

EMC[®] Avamar[®] 7.0 NDMP Accelerator

User Guide

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PREFACE

As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

Contact your EMC technical support professional if a product does not function properly or does not function as described in this document.

Note: This document was accurate at publication time. Go to EMC Online Support (<https://support.emc.com>) to ensure that you are using the latest version of this document.

Purpose

This publication describes how to install, configure, administer, and use the Avamar NDMP Accelerator (accelerator) to back up and restore supported EMC Isilon, VNX, VNXe, and Celerra IP storage systems, and NetApp filers.

Note: For the sake of clarity, this publication often uses the term “storage device” to generically refer to any supported EMC Isilon, VNX, VNXe, or Celerra IP storage system, or NetApp filer.

Audience

The information in this publication is primarily intended for system administrators who are responsible for installing software and maintaining servers and clients on a network.

Persons using this publication should have current practical experience with:

- ◆ Network Data Management Protocol (NDMP)
- ◆ Supported storage devices currently deployed at the site
- ◆ UNIX shell scripts

Revision history

The following table presents the revision history of this document.

Table 1 Revision history

Revision	Date	Description
02	May 2, 2014	<ul style="list-style-type: none">• Revised “Configuring multiple simultaneous backups” on page 44 due to changes in shell session prompts.• Revised “Restoring to CIFS and NFS mounts is supported” on page 15 to clarify that no metadata is restored.• Revised “Creating a browse user account on the Isilon system” on page 22 to correct typo in --add-user command.
01	July 10, 2013	First release of Avamar 7.0.

Related documentation

The following EMC publications provide additional information:

- ◆ *EMC Avamar Compatibility and Interoperability Matrix*
- ◆ *EMC Avamar Release Notes*
- ◆ *EMC Avamar Administration Guide*
- ◆ *EMC Avamar Data Store Gen 4 Multi-Node System Installation Guide*
- ◆ *EMC Avamar Operational Best Practices*
- ◆ *EMC Avamar Product Security Guide*
- ◆ *EMC Isilon OneFS Administration Guide*

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EMC uses the following conventions for special notices:

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NOTICE is used to address practices not related to personal injury.

Note: A note presents information that is important, but not hazard-related.

IMPORTANT

An important notice contains information essential to software or hardware operation.

Typographical conventions

EMC uses the following type style conventions in this document:

Bold	Use for names of interface elements, such as names of windows, dialog boxes, buttons, fields, tab names, key names, and menu paths (what the user specifically selects or clicks)
<i>Italic</i>	Use for full titles of publications referenced in text
Monospace	Use for: <ul style="list-style-type: none"> • System output, such as an error message or script • System code • Pathnames, filenames, prompts, and syntax • Commands and options
<i>Monospace italic</i>	Use for variables.
Monospace bold	Use for user input.
[]	Square brackets enclose optional values
	Vertical bar indicates alternate selections — the bar means “or”
{ }	Braces enclose content that the user must specify, such as x or y or z
...	Ellipses indicate nonessential information omitted from the example

Where to get help

The Avamar support page provides access to licensing information, product documentation, advisories, and downloads, as well as how-to and troubleshooting information. This information may enable you to resolve a product issue before you contact EMC Customer Support.

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5. (Optional) Add the product to the **My Products** list by clicking **Add to my products** in the top right corner of the **Support by Product** page.

Documentation

The Avamar product documentation provides a comprehensive set of feature overview, operational task, and technical reference information. Review the following documents in addition to product administration and user guides:

- ◆ Release notes provide an overview of new features and known limitations for a release.
- ◆ Technical notes provide technical details about specific product features, including step-by-step tasks, where necessary.
- ◆ White papers provide an in-depth technical perspective of a product or products as applied to critical business issues or requirements.

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5. (Optional) Specify advanced options by clicking **Advanced options** and specifying values in the available fields.
6. Click the search button.

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Your suggestions help us to continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to:

BSGDocumentation@emc.com

Please include the following information:

- ◆ Product name and version
- ◆ Document name, part number, and revision (for example, 01)
- ◆ Page numbers
- ◆ Other details that will help us address the documentation issue

CHAPTER 1

Introduction

This chapter provides an overview and general capabilities and limitations of the EMC® Avamar® NDMP Accelerator. Topics include:

- ◆ Overview..... 12
- ◆ Compatibility and interoperability 12
- ◆ General capabilities and limitations 12
- ◆ EMC storage device capabilities and limitations 15
- ◆ NetApp capabilities and limitations 16

Note: For the sake of clarity, this publication often uses the term “storage device” to generically refer to any supported EMC Isilon®, VNX®, VNXe®, or Celerra® IP storage system, or NetApp filer.

Overview

The Avamar NDMP Accelerator (accelerator) is a dedicated single-node Avamar client. When used as part of an Avamar system, the accelerator provides a complete backup and recovery solution for supported EMC Isilon, VNX, VNXe, or Celerra IP storage systems, and NetApp filers by using Network Data Management Protocol (NDMP) to communicate with these storage devices.

The accelerator uses the standard Network Data Management Protocol (NDMP) and published extensions of the **NDMPcopy** utility.

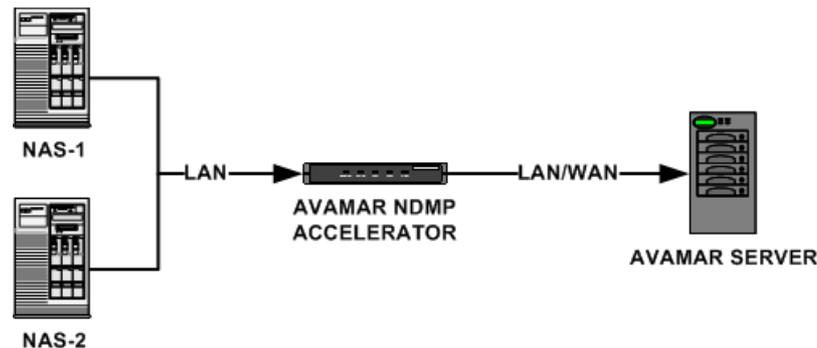


Figure 1 Accelerator deployment diagram

Data from the storage device is not stored on the accelerator. The accelerator performs NDMP processing and real-time data deduplication, then forwards that data to the Avamar server. Due to the inherent advantages of data deduplication, you can locate the accelerator either locally (LAN) or remotely (WAN) with respect to the Avamar server. However, to ensure acceptable performance, the accelerator must be located on the same Local Area Network (LAN) as the storage device being protected.

Compatibility and interoperability

Before deploying an accelerator, ensure that the storage devices are supported.

Up-to-date detailed compatibility and interoperability information is available at <https://support.EMC.com/products>.

General capabilities and limitations

This topic discusses general capabilities and limitations of the accelerator.

Full support for NDMP version 4

Avamar 5.0 and later accelerators fully support NDMP version 4.

Full support for storage device ACLs

The accelerator can protect and restore all storage device accounting information and Access Control Lists (ACLs).

Support for multiple storage devices using one accelerator

A single accelerator can support more than one storage device. However, by default you cannot perform more than one backup at a time.

For example, consider two storage devices: NAS-1 and NAS-2. Both storage devices use the same accelerator. Both storage devices belong to the same backup group.

When the scheduled group backups are initiated, NAS-1 begins backing up immediately, while NAS-2's backup job is queued until NAS-1's job completes.

Support for multiple simultaneous data streams

All NDMP plug-ins offer a Maximum Concurrent Data Streams option. You can set this option persistently in backup datasets, or as a backup or restore option for individual on-demand backup and restore operations, respectively.

The number of simultaneous data streams available is dependent on storage device version and the amount of RAM installed. The following table lists the maximum number of simultaneous data streams for various system configurations:

Table 2 Maximum simultaneous data streams per configuration

Storage device	RAM	Maximum number of streams
EMC Isilon OneFS 7.0.1.3	4GB	8
EMC VNX OE 7.1.34.0, 7.0	> 8 GB	8
EMC VNX OE 7.0, VNXe 2.3.0, or Celerra DART 6.0	8 GB	4
NetApp Data ONTAP 8.1, 8.0, 7.3, 7.2, or 7.1.	8 GB	8

Small backup bytes reported might be incorrect

The number of bytes that Avamar reports for small NDMP backups may be incorrect by a few KB. This behavior is normal because the NDMP device adds a small amount of "housekeeping" data to each backup.

Folder bytes reported might be incorrect

Avamar 5.0 and later reports incorrect folder sizes in Avamar Administrator. Folder sizes are routinely shown to be smaller than the aggregate size of the folder contents. This is due to a change in the way backups are stored on the Avamar server, and does not affect backup and restore behavior or data integrity.

Restoring non-NDMP client backups to an NDMP storage device is not supported

Volumes, folders, and files that were originally backed up from other Avamar client types are fully browsable by Avamar Administrator. However, these entities cannot be restored to an NDMP storage device.

You cannot configure the accelerator using Avamar Administrator

Accelerators are configured using the **avsetupndmp** command line script. You cannot modify any accelerator settings using Avamar Administrator.

Overwrite behavior during restores cannot be controlled

None of the overwrite and open file options are applicable when performing an NDMP restore. NDMP implicitly always overwrites existing files when restoring.

Web services restores with external authentication are not supported

You cannot restore data from an NDMP backup using Avamar Web services if the user who initiates the restore is authenticated using an external authentication system such as LDAP or Windows Active Directory.

User and group names are not displayed

When listing the contents of a backup, user and group names appear as numbers instead of plain text names.

Wild cards are not supported

You cannot use wild card characters to specify a backup target (that is, which volumes or folders to include in the backup). This is an NDMP limitation.

Cancelling backups might take several minutes

Due to the behavior of some storage devices, cancelling an NDMP backup might take several (typically 3–5) minutes.

NDMP environment variables are not supported

Avamar does not permit you to set arbitrary NDMP environment variables when defining a dataset or performing on-demand backups and restores.

Passwords cannot contain single-quotes

During installation and configuration of the accelerator for use with the storage device, the **avsetupndmp** script asks for an ndmp user account password. This password cannot contain single-quotes.

International characters might not display correctly in Avamar Administrator

When browsing NDMP backups in Avamar Administrator, folder and file names containing international characters might not display correctly. However, this does not affect the ability to restore data.

Mixed backups are not supported

The full backup for a client and all subsequent incremental and differential backups must be stored on either the Avamar server or a single Data Domain system. Avamar does not support:

- ◆ Full backups on a Data Domain system and incremental or differential backups on the Avamar server
- ◆ Full backups on the Avamar server and incremental or differential backups on a Data Domain system
- ◆ Full backups on one Data Domain system and incremental or differential backups on another Data Domain system

Therefore, if you change the device on which backups for a client are stored, then you must perform a full backup before any further incremental or differential backups.

EMC storage device capabilities and limitations

This topic discusses capabilities and limitations specific to protecting EMC Isilon, VNX, VNXe, and Celerra IP storage systems.

Support for replicated backups

Avamar fully supports backing up Isilon, VNX, VNXe, and Celerra replication targets. During backups, original source and replicated data is analyzed to determine the latest modification date and time. This ensures that the most recent data is always backed up.

Restoring to CIFS and NFS mounts is supported

Backups from EMC Isilon, VNX, VNXe, and Celerra systems can be restored to CIFS mounts on Windows systems and NFS mounts on Linux systems.

When restoring to an NFS or CIFS mount, metadata such as ACLs, alternate data streams, attributes associated with hard links or file compression, is not restored.

Browsing folders and files is not supported on VNX, VNXe, and Celerra

When browsing a VNX, VNXe, and Celerra storage device file system for purposes of creating a dataset or performing an on-demand backup, only volumes are visible. You cannot browse volumes and view individual folders or files.

Include and exclude lists

You cannot define dataset include or exclude entries when performing an NDMP backup of VNX, VNXe, and Celerra storage systems. You can define exclude entries for NDMP backups of an Isilon storage system. The *EMC Avamar Operational Best Practices* provides details about how to use exclude lists with Isilon backups.

Disabling deduplicated VNX, VNXe, and Celerra backups

To maximize the benefits of Avamar deduplicated backup, EMC recommends that you configure the VNX, VNXe, and Celerra system to “unpack” the deduplicated files before sending them to the Avamar accelerator for backup. This is done on the Data Mover by setting the **fs_dedupe backup_data_threshold** parameter to **0**. For example:

```
fs_dedupe -default -set server_2 -backup_data_threshold 0
```

For additional information, refer to *Using VNX File Deduplication and Compression* (for VNX and VNXe storage systems), or *Using Celerra Data Deduplication* (for Celerra storage systems).

VNX, VNXe, and Celerra incremental backups should only be performed at the volume level

When backing up VNX, VNXe or Celerra storage systems, you should only perform incremental backups at the volume level. Avamar defaults to performing full backups of lower level folders and subfolders. However, it is possible to override this default behavior and force an incremental backup of lower level folders and subfolders. This is not a good practice as it can cause unpredictable application behavior.

VNX, VNXe, and Celerra subvolume backups should always be level-0

When backing up VNX, VNXe, or Celerra subvolumes (that is, anything other than the root volume), you should allow the Avamar to perform a level-0 backup. This is the default behavior.

You can override the default behavior by selecting the **Filer Dump Mode: Force an incremental (level 1) dump** plug-in option (either in the backup dataset or the on-demand backup options). However, it must be understood that performing an incremental level-1 backup at the subvolume level is known to be less reliable than a level-0 and might result in backup errors.

VNX, VNXe, and Celerra incremental backup limitation

When backing up VNX, VNXe or Celerra storage systems, any incremental backup that includes many files might fail due to memory limitations.

Avoid including certain UNIX hardlinks in incremental backups

When performing incremental backups, some UNIX hardlinks with non-ASCII characters in the name might not be processed correctly. For best results, exclude these hardlinks from incremental backups. If this is not possible, use level-0 backups instead.

Path length limitation

When backing up any EMC storage system, paths cannot be longer than 4,096 characters.

Maximum number of files limitation

Each individual Avamar backup can contain a maximum of 10 million files.

File size variance

The size of a backup from a storage device differs from the size of the on-disk data. For example, the reported size of a backup from a storage device in Avamar Administrator is the size on the deduplicated disk, not the actual file size.

Data Domain systems are not supported with Isilon

Avamar does not support storing Isilon backups on a Data Domain system.

NetApp capabilities and limitations

This topic discusses capabilities and limitations specific to protecting NetApp filers.

Support for backup and restore of volumes, qtrees, and folders

The accelerator can perform backups and restores at the volume, qtree, or folder levels. Selection of any entity type other than a volume (qtree, folder) must be done by typing the path to that entity within the volume.

Browsing folders and files is not supported

When browsing a NetApp file system for purposes of creating a dataset or performing an on-demand backup, only volumes are visible. You cannot browse volumes and view individual folders or files.

Include/exclude is not supported

You cannot define dataset include or exclude rules when performing an NDMP backup of a NetApp filer.

Backing up empty folders

When backing up empty folders, Avamar reports a size of between one and a few kilobytes for each empty folder. The number of kilobytes reported depends on the number of empty files.

Extra “restore_symboltable” file written during restores from NetApp filers

When restoring a NetApp filer backup, an extra file “restore_symboltable” is created on the restore target. This file is created by the NetApp filer (not Avamar software) and is a known NetApp limitation. Refer to NetApp Bug ID 30347 for additional information. Note also that if the dataset used for backups already contains a restore_symboltable file, that file is renamed to rstabRENAME47026EF7 on the restore target.

LUN restore issue

When restoring a LUN, the Avamar Administrator Restore to original location setting does not correctly restore the data as a LUN. The interim solution is to manually specify a NetApp qtree root folder as a restore location for the LUN, which causes the NetApp filer to create the proper LUN container.

Viewing UTF-8 characters in Avamar Administrator

In order to view UTF-8 folder and file names in Avamar Administrator, UTF-8 must be enabled by way of the Data ONTAP filer volume language setting.

SnapVault snapshots must be backed up with full backups

If backing up a SnapVault snapshot, you must perform a full backup. Incremental backups fail and exit with an error.

CHAPTER 2

EMC Storage System Installation and Configuration

The following topics describe how to install and configure the Avamar NDMP Accelerator for use with supported EMC Isilon, VNX, VNXe, or Celerra IP storage systems:

- ◆ Prerequisites..... 20
- ◆ Connecting components to the network 20
- ◆ Verifying networking 20
- ◆ Installation procedure 21

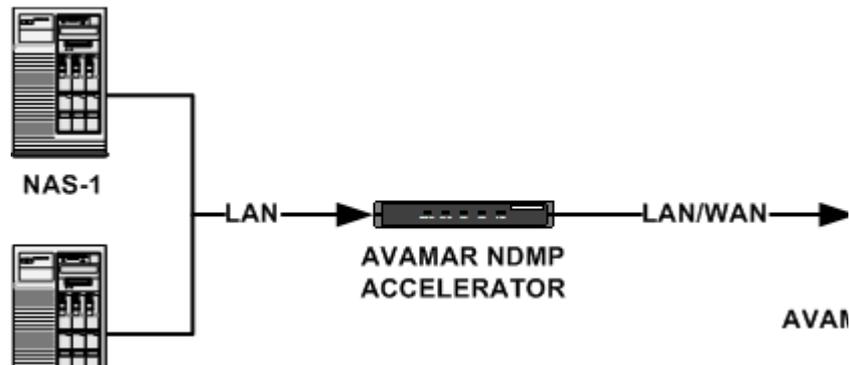
Note: For the sake of clarity, this chapter often uses the term “storage system” to generically refer to any supported EMC Isilon, VNX, VNXe, or Celerra IP storage system.

Prerequisites

Ensure that the accelerator has been configured according to the instructions found in the *EMC Avamar Data Store Gen 4 Multi-Node System Installation Guide*.

Connecting components to the network

The following figure illustrates a typical accelerator deployment.



1. Connect the Avamar server, accelerator, and storage system to the LAN by using 100BaseT or 1000BaseT network connections.
2. Add each hostname to corporate DNS or modify `/etc/hosts` files on each network host such that:
 - The Avamar server and accelerator can resolve each other's hostnames.
 - The accelerator and storage system can resolve each other's hostnames.

The Avamar server and storage system do not need to directly resolve each other's hostnames.

Verifying networking

For the accelerator to function correctly, the Avamar server and accelerator must be resolvable by corporate DNS from each other. Similarly, the accelerator and storage system must also be resolvable by corporate DNS from each other.

1. Deploy the Avamar server, accelerator, and storage system on the network.
2. Ensure that the Avamar server, accelerator, and storage system are powered on and operating correctly.
3. Open a command shell and log in to the Avamar server as admin.
4. Type:


```
ping ACCEL
```

 where ACCEL is the accelerator IP address or hostname as defined in corporate DNS. This command should show that the accelerator is responding to the **ping** command.
5. Open a command shell and log in to the accelerator as admin.

6. Type:

```
ping AVAMARSERVER
ping STORAGE-DEVICE
```

where:

- AVAMARSERVER is the Avamar server IP address or hostname as defined in corporate DNS.
- STORAGE-DEVICE is the EMC VNX, VNXe, Isilon, or Celerra IP address or hostname as defined in corporate DNS.

These commands should show that both the Avamar server and the storage system are both responding to the **ping** commands.

7. Log in to the storage system:

- On a VNX or VNXe storage system, log in to Unisphere.
- On an Isilon storage system, log in to OneFS Storage Administrator.
- On a Celerra storage system, log in to Celerra Manager.

8. Ping the accelerator by typing:

```
ping ACCEL
```

where ACCEL is the accelerator IP address or hostname as defined in corporate DNS.

This command should show that the accelerator is responding to the **ping** command.

Any failure to correctly resolve any hostname from any of the network hosts involved in this integration (Avamar server, accelerator, or storage system) must be identified and corrected before proceeding any further with this installation procedure.

Installation procedure

To install and configure an accelerator:

1. [“Creating an ndmp user account on the storage system” on page 22.](#)
2. [“Creating a browse user account on the Isilon system” on page 22](#)
3. [“Modifying NDMP snapTimeout parameters” on page 23.](#)
4. [“Downloading the accelerator install packages” on page 23.](#)
5. [“Installing the Avamar Client for Linux RPM” on page 24.](#)
6. [“Installing the accelerator RPM” on page 24.](#)
7. [“Configuring and registering the accelerator” on page 25.](#)

Creating an ndmp user account on the storage system

1. Do one of the following:
 - If configuring a VNX or VNXe storage system, log in to Unisphere.
 - If configuring an Isilon storage system, log in to OneFS Storage Administrator.
 - If configuring a Celerra storage system, log in to Celerra Manager.
2. Create a user account named **ndmp**.
3. Create a password for the ndmp user account.

For VNX and Celerra IP storage systems, by default, if there is a single Data Mover in the configuration, the name of the single Data Mover is “server_2.”

NOTICE

For VNX and Celerra IP storage systems, there is an option to transmit the md5sum of the NDMP username password. The accelerator can accommodate this option (**-md5**). For example, if the name of the Data Mover is “server_2” and the ndmp username is “ndmp,” then this command would be: **server_user server_2 -add -md5 ndmp**.

4. If configuring an Isilon storage system, set **DMA vendor** to **generic**.
5. Note this password for future use.

You type this password during the [“Configuring and registering the accelerator”](#) on [page 25](#) installation task.

6. Ensure that the ndmp user account has sufficient privileges to run NDMP jobs and access all data on the Celerra.

Creating a browse user account on the Isilon system

In order to perform on-demand backups, or create datasets for scheduled backups in Avamar Administrator, you must be able to browse the Isilon file system. These actions require typing a password for a local Isilon user account with following privileges:

- ◆ ISI_PRIV_LOGIN_PAPI
- ◆ ISI_PRIV_NS_TRAVERSE
- ◆ ISI_PRIV_NS_IFS_ACCESS

Although there are several methods for creating local Isilon user accounts, privileges can only be assigned to roles using the command-line interface. Therefore, this procedure describes how to perform all the necessary actions (that is, creating a user account, creating a new role, and assigning the user and required privileges to that role) using the command-line interface.

The *EMC Isilon OneFS Administration Guide* provides detailed information about creating local Isilon user accounts, and managing roles and privileges.

This procedure uses “av-browse-admin” and “namespace” as example user and role names, respectively. However, you can use any other user and role names that do not already exist in Isilon.

To create the Isilon browse user account:

1. Establish an SSH connection to any node in the Isilon cluster.
2. Create and enable the **av-browse-admin** user account by typing:

```
isi auth users create av-browse-admin --password PASSWORD
--home-directory /ifs/home/av-browse-admin --enabled true
```

Where PASSWORD is the actual password assigned to the av-browse-admin user account. This is the password you will type when browsing the Isilon file system in Avamar Administrator.

3. Create the “namespace” role, and assign the “av-browse-admin” user and required privileges to the new role by typing:

```
isi auth roles create namespace
isi auth roles modify namespace --add-user av-browse-admin
isi auth roles modify namespace --add-priv ISI_PRIV_LOGIN_PAPI
isi auth roles modify namespace --add-priv ISI_PRIV_NS_TRAVERSE
isi auth roles modify namespace --add-priv ISI_PRIV_NS_IFS_ACCESS
```

Modifying NDMP snapTimeout parameters

For VNX, VNXe, or Celerra IP storage systems, to avoid problems with running multiple NDMP backups simultaneously, increase the value for the NDMP snapTimeout parameter. The default value for the NDMP snapTimeout parameter is 5 minutes. Increase the value to at least 30 minutes. This does not apply to Isilon storage systems.

To modify NDMP snapTimeout parameters on VNX or Celerra IP storage systems, type the following command from the Control Station command line interface:

```
server_param server_2 -f NDMP -m snapTimeout -v 30
```

To modify NDMP snap timeout parameters on VNXe storage systems, use the graphical interface. VNXe documentation contains more information.

Downloading the accelerator install packages

1. Open a web browser and type the following URL:

```
http://AVAMARSERVER
```

where AVAMARSERVER is the Avamar server network hostname or IP address.

The EMC Avamar Web Restore web page appears.

2. Click **Downloads**.
3. Click **+** next to the **NDMP Accelerator** folder.
4. Download both the **AvamarClient-linux-rhel4-x86_64-VERSION.rpm** and **AvamarNDMP-linux-rhel4-x86_64-VERSION.rpm** install packages to a temporary install folder such as /tmp, where VERSION is the Avamar software version.

Installing the Avamar Client for Linux RPM

1. Open a command shell and log in to the accelerator as admin.
2. Switch user to root by typing:

```
su -
```

3. Change directory to the temporary install folder that you created in [“Downloading the accelerator install packages”](#) on page 23. For example:

```
cd /tmp
```

4. Type:

```
rpm -ivh AvamarClient-linux-rhel4-x86_64-VERSION.rpm
```

where VERSION is the Avamar software version.

The following information appears in the command shell:

```
Preparing... ##### [100%]
 1:AvamarClient
##### [100%]
Installation complete
You may run /usr/local/avamar/bin/avregister to register and
activate this client with the Administrator server.
avagent Info <5241>: Logging to /usr/local/avamar/var/avagent.log
avagent Info <5417>: daemonized as process id 23920
avagent.d Info: Client Agent started.
```

Installing the accelerator RPM

1. Ensure that you are still logged in to the accelerator as root.
2. Change directory to the temporary install folder that you created in [“Downloading the accelerator install packages”](#) on page 23. For example:

```
cd /tmp
```

3. Type:

```
rpm -ivh AvamarNDMP-linux-rhel4-x86_64-VERSION.rpm
```

where VERSION is the Avamar software version.

The following information appears in the command shell:

```
Preparing... ##### [100%]
 1:AvamarNDMP
##### [100%]
ndmjob Info: Server started.
avagent Info: Stopping Avamar Client Agent (avagent)...
avagent Info: Client Agent stopped.
avagent Info <5241>: Logging to /usr/local/avamar/var/avagent.log
avagent Info <5417>: daemonized as process id 23956
avagent Info: Client Agent started.
Installation complete
You may run /usr/local/avamar/bin/avsetupndmp to register and
activate this NDMP Accelerator Node with the Administrator server.
```

Configuring and registering the accelerator

Run the **avsetupndmp** script to configure the accelerator, and then run the **avregister** script to register the accelerator with the Avamar server.

1. Ensure that you are still logged in to the accelerator as root.

2. Type:

```
avsetupndmp
```

The following information appears in the command shell:

```
avsetupndmp version 5.0
Configure systems for backup and restore.
```

```
avsetupndmp will stop all running agents, do you wish to continue
Y/N? [Y]:
```

3. Press **Enter** to accept the default action to stop all running agents.

The following information appears in the command shell:

```
Network address or DNS name of this Accelerator Node
[ndmpa-1.example.com]:
```

4. Type the accelerator DNS name or IP address and press **Enter**.

The following information appears in the command shell:

```
Network address or DNS name of the Avamar Server
[avamar-1.example.com]:
```

5. Type the Avamar server DNS name or IP address and press **Enter**.

avamar-1.example.com is used as an example Avamar server name for the remainder of this procedure.

The following information appears in the command shell:

```
Root password of Avamar Server (avamar-1.example.com) [*****]:
```

6. Type the Avamar server software root password (not the operating system root password) and press **Enter**.

The following information appears in the command shell:

```
Enable support for multiple simultaneous backups Y/N?
```

NOTICE

Enabling support for multiple simultaneous backups without satisfying the minimum hardware and operating system requirements specified in [“General capabilities and limitations” on page 12](#) will adversely affect backup performance.

7. Do one of the following:

- To enable multiple simultaneous backups, type **y** and press **Enter**.
- To perform multiple backups consecutively instead of simultaneously, press **Enter** to accept the default action.

The following information appears in the command shell:

```
Configure individual system parameters.
```

```
The following systems are configured:
```

```
Choose an action:
```

1. Add a new system
2. Edit an existing system
3. Remove a system from the list
4. Combine accounts
5. Exit setup

8. Type **1** and press **Enter**.

The following information appears in the command shell:

```
Setting up a new system account
```

```
What kind of system do you want to setup?
```

1. EMC Celerra/VNX
2. EMC Isilon
3. NetApp Filer

```
Enter choice:
```

9. Do one of the following:

- To configure a VNX, VNXe, or Celerra storage system, type **1** and press **Enter**.
- To configure an Isilon storage system, type **2** and press **Enter**.

Note: The remainder of this procedure uses Celerra as an example. Similar information appears when configuring VNX, VNXe, or Isilon storage systems.

The following information appears in the command shell:

```
Starting setup for EMC Celerra
```

```
Network address or DNS name of the EMC Celerra [filer.company.com]:
```

10. Type the storage system DNS name or IP address and press **Enter**.

MyCelerra.example.com is used as an example Celerra name for the remainder of this procedure.

The following information appears in the command shell:

```
The ndmp user password on "MyCelerra.example.com":
```

11. Type the password for the ndmp user account you created in [“Creating an ndmp user account on the storage system”](#) on page 22 and press **Enter**.

The following information appears in the command shell:

```
Repeat password:
```

12. Retype the password and press **Enter**.

The following information appears in the command shell:

```
Password encoding scheme ("md5" or "text") to use for  
"MyCelerra.example.com" [md5]:
```

13. Type the correct password encoding scheme (either **md5** or **text**) and press **Enter**.

NOTICE

The only valid entries are **md5** or **text**. Supplying any other entries or specifying the incorrect encoding scheme causes an error.

The following information appears in the command shell:

```
Checking username and password... verified Avamar account name for
"MyCelerra.example.com" [MyCelerra.example.com]:
```

This prompt is asking for a short descriptive name for this storage system. This is how that storage system client instance will appear in Avamar Administrator. Any user-defined name is acceptable. However, this name must be unique. Be especially careful when adding a second instance of the same storage system that you differentiate it from any existing Avamar account name.

14. Specify the Avamar account name:

- To specify an Avamar account name other than the default, type the account name and press **Enter**.
- To use the default Avamar account name, press **Enter** to accept the default Avamar account name.

The following information appears in the command shell:

```
Routable address or DNS name of this accelerator from
"MyCelerra.example.com" [ndmpa-1.example.com]:
```

15. Type the accelerator DNS name or IP address and press **Enter**.

The following information appears in the command shell:

```
Writing /usr/local/avamar/var/MyCelerra-ndmpa3/.avagent...
Writing /usr/local/avamar/var/MyCelerra-ndmpa3/ndmp.cfg...
```

```
Trying to get list of volumes from MyCelerra.example.com...
```

```
Trying to get list of volumes from MyCelerra.example.com...
```

```
<dir name="/CIFS_share1" />
<dir name="/NFS_share1" />
<dir name="/.etc_common" />
<dir name="/" />
```

```
Finished setup for
```

```
MyCelerra.example.com:/usr/local/avamar/var/MyCelerra-ndmpa3.
```

The following filers are configured:

```
MyCelerra-ndmpa3 /usr/local/avamar/var/MyCelerra-ndmpa3
```

Choose an action:

1. Add a new system
2. Edit an existing system
3. Remove a system from the list
4. Combine accounts
5. Exit setup

```
Enter action: [5]:
```

16. Do one of the following:

- To add another storage system or an additional Avamar client instance of an existing storage system, select menu option 1 (by typing **1** and pressing **Enter**), then repeat steps 7–15.
- Otherwise, press **Enter** to accept the default action (exit setup).

17. Wait for **avsetupndmp** to complete.

The following information appears in the command shell:

```
Attempting to restart avagent service.
```

```
avagent Info: Client 'MyCelerra.example.com' in folder
'/usr/local/avamar/var/MyCelerra.example.com'
avagent Info <5241>: Logging to
/usr/local/avamar/var/MyCelerra.example.com/avagent.log
avagent Info <5417>: daemonized as process id 6669
avagent Info: Client Agent MyCelerra.example.com started.
[ OK ]
```

IMPORTANT: Be sure to run `avregister` if you have added new accounts.

18. Type the following:

```
avregister
```

NOTICE

If you added more than one storage system or client instance during **avsetupndmp** session, then **avregister** automatically attempts to register all client instances that it detects on the accelerator.

The following information appears in the command shell:

```
=== Client Registration and Activation
This script will register and activate the client with the
Administrator server.
Enter the Administrator server address (DNS text name or numeric IP
address, DNS name preferred):
```

19. Type the network hostname (as defined in DNS) of the Avamar server and press **Enter**.

The following information appears in the command shell:

```
Enter the Avamar server domain [clients]:
```

20. Do one of the following:

- Press **Enter** to accept the default domain (clients).
- Type a valid domain path and press **Enter**.

When typing a domain path (for example, `clients/linux`), do not include a slash (/) as the first character.

The following information appears in the command shell:

```
avagent.d Info: Server stopped.  
[ OK ]  
avagent Info <5241>: Logging to /usr/local/avamar/var/avagent.log  
avagent.d Info: Client activated successfully.  
[ OK ]  
avagent Info <5241>: Logging to /usr/local/avamar/var/avagent.log  
avagent Info <5417>: daemonized as process id 3385  
avagent.d Info: Server started.  
[ OK ]  
Registration Complete.
```


CHAPTER 3

NetApp Installation and Configuration

The following topics describe how to install and configure the Avamar NDMP Accelerator for use with supported NetApp filers:

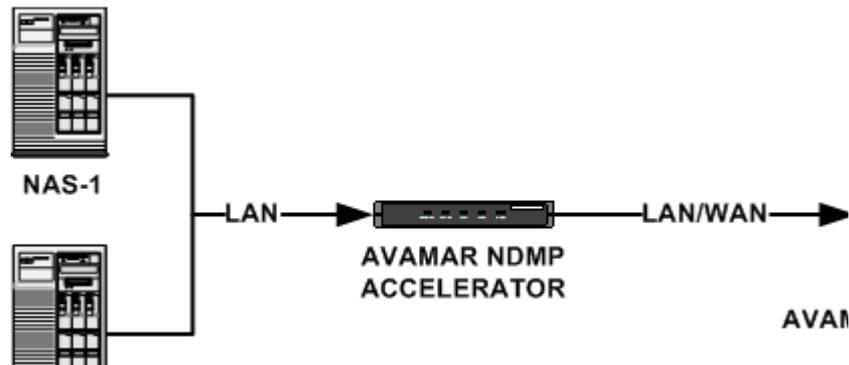
- ◆ Prerequisites..... 32
- ◆ Connecting components to the network 32
- ◆ Verifying networking 32
- ◆ Installation procedure 33

Prerequisites

Ensure that the accelerator has been configured according to the instructions found in the *EMC Avamar Data Store Gen 4 Multi-Node System Installation Guide*.

Connecting components to the network

The following figure illustrates a typical accelerator deployment.



1. Connect the Avamar server, accelerator, and filer to the LAN by using 100BaseT or 1000BaseT network connections.
2. Add each hostname to corporate DNS or modify `/etc/hosts` files on each network host such that:
 - The Avamar server and accelerator can resolve each other's hostnames.
 - The accelerator and filer can resolve each other's hostnames.

The Avamar server and filer do not need to be able to directly resolve each other's hostnames.

Verifying networking

For the accelerator to function correctly, the Avamar server and accelerator must be resolvable by corporate DNS from each other. Similarly, the accelerator and storage system must also be resolvable by corporate DNS from each other.

1. Deploy the Avamar server, accelerator, and filer on the network.
2. Ensure that the Avamar server, accelerator, and filer are powered on and operating correctly.
3. Open a command shell and log in to the Avamar server as admin.
4. Type:


```
ping ACCEL
```

 where ACCEL is the accelerator IP address or hostname as defined in corporate DNS. This command should show that the accelerator is responding to the **ping** command.
5. Open a command shell and log in to the accelerator as admin.

6. Type:

```
ping AVAMARSERVER
ping FILER
```

where:

- AVAMARSERVER is the Avamar server IP address or hostname as defined in corporate DNS.
- FILER is the NetApp filer IP address or hostname as defined in corporate DNS.

These commands should show that both the Avamar server and filer are both responding to the **ping** commands.

7. Open a command shell and log in to the filer.

8. Ping the accelerator by typing:

```
ping ACCEL
```

where ACCEL is the accelerator IP address or hostname as defined in corporate DNS.

This command should show that the accelerator is responding to the **ping** command.

9. Also ensure that the filer allows NDMP connections from the accelerator by typing:

```
options ndmpd.access
```

10. Do one of the following:

- If the previous command returned all or legacy, no further action is necessary.
- If the previous command did not return all or legacy, Grant access to the accelerator by typing either:

```
options ndmpd.access host=HOSTNAME
```

where HOSTNAME is the accelerator hostname or IP address.

Any failure to correctly resolve any hostname from any of the network hosts involved in this integration (Avamar server, accelerator, or filer) must be corrected before proceeding any further with this installation procedure.

Installation procedure

To install and configure an accelerator:

1. [“Downloading the accelerator install packages” on page 34.](#)
2. [“Installing the Avamar Client for Linux RPM” on page 34.](#)
3. [“Installing the accelerator RPM” on page 34.](#)
4. [“Configuring and registering the accelerator” on page 35.](#)
5. [“Enabling NDMP services on the filer” on page 40.](#)

Downloading the accelerator install packages

1. Open a web browser and type the following URL:

```
http://AVAMARSERVER
```

where AVAMARSERVER is the Avamar server network hostname or IP address.

The EMC Avamar Web Restore web page appears.

2. Click **Downloads**.
3. Click **+** next to the **NDMP Accelerator** folder.
4. Download both the **AvamarClient-linux-rhel4-x86_64-VERSION.rpm** and **AvamarNDMP-linux-rhel4-x86_64-VERSION.rpm** install packages to a temporary install folder such as /tmp, where VERSION is the Avamar software version.

Installing the Avamar Client for Linux RPM

1. Open a command shell and log in to the accelerator as admin.
2. Switch user to root by typing:

```
su -
```

3. Change directory to the temporary install folder that you created in [“Downloading the accelerator install packages” on page 34](#). For example:

```
cd /tmp
```

4. Type:

```
rpm -ivh AvamarClient-linux-rhel4-x86_64-VERSION.rpm
```

where VERSION is the Avamar software version.

The following output appears in the command shell:

```
Preparing... ##### [100%]
 1:AvamarClient
##### [100%]
Installation complete
You may run /usr/local/avamar/bin/avregister to register and
activate this client with the Administrator server.
avagent Info <5241>: Logging to /usr/local/avamar/var/avagent.log
avagent Info <5417>: daemonized as process id 23920
avagent.d Info: Client Agent started.
```

Installing the accelerator RPM

1. Ensure that you are still logged in to the accelerator as root.
2. Change directory to the temporary install folder that you created in [“Downloading the accelerator install packages” on page 34](#). For example:

```
cd /tmp
```

3. Type:

```
rpm -ivh AvamarNDMP-linux-rhel4-x86_64-VERSION.rpm
```

where VERSION is the Avamar software version.

The following output appears in the command shell:

```
Preparing... ##### [100%]
 1:AvamarNDMP
##### [100%]
ndmjob Info: Server started.
avagent Info: Stopping Avamar Client Agent (avagent)...
avagent Info: Client Agent stopped.
avagent Info <5241>: Logging to /usr/local/avamar/var/avagent.log
avagent Info <5417>: daemonized as process id 23956
avagent Info: Client Agent started.
Installation complete
You may run /usr/local/avamar/bin/avsetupndmp to register and
activate this NDMP Accelerator Node with the Administrator server.
```

Configuring and registering the accelerator

Run the **avsetupndmp** script to configure the accelerator, and then run the **avregister** script to register the accelerator with the Avamar server.

1. Ensure that you are still logged in to the accelerator as root.

2. Type:

```
avsetupndmp
```

The following output appears in the command shell:

```
avsetupndmp version 5.0
Configure systems for backup and restore.

avsetupndmp will stop all running agents, do you wish to continue
Y/N? [Y]:
```

3. Press **Enter** to accept the default action to stop all running agents.

The following output appears in the command shell:

```
Network address or DNS name of this Accelerator Node
[ndmpa-1.example.com]:
```

4. Type the accelerator DNS name or IP address and press **Enter**.

The following output appears in the command shell:

```
Network address or DNS name of the Avamar Server
[avamar-1.example.com]:
```

5. Type the Avamar server DNS name or IP address and press **Enter**.

The following output appears in the command shell:

```
Root password of Avamar Server (avamar-1.example.com) [*****]:
```

6. Type the Avamar server software root password (not the operating system root password) and press **Enter**.

The following output appears in the command shell:

```
Enable support for multiple simultaneous backups Y/N?
```

NOTICE

Enabling support for multiple simultaneous backups without satisfying the minimum hardware and operating system requirements specified in [“General capabilities and limitations” on page 12](#) will adversely affect backup performance.

7. Do one of the following:
 - To enable multiple simultaneous backups, type **y** and press **Enter**.
 - To perform multiple backups consecutively instead of simultaneously, press **Enter** to accept the default action.

The following output appears in the command shell:

```
Configure individual system parameters.
```

The following systems are configured:

Choose an action:

1. Add a new system
2. Edit an existing system
3. Remove a system from the list
4. Combine accounts
5. Exit setup

Enter action: [5]:

8. Type **1** and press **Enter**.

The following output appears in the command shell:

```
Setting up a new system account
```

What kind of system do you want to setup?

1. EMC Celerra/VNX
2. EMC Isilon
3. NetApp Filer

Enter choice:

9. Type **3** and press **Enter**.

The following output appears in the command shell:

```
Starting setup for NetApp Filer
```

```
Network address or DNS name of the NetApp Filer [filer.company.com]:
```

10. Type the NDMP filer DNS name or IP address and press **Enter**.

MyFiler.example.com is used as an example NDMP filer name for the remainder of this procedure.

The following output appears in the command shell:

```
storage systemstorage systemNDMP user on "MyFiler.example.com"
[root]:
```

This prompt is asking for a login account on the filer that has sufficient privileges to run NDMP jobs and access all data on the filer. The root user account always has sufficient privileges, but you may specify another user account.

If the user account that you specify in the next step does not have sufficient privileges to run NDMP jobs and access all data on the filer, then backups might not start or might be incomplete.

11. If you intend to specify a filer account other than root, verify that the user account you intend to use has administrator privileges, or at a minimum, has `cli-ndmpd*` and `cli-ndmpcopy*` CLI rights and capabilities.

12. Do one of the following:

- To use the default user account (root), press **Enter** to accept the default filer account name (root).
- To use specify a filer account other than root, type the account name and press **Enter**.

The following output appears in the command shell:

```
Password for "root" on "MyFiler.example.com":
```

13. Type the filer user account password and press **Enter**.

The following output appears in the command shell:

```
Repeat password:
```

14. Retype the same password and press **Enter**.

The following output appears in the command shell:

```
Password encoding scheme ("md5" or "text") to use for
"MyFiler.example.com" [md5]:
```

15. (Optional) Determine which password encoding scheme is currently in use on the NDMP filer:

- a. Open a command shell and log in to the filer.
- b. Type:

```
options ndmpd.authtype
```

This command returns either `plaintext` or `challenge`.

- If `plaintext` is returned, then **text** is the correct entry.
- If `challenge` is returned, then **md5** is the correct entry.

EMC recommends using `challenge/md5` encrypted passwords whenever possible.

16. Type the correct password encoding scheme (either **md5** or **text**) and press **Enter**.

NOTICE

The only valid entries are **md5** or **text**. Supplying any other entries or specifying the incorrect encoding scheme causes an error.

The following output appears in the command shell:

```
Checking username and password... verified Avamar account name for
"MyFiler.example.com" [MyFiler.example.com]:
```

This prompt is asking for a short descriptive name for this filer. This is how that filer client instance will appear in Avamar Administrator. Any user-defined name is acceptable. However, this name must be unique. Be especially careful when adding a second instance of the same filer that you differentiate it from any existing Avamar account name.

17. Specify an Avamar account name:

- To specify an Avamar account name other than the default, type the account name and press **Enter**.
- To use the default Avamar account name, press **Enter** to accept the default Avamar account name.

The following output appears in the command shell:

```
Routable address or DNS name of this accelerator from
"MyFiler.example.com" [ndmpa-1.example.com]:
```

18. Type the accelerator DNS name or IP address and press **Enter**.

The following output appears in the command shell:

```
Writing /usr/local/avamar/var/MyFiler.example.com/.avagent...
Writing /usr/local/avamar/var/MyFiler.example.com/ndmp.cfg...
```

```
Trying to get list of volumes from MyFiler.example.com...
```

```
<dir name="/vol/local1" />
<dir name="/vol/local2" />
Finished setup for
MyFiler.example.com: /usr/local/avamar/var/MyFiler.example.com.
```

```
The following filers are configured:
MyFiler.example.com
/usr/local/avamar/var/MyFiler.example.com
```

```
Choose an action:
1. Add a new filer
2. Edit an existing filer
3. Remove a filer from the list
4. Combine accounts
5. Exit setup
Enter action: [5]:
```

19. Do one of the following:

- To add another filer or an additional Avamar client instance of an existing filer now, select menu option 1 (by typing **1** and pressing **Enter**), then repeat steps 8–18.
- If you do not want to add another filer or an additional Avamar client instance of an existing filer now, press **Enter** to accept the default action (exit setup).

20. Wait for **avsetupndmp** to complete.

The following output appears in the command shell:

```
Attempting to restart avagent service.
```

```
avagent Info: Client 'MyFiler.example.com' in folder
'/usr/local/avamar/var/MyFiler.example.com'
avagent Info <5241>: Logging to
/usr/local/avamar/var/MyFiler.example.com/avagent.log
avagent Info <5417>: daemonized as process id 6669
avagent Info: Client Agent MyFiler.example.com started.
[ OK ]
```

IMPORTANT: Be sure to run `avregister` if you have added new accounts.

21. Type:

avregister

Note: If you added more than one filer or client instance during the **avsetupndmp** session, then **avregister** automatically attempts to register all client instances that it detects on the accelerator.

The following output appears in the command shell:

```
=== Client Registration and Activation
This script will register and activate the client with the
Administrator server.
Enter the Administrator server address (DNS text name or numeric IP
address, DNS name preferred):
```

22. Type the network hostname (as defined in DNS) of the Avamar server and press **Enter**.

The following output appears in the command shell:

```
Enter the Avamar server domain [clients]:
```

23. Do one of the following:

- Press **Enter** to accept the default domain (clients).
- Type a valid domain path and press **Enter**.

When typing a domain path (for example, `clients/linux`), do not include a slash (/) as the first character.

The following output appears in the command shell:

```
avagent.d Info: Server stopped.
[ OK ]
avagent Info <5241>: Logging to /usr/local/avamar/var/avagent.log
avagent.d Info: Client activated successfully.
[ OK ]
avagent Info <5241>: Logging to /usr/local/avamar/var/avagent.log
avagent Info <5417>: daemonized as process id 3385
avagent.d Info: Server started.
[ OK ]
Registration Complete.
```

Enabling NDMP services on the filer

To back up the NetApp filer to the Avamar server, enable the Network Data Management Protocol (NDMP) services on the filer.

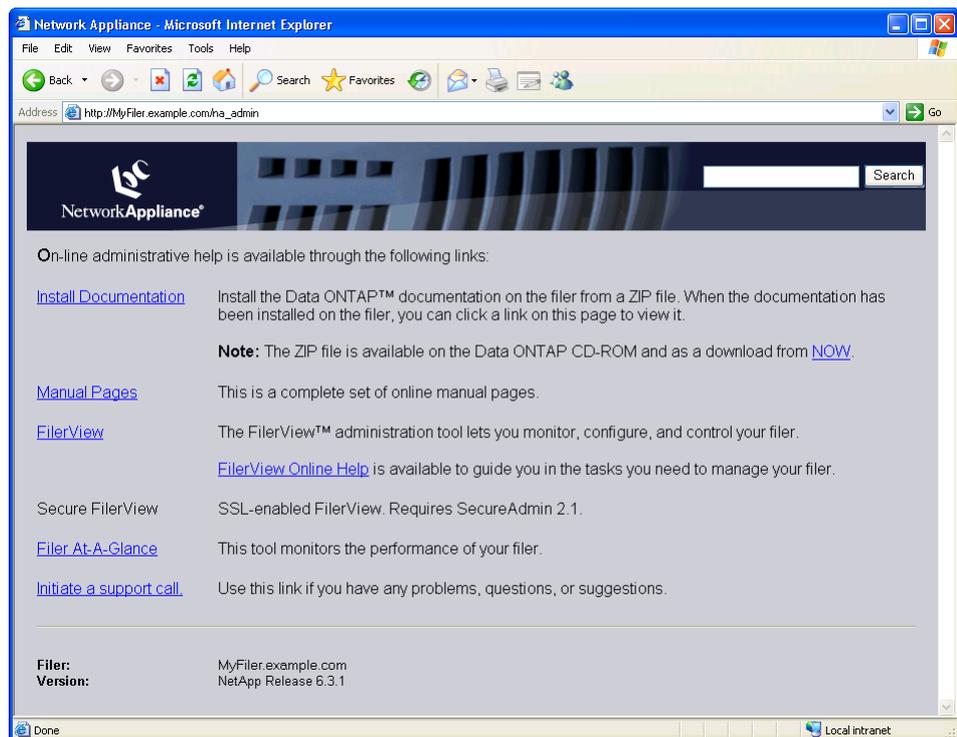
1. Open a web browser and type:

http://MyFiler.example.com/na_admin

where MyFiler.example.com is the NetApp filer network hostname (as defined in DNS) or IP address.

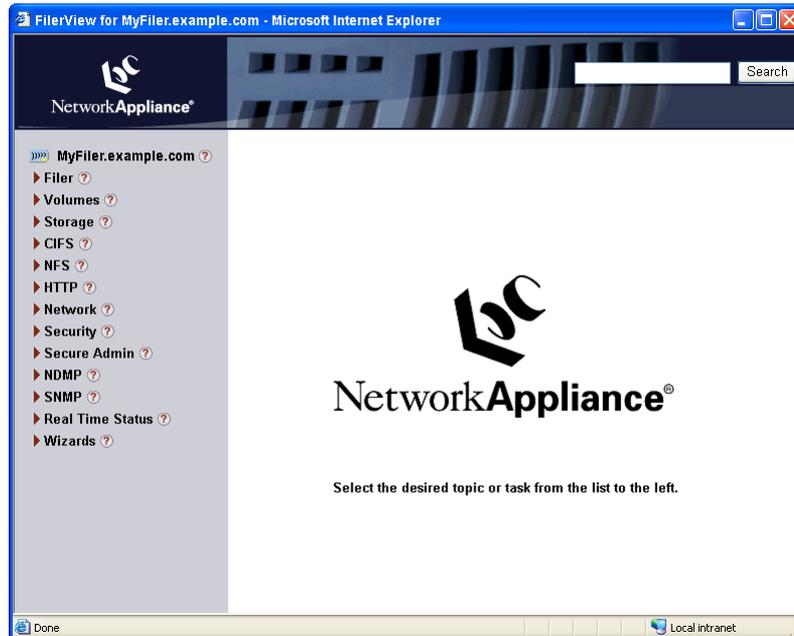
2. If a security alert dialog box appears, click **Yes** or **OK** to allow redirection to the NetApp filer administration page.
3. If a login dialog box appears, type a valid NetApp administrative username and password, then click **Yes** or **OK** to log in to the NetApp filer.

The NetApp administration page appears.



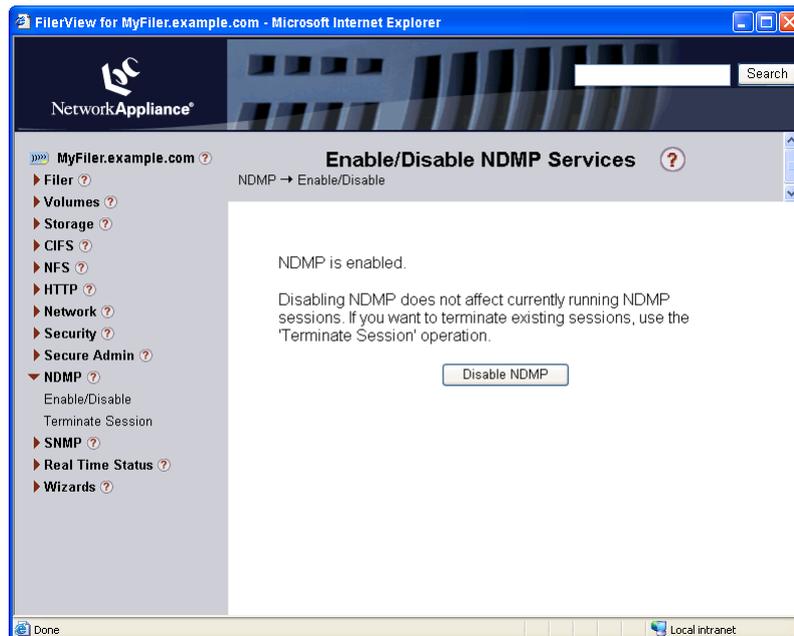
4. Click **FilerView**.

The FilerView page appears.

5. Click **NDMP**.

The Enable/Disable NDMP Services page appears.

If NDMP is already enabled, the Enable/Disable NDMP Services page looks like the following example:



The status NDMP is enabled appears and the alternate action button label is **Disable NDMP**.

6. If NDMP is disabled, click **Enable NDMP**.

Note: You can also enable NDMP by opening a command shell, logging in to the filer, and running the **options ndmpd.enable on** command.

CHAPTER 4

Post-Installation Configuration

The following topics describe how to change Avamar NDMP Accelerator configuration settings, and how to uninstall or upgrade accelerator software:

- ◆ [Changing accelerator configuration settings](#) 44
- ◆ [Configuring multiple simultaneous backups](#)..... 44
- ◆ [Uninstalling the accelerator software](#)..... 47
- ◆ [Upgrading accelerator software](#) 48
- ◆ [Configuring NTP time services on RHEL](#)..... 50
- ◆ [Configuring accelerator dual NIC operation](#)..... 51

Changing accelerator configuration settings

The **avsetupndmp** program can be rerun as often as necessary to reconfigure accelerator settings.

Previously configured storage systems or storage system client instances can be edited or removed by choosing the respective option in the **avsetupndmp** menu.

To use the accelerator with a different Avamar server, you must rerun **avregister**.

You must always rerun **avregister** after adding a new storage system or new client instance of an existing storage system.

Configuring multiple simultaneous backups

It is a best practice to always merge multivolume accounts into one account to take maximum advantage of the Avamar software's ability to schedule multiple simultaneous backups. For example, consider a configuration comprising four accounts, each with multiple volumes:

- ◆ Account1: vol0, vol1, vol2
- ◆ Account2: vol3, vol4, vol5
- ◆ Account3: vol6, vol7, vol8
- ◆ Account4: vol9, vol10, vol11

Before implementation of multiple simultaneous backups support, the backup jobs for each volume in an individual account would run consecutively. This means that the maximum number of concurrent backups running on the filer or Data Mover would be four.

After implementing multiple simultaneous backups, if the accounts are not merged but the three individual volumes in each account are combined into a single multivolume backup job (one backup job for each account), the backups of all volumes runs concurrently when each multivolume backup is run concurrently. This results in 12 concurrent backups, which exceeds the maximum number of concurrent backups allowed on the filer or Data Mover. This causes the backups to fail. A configuration such as this requires that the Maximum Concurrent Data Streams backup option be set to 1 for each multivolume backup, to prevent overloading the filer or Data Mover. This results in only four volumes (one volume from each account) being backed up concurrently.

Instead, the four accounts should all be merged into one combined account with a single, multivolume backup job for all 12 volumes. This allows the Maximum Concurrent Data Streams backup option to be set to the maximum allowed for the filer or Data Mover and takes full advantage of the filer's or Data Mover's ability to stream multiple backups.

To combine multiple accounts into a single account:

1. Install and configure the accelerator as described in [Chapter 2, “EMC Storage System Installation and Configuration,”](#) or [Chapter 3, “NetApp Installation and Configuration”](#).
2. Ensure that the environment meets the requirements to support multiple simultaneous backups. [“General capabilities and limitations” on page 12](#) provides details.
3. Open a command shell and log in to the accelerator as admin.

- Switch user to root by typing:

```
su -
```

- Type:

```
avsetupndmp
```

The following information appears in the command shell:

```
Configure systems for backup and restore.
```

```
avsetupndmp will stop all running agents, do you wish to continue
Y/N? [Y]:
```

NOTICE

Stopping all running agents permanently cancels any backups in progress.

- Press **Enter** to accept the default action to stop all running agents.

The following information appears in the command shell:

```
Network address or DNS name of this Accelerator Node
[ndmpa-1.example.com]:
```

- Type the accelerator DNS name or IP address and press **Enter**.

ndmpa-1.example.com is used as an example accelerator name for the remainder of this procedure.

- Press **Enter** to accept the default action to stop all running agents.

The following information appears in the command shell:

```
Network address or DNS name of the Avamar Server
[avamar-1.example.com]:
```

- Type the Avamar server DNS name or IP address and press **Enter**.

avamar-1.example.com is used as an example Avamar server name for the remainder of this procedure.

The following information appears in the command shell:

```
Root password of Avamar Server [*****]:
```

- Type the Avamar server software root password (not the operating system root password) and press **Enter**.

The following information appears in the command shell:

```
Enable support for multiple simultaneous backups? (IMPORTANT:
Requires 8 or more GB of RAM) [N]:
```

11. Type **y** to enable multiple simultaneous backups and press **Enter**.

The following information appears in the command shell:

```
Writing /usr/local/avamar/etc/usersettings.cfg...
Successfully wrote '/usr/local/avamar/etc/usersettings.cfg'
Writing /usr/local/avamar/etc/agentsettings.cfg...
Successfully wrote '/usr/local/avamar/etc/agentsettings.cfg'
Copying .pin files to existing configurations.
Configure individual system parameters.Writing
```

The following systems are configured:

Choose an action:

1. Add a new system
2. Edit an existing system
3. Remove a system from the list
4. Combine accounts
5. Exit setup

Enter action: [5]:

12. Type **4** to combine accounts and press **Enter**.

The following information appears in the command shell:

```
Enter domain. NOTE: The accounts to be combined must be in the same
domain.:
```

13. Type the name of the domain that contains the accounts to be combined.

Information similar to the following appears in the command shell:

```
Choose the system Account to combine FROM
1. Account1
2. Account2
3. Account1-combined
4. Account2-combined
5. Exit selection
Enter number: [5]
```

14. Select the first account to combine by typing the number of the account and pressing **Enter**.

The following information appears in the command shell:

```
Choose the system Account to combine TO
1. Account1
2. Account2
3. Account1-combined
4. Account2-combined
5. Exit selection
Enter number: [5]
```

15. Select the second account by typing the number of the account and pressing **Enter**.

The following information appears in the command shell:

```
Combining account [domain/account1] TO account
[domain/account1-combined].
The log file is located at
/usr/local/avamar/var/account1-combined/Replicate_account1.log.
```

The following systems are configured:

```
account1          /usr/local/avamar/var/account1
account2          /usr/local/avamar/var/account2
account1-combined /usr/local/avamar/var/account1-combined
```

```
account2-combined      /usr/local/avamar/var/account2-combined
```

Choose an action:

1. Add a new system
2. Edit an existing system
3. Remove a system from the list
4. Combine accounts
5. Exit setup

Enter action: [5]:

16. Do one of the following:

- To combine additional accounts, repeat steps [12–15](#).
- If you do not want to combine additional accounts, press **Enter** to accept the default action (exit setup).

17. After combining accounts, disable scheduled backups for the previous accounts, and configure new datasets and backup schedules for the combined account. “[Backup](#)” on [page 55](#) provides details about creating datasets and scheduling backups.

Uninstalling the accelerator software

1. Open a command shell and log in to the accelerator as admin.

2. Switch user to root by typing:

```
su -
```

3. Query the RPM database for the currently installed clients by typing:

```
rpm -qa | grep Avamar
```

The following information appears in the command shell:

```
AvamarClient-VERSION
AvamarNDMP-linux-rhel4-x86_64-VERSION
```

where VERSION is the Avamar software version.

4. Uninstall the Avamar NDMP software by typing:

```
rpm -e AvamarNDMP-linux-rhel4-x86_64-VERSION
```

where AvamarNDMP-linux-rhel4-x86_64-VERSION is the software package name returned in [step 3](#).

The following information appears in the command shell:

```
ndmjob Info: Server stopped.
avagent Info: Stopping Avamar Client Agent (avagent)...
avagent Info: Client Agent stopped.
avagent Info <5241>: Logging to /usr/local/avamar/var/avagent.log
avagent Info <5417>: daemonized as process id 23997
avagent Info: Client Agent started.
```

5. Uninstall the Avamarclient software by typing:

```
rpm -e AvamarClient-VERSION
```

where AvamarClient-VERSION is the software package name returned in [step 3](#).

The following information appears in the command shell:

```
avagent.d Info: Stopping Avamar Client Agent (avagent)...
avagent.d Info: Client Agent stopped.
```

Upgrading accelerator software

To upgrade the accelerator, you must upgrade both the Avamar Client for Linux and AvamarNDMP software packages to the same version.

Download and copy the accelerator install packages

1. Open a web browser and type the following URL:

```
http://AVAMARSERVER
```

where AVAMARSERVER is the Avamar server network hostname or IP address.

The EMC Avamar Web Restore web page appears.

2. Click **Downloads**.
3. Click **+** next to the **NDMP Accelerator** folder.
4. Download both the **AvamarClient-linux-rhel4-x86_64-VERSION.rpm** and **AvamarNDMP-linux-rhel4-x86_64-VERSION.rpm** install packages to a temporary install folder such as /tmp.

where VERSION is the Avamar software version.

Upgrading from 6.0 and later software

If you are upgrading the accelerator to version 6.0 and later software:

1. Open a command shell and log in to the accelerator as admin.
2. Switch user to root by typing:

```
su -
```

3. Upgrade the AvamarClient software by typing:

```
rpm -U AvamarClient*
```

4. Upgrade the AvamarNDMP software by typing:

```
rpm -U AvamarNDMP-linux-rhel4-x86_64-VERSION*
```

where VERSION is the Avamar software version.

Note: Upgrading the accelerator in this manner preserves the existing configuration settings. You do not have to rerun **avsetupndmp** or **avregister**.

Upgrading from 5.x and earlier software

If you are upgrading the accelerator to version 5.x or earlier software, you must completely uninstall the old software and install the new software. Use of the Linux software upgrade command (**rpm -U**) is not supported.

Running a newer later accelerator with a older Avamar server

If you upgrade accelerator software to a newer version, but do not also upgrade the Avamar server software to the same version, you must manually update the **avtar** binary on the Avamar server utility node. Otherwise, you will not be able to continue backing up to the older Avamar server.

To manually update the **avtar** binary on the Avamar server utility node:

1. Open a command shell and log in:
 - For a single-node server, log in to the server as admin.
 - For a multinode server, log in to the utility node as admin.
2. Switch user to root by typing:
su -
3. Obtain the **dnavclient-VERSION.rhel4_64.x86_64.rpm** installation package and copy it to a temporary folder.

where VERSION is 6.1.100-402 or later.
4. Install the dnavclient package by typing:
rpm -U dnavclient-VERSION.rhel4_64.x86_64.rpm
5. Verify the **avtar** binary version is correct by typing:
avtar --version
6. Verify that the version reported in step 5 is the same version you installed in steps 3–4.

Configuring NTP time services on RHEL

This task is only required if you are configuring an accelerator running the Red Hat Enterprise Linux (RHEL) operating system. Do not perform this task on any accelerator running the SUSE Linux Enterprise Server (SLES) operating system.

1. Open a command shell and log in to the accelerator as admin.
2. Switch user to root by typing:

```
su -
```

3. Copy the `/etc/ntp.conf` and `/etc/ntp/step-tickers` files from the utility node by typing:

```
ssh -x root@ACCELERATOR-NODE
cp -p /etc/ntp.conf{,.orig}
scp root@UTILITY-NODE:/etc/ntp.conf /etc/
cp -p /etc/ntp/step-tickers{,.orig}
scp root@UTILITY-NODE:/etc/ntp/step-tickers /etc/ntp/
```

where `ACCELERATOR-NODE` and `UTILITY-NODE` are the network names or IP addresses of the accelerator and utility nodes, respectively.

4. Restart the `ntpd` service by typing:

```
service ntpd restart
```

5. Verify that the `ntpd` service started correctly by typing:

```
service ntpd status
```

6. Wait 7 to 10 minutes for the system to fully settle.
7. Verify that the `ntpd` service is synchronizing time by typing:

```
/usr/sbin/ntpq -pn
```

8. Verify that the reach column values eventually become nonzero and that an asterisk appears in the left column of one of the time servers.

Ideally, all reach values are 377, which is an octal value meaning that the last eight time server contacts were all successful with no misses.

9. If there are zero reach values, then troubleshoot as follows:

- a. Verify that the list of time servers is correct in `/etc/ntp.conf`. Check this on server nodes `0.s` and `0.0` as well.

The restrict statements in `/etc/ntp.conf` on nodes `0.s` and `0.0` should permit other nodes, such as the accelerator node, to obtain time.

- b. However, if this is not the case, and the reach values for nodes `0.s` and `0.0` remain zero on the accelerator node, then add the following line in `/etc/ntp.conf` on nodes `0.s` and `0.0` for each NDMP Accelerator node IP address:

```
restrict ACCELERATOR-NODE-ADDRESS nomodify
```

where `ACCELERATOR-NODE-ADDRESS` is the IP address of the accelerator node.

The objective is to remove the access restriction from the specified accelerator node.

- c. After making changes to `/etc/ntp.conf` on nodes 0.s and 0.0, restart **ntpd** on those nodes by typing:

```
service ntpd restart
```

- d. Verify that there are no errors, and that the **ntpd** service is synchronizing time by typing:

```
/usr/sbin/ntpq -pn
```

- e. If problems remain, refer to the following EMC knowledgebase articles for additional troubleshooting information:

- *esg119146 Trouble-shooting Avamar 'asktime' and related NTP issues.*
- *esg113472 Frequently asked questions about the Avamar asktime utility.*

10. Ensure that **ntpd** will start at the next reboot by typing:

```
chkconfig ntpd on
```

11. If you have not already done so, set the local time zone on the accelerator by typing:

```
/usr/sbin/timeconfig
```

For best results, set accelerator local time to that of the NDMP storage system so that both client and accelerator log files correlate.

12. Select the correct local time zone from the time zone menu.

13. Verify that the output of the `date` command is accurate by typing:

```
date
```

Configuring accelerator dual NIC operation

To maximize data throughput when you back up multiple Avamar NDMP streams to a Data Domain system, segregate the storage system network traffic from the Avamar server network traffic. This is accomplished by configuring a second Network Interface Card (NIC) so that one NIC accepts storage system traffic, and the other NIC connects to the Avamar server.

Configuring an accelerator for dual NIC operation supports diverse network topologies. Storage systems can be on the same or different subnets, and are not required to be on the same subnet as the Avamar server.

To configure an accelerator for dual NIC operation:

1. Ensure that the accelerator has been set up and configured, as described in [Chapter 2, “EMC Storage System Installation and Configuration,”](#) or [Chapter 3, “NetApp Installation and Configuration”](#).
2. Obtain and note the following information:
 - IP address for the secondary NIC
 - Subnet mask for the accelerator
 - Host name for the secondary NIC

- Gateway IP address of the subnet where the accelerator resides
 - IP address of the storage system
3. Open a command shell and log in to the accelerator as admin.
 4. Switch user to root by typing:


```
su -
```
 5. Launch the YaST2 configuration program by typing:


```
yast2
```
 6. In the YaST2 Control Center, select **Network Devices** > **Network Settings**, and press **Enter**.

Note: Use **Tab** or cursor keys to select menus, submenus, and fields.

7. On the **Network Settings** screen, highlight the secondary NIC list entry, then press **F4** to edit secondary NIC settings.
8. On the **Network Card Setup** screen, complete the following:

Note: Use the information obtained in step 2 for these settings.

- a. Press **Tab** to highlight the **Statically assigned IP address** option, and press **Enter** to select it.
 - b. Press **Tab** to enter the **IP Address** field.
 - c. Type the IP address for the secondary NIC.
 - d. Press **Tab** to enter the **Subnet Mask** field.
 - e. Type the subnet mask for the accelerator.
 - f. Press **Tab** to enter the **Hostname** field.
 - g. Replace the default hostname with the correct hostname of the secondary NIC.
 - h. Note the device name in the **Configuration Name** field.
Typically, the device name will be eth1.
 - i. Press **Tab** to highlight **Next**, and press **Enter**.
9. On the **Network Settings** screen, complete the following:

Note: Use the information obtained in step 2 for these settings.

- a. Press **Tab** to navigate to the top row, press the right arrow key to highlight **Routing**, and press **Enter**.
- b. Press **Tab** to enter the **Default Gateway** field.
- c. Ensure the **Default Gateway** setting is correct. If not, type the correct gateway IP address of the subnet where the accelerator resides.
- d. Press **Tab** to highlight **Add**, and press **Enter**.

10. In the next window, complete the following:

Note: Use the information obtained in step 2 for these settings.

- a. Press **Tab** to enter the **Destination** field.
- b. Type the storage system IP address.
- c. Press **Tab** to enter the **Device** field.
- d. Type the device name noted on the **Network Card Setup** screen.

Typically, the device name will be eth1.

- e. Press **Tab** to enter the **Gateway** field.
- f. Type the IP address of the secondary NIC.
- g. Press **Tab** to enter the **Netmask** field.
- h. Type the subnet mask for this route.

Typically, the subnet mask will be 255.255.255.255 when a single storage system is backing up to an accelerator. However, when multiple storage systems are backing up to the same accelerator, the subnet mask might be different.

- i. Press **Tab** to highlight **OK**, and press **Enter**.

11. On the **Network Settings** screen, press **Tab** to highlight **OK**, and press **Enter**.

12. On the YaST2 Control Center main screen, exit the program by pressing **Tab** to highlight **Quit**, and pressing **Enter**.

CHAPTER 5

Backup

The following topics describe how to use the Avamar NDMP Accelerator to perform full or incremental backups of supported storage systems:

- ◆ [On-demand backup](#) 56
- ◆ [Scheduled backups](#)..... 58

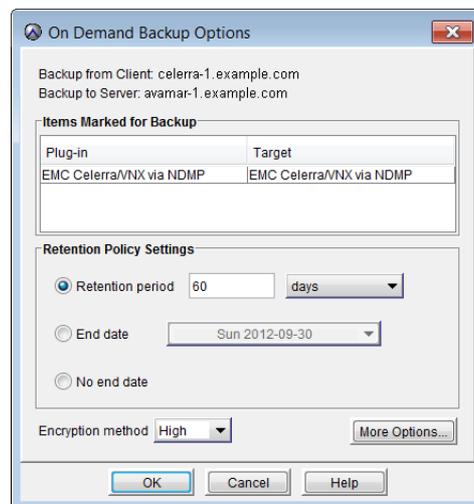
Note: For the sake of clarity, this publication often uses the term “storage system” to generically refer to any supported EMC Isilon, VNX, VNXe, or Celerra IP storage system, or NetApp filer.

On-demand backup

To perform full or incremental backups using the Avamar NDMP Accelerator:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.
The Backup, Restore and Manage window appears.
2. In the clients tree, select a storage system client.
3. Click the **Backup** tab.
4. Select the accelerator in the tree in the upper left pane.
5. Select a client in the lower left pane.
6. In the **Browse for Files, Folders, or Directories** pane, do one of the following:
 - For VNX, VNXe, Celerra, or NetApp storage systems:
 - a. Select the plug-in.
 - b. Select one or more volume checkboxes.
 - For Isilon filers:
 - a. Select the **Isilon Filer via NDMP** plug-in.
The Browse Command Line Options dialog box appears.
 - b. Type the Isilon browse password and click **OK**.
The Browse Command Line Options dialog box closes.
The /ifs root directory appears.
 - c. Select one or more directory checkboxes.
7. Select **Actions > Backup Now**.

The On Demand Backup Options dialog box appears.



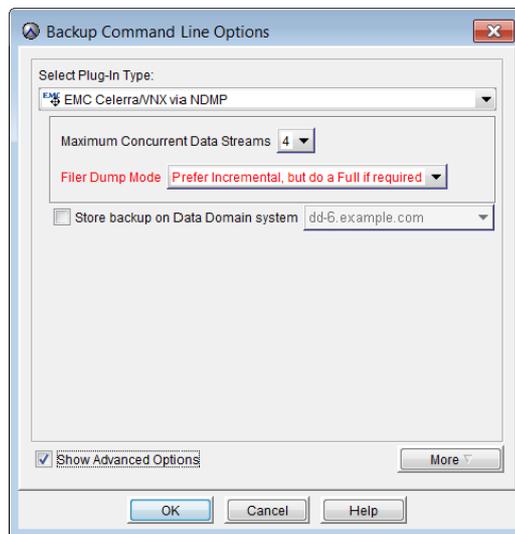
8. Select the backup retention setting:
 - To automatically delete this backup from the Avamar server after a specific amount of time, select **Retention period** and then specify the number of days, weeks, months, or years for the retention period.
 - To automatically delete this backup from the Avamar server on a specific calendar date, select **End date** and browse to that date on the calendar.
 - To keep this backup for as long as this client remains active in the Avamar server, select **No end date**.
9. Select the encryption method for client/server data transfers during the backup.

Note: The exact encryption technology and bit strength used for any particular client/server connection depends on several factors, including the client operating system and Avamar server version. The *EMC Avamar Product Security Guide* provides details.

10. Click **More Options**.

The Backup Command Line Options dialog box appears.

11. Select the **Show Advanced Options** checkbox.



12. From the **Maximum Concurrent Data Streams** list, select the maximum number of streams that can be processed concurrently during the backup.
13. From the **Filer Dump Mode** list, select the type of backup to perform:
 - To perform an incremental (level 1) backup unless a full (level 0) backup is required (because it does not exist), select **Prefer Incremental, but do a Full if required**.
 - To perform a full backup, select **Force a level 0 dump**.

NOTICE

Forcing a full (level 0) dump resends all data in the requested volume from the storage system to the accelerator. This is not recommended.

- To perform an incremental backup, select **Force an incremental (level 1) dump**.

NOTICE

For best results, always perform incremental backups at the volume level. Do not force incremental backups of lower level folders and subfolders as this can cause unpredictable application behavior.

14. In the **Backup label** field, specify a descriptive label for the backup.
15. To store this backup on a Data Domain system, select the **Use Data Domain System** option, then select a Data Domain system from the list.
16. Click **OK**.
The On Demand Backup Options dialog box closes and the following status message appears: Backup initiated.
17. Click **OK**.

Scheduled backups

To perform scheduled backups using the accelerator:

1. Create a dataset for the backups, as discussed in [“Creating a dataset” on page 58](#).
2. Create a group for the backups, as discussed in [“Creating a group” on page 60](#).
3. Enable scheduling for the group, as discussed in [“Enabling scheduled backups” on page 61](#).

A thorough discussion of groups, group policy, datasets, schedules, and retention policies is beyond the scope of this guide. The *EMC Avamar Administration Guide* provides details.

Creating a dataset

To create a dataset for scheduled backups:

1. In Avamar Administrator, select **Tools > Manage Datasets**.
The Manage All Datasets window appears.
2. Click **New**.
The New Dataset dialog box appears.
3. In the **Name** field, type a name for the dataset.
Do not use any of the following characters in the dataset name: ~!@\$%^&(){}[]|,`;
#\/*?<>””&.
4. On the **Source Data** tab, choose whether the dataset includes data from all plug-ins installed on the client or only specific plug-ins installed on the client.
 - To include data from all plug-ins installed on the client, select **Select All Data for All Local File Systems**.
 - To include data from only specific plug-ins installed on the client, select **Enter Explicitly**.

5. If you chose **Enter Explicitly**, you can customize the dataset by including a subset of the installed plug-ins or by specifying individual files or folders:
 - a. To remove a plug-in from the dataset, select the plug-in from the list in the bottom portion of the **New Dataset** dialog box, and then click -. Repeat this step as necessary.
 - b. To add a plug-in to the dataset, select the plug-in from the **Select Plug-In Type** list, and then click +. Repeat this step as necessary.

All Avamar plug-ins are listed in the **Select Plug-In Type** list, but only plug-ins installed on the client are available to add to the dataset.
 - c. (Optional) Limit the dataset to specific volumes:
 - Select **Select Files and/or Folders**.
 - Click ... (**Browse for files and/or folders**) to open the **Select Files and/or Folders** dialog box.
 - Browse to and select the client from the **Clients** tree.
 - Expand the plug-in node in the middle pane to view a list of volumes on the client.
 - If the **Browse Command Line Options** dialog box appears, enter a password and click **OK**.
 - Select the checkbox next to the volumes to include in the dataset for scheduled backups.
 - Click **OK**.
6. Do one of the following:
 - For VNX, VNXe, Celerra, or NetApp storage systems, disregard **Exclusions** tab settings. Exclusions cannot be specified for these storage systems.
 - (Optional) For Isilon filers, enter directories, folders, or files you want to exclude in the **Exclusions** tab. *EMC Avamar Operational Best Practices* provides details about using dataset exclusions to optimize Isilon backup performance.
 - Disregard **Inclusions** tab settings. Inclusions cannot be specified for any storage systems.
7. Click the **Options** tab and set the plug-in options:
 - a. Select the accelerator plug-in from the **Select Plug-In Type** list.
 - b. Select the **Show Advanced Options** checkbox.

The plug-in options appear on the **Options** tab.
 - c. From the **Maximum Concurrent Data Streams** list, select the maximum number of streams that can be processed concurrently during the backup.
 - d. From the **Filer Dump Mode** list, select the type of backup to perform:
 - To perform an incremental (level 1) backup unless a full (level 0) backup is required because it does not exist, select **Prefer Incremental, but do a Full if required**.

- To perform a full backup, select **Force a level 0 dump**.
Note: Forcing a full (level 0) dump resends all data in the requested volume from the storage system to the accelerator. This is not recommended.
 - To perform an incremental backup, select **Force an incremental (level 1) dump**.
Note: For best results, always perform incremental backups at the volume level. Do not force incremental backups of lower level folders and subfolders as this can cause unpredictable application behavior.
 - e. To store this backup on a Data Domain system, select the **Use Data Domain System** option, then select a Data Domain system from the list.
8. Click **OK** to close the **New Dataset** dialog box, and then click **OK** to close the **Manage All Datasets** dialog box.

Creating a group

To create a group for scheduled backups:

1. In Avamar Administrator, click the **Policy** launcher button.
The Policy window appears.
2. Select the **Groups** tab.
3. In the left pane, select the Avamar domain to which the group should belong.
4. Select **Actions > New Group**.
The New Group wizard appears.
5. In the **Name** field, type a name for the new group.
Do not use any of the following characters in the group name: ~!@\$%^&{}[]|,`~; #\/*?<>'”&.
6. Clear the **Disabled** checkbox to use this group to perform scheduled client backups.
Selecting the checkbox disables backups for the group.
7. Select the encryption method for client/server data transfers during backups.

Note: The exact encryption technology and bit strength used for any particular client/server connection depends on several factors, including the client operating system and Avamar server version. The *EMC Avamar Product Security Guide* provides details.

8. Choose whether to use the assigned schedule for the group or override the assigned schedule:
 - To use the assigned schedule, leave the **Override Schedule** checkbox clear.
 - To override the schedule:
 - a. Select **Override Schedule**.
Selecting **Override Schedule** enables the **Skip Next Backup** and **Run Next Backup Once** options.

- b. Choose whether to skip the next scheduled backup entirely or to perform the next scheduled backup one time only by selecting either **Skip Next Backup** or **Run Next Backup Once**.
9. Click **Next**.

The next New Group wizard screen appears with dataset information.
10. From the **Select An Existing Dataset** list, select the dataset that you defined during [“Creating a dataset” on page 58](#).
11. Click **Next**.

The next New Group wizard screen appears with schedule information.
12. From the **Select An Existing Schedule** list, select a schedule for the group.

You cannot edit schedules from this screen. Detailed schedule properties are shown so that you can review them prior to making a selection. The *EMC Avamar Administration Guide* provides details about editing schedule properties.
13. Click **Next**.

The next New Group wizard screen appears with retention policy information.
14. From the **Select An Existing Retention Policy** list, select a retention policy for the group.

You cannot edit retention policies from this screen. Detailed retention policy properties are shown so that you can review them prior to making a selection. The *EMC Avamar Administration Guide* provides details about editing retention policy properties.
15. Click **Next**.

The final New Group wizard screen appears with a tree of domains and clients.
16. Select the storage system from the client list.
17. Click **Finish**.

The New Group wizard closes and the new group appears in the Policy window.

Enabling scheduled backups

To ensure that the group is enabled for scheduled backups:

1. In Avamar Administrator, click the **Policy** launcher button.

The Policy window appears.
2. On the **Policy Management** tab, select the **Groups** tab.
3. Select the group that you created in [“Creating a group” on page 60](#).
4. Select **Actions > Group > Disable Group**.

This clears the **Disable Group** option on the **Actions > Group** menu.

A confirmation message appears.
5. Click **Yes** to enable this group.

CHAPTER 6

Restore

The following topics describe how to use the Avamar NDMP Accelerator to perform full recoveries (restores) of supported storage systems:

- ◆ [Restoring to the original location](#) 64
- ◆ [Restoring to a different location](#) 66

Note: For the sake of clarity, this publication often uses the term “storage system” to generically refer to any supported EMC Isilon, VNX, VNXe, or Celerra IP storage system, or NetApp filer.

Restoring to the original location

To restore data to the original storage system location:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The **Backup, Restore and Manage** window appears.

2. From the list of clients, select the accelerator.

A list of storage system clients registered with that accelerator appears in the lower pane.

3. Select the storage system client.

4. Click the **Restore** tab.

5. Click the **By Date** tab.

Valid backups occurred on dates with a yellow highlight.

6. Select the backup date from the calendar.

A list of backups on that date appears in the **Backups** table next to the calendar.

7. Select a backup from the **Backups** table.

8. In the lower right pane, expand the folder tree to view a list of volumes.

9. Select the data to restore:

- To restore an entire volume, select the checkbox next to the volume in the left section of the **Contents of Backup** pane.

- To restore an individual folder or file on a volume:

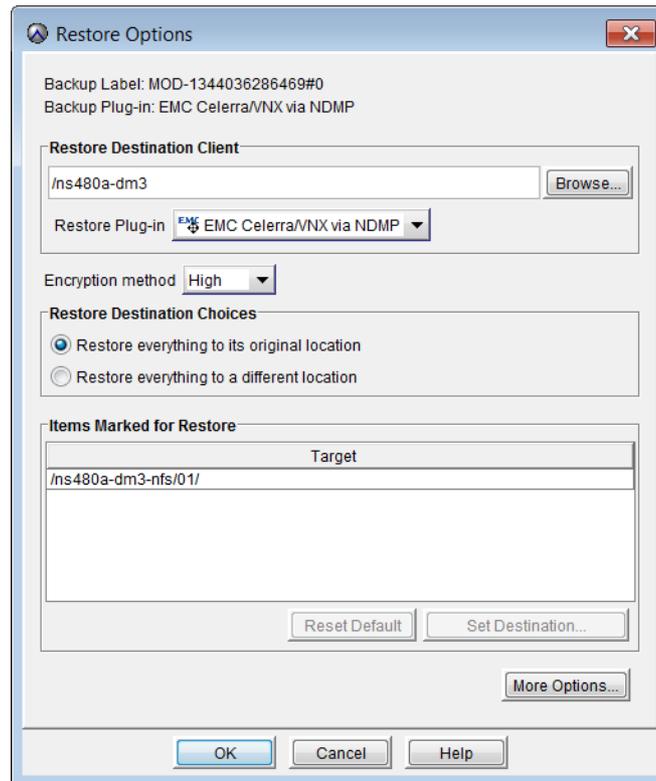
- a. Select the volume in the left section of the **Contents of Backup** pane.

The files and folders on the volume appear in the right section of the **Contents of Backup** pane.

- b. Select the checkbox next to the folder or file to restore.

10. Select **Actions > Restore Now**.

The Restore Options dialog box appears.



11. Ensure that the accelerator is selected in the **Restore Plug-in** list.

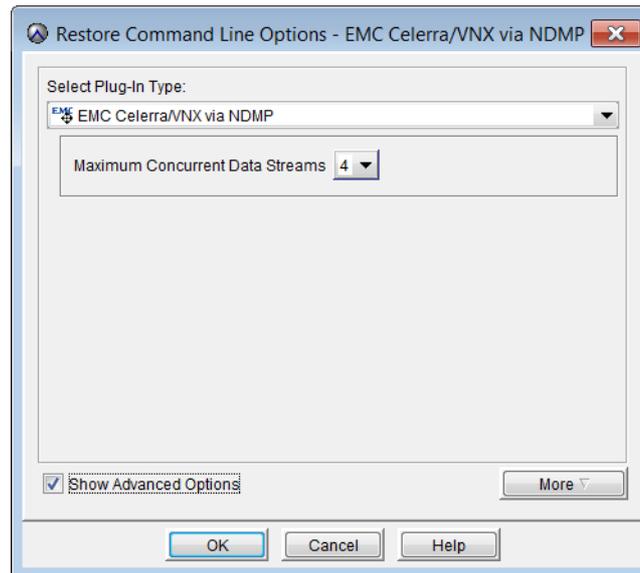
12. Select the encryption method for client/server data transfers during the restore.

Note: The exact encryption technology and bit strength used for any particular client/server connection depends on several factors, including the client operating system and Avamar server version. The *EMC Avamar Product Security Guide* provides details.

13. Select **Restore everything to its original location**.

14. Click **More Options**.

The Restore Command Line Options dialog box appears.



15. From the **Maximum Concurrent Data Streams** list, select the maximum number of streams that can be processed concurrently during the restore.

16. Click **OK** on the **Restore Command Line Options** dialog box.

17. Click **OK** on the **Restore Options** dialog box.

The Restore Request dialog box indicates that the restore was initiated.

18. Click **Close**.

Restoring to a different location

To restore data to a different location:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The **Backup, Restore and Manage** window appears.

2. From the list of clients, select the accelerator.

A list of storage system clients registered with that accelerator appears in the lower pane.

3. Select the storage system client.

4. Click the **Restore** tab.

5. Click the **By Date** tab.

Valid backups occurred on dates with a yellow highlight.

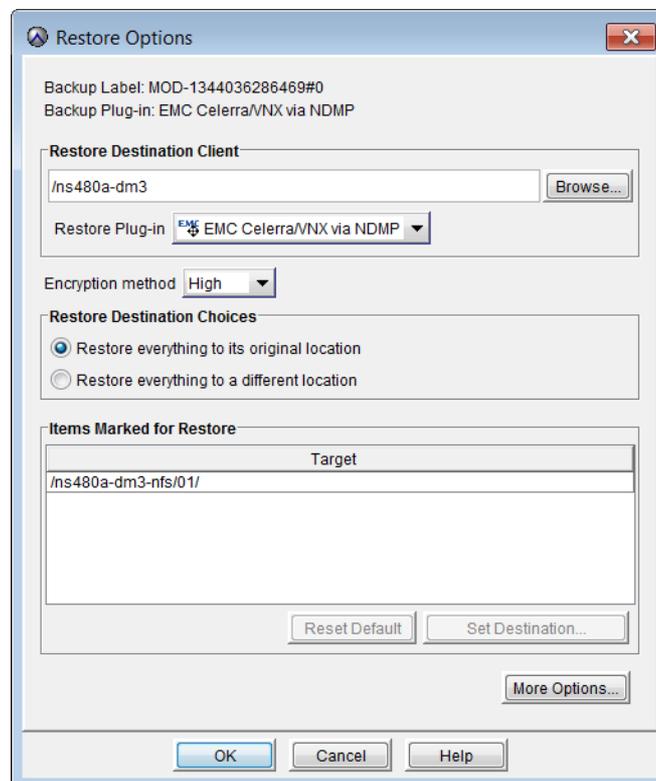
6. Select the backup date from the calendar.

A list of backups on that date appears in the **Backups** table next to the calendar.

7. Select a backup from the **Backups** table.

8. In the lower right pane, expand the folder tree to view a list of volumes.
9. Select the data to restore:
 - To restore an entire volume, select the checkbox next to the volume in the left section of the **Contents of Backup** pane.
 - To restore an individual folder or file on a volume:
 - a. Select the volume in the left section of the **Contents of Backup** pane.
The files and folders on the volume appear in the right section of the **Contents of Backup** pane.
 - b. Select the checkbox next to the folder or file to restore.
10. Select **Actions > Restore Now**.

The Restore Options dialog box appears.



11. Select the destination client for the data to restore:
 - To restore to a different volume on the same client, leave the default selection of the original client in the **Restore Destination Client** box.
 - To restore to a different client:
 - a. Click the **Browse** button next to the **Restore Destination Client** field.
The Browse for Client Destination dialog box appears.
 - b. Browse to and select the destination client.
 - c. Click **OK**.

12. Ensure that the accelerator is selected in the **Restore Plug-in** list.
13. Select the encryption method for client/server data transfers during the restore.

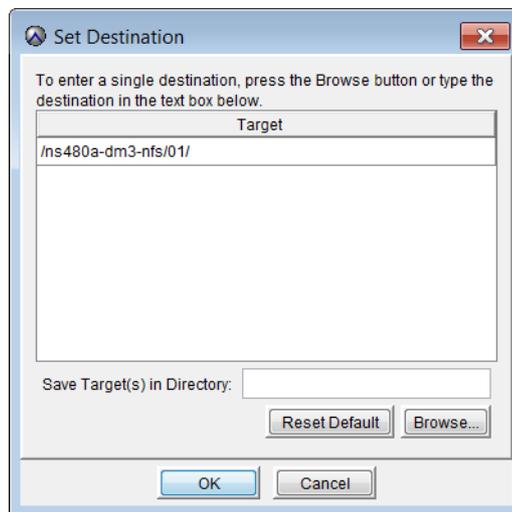
Note: The exact encryption technology and bit strength used for any particular client/server connection depends on several factors, including the client operating system and Avamar server version. The *EMC Avamar Product Security Guide* provides details.

14. Select **Restore everything to a different location**.

The buttons below the Items Marked for Restore list become active.

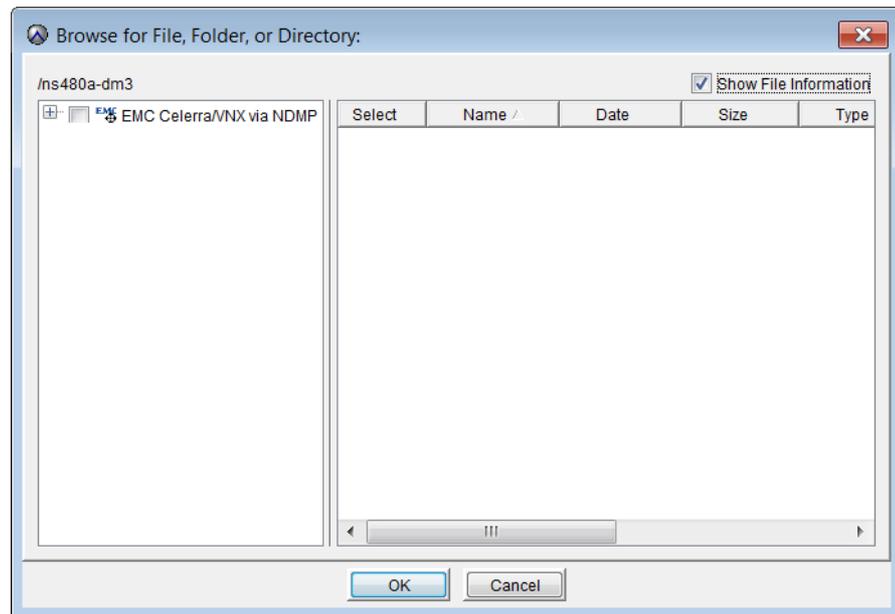
15. Click **Set Destination**.

The Set Destination dialog box appears.



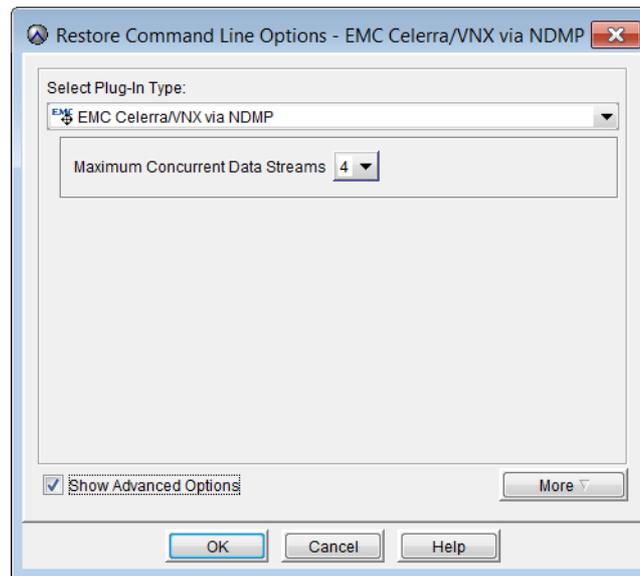
16. Click **Browse**.

The **Browse for File, Folder, or Directory** dialog box appears.



17. Select the node in the left pane for the accelerator.
A list of volumes on the storage system appears.
18. Select the checkbox next to the target volume in the left pane.
19. For Isilon filers:
 - a. In the Browse Command Line Options dialog box, enter the Isilon root password and click **OK**.
The Browse Command Line Options dialog box closes.
The /ifs root directory appears.
 - b. Select one or more directory checkboxes.
20. Click **OK**.
The target volume appears in the Save Target(s) in folder field.
21. Click **OK**.
22. On the **Restore Options** dialog box, click **More Options**.

The Restore Command Line Options dialog box appears.



23. From the **Maximum Concurrent Data Streams** list, select the maximum number of streams that can be processed concurrently during the restore.
24. Click **OK** on the **Restore Command Line Options** dialog box.
25. Click **OK** on the **Restore Options** dialog box.

The Restore Request dialog box indicates that the restore was initiated.

26. Click **Close**.

APPENDIX A

Plug-in Options

The following topics provide information about backup and restore plug-in options for the Avamar NDMP Accelerator:

- ◆ [How to set plug-in options 72](#)
- ◆ [Backup options 72](#)
- ◆ [Restore options 73](#)

How to set plug-in options

Plug-in options enable you to control specific actions for on-demand backups, restores, and scheduled backups. The plug-in options that are available depend on the operation type and client plug-in type.

You specify plug-in options for on-demand backup or restore operations, or when you create a dataset for a scheduled backup. You can set options by using the graphical controls and by typing options and values in the Enter Attribute and Enter Attribute Value fields.

NOTICE

No error checking or validation is performed on free text entries. Additionally, free text entries override settings made using the graphical controls.

Detailed instructions on how to access and set plug-in options during a backup or restore are available in [Chapter 5, “Backup,”](#) and [Chapter 6, “Restore.”](#)

Backup options

The following plug-in options are available when you perform an on-demand backup or configure a dataset for scheduled backups for the EMC Celerra via NDMP and Netapp Filer via NDMP plug-ins.

Table 3 Backup options

Setting	Description
Maximum Concurrent Data Streams	Specifies the maximum number of streams that can be processed concurrently.
Filer Dump Mode	One of the following: <ul style="list-style-type: none"> • Prefer Incremental, but do a Full if required • Force a level 0 dump • Force an incremental (level 1) dump
Backup label	Descriptive label for the backup. Note: This option is only available during on-demand backups.
Use Data Domain system	To store the backup on a Data Domain system instead of the Avamar server, select the checkbox and then select the Data Domain system from the list. Note: To enable this option, add a Data Domain system to the Avamar configuration. The <i>EMC Avamar and EMC Data Domain System Integration Guide</i> provides instructions.

Restore options

The following plug-in option is available when you perform a restore using the Avamar NDMP Accelerator plug-ins (EMC Celerra via NDMP and Netapp Filer via NDMP).

Table 4 Restore options

Setting	Description
Maximum Concurrent Data Streams	Specifies the maximum number of streams that can be processed concurrently.

APPENDIX A

Command-Line Interface

The following topics explain how to use the Command-Line Interface (CLI) to back up or restore data with the Avamar NDMP Accelerator:

- ◆ [Synopsis](#) 76
- ◆ [Commands](#) 76
- ◆ [Options](#)..... 76
- ◆ [Avamar-only options](#) 78

Synopsis

```
avndmp {--backup | --browse | --check-filer-version |
--check-ndmp-enabled | --restore}

[--acceladdr=ACCELERATOR] [--advanced_options="FLAGS"]
[--allowsubvolumeincremental] [--avamar-account-path=PATH]
[--avtarflags="OPTIONS"] [--avtarport=PORT] [--check-password]
[--ddr] [--ddr-index=INT] [--debug] --fileraddr=FILER
[--filerpswd=PASSWORD] [--filertype={md5 | text}]
[--fileruser=USER] [--full] [--incremental] [--isilon-exclude=PATH]
--labelnum=NUM [--logfile=FILE] [--prefix=STRING]
[--restoretarg=PATH] [--version]
```

Commands

Supply one and only one of the following commands on each command line.

Table 5 avndmp commands

Command	Description
--backup	Backs up an NDMP filer.
--browse	Browses the NDMP filer for available volumes.
--check-filer-version	Returns the version of the NetApp software.
--check-ndmp-enabled	Returns status of NDMP services on the filer.
--restore	Restores an NDMP filer.

Options

The following options are available for the **avndmp** script.

Table 6 avndmp options (page 1 of 2)

Option	Description
--acceladdr=ACCELERATOR	Specifies the IP address or DNS name of the Avamar NDMP Accelerator.
--advanced_options="FLAGS"	Specifies a list of advanced options (FLAGS) from a work order.
--allowsubvolumeincremental	Used with --backup to force incremental backups of target subfolders.
--avamar-account-path=PATH	Specifies a user location (PATH) in the Avamar server. Derived from work order.
--avtarflags="OPTIONS"	Specifies OPTIONS from work order that are passed to avtar . Enclose OPTIONS in double-quotes and separate multiple options with white space.
--avtarport=PORT	Specifies the PORT that avtar uses to communicate with avagent . Derived from work order.
--check-password	If supplied, the ndmjob -q command is issued to validate the username and password on the storage system. It exits with an error if that password is not valid.

Table 6 avndmp options (page 2 of 2)

Option	Description
--ddr	If supplied, backup is stored on a Data Domain system. If not supplied, backup is stored on the Avamar server.
--ddr-index=INT	If --ddr-index=0 is supplied, backup is stored on the Avamar server. Any other positive integer (INT) refers to a Data Domain system.
--debug	Enables debug mode, which prints messages that programmers can use to debug script execution.
--fileraddr=FILER	Specifies the IP address or DNS name of the NDMP FILER. This option is required for all commands.
--filerpswd=PASSWORD	Specifies the PASSWORD for the --id=fileruser account.
--filertype={md5 text}	Specifies the filer authentication method as either md5 or text when logging in with the --id=fileruser account.
--fileruser=USER	Specifies the NDMP filer login account.
--full	Used with --backup to perform a full backup of the NDMP filer.
--incremental	Used with --backup to perform an incremental backup of the NDMP filer. This is the default backup mode.
--isilon-exclude=PATH	Specifies one or more directories to exclude from Isilon backups, where PATH conforms to the following format: ROOT-DIR:SUBDIR[,SUBDIR,...] Root directories are separated from subdirectories by a colon (:). Multiple excluded subdirectories are separated by commas (,). PATH cannot exceed 1,024 characters. If a directory name contains a colon (:) or comma (,), it must be escaped with a backslash (\). Relative paths should begin with a forward slash (/). If a forward slash is not specified on the command line, the system will add it. For example, this PATH statement: --isilon-exclude=/ifs/backup_dir2:/relative_path_2_1,/relative_path_2_2 Excludes both of these directories: /ifs/backup_dir2/relative_path_2_1 /ifs/backup_dir2/relative_path_2_2
--labelnum=NUM	Used with --restore to select the label (sequence) number of the backup to restore. This option is required.
--logfile=FILE	Logs to FILE. If no FILE value is supplied, then the default log file (avndmp.log) is used.
--prefix=STRING	Prefixes this STRING to all log files. This is typically the Work order ID (WID).
--restoretargt=PATH	Used with --restore to specify an alternative restore location (other than the default location specified by --snappath) on the NDMP filer.
--version	Shows version, then exits.

Avamar-only options

Avamar-only options access advanced functionality that is normally reserved for use by EMC personnel only. Misuse of these advanced options can cause loss of data. If you are unsure about any aspect of these options, contact EMC Customer Support before using them.

Table 7 Avamar-only advanced options for the **avndmp** command

Option	Description
<code>--use-max-changed-date={true false}</code>	If <code>--use-max-changed-date=true</code> is supplied, latest modification date is used. If <code>--use-max-changed-date=false</code> is supplied, the base modification date is used. True is the default setting.

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