-down menu in the bottom-middle of the window, select **Collect System Information**.
- 4 Select the desired items from the **Collection Scope** list. Collecting system information can take several minutes depending on the items selected.
- 5 After collection of system information completes, select **Download Information to Client** from the **Actions** pull-down menu and select the location to save the System Information. (It will be a tar file.)

Oracle Solaris Server

General Information

This information is provided to help you use NetBackup for NDMP with an Oracle Solaris NDMP server.

For further details, contact Oracle.

Pre-requisites

To install the server software on any Solaris 11 server:

```
pkg install service/storage/ndmp
```

To allow control of locally-attached tape libraries, configure the sgen driver:

```
update_drv -a -I "scsiclass,08" sgen  
reboot
```

Note: It is not recommended to run NetBackup on the same machine. NetBackup Tape Library control cannot run in conjunction with Solaris Tape Library control.

Service Configuration

To display the existing configuration:

```
ndmpadm get
```

The username and password for NDMP access is set when the service is enabled:

```
ndmpadm enable -a cram-md5 -u <username>
```

Enable DAR:

```
ndmpadm set dar-support=yes
```

Enable BSD-style drive access:

```
ndmpadm set drive-type=bsd
```

Configure volumes for NDMP export:

```
ndmpadm set fs-export=<path1>,[<path2>, etc.]
```

To start/stop the NDMP service:

```
svcadm [enable|disable] ndmpd
```

Troubleshooting

To display where the service logs:

```
# svcs -l ndmpd
fmri          svc:/system/ndmpd:default
name          NDMP Service
enabled       true
state         online
next_state    none
state_time    May 13, 2015 12:54:07 PM CDT
logfile       /var/svc/log/system-ndmpd:default.log
restarter     svc:/system/svc/restarter:default
contract_id   123
manifest      /lib/svc/manifest/system/ndmp.xml
dependency    require_all/error svc:/milestone/self-assembly-complete
              (online)
```

Other

If you specify an incorrect path name in the NetBackup policy's Backup Selections list (file list), the entire backup fails with status code 99, "NDMP backup failure."

Stratus V Series

General Information

This information is provided to help you use NetBackup for NDMP with a Stratus V Series system.

For further details on the Stratus V Series system, contact Stratus Technologies.

NetBackup configuration

The following directives must be placed at the start of the NetBackup policy's **Backup Selections** tab (file list):

```
SET TYPE=save
SET SAVE_OPTIONS='-backup'
```

To learn more about the additional directives available for the Stratus V Series, see the Stratus V Series documentation.

Troubleshooting

The Stratus VOS Enterprise Backup Agent creates the following log files. All are stored on the Status system in the `>system>ndmpd>log` directory:

- `ndmpd_log.YY_MM_DD.out`
- `save.YY_MM_DD.hh_mm_ss.process_id`
- `macro.YY_MM_DD.hh_mm_ss.process_id`

For more information about these files, refer to "Log Files" in the VOS Enterprise Backup Agent online documentation.

Other

Known restrictions

- The Stratus V Series does not support directory names greater than 32 characters. The limitation for files names is 255 characters.
- The Stratus V Series does not support CIFS or NFS for file system access. To access the Stratus file system, you must use SAMBA. To learn more about file system access to the Stratus V Series, refer to your Stratus documentation.
- The Stratus V Series uses its own operating system called VOS. To access the VOS operating system directly, you must use a terminal emulator such as TTWIN 3.
- The Stratus V Series supports the NDMP version 3 protocol only.

Backup and restore procedures

This chapter includes the following topics:

- [Performing a manual backup with an NDMP policy](#)
- [Perform an NDMP restore](#)

Performing a manual backup with an NDMP policy

The following procedures explain how the NetBackup administrator can perform the backup manually. Only a NetBackup administrator can initiate an NDMP backup. In the NetBackup Web UI, a user must have the **Administrator** role.

Perform a manual backup of NDMP (NetBackup Web UI)

To perform a manual backup of NDMP with the Web UI

- 1 On the primary server, open the NetBackup Web UI.
- 2 On the right, open **Protection > Policies**.
- 3 Locate and select the NDMP policy. Then click **Manual Backup**.
- 4 Select a schedule and then select the clients that you want to back up.

If you do not select any schedules, NetBackup uses the schedule with the highest retention level. If you do not select any clients, NetBackup backs up all configured NDMP hosts.

- 5 Click **OK** to start the backup.

Perform an NDMP restore

An administrator can perform a restore as follows:

- With the NetBackup Web UI, from the primary server.
- With the **Backup, Archive, and Restore** interface from a NetBackup primary server or media server.

NetBackup administrators can restore files to the original NDMP host or to a different NDMP host.

Note: User-directed restores of files are not allowed, because no NetBackup client software is installed on an NDMP host.

Restore NDMP (NetBackup Web UI)

To restore NDMP with the NetBackup Web UI

- 1 On the primary server, open the NetBackup Web UI.
- 2 On the left, select **Recovery**.
- 3 On the **Regular recovery** card, click **Start recovery**.
- 4 Select the following information and click **Next**.

Policy type	NDMP
Source client	Select the appropriate NDMP (NAS) host.
Destination client	Select the appropriate NDMP (NAS) host. The destination host must be an NDMP host that is compatible with the data format of the source. (The source and destination must be of the same NAS vendor type.)

- 5 NetBackup automatically displays the most recent backup. To select a different date range, click **Edit**.
- 6 Select the files or folders that you want to restore. Then click **Next**.
- 7 Select the recovery options that you want for the restore. Then click **Next**.

Warning: An NDMP restore always overwrites existing files.

Restore NDMP (Backup, Archive, and Restore interface)

To restore NDMP with the BAR interface

- 1 In the **Backup, Archive, and Restore** interface on a NetBackup server, click **Actions > Specify NetBackup Machines and Policy Type**.

- 2 For the server, select the NetBackup primary server.

If your configuration has multiple primary servers, specify the primary server that has the policy for the NDMP host that you plan to restore. If the server name is not in the pull-down list, use **Edit Server List** to add it.

- 3 For the source clients and destination clients, select the appropriate NDMP (NAS) hosts.

The destination host must be an NDMP host compatible with the data format of the source. (The source and destination must be of the same NAS vendor type.)

Warning: An NDMP restore always overwrites existing files.

If the hosts that you want are not available in the pull-down menu, use **Edit Client List** to add the client.

- 4 In the policy type field, select **NDMP**.

Troubleshooting

This chapter includes the following topics:

- [About NetBackup for NDMP logs](#)
- [General NetBackup for NDMP operating notes and restrictions](#)
- [NetBackup for NDMP troubleshooting suggestions](#)
- [About robot tests](#)

About NetBackup for NDMP logs

NetBackup uses two types of logging, unified logging and legacy logging. Both logging types are described in the "Using Logs and Reports" topic in the [NetBackup Troubleshooting Guide](#).

Note the following:

- All unified logs are written to `/usr/opensv/logs` (UNIX) or `install_path\logs` (Windows). Unlike legacy logging, you do not need to create logging directories.
- Use the `vxlogview` command to examine unified logs:
See "[Viewing NetBackup for NDMP logs](#)" on page 187.
On UNIX: `/usr/opensv/netbackup/bin/vxlogview`
On Windows: `install_path\NetBackup\bin\vxlogview`
Refer to the [NetBackup Troubleshooting Guide](#) for assistance in using the `vxlogview` command.
See also the `vxlogview` man page or the [NetBackup Commands Guide](#).

Viewing NetBackup for NDMP logs

The following procedure describes how to view NetBackup logs.

Note: The legacy and unified logging files can consume a lot of disk space. Delete the log files when you are finished and set logging to a lower level of detail.

To view the NetBackup logs

- 1 In the **NetBackup web UI**, select **Host > Host properties**.
- 2 Select **Logging** and set the **Global logging level** to 5.
- 3 Click **Apply** and then **OK**.
- 4 View the unified logging information in `/usr/opensv/logs` (UNIX) or `install_path\logs` (Windows) for the following processes:
 - `ndmpagent` (originator ID 134)
 - `ndmp` (originator ID 151)
 - `nbpem` (originator ID 116)
 - `nbjm` (originator ID 117)
 - `nbrb` (originator ID 118)
- 5 For `ndmpagent` logs, try the `vxlogview` command as follows:


```
/usr/opensv/netbackup/bin/vxlogview -I ndmpagent -d T,s,x,p
```
- 6 For `ndmp` logs, try the `vxlogview` command as follows:


```
/usr/opensv/netbackup/bin/vxlogview -I ndmp -d T,s,x,p
```
- 7 On the NetBackup for NDMP server, create `bptm`, and `bpbrm` legacy debug log folders in the `/usr/opensv/netbackup/logs` directory (UNIX) or `install_path\NetBackup\logs` folder (Windows):
 - `bpbrm`
 - `bpfis`
 - `bpmount`
 - `bptm`
 - `bppfi`

NetBackup writes legacy log files in these directories, if the directories exist.

NDMP backup levels

At the start of a debug log, you may see an entry titled `LEVEL`. This entry refers to an environment variable that NetBackup set based on the type of backup. Here is an example from a `bptm` log:

```
08:48:38.816 [22923] <2> write_data_ndmp: backup environment
values:
08:48:38.816 [22923] <2> write_data_ndmp: Environment 1:
TYPE=dump
08:48:38.816 [22923] <2> write_data_ndmp: Environment 2:
FILESYSTEM=/vol/vol0/2million
08:48:38.817 [22923] <2> write_data_ndmp: Environment 3:
PREFIX=/vol/vol0/2million
08:48:38.817 [22923] <2> write_data_ndmp: Environment 4: LEVEL=0
```

The NDMP backup level is modeled after UNIX dump levels. The backup level is a number in the range of 0 to 9.

An NDMP backup level of 0 is a full backup. A backup level greater than 0 is an incremental backup of all objects that were modified since the last backup of a lower level. For example, level 1 is a backup of all objects that were modified since the full backup (level 0). Level 3 is a backup of all objects that were modified since the last level 2 incremental.

Table 21-1 NetBackup backup types and corresponding NDMP backup levels

NetBackup backup types	NDMP backup levels
NetBackup Full	NDMP level 0
NetBackup Cumulative Incremental	NDMP level 1
NetBackup Differential Incremental	NDMP level (last level + 1, up to 9) See “About NAS appliances support” on page 152. for valid level values for your device. Some vendors support level values that are greater than 9..

More information is available on environment variables.

See [“About environment variables in the backup selections list”](#) on page 117.

General NetBackup for NDMP operating notes and restrictions

Before you try to troubleshoot a suspected problem, review the following operating notes:

- A tape that was created on an NDMP storage unit is in backup format. It cannot be restored from a non-NDMP storage unit. If you duplicate an NDMP backup image, the new copy is still in backup format. It cannot be used for restores on a non-NDMP storage unit.
- In the backup selections list for an NDMP policy, you can include only directory paths. Individual file names are not allowed. Wildcard characters are allowed in backup selections, though some limitations apply to some filers. More information about wildcards in NDMP backup selections is available:
See [“Wildcard characters in backup selections for an NDMP policy”](#) on page 112.
- In a NetBackup NDMP policy, you cannot include a path in the file list that is more than 1024 characters long. This limitation may be further restricted for certain vendors. See [“About NAS appliances support”](#) on page 152. for path name length information for specific filers.
- Observe the following restrictions to the use of the `ALL_FILESYSTEM` directive and the `VOLUME_EXCLUDE_LIST` directive:
 - A `VOLUME_EXCLUDE_LIST` statement may include a maximum of 256 characters. Create multiple `VOLUME_EXCLUDE_LIST` statements if necessary to avoid exceeding the limit of 256 characters. If you specify more than 256 characters, the volume list is truncated. A truncated statement may result in a backup job failure, and the error message `Invalid command parameter(20)` is displayed. `VOLUME_EXCLUDE_LIST` applies only to `ALL_FILESYSTEMS`. It does not apply to explicit backup selections or wildcard-based backup selections.
 - With NetBackup Replication Director, if the backup selection includes read-only volumes or full volumes, an NDMP backup job fails with the status code 20 (`Invalid command parameter(20)`). If you encounter a similar NDMP backup job error, review the `ostfi` logs to identify the volumes for which the failure occurred. You can use `VOLUME_EXCLUDE_LIST` statements with the `ALL_FILESYSTEMS` statement to exclude the read-only volumes and the volumes with insufficient space.

Note: This restriction applies only to NetBackup Replication Director environments.

More information about these directives is available:

See [“ALL_FILESYSTEMS and VOLUME_EXCLUDE_LIST directives”](#) on page 115.

- The NDMP protocol uses port 10000 for communication.
- On UNIX systems, the NetBackup `avrd` process uses Internet Control Message Protocol (ICMP) to ping NDMP hosts to verify network connectivity. This protocol is required for the NetBackup for NDMP product.
- If backup jobs or restore jobs are running slowly, verify that the network interface cards (NIC) are set to full duplex. Half-duplex often causes poor performance. For assistance viewing and resetting duplex mode for a particular NAS host, consult the documentation that the manufacturer provides. You may be able to use the `ifconfig` (or `ipconfig`) command, as explained in the [NetBackup Troubleshooting Guide](#).
- Do not perform incremental backups of the same NDMP data from two different policies. Incremental backups performed by one of the policies may be incomplete, because NDMP filers perform level-based incremental backups instead of time-based incremental backups. Consider the following example:

Policy A performs a full backup of `/vol/vol1` (level 0).

Policy B then performs a full backup of `/vol/vol1` (level 0). The filer now considers the policy B backup to be the last full (level 0) backup of `/vol/vol1`.

Policy A performs an incremental backup of `/vol/vol1` (level 1). The policy A incremental backup captures only the data that changed since the full backup that was done by policy B. The incremental backup misses any changes that occurred between the policy A full backup and the policy B full backup.

- NDMP restore jobs may complete successfully even though no data (0 KB) has been restored. This situation can occur when a target volume does not have enough space for an image you are trying to restore.
 - Workaround: Check the restore job details for entries similar to the following messages:

```
mm/dd/yyyy hh:mm:ss PM - Info ndmpagent(pid=11071) fas2050c1: RESTORE: We recommend that 19
inodes and 907620 kbytes of disk space be available on the target volume order to restore
this dump. You have 466260 inodes and 5316 kbytes of disk space on volume /vol/abc_15gb
mm/dd/yyyy hh:mm:ss PM - Info ndmpagent(pid=11071) fas2050c1: RESTORE: This restore will
proceed, but may fail when it runs out of inodes and/or disk space on this volume.
```

Confirm that the target volume does not have enough space for the restore image. If it does not, either free up enough space on the volume to complete the restore job successfully or specify a different restore volume.

NetBackup for NDMP troubleshooting suggestions

Try the following troubleshooting suggestions:

- Check the NetBackup All Log Entries report for information about the failed job.
- To verify that the appropriate services are running, use one of the following: the NetBackup Activity Monitor, the Windows control panel (on Windows systems), or the `bpps` command (UNIX systems).
- If NDMP host backups terminate with a status code of 154 (storage unit characteristics mismatch requests), the problem may be one of the following:
 - Verify that the NetBackup configuration is correct.
 - There may be a conflict between the policy type and storage unit type. (For example, if the policy type is Standard and the storage unit is of type NDMP.)
- If your NDMP backup fails with a status code of 99 (NDMP backup failure), no paths in your NDMP policy backup selections list were backed up. Check the NetBackup All Log Entries report for more information. A possible cause of this status is that none of the backup paths exist on the NDMP host.
 For more information about status code 99 and NDMP backup failures, refer to the following tech note:
<http://www.veritas.com/docs/000081335>
- NetBackup does not support client-side deduplication of NDMP hosts. The backup jobs fail if you try to use client-side deduplication for NDMP hosts.

Troubleshooting NDMP media and devices on Windows

To troubleshoot media and devices on Windows, try the following:

- For legacy logging, enable debug logging by creating `reqlib` and `daemon` directories in the `install_path\Volmgr\debug` directory on the NetBackup for NDMP server.
- Check the Windows Event Viewer Application log for troubleshooting clues.
 For more information on the **Event Viewer logging** option, refer to the [NetBackup Troubleshooting Guide](#).
- Use the **Activity Monitor** utility or the Windows control panel to verify that the **Media and Device Management** utilities are running.

- Drives can be unexpectedly set to the DOWN state.
 This action is due to communication problems between `avrd` on the NetBackup for NDMP server and the NDMP server application on the NDMP host. Some possible causes for the communication problems are:
 - Network cable on the NDMP host was unplugged.
 - NIS (Network Information System) problems on the NetBackup for NDMP server (NDMP client).
 - The NDMP host was halted for too long.

Note: Whatever the cause, if the `avrd` connection to the NDMP host fails, the drive is set to DOWN. It is not automatically set to UP when the communication problem is corrected.

Troubleshooting NDMP media and devices on UNIX

To troubleshoot media and devices on UNIX, try the following:

- Ensure that the `syslogd` logs debug messages relating to `ltid` and other device processes.
 For more information on `syslogd`, refer to the [NetBackup Troubleshooting Guide](#).
- Start `ltid` with the `-v` option. Check the system's syslog for troubleshooting clues.
- Use `vmops` to make sure that the appropriate daemons are running.
- Drives can be unexpectedly set to the DOWN state. This action is due to communication problems between `avrd` on the NetBackup for NDMP server and the NDMP server application on the NDMP host.
 Further details are available.
 See "[Troubleshooting NDMP media and devices on Windows](#)" on page 192.

Troubleshooting NDMP DirectCopy

When NetBackup enables NDMP DirectCopy for a backup image duplication, the NetBackup progress log includes the message "NDMP DirectCopy should be used." If NDMP DirectCopy was not enabled for the duplication, no specific messages about NDMP DirectCopy are listed in the progress log. For detailed messages (such as why NDMP DirectCopy was not used), consult the legacy debug logs for the admin log or the `bptm` log.

Refer to the [NetBackup Troubleshooting Guide](#) for information on legacy NetBackup logs.

Troubleshooting Direct Access Recovery (DAR) with NetBackup for NDMP

Note the following points when using Direct Access Recovery (DAR):

- DAR can be used when restoring NetBackup 4.5 or later backups. Starting with NetBackup 4.5, NetBackup stores the required DAR offset information on each backup.
- Backups must have been performed with the NetBackup catalog set to binary mode. If backups were made with the catalog set to ASCII mode, restores cannot use DAR. ASCII mode did not store the required DAR offset information on each backup. Note that all backups that were made before NetBackup 4.5 used ASCII catalog mode.

Note: Starting with NetBackup 6.0, all backups are in binary mode.

- To use DAR with NetBackup, the NDMP host you want to restore must support DAR. Some NDMP host vendors do not currently support DAR.

The following table lists the messages that may appear in the unified logs for `ndmpagent` (originator ID 134) on the NetBackup media server. These messages are also written to the progress log.

Table 21-2 DAR log messages

Message	Explanation
Data host does not support DAR recovery	The current NDMP host does not support DAR.
DAR disabled—continuing restore without DAR	DAR information is not available for the file.
DAR disabled—backup was performed before NB 4.5	The DAR feature can be used to restore the backups that NetBackup 4.5GA or later made. Starting with NetBackup 4.5GA, NetBackup stores the required DAR offset information on each backup. For pre-4.5GA NetBackup backups, restores cannot use DAR because the pre-4.5 versions did not store DAR offset information.
DAR disabled—NDMP host did not provide DAR info during backup	The backup was performed with an NDMP host version that does not support DAR. Ask the NDMP host vendor if a later NAS software version is available that supports DAR.

Table 21-2 DAR log messages (*continued*)

Message	Explanation
DAR disabled—Exceeded optimal DAR parameters for this image size	NetBackup determined that the restore would take longer with DAR than without it.
DAR disabled—Directory DAR not supported	DAR is automatically disabled when a restore job specifies a directory to restore. DAR can be used to restore files, but not to restoring directories.
DAR disabled by host parameters	DAR was disabled on the Master or Media Server Properties dialog box. See “About enabling or disabling DAR” on page 120.

About robot tests

Depending on the type of robot, use the tests in the following table to exercise the robot.

Table 21-3 Robot types and tests

Robot type	Test
TLD	tldtest
ACS	acstest

TLD robot test example for UNIX

To exercise drive 1 in the TLD robot `c2t3l0` the NDMP host `stripes` controls, use the following commands on UNIX:

```
/usr/opensv/volmgr/bin/tldtest -r stripes:c2t3l0 -d1 stripes:/dev/RMT/Ocbr
```

At the prompt, enter `?` for help information.

`inquiry` (Displays the Vendor ID and Product ID. If you get a UNIT ATTENTION message, try the `mode` command and then continue your testing.)

`s s` (Checks slot status.)

`s d` (Checks drive status.)

`m s3 d1` (Moves a tape from slot 3 to drive 1.)

`unload d1` (Unloads the tape.)

m d1 s3 (Moves the tape back to slot 3.)

Using NetBackup for NDMP scripts

This chapter includes the following topics:

- [About the NetBackup for NDMP scripts](#)
- [ndmp_start_notify script \(UNIX\)](#)
- [ndmp_start_notify.cmd script \(Microsoft Windows\)](#)
- [ndmp_end_notify script \(UNIX\)](#)
- [ndmp_end_notify.cmd script \(Microsoft Windows\)](#)
- [ndmp_start_path_notify script \(UNIX\)](#)
- [ndmp_start_path_notify.cmd script \(Microsoft Windows\)](#)
- [ndmp_end_path_notify script \(UNIX\)](#)
- [ndmp_end_path_notify.cmd script \(Microsoft Windows\)](#)
- [ndmp_moving_path_notify script \(UNIX\)](#)
- [ndmp_moving_path_notify.cmd script \(Microsoft Windows\)](#)

About the NetBackup for NDMP scripts

This topic provides information that you can use to customize the NDMP-specific notification scripts.

NetBackup for NDMP provides the following scripts (commands on Windows) for collecting information and providing notification of events.

Table 22-1 Scripts to run on the NetBackup for NDMP server

Scripts for UNIX	Scripts for Windows
ndmp_start_notify	ndmp_start_notify.cmd
ndmp_end_notify	ndmp_end_notify.cmd
ndmp_start_path_notify	ndmp_start_path_notify.cmd
ndmp_end_path_notify	ndmp_end_path_notify.cmd
ndmp_moving_path_notify	ndmp_moving_path_notify.cmd

The scripts are similar to those already included in your NetBackup server installation. To create the scripts on UNIX, copy the `bpstart_notify` and `bpend_notify` scripts from

```
/usr/opensv/netbackup/bin/goodies (UNIX)
```

to

```
/usr/opensv/netbackup/bin
```

on the NetBackup for NDMP server. Then rename the copied scripts and modify as needed.

On Windows, you must create the scripts from scratch.

ndmp_start_notify script (UNIX)

The UNIX scripts are provided as examples only. You must customize the scripts before using them. For example, the `-ne` value in the first `if` statement must be modified to reflect the number of passed parameters. For the `ndmp_start_notify` script, the `-ne` value must be set to 7.

On the UNIX media server, NetBackup calls the `ndmp_start_notify` script each time the client starts a backup operation. To use this script, create a script similar to

```
/usr/opensv/netbackup/bin/goodies/bpstart_notify
```

on the server, and copy it to

```
/usr/opensv/netbackup/bin/ndmp_start_notify
```

on the UNIX NetBackup for NDMP server. Then, modify the script and ensure that you have permission to run it.

Note: Before you use this script, make sure that you can run it by using `other` on the media server. Run `chmod 755 script_name`, where *script_name* is the name of the script.

The `ndmp_start_notify` script runs each time a backup starts and after the tape has been positioned. This script must exit with a status of 0 for the calling program to continue and for the backup to proceed. A nonzero status causes the client backup to exit with a status of `ndmp_start_notify failed`.

If the `/usr/opensv/netbackup/bin/ndmp_start_notify` script exists, it runs in the foreground. The `bptm` process that is on the NetBackup for NDMP server waits for it to complete before continuing. Any commands in the script that do not end with an `&` character run serially.

The server expects the client to respond with a `continue` message within the period of time that the NetBackup `CLIENT_READ_TIMEOUT` option on the server specifies.

The default for `CLIENT_READ_TIMEOUT` is 300. If the script needs more time than 300 seconds, increase the value to allow more time.

NetBackup passes the following parameters to the script:

Table 22-2 Script parameters for `ndmp_start_notify` (UNIX)

Parameter	Description
\$1	Specifies the name of the NDMP host.
\$2	Specifies the policy name from the NetBackup catalog.
\$3	Specifies the schedule name from the NetBackup catalog.
\$4	Specifies one of the following: FULL INCR (differential incremental) CINC (cumulative incremental)
\$5	Specifies the NetBackup status code for the operation.

For example:

```
ndmp_start_notify freddie cd4000s fulls FULL 0
ndmp_start_notify danr cd4000s incrementals INCR 0
ndmp_start_notify hare cd4000s fulls FULL 0
```

To create an `ndmp_start_notify` script for a specific policy or policy and schedule combination, create script files with a `.polycname` or `.polycname.schedulename` suffix. In the following two examples of script names, the policy is named `production` and the schedule is named `fulls`:

```
/usr/opensv/netbackup/bin/ndmp_start_notify.production  
/usr/opensv/netbackup/bin/ndmp_start_notify.production.fulls
```

The first script affects all scheduled backups in the policy that is named `production`. The second script affects scheduled backups in the policy that is named `production` only when the schedule is named `fulls`.

Note: For a given backup, NetBackup uses only one `ndmp_start_notify` script and that is the one with the most specific name. For example, if there are both `ndmp_start_notify.production` and `ndmp_start_notify.production.fulls` scripts, NetBackup uses only `ndmp_start_notify.production.fulls`.

The `ndmp_start_notify` script can use the following environment variables:

```
BACKUPID  
UNIXBACKUPTIME  
BACKUPTIME
```

The NetBackup `bptm` process creates these variables. The following are examples of the strings that are available to the script for use in recording information about a backup:

```
BACKUPID=freddie_0857340526  
UNIXBACKUPTIME=0857340526  
BACKUPTIME=Sun Mar 2 16:08:46 1997
```

ndmp_start_notify.cmd script (Microsoft Windows)

When you use Windows NetBackup for NDMP media servers, you can create the batch scripts that provide notification whenever the client starts a backup. These scripts must reside on the media server in the following directory:

```
install_path\NetBackup\bin
```

where `install_path` is the directory where NetBackup is installed.

You can create `ndmp_start_notify` scripts that provide notification for all backups or only for backups of a specific policy or schedule. The `ndmp_start_notify` script runs each time a backup starts and after the tape is positioned.

To create a script that applies to all backups, name the script:

```
install_path\netbackup\bin\ndmp_start_notify.cmd
```

To create an `ndmp_start_notify` script that applies only to a specific policy or policy and schedule combination, add a `.policyname` or `.policyname.schedulename` suffix to the script name. The following are two examples:

- The following script applies only to a policy named `days`:

```
install_path\netbackup\bin\ndmp_start_notify.days.cmd
```

- The following script applies only to a schedule that is named `fulls`, which is in a policy named `days`:

```
install_path\netbackup\bin\ndmp_start_notify.days.fulls.cmd
```

The first script affects the scheduled backups in the policy named `days`. The second script affects the scheduled backups in the policy named `days` only when the schedule is named `fulls`.

For a given backup, NetBackup calls only one `ndmp_start_notify` script and checks for them in the following order:

```
ndmp_start_notify.policy.schedule.cmd
ndmp_start_notify.policy.cmd
ndmp_start_notify.cmd
```

For example, if there are both `ndmp_start_notify.policy.cmd` and `ndmp_start_notify.policy.schedule.cmd` scripts, NetBackup uses only the `ndmp_start_notify.policy.schedule.cmd` script.

Note: If you also use `ndmp_end_notify` scripts, they can provide a different level of notification than the `ndmp_start_notify` scripts. For example, if you had one of each, they could be `ndmp_start_notify.policy.cmd` and `ndmp_end_notify.policy.schedule.cmd`.

When the backup starts, NetBackup passes the following parameters to the script:

Table 22-3 Script parameters for `ndmp_start_notify.cmd` (Microsoft Windows)

Parameter	Description
%1	Specifies the name of the client from the NetBackup catalog.

Table 22-3 Script parameters for ndmp_start_notify.cmd (Microsoft Windows)
(continued)

Parameter	Description
%2	Specifies the policy name from the NetBackup catalog.
%3	Specifies the schedule name from the NetBackup catalog.
%4	Specifies one of the following: FULL INCR CINC
%5	Specifies the status of the operation is always 0 for bpstart_notify.
%6	Specifies the results file that NetBackup checks for a return code from the script. NetBackup uses %6 to pass the file name and then expects the script to create the file in the same directory as the script. If the script applies to a specific policy and schedule, the results file must be named <i>install_path\netbackup\bin\NDMP_START_NOTIFY_RES.policy.schedule</i> If the script applies to a specific policy, the results file must be named <i>install_path\NetBackup\bin\NDMP_START_NOTIFY_RES.policy</i> If the script applies to all backups, the results file must be named <i>install_path\NetBackup\bin\NDMP_START_NOTIFY_RES</i> An <code>echo 0> %6</code> statement is one way for the script to create the file. NetBackup deletes the existing results file before it calls the script. After the script runs, NetBackup checks the new results file for the status. The status must be 0 for the script to be considered successful. If the results file does not exist, NetBackup assumes that the script was successful.

The server expects the client to respond with a `continue` message within the period of time that the NetBackup `CLIENT_READ_TIMEOUT` option on the server specifies. The default is 300 seconds. If the script needs more than 300 seconds, increase the value to allow more time.

ndmp_end_notify script (UNIX)

The `ndmp_end_notify` script is run at the end of the backup. The backup does not wait for the script to complete.

Note: Before you use this script, make sure you can run it by using `other` on the media server. Run `chmod 755 script_name`, where *script_name* is the name of the script.

The UNIX scripts are provided as examples only. You must customize the scripts before using them. For example, the `-ne` value in the first if statement must be modified to reflect the number of passed parameters. For the `ndmp_end_notify` script, the `-ne` value must be set to 7.

For a UNIX media server, if you need notification whenever the NDMP host completes a backup, copy

```
/usr/opensv/netbackup/bin/goodies/bpend_notify
```

from the server, to

```
/usr/opensv/netbackup/bin/ndmp_end_notify
```

on the UNIX NetBackup for NDMP host. Then, modify the script and ensure that you have permission to run it.

The `ndmp_end_notify` script runs each time a backup completes.

NetBackup passes the following parameters to the `ndmp_end_notify` script:

Table 22-4 Script parameters for `ndmp_end_notify` (UNIX)

Parameter	Description
\$1	Specifies the name of the client from the NetBackup catalog.
\$2	Specifies the policy name from the NetBackup catalog.
\$3	Specifies the schedule name from the NetBackup catalog.
\$4	Specifies one of the following: FULL INCR (differential incremental) CINC (cumulative incremental)
\$5	Specifies the exit code from <code>bptm</code> .

For example:

```
ndmp_end_notify freddie cd4000s fulls FULL 0  
ndmp_end_notify danr cd4000s incrementals INCR 73
```

To create an `ndmp_end_notify` script for a specific policy or policy and schedule combination, create script files with a `.policyname` or `.policyname.schedulename` suffix. In the following two examples of script names, the policy is named `production` and the schedule is named `fulls`:

```
/usr/opensv/netbackup/bin/ndmp_end_notify.production  
/usr/opensv/netbackup/bin/ndmp_end_notify.production.fulls
```

The first script affects all scheduled backups in the policy that is named `production`. The second script affects scheduled backups in the policy that is named `production` only when the schedule is named `fulls`.

Note: For a given backup, NetBackup uses only one `ndmp_end_notify` script and that is the one with the most specific name. For example, if there are both `ndmp_end_notify.production` and `ndmp_end_notify.production.fulls` scripts, NetBackup uses only `ndmp_end_notify.production.fulls`.

The `ndmp_end_notify` script can use the following environment variables:

```
BACKUPID  
UNIXBACKUPTIME  
BACKUPTIME
```

The NetBackup `bptm` process creates these variables. The following are examples of the strings that are available to the script for use in recording information about a backup:

```
BACKUPID=freddie_0857340526  
UNIXBACKUPTIME=0857340526  
BACKUPTIME=Sun Mar 2 16:08:46 1997
```

ndmp_end_notify.cmd script (Microsoft Windows)

For Windows media servers, you can create the batch scripts that provide notification whenever the client completes a backup. These scripts must reside on the media server in the same directory as the NetBackup binaries:

```
install_path\NetBackup\bin
```

where *install_path* is the directory where NetBackup is installed.

You can create `ndmp_end_notify` scripts that provide notification for all backups or only for backups of a specific policy or schedule.

To create an `ndmp_end_notify` script that applies to all backups, name the script:

```
install_path\netbackup\bin\ndmp_end_notify.cmd
```

To create a script that applies only to a specific policy or policy and schedule combination, add a `.policyname` or `.policyname.schedulename` suffix to the script name. The following are two examples:

- The following script applies only to a policy named `days`:

```
install_path\netbackup\bin\ndmp_end_notify.days.cmd
```

- The following script applies only to a schedule that is named `fulls`, which is in a policy named `days`:

```
install_path\netbackup\bin\ndmp_end_notify.days.fulls.cmd
```

The first script affects all scheduled backups in the policy named `days`. The second script affects scheduled backups in the policy named `days` only when the schedule is named `fulls`.

For a given backup, NetBackup calls only one `ndmp_end_notify` script and checks for them in the following order:

```
ndmp_end_notify.policy.schedule.cmd  
ndmp_end_notify.policy.cmd  
ndmp_end_notify.cmd
```

For example, if there are both `ndmp_end_notify.policy.cmd` and `ndmp_end_notify.policy.schedule.cmd` scripts, NetBackup uses only `ndmp_end_notify.policy.schedule.cmd`.

Note: If you also use `ndmp_start_notify` scripts, they can provide a different level of notification than the `ndmp_end_notify` scripts. For example, if you had one of each, they could be `ndmp_start_notify.policy.cmd` and `ndmp_end_notify.policy.schedule.cmd`.

When the backup completes, NetBackup passes the following parameters to the script:

Table 22-5 Script parameters for `ndmp_end_notify.cmd` (Microsoft Windows)

Parameter	Description
%1	Specifies the name of the client from the NetBackup catalog.
%2	Specifies the policy name from the NetBackup catalog.

Table 22-5 Script parameters for ndmp_end_notify.cmd (Microsoft Windows)
(continued)

Parameter	Description
%3	Specifies the schedule name from the NetBackup catalog.
%4	Specifies one of the following: FULL INCR CINC
%5	Specifies the status of the operation. It is the same as the status sent to the NetBackup server. This status is 0 for successful backups and 1 for partially successful backups. If an error occurs, the status is the value associated with that error.
%6	Note: The following file is not checked at the end of a backup. Specifies the results file that NetBackup checks for a return code from the script. NetBackup uses %6 to pass the file name and then expects the script to create the file in the same directory as the script. If the script applies to a specific policy and schedule, the results file must be named <i>install_path\NetBackup\bin\NDMP_END_NOTIFY_RES.policy.schedule</i> If the script applies to a specific policy, the results file must be named <i>install_path\netbackup\bin\NDMP_END_NOTIFY_RES.policy</i> If the script applies to all backups, the results file must be named <i>install_path\NetBackup\bin\NDMP_END_NOTIFY_RES</i> An <code>echo 0> %6</code> statement is one way for the script to create the file. NetBackup deletes the existing results file before it calls the script. After the script runs, NetBackup checks the new results file for the status. The status must be 0 for the script to be considered successful. If the results file does not exist, NetBackup assumes that the script was successful.

ndmp_start_path_notify script (UNIX)

The UNIX scripts are provided as examples only. You must customize the scripts before using them. For example, the `-ne` value in the first `if` statement must be modified to reflect the number of passed parameters. For the `ndmp_start_path_notify` script, the `-ne` value must be set to 7.

To use this script, create a script similar to

```
/usr/opensv/netbackup/bin/goodies/bpstart_notify
```

on the server, and copy it to

```
/usr/opensv/netbackup/bin/ndmp_start_path_notify
```

on the UNIX NetBackup for NDMP server. Then, modify the script and ensure that you have permission to run it.

On the UNIX media server, the `ndmp_start_path_notify` script runs before the backup process is issued to the NAS machine. This script must exit with a status of 0 for the calling program to continue and for the backup to proceed. A nonzero status causes the client backup to exit with a status of 99 (NDMP backup failure).

Note: Before you use this script, make sure you can run it by using `other` on the media server. Run `chmod 755 script_name`, where *script_name* is the name of the script.

If the `/usr/opensv/netbackup/bin/ndmp_start_path_notify` script exists, it runs in the foreground. The `bptm` process on the NetBackup for NDMP server waits for it to complete before continuing. Any commands in the script that do not end with an `&` character run serially.

The server expects the client to respond with a `continue` message within the period of time that the NetBackup `CLIENT_READ_TIMEOUT` option on the server specifies.

The default for `CLIENT_READ_TIMEOUT` is 300. If the script needs more time than 300 seconds, increase the value to allow more time.

NetBackup passes the following parameters to the script:

Table 22-6 Script parameters for `ndmp_start_path_notify` (UNIX)

Parameter	Description
\$1	Specifies the name of the NDMP host.
\$2	Specifies the policy name from the NetBackup catalog.
\$3	Specifies the schedule name from the NetBackup catalog.
\$4	Specifies one of the following: FULL INCR (differential incremental) CINC (cumulative incremental)
\$5	Specifies the NetBackup status code for the operation.

Table 22-6 Script parameters for ndmp_start_path_notify (UNIX) (*continued*)

Parameter	Description
\$6	Not used.
\$7	Specifies the path being backed up.

For example:

```
ndmp_start_path_notify freddie cd4000s fulls FULL
ndmp_start_path_notify danr cd4000s incrementals INCR
ndmp_start_path_notify hare cd4000s fulls FULL
```

To create an `ndmp_start_path_notify` script for a specific policy or policy and schedule combination, create script files with a `.polycname` or `.polycname.schedulename` suffix. In the following two examples of script names, the policy is named `production` and the schedule is named `fulls`:

```
/usr/opensv/netbackup/bin/ndmp_start_path_notify.production
/usr/opensv/netbackup/bin/ndmp_start_path_notify.production.fulls
```

The first script affects all scheduled backups in the policy that is named `production`. The second script affects scheduled backups in the policy that is named `production` only when the schedule is named `fulls`.

Note: For a given backup, NetBackup uses only one `ndmp_start_path_notify` script and that is the one with the most specific name. For example, if there are both `ndmp_start_path_notify.production` and `ndmp_start_path_notify.production.fulls` scripts, NetBackup uses only `ndmp_start_path_notify.production.fulls`.

The `ndmp_start_path_notify` script can use the following environment variables:

```
BACKUPID
UNIXBACKUPTIME
BACKUPTIME
```

The NetBackup `bptm` process creates these variables. The following are examples of the strings that are available to the script for use in recording information about a backup:

```
BACKUPID=freddie_0857340526
UNIXBACKUPTIME=0857340526
BACKUPTIME=Sun Mar 2 16:08:46 1997
```

ndmp_start_path_notify.cmd script (Microsoft Windows)

For Windows media servers, you can create the batch scripts that provide notification before the backup process is issued to the NAS machine. These scripts must reside on the media server in the same directory as the NetBackup binaries:

```
install_path\NetBackup\bin
```

where *install_path* is the directory where NetBackup is installed.

You can create `ndmp_start_path_notify` scripts that provide notification for all backups or only for backups of a specific policy or schedule.

To create an `ndmp_start_path_notify` script that applies to all backups, name the script:

```
install_path\netbackup\bin\ndmp_start_path_notify.cmd
```

To create a script that applies only to a specific policy or policy and schedule combination, add a `.polycname` or `.polycname.schedulename` suffix to the script name. The following are two examples:

- The following script applies only to a policy named `days`:

```
install_path\netbackup\bin\ndmp_start_path_notify.days.cmd
```

- The following script applies only to a schedule that is named `fulls`, which in a policy named `days`:

```
install_path\netbackup\bin\ndmp_start_path_notify.days.fulls.cmd
```

The first script affects all scheduled backups in the policy named `days`. The second script affects scheduled backups in the policy named `days` only when the schedule is named `fulls`.

For a given backup, NetBackup calls only one `ndmp_start_path_notify` script and checks for them in the following order:

```
ndmp_start_path_notify.policy.schedule.cmd  
ndmp_start_path_notify.policy.cmd  
ndmp_start_path_notify.cmd
```

For example, if there are both `ndmp_start_path_notify.policy.cmd` and `ndmp_start_path_notify.policy.schedule.cmd` scripts, NetBackup uses only `ndmp_start_path_notify.policy.schedule.cmd`.

Note: If you also use `ndmp_start_notify` scripts, they can provide a different level of notification than the `ndmp_start_path_notify` scripts. For example, if you had one of each, they could be `ndmp_start_notify.policy.cmd` and `ndmp_start_path_notify.policy.schedule.cmd`.

When the backup starts, NetBackup passes the following parameters to the script:

Table 22-7 Script parameters for `ndmp_start_path_notify.cmd` (Microsoft Windows)

Parameter	Description
%1	Specifies the name of the client from the NetBackup catalog.
%2	Specifies the policy name from the NetBackup catalog.
%3	Specifies the schedule name from the NetBackup catalog.
%4	Specifies one of the following: FULL INCR CINC
%5	Specifies the status of the operation. It is the same as the status sent to the NetBackup server. This status is 0 for successful backups and 1 for partially successful backups. If an error occurs, the status is the value associated with that error.
%6	Specifies the results file that NetBackup checks for a return code from the script. NetBackup uses %6 to pass the file name and then expects the script to create the file in the same directory as the script. If the script applies to a specific policy and schedule, the results file must be named <code>install_path\netbackup\bin\NDMP_START_PATH_NOTIFY_RES.policy.schedule</code> If the script applies to a specific policy, the results file must be named <code>install_path\NetBackup\bin\NDMP_START_PATH_NOTIFY_RES.policy</code> If the script applies to all backups, the results file must be named <code>install_path\NetBackup\bin\NDMP_START_PATH_NOTIFY_RES</code> An <code>echo 0> %6</code> statement is one way for the script to create the file. NetBackup deletes the existing results file before it calls the script. After the script runs, NetBackup checks the new results file for the status. The status must be 0 for the script to be considered successful. If the results file does not exist, NetBackup assumes that the script was successful.
%7	Pathname being backed up.

ndmp_end_path_notify script (UNIX)

The UNIX scripts are provided as examples only. You must customize the scripts before using them. For example, the `-ne` value in the first `if` statement must be modified to reflect the number of passed parameters. For the `ndmp_end_path_notify` script, the `-ne` value must be set to 7.

Note: Before you use this script, make sure you can run it by using `other` on the media server. Run `chmod 755 script_name`, where *script_name* is the name of the script.

For a UNIX media server, if you need notification whenever the NDMP host completes a backup, copy

```
/usr/opensv/netbackup/bin/goodies/bpend_notify
```

from the server, to

```
/usr/opensv/netbackup/bin/ndmp_end_path_notify
```

on the UNIX NetBackup for NDMP host. Then, modify the script and ensure that you have permission to run it.

The `ndmp_end_path_notify` script runs after the NAS machine has informed NetBackup that it has completed sending data.

NetBackup passes the following parameters to the `ndmp_end_notify` script:

Table 22-8 Script parameters for `ndmp_end_path_notify` (UNIX)

Parameter	Description
\$1	Specifies the name of the client from the NetBackup catalog.
\$2	Specifies the policy name from the NetBackup catalog.
\$3	Specifies the schedule name from the NetBackup catalog.
\$4	Specifies one of the following: FULL INCR (differential incremental) CINC (cumulative incremental)
\$5	Specifies the exit code from <code>bptm</code> .
\$6	Not used.

Table 22-8 Script parameters for ndmp_end_path_notify (UNIX) (*continued*)

Parameter	Description
\$7	Specifies the path being backed up.

For example:

```
ndmp_end_path_notify freddie cd4000s fulls FULL 0
ndmp_end_path_notify danr cd4000s incrementals INCR 73
```

To create an `ndmp_end_path_notify` script for a specific policy or policy and schedule combination, create script files with a `.policyname` or `.policyname.schedulename` suffix. In the following two examples of script names, the policy is named `production` and the schedule is named `fulls`:

```
/usr/opensv/netbackup/bin/ndmp_end_path_notify.production
/usr/opensv/netbackup/bin/ndmp_end_path_notify.production.fulls
```

The first script affects all scheduled backups in the policy that is named `production`. The second script affects scheduled backups in the policy that is named `production` only when the schedule is named `fulls`.

Note: For a given backup, NetBackup uses only one `ndmp_end_path_notify` script and that is the one with the most specific name. For example, if there are both `ndmp_end_path_notify.production` and `ndmp_end_path_notify.production.fulls` scripts, NetBackup uses only `ndmp_end_path_notify.production.fulls`.

The `ndmp_end_path_notify` script can use the following environment variables:

```
BACKUPID
UNIXBACKUPTIME
BACKUPTIME
```

The NetBackup `bptm` process creates these variables. The following are examples of the strings that are available to the script for use in recording information about a backup:

```
BACKUPID=freddie_0857340526
UNIXBACKUPTIME=0857340526
BACKUPTIME=Sun Mar 2 16:08:46 1997
```

ndmp_end_path_notify.cmd script (Microsoft Windows)

For Windows media servers, you can create the batch scripts that provide notification whenever the client is finished writing to tape. These scripts must reside on the media server in the same directory as the NetBackup binaries:

```
install_path\NetBackup\bin
```

where *install_path* is the directory where NetBackup is installed.

You can create `ndmp_end_path_notify` scripts that provide notification for all backups or only for backups of a specific policy or schedule.

To create an `ndmp_end_path_notify` script that applies to all backups, name the script:

```
install_path\netbackup\bin\ndmp_end_path_notify.cmd
```

To create a script that applies only to a specific policy or policy and schedule combination, add a `.policyname` or `.policyname.schedulename` suffix to the script name. The following are two examples:

- The following script applies only to a policy named `days`:

```
install_path\netbackup\bin\ndmp_end_path_notify.days.cmd
```

- The following script applies only to a schedule that is named `fulls`, which is in a policy named `days`:

```
install_path\netbackup\bin\ndmp_end_path_notify.days.fulls.  
cmd
```

The first script affects all scheduled backups in the policy named `days`. The second script affects scheduled backups in the policy named `days` only when the schedule is named `fulls`.

For a given backup, NetBackup calls only one `ndmp_end_path_notify` script and checks for them in the following order:

```
ndmp_end_path_notify.policy.schedule.cmd  
ndmp_end_path_notify.policy.cmd  
ndmp_end_path_notify.cmd
```

For example, if there are both `ndmp_end_path_notify.policy.cmd` and `ndmp_end_path_notify.policy.schedule.cmd` scripts, NetBackup uses only `ndmp_end_path_notify.policy.schedule.cmd`.

Note: If you also use `ndmp_end_notify` scripts, they can provide a different level of notification than the `ndmp_end_path_notify` scripts. For example, if you had one of each, they could be `ndmp_end_notify.policy.cmd` and `ndmp_end_path_notify.policy.schedule.cmd`.

When the backup completes, NetBackup passes the following parameters to the script:

Table 22-9 Script parameters for `ndmp_end_path_notify.cmd` (Microsoft Windows)

Parameter	Description
%1	Specifies the name of the client from the NetBackup catalog.
%2	Specifies the policy name from the NetBackup catalog.
%3	Specifies the schedule name from the NetBackup catalog.
%4	Specifies one of the following: FULL INCR CINC
%5	Specifies the status of the operation. It is the same as the status sent to the NetBackup server. This status is 0 for successful backups and 1 for partially successful backups. If an error occurs, the status is the value associated with that error.

Table 22-9 Script parameters for ndmp_end_path_notify.cmd (Microsoft Windows) (*continued*)

Parameter	Description
%6	Note: The following file is not checked when using <code>ndmp_end_path_notify</code>. Specifies the results file that NetBackup checks for a return code from the script. NetBackup uses %6 to pass the file name and then expects the script to create the file in the same directory as the script. If the script applies to a specific policy and schedule, the results file must be named <i>install_path\NetBackup\bin\NDMP_END_PATH_NOTIFY_RES.policy.schedule</i> If the script applies to a specific policy, the results file must be named <i>install_path\netbackup\bin\NDMP_END_PATH_NOTIFY_RES.policy</i> If the script applies to all backups, the results file must be named <i>install_path\NetBackup\bin\NDMP_END_PATH_NOTIFY_RES</i> An <code>echo 0 > %6</code> statement is one way for the script to create the file. NetBackup deletes the existing results file before it calls the script. After the script runs, NetBackup checks the new results file for the status. The status must be 0 for the script to be considered successful. If the results file does not exist, NetBackup assumes that the script was successful.
%7	Specifies the pathname being backed up.

ndmp_moving_path_notify script (UNIX)

The UNIX scripts are provided as examples only. You must customize the scripts before using them. For example, the `-ne` value in the first if statement must be modified to reflect the number of passed parameters. For the `ndmp_moving_path_notify` script, the `-ne` value must be set to 7.

To use this script, create a script similar to

```
/usr/opensv/netbackup/bin/goodies/bpstart_notify
```

on the server, and copy it to

```
/usr/opensv/netbackup/bin/ndmp_moving_path_notify
```

on the UNIX NetBackup for NDMP server. Then, modify the script and ensure that you have permission to run it.

On UNIX media servers, the `ndmp_moving_path_notify` script runs after the backup process sends data to NetBackup.

Note: Before you use this script, make sure you can run it using other on the media server. Run `chmod 755 script_name`, where *script_name* is the name of the script.

If the `/usr/opensv/netbackup/bin/ndmp_moving_path_notify` script exists, it runs in the foreground. The `bptm` process that is on the NetBackup for NDMP server waits for it to complete before continuing. Any commands in the script that do not end with an `&` character run serially.

The server expects the client to respond with a `continue` message within the period of time that the NetBackup `CLIENT_READ_TIMEOUT` option on the server specifies.

The default for `CLIENT_READ_TIMEOUT` is 300 seconds. If the script needs more than 300 seconds, increase the value to allow more time.

NetBackup passes the following parameters to the script:

Table 22-10 Script parameters for `ndmp_moving_path_notify` (UNIX)

Parameter	Description
\$1	Specifies the name of the NDMP host.
\$2	Specifies the policy name from the NetBackup catalog.
\$3	Specifies the schedule name from the NetBackup catalog.
\$4	Specifies one of the following: FULL INCR (differential incremental) CINC (cumulative incremental)
\$5	Specifies the NetBackup status code for the operation.
\$6	Not used.
\$7	Specifies the path being backed up.

For example:

```
ndmp_moving_path_notify freddie cd4000s fulls FULL
ndmp_moving_path_notify danr cd4000s incrementals INCR
ndmp_moving_path_notify hare cd4000s fulls FULL
```

To create an `ndmp_moving_path_notify` script for a specific policy or policy and schedule combination, create script files with a `.polycname` or `.polycname.schedulename` suffix. In the following two examples of script names, the policy is named `production` and the schedule is named `fulls`:

```
/usr/opensv/netbackup/bin/ndmp_moving_path_notify.production
/usr/opensv/netbackup/bin/ndmp_moving_path_notify.production.fulls
```

The first script affects all scheduled backups in the policy that is named `production`. The second script affects scheduled backups in the policy that is named `production` only when the schedule is named `fulls`.

Note: For a given backup, NetBackup uses only one `ndmp_moving_path_notify` script and that is the one with the most specific name. For example, if there are both `ndmp_moving_path_notify.production` and `ndmp_moving_path_notify.production.fulls` scripts, NetBackup uses only `ndmp_moving_path_notify.production.fulls`.

The `ndmp_moving_path_notify` script can use the following environment variables:

```
BACKUPID
UNIXBACKUPTIME
BACKUPTIME
```

The NetBackup `bptm` process creates these variables. The following are examples of the strings that are available to the script for use in recording information about a backup:

```
BACKUPID=freddie_0857340526
UNIXBACKUPTIME=0857340526
BACKUPTIME=Sun Mar 2 16:08:46 1997
```

ndmp_moving_path_notify.cmd script (Microsoft Windows)

For Windows media servers, you can create the batch scripts that provide notification whenever the NAS machine starts sending data. These scripts must reside on the media server in the same directory as the NetBackup binaries:

```
install_path\NetBackup\bin
```

where *install_path* is the directory where NetBackup is installed.

You can create `ndmp_moving_path_notify` scripts that provide notification for all backups or only for backups of a specific policy or schedule.

To create an `ndmp_moving_path_notify` script that applies to all backups, name the script:

```
install_path\netbackup\bin\ndmp_moving_path_notify.cmd
```

To create a script that applies only to a specific policy or policy and schedule combination, add a `.policyname` or `.policyname.schedulename` suffix to the script name. The following are two examples:

- The following script applies only to a policy named `days`:

```
install_path\netbackup\bin\ndmp_moving_path_notify.days.cmd
```

- The following script applies only to a schedule that is named `fulls`, which is in a policy named `days`:

```
install_path\netbackup\bin\ndmp_moving_path_notify.days.fulls.cmd
```

The first script affects all scheduled backups in the policy named `days`. The second script affects scheduled backups in the policy named `days` only when the schedule is named `fulls`.

For a given backup, NetBackup calls only one `ndmp_moving_path_notify` script and checks for them in the following order:

```
ndmp_moving_path_notify.policy.schedule.cmd  
ndmp_moving_path_notify.policy.cmd  
ndmp_moving_path_notify.cmd
```

For example, if there are both `ndmp_moving_path_notify.policy.cmd` and `ndmp_moving_path_notify.policy.schedule.cmd` scripts, NetBackup uses only `ndmp_moving_path_notify.policy.schedule.cmd`.

Note: If you also use `ndmp_start_notify` scripts, they can provide a different level of notification than the `ndmp_moving_path_notify` scripts. For example, if you had one of each, they could be `ndmp_start_notify.policy.cmd` and `ndmp_moving_path_notify.policy.schedule.cmd`.

When the backup starts, NetBackup passes the following parameters to the script.

Table 22-11 Script parameters for ndmp_moving_path_notify.cmd (Microsoft Windows)

Parameter	Description
%1	Specifies the name of the client from the NetBackup catalog.
%2	Specifies the policy name from the NetBackup catalog.
%3	Specifies the schedule name from the NetBackup catalog.
%4	Specifies one of the following: FULL INCR CINC
%5	Specifies the status of the operation. It is the same as the status sent to the NetBackup server. This status is 0 for successful backups and 1 for partially successful backups. If an error occurs, the status is the value associated with that error.
%6	Note: The following is not checked when using <code>ndmp_moving_path_notify</code>. Specifies the results file that NetBackup checks for a return code from the script. NetBackup uses %6 to pass the file name and then expects the script to create the file in the same directory as the script. If the script applies to a specific policy and schedule, the results file must be named <code>install_path\netbackup\bin\NDMP_END_NOTIFY_RES.policy.schedule</code> If the script applies to a specific policy, the results file must be named <code>install_path\NetBackup\bin\NDMP_END_NOTIFY_RES.policy</code> If the script applies to all backups, the results file must be named <code>install_path\NetBackup\bin\NDMP_END_NOTIFY_RES</code> An <code>echo 0> %6</code> statement is one way for the script to create the file. NetBackup deletes the existing results file before it calls the script. After the script runs, NetBackup checks the new results file for the status. The status must be 0 for the script to be considered successful. If the results file does not exist, NetBackup assumes that the script was successful.
%7	Specifies the pathname being backed up.