

# NDMP NAS Option Guide

Arcserve® Backup

r17.5

arcserve®

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## Arcserve Product References

This document references the following Arcserve products:

- Arcserve® Backup
- Arcserve® Unified Data Protection
- Arcserve® Unified Data Protection Agent for Windows
- Arcserve® Unified Data Protection Agent for Linux
- Arcserve® Replication and High Availability

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## Arcserve Backup Documentation

Arcserve Backup documentation contains specific guides and release notes for all major releases and service packs. Click links below to access documentation.

- [Arcserve Backup r17.5 SP1 Release Notes](#)
- [Arcserve Backup r17.5 Bookshelf](#)

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## Chapter 1: Introducing the Arcserve Backup NDMP NAS Option

Arcserve Backup is a comprehensive storage solution for applications, databases, distributed servers, and file systems. It provides backup and restore capabilities for databases, business-critical applications, and network clients.

The Arcserve Backup NDMP NAS Option lets you back up and restore data on Network Attached Storage (NAS) devices using Network Data Management Protocol (NDMP). The Arcserve Backup NDMP NAS Option resides on the same server as Arcserve Backup and handles all communication between Arcserve Backup and the NAS server that performs backup and restore jobs.

This section contains the following topics:

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## Features

The option has the following features:

### **Push Technology**

Lets you complete a backup more efficiently by processing the data locally at the NAS server. Push technology offloads system resources from the Arcserve Backup host server and minimizes network traffic by initiating the backup and restore jobs remotely on the NAS server.

### **Real-time Remote Browsing**

Lets system administrators view real-time file and directory information about the remote target computer.

**Note:** This feature requires NAS-vendor support.

### **Local and Three-way NDMP Backups and Restores**

Lets you use a tape device attached to one of the NAS servers with the other NAS servers in the configuration. The tape device does not need to be attached locally to the NAS server to back up or restore that server.

**Note:** When you move NAS tape devices from one NAS server to a different NAS server, the new hardware configuration results in a three-way restore operation.

### **NAS Filer to Server NDMP Backups and Restores**

Lets you back up the NAS filer directly to the Arcserve Backup server, where all devices that are attached to the backup server can be used as the destination of the NAS filer backup job. NAS filer to server restore jobs restore NAS data back to an NAS filer from any type of Arcserve Backup media or migrated media.

### **NAS Changer Support**

Supports backing up and restoring NAS servers using changers or tape library units attached locally to an NAS server or remotely to a different NAS server. This feature lets you back up and restore a local or remote NAS server using a three-way NDMP backup or restore.

### **Multistreaming Support**

Lets one agent handle different requests and perform multiple jobs simultaneously.

### **NAS 64-bit Support**

Supports x64 Arcserve Backup servers to back up NAS filers.

### **Tapecopy Support**

Provides the tapecopy utility, which allows you to copy NAS sessions from one tape to another.

The tapecopy utility provides the following NAS session capabilities:

- Perform a tapecopy backup of normal NAS sessions
- Perform a tapecopy backup of NAS sessions with or without a tape span situation (involving one or more tapes)
- Perform a tapecopy backup of NAS sessions from the query mode
- Perform a tapecopy backup of NAS sessions using the "-entire" source option which allows you to copy all tapes in a group to another group.

Most tapecopy switches can be used; however, some limitations apply for tapecopy support of NAS sessions:

- The tapecopy source and destination groups should be SAN dynamic device sharing (DDS) groups (accessible to both the Arcserve Backup server and the NAS filer).
- Does not support remote copy (using SAN/NAS DDS environment)
- Does not support copy to a FSD or from a FSD.
- Does not support multiplexing and encryption

### **Dynamic Device Sharing**

Uses DDS to enable the Arcserve Backup server to share tape library units (TLU) on a storage area network (SAN). You can share a TLU between multiple NAS servers exclusively, or share multiple NAS servers with a TLU and the Arcserve Backup server. DDS enables your environment to select the optimal device to back up and restore data. For more information about DDS, see the section Dynamic Device Sharing.

**Note:**To use dynamic device sharing, you must install the Arcserve Backup SAN Option and Tape Library Option.

## Option Architecture

The NDMP NAS Option provides services that allow Arcserve Backup to back up and restore files and directories. These services utilize several components in a variety of configurations to perform backup and restore jobs.

## Network Data Management Protocol (NDMP)

NDMP is a communication protocol that allows interaction with an NAS server on the network. It lets a backup application, such as Arcserve Backup, control the backup and retrieval of data performed by an NDMP server. The NDMP-enabled server executes on NAS servers. It enables data transfers between tape library units and disks connected locally and remotely to any NAS server on the network.

NDMP allows a network backup application, such as Arcserve Backup, to initiate backup operations from a network node. The backup application does not transfer data. Instead, the NDMP server executing on the NAS server performs the data transfer.

## NAS Server

The NAS server implements the NDMP protocol and performs the actual backup and restore operations. The NDMP server executes on the NAS server and is supplied by the manufacturer of the NAS server. Arcserve Backup interfaces with the NDMP server running on the NAS server using NDMP.

## Remote Browsing

Arcserve Backup automatically enumerates files and directories for Network Appliance servers that support NDMP Version 4. If an NAS server supports NDMP Version 3, the volumes are automatically enumerated.

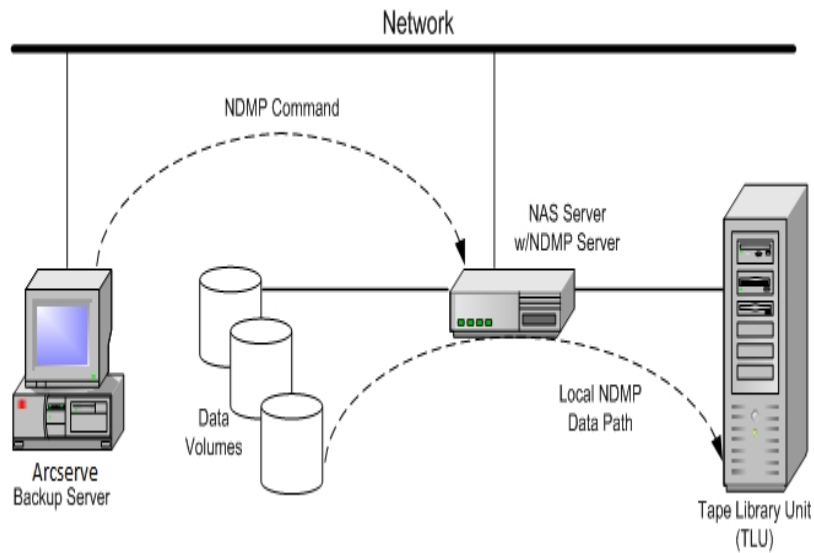
## Supported NAS Backup Configurations

Arcserve Backup supports NAS local, three-way, and Filer to Server NDMP backups.



## NAS Local NDMP Backup

If an NAS server has a locally-attached tape device, Arcserve Backup can trigger a serverless backup of the NAS server's data to this device.

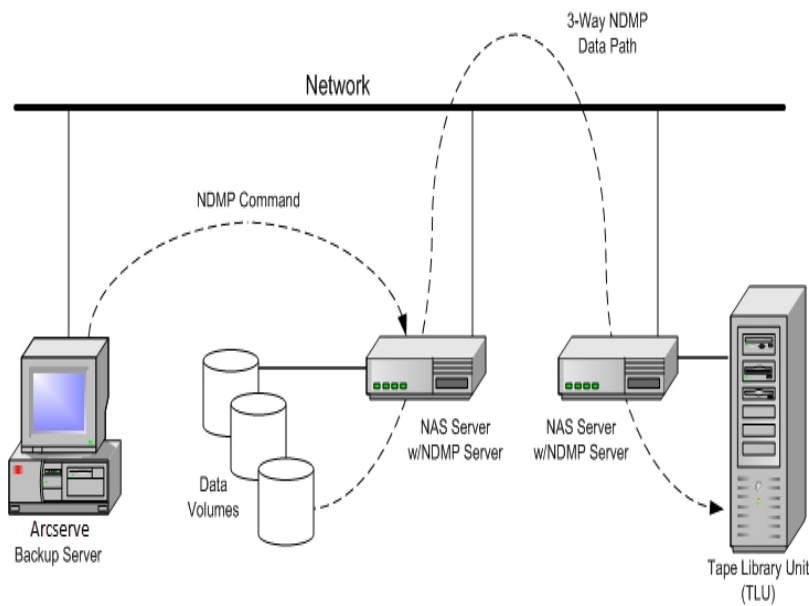


## NAS Three-way NDMP Backup

Some NAS servers on the network may not have tape devices attached to them. As long as at least one NAS server has an attached tape device, that device can be used when backing up other NAS servers.

### Example: NAS Three-way NDMP Backup

NAS Server 1 does not have a tape device attached to it, but NAS Server 2 does. The NDMP NAS Option can back up NAS Server 1's data to the tape device attached to NAS Server 2. This configuration is known as NAS three-way NDMP backup.

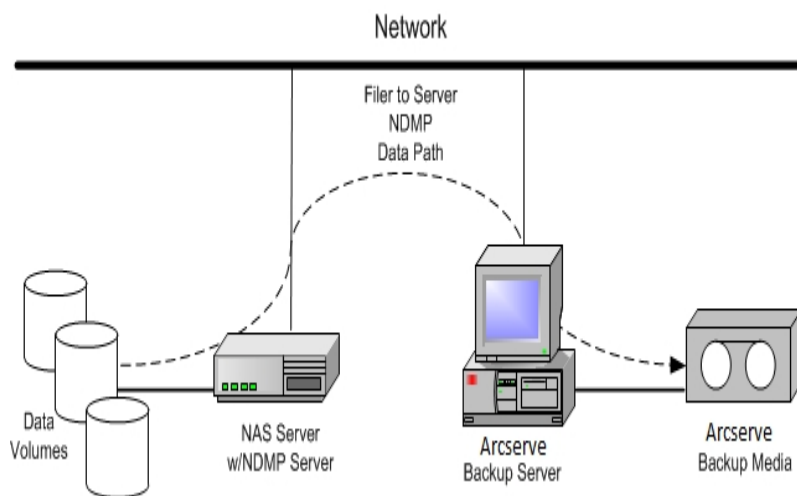


## NAS Filer to Server NDMP Backup

The NAS filer can be backed up directly to the Arcserve Backup server using the Filer to Server feature. All devices that are attached to the backup server can be used as the destination of an NAS filer backup job. A limitation no longer exists that there must be a dedicated device (attached to the NAS filer) to do the NAS backup.

### Example: NAS Filer to Server NDMP Backup

Any Arcserve Backup media destination can be an NAS filer to server destination, where Arcserve Backup media refers to tape library/VTL or disk (file system device, staging device, or deduplication device).



## How the Option Backs Up Data

You can use the Backup Manager to configure and submit a backup job for data in your network. Select any NAS server as the source and a tape device connected to an NAS server as the destination.

**Note:** In an NAS filer to server backup job, you can select any device attached to the Arcserve Backup server as the destination.

When you back up data from a file system, the Network Appliance NAS server creates a snapshot of that data set so that the backup reflects a consistent view of the data at the time of the backup. The data is then indirectly backed up from this snapshot.

**Important!** You can use the NDMP NAS Option when you have to back up data stored on an NAS server to a tape device that is connected to either the same NAS server or another NAS server. In either case, the NAS server must support NDMP. You can also use the NDMP NAS Option when you want to perform an NAS filer to server backup job.

In an environment where a shared backup device on a SAN is connected to the Arcserve Backup server and an NAS device, you can use the NDMP NAS Option to back up data directly from the NAS server to the shared device.

For more information about the backup features of Arcserve Backup, see the *Administration Guide*.

**Important!** The backup options depend on the NDMP version implemented and the type of NAS server.

**More information:**

[Supported Backup Features](#)

[Supported General Features](#)

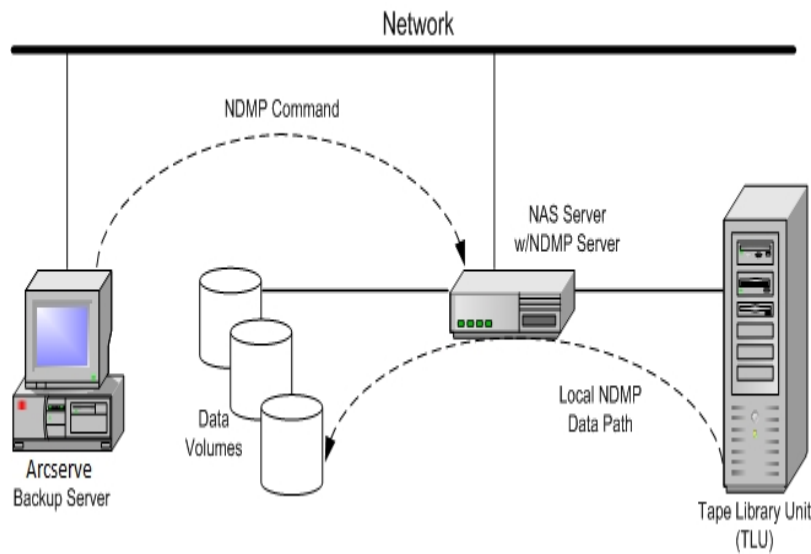
## How the Option Restores Data

The restore options depend on the NDMP version implemented and the type of NAS server. To restore data from a tape device to an NAS server, use the Restore Manager to configure and submit the job. For more information about the restore features, see the *Administration Guide*.

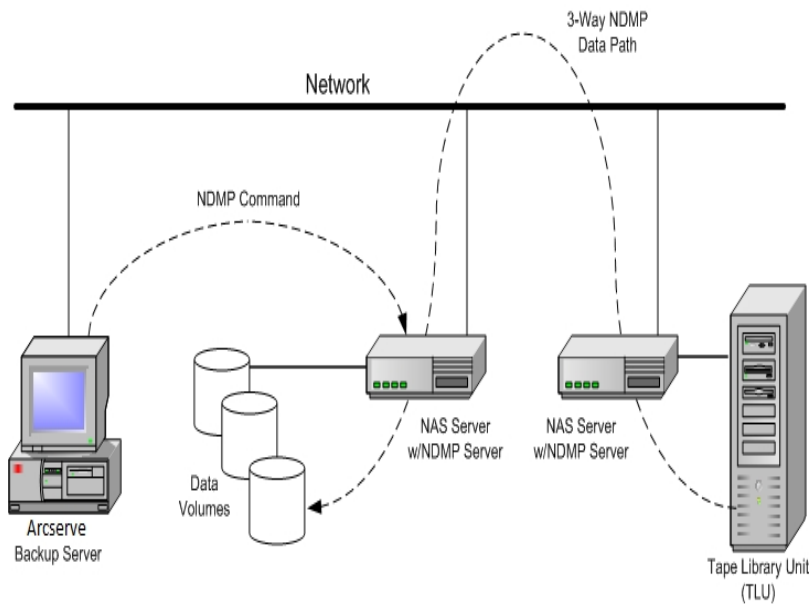
**Note:** Sessions created by an NAS filer to server backup job can be restored to the original location or to an alternate location. You can restore directly from the following:

- Non-NAS connected tapes
- File system device, staging device, or deduplication device
- Cloud device
- NAS sessions across minor versions of OnTap

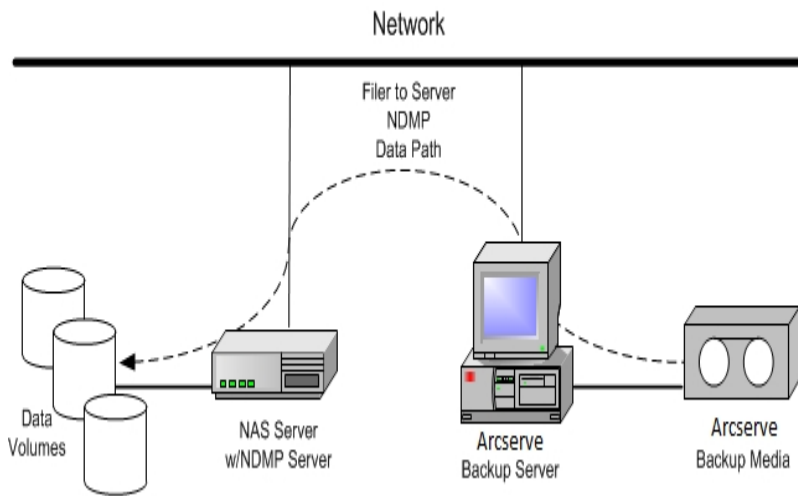
The following diagram shows an example of a local restore:



The following diagram shows an example of a three-way restore:



The following diagram shows an example of an NAS Filer to Server restore:



**More information:**

[Supported Backup Features](#)

[Supported General Features](#)

## Restore by Source

You can view NAS servers by clicking the Source tab of the Restore Manager. You can select individual NAS files or directories for recovery, as you can for other types of hosts or clients supported by Arcserve Backup.

## Restore by Destination

Because NAS backups are third-party backups, they use the NAS vendor's proprietary format. Although most NAS servers use NDMP, it is advisable to perform backup and restore operations to the same vendor's type of server. Furthermore, you cannot restore the NAS session if you move the tape to a device locally connected to the Arcserve Backup server.

You can browse file or directory selection for restores in the same way as you browse NAS servers from the Source tab of the Backup Manager.



## Dynamic Device Sharing

You must install the Arcserve Backup SAN Option and Tape Library Option before you can start using dynamic device sharing (DDS).

In an environment composed of fibre attached storage devices with one or more Arcserve Backup servers, complications can arise when exposing devices that reside on the fibre uniquely. Duplication of devices occurs when more than one fibre adapter exists to enumerate the devices on a fibre loop.

**Note:** If individual media engines reside on the same SAN, you must collect and organize multiple media engines from a central management application to ensure that these engines integrate seamlessly.

In this case, an NDMP tape server running on an NAS device is considered a media engine. The Arcserve Backup tape engine is also considered a media engine. Using this feature will allow them to integrate seamlessly.

When separate fibre adapters exist to enumerate devices on a fibre loop, DDS dynamically manages all duplicate references to a device. DDS gives you more flexibility in choosing how to design your storage topology.

DDS is cost efficient because only one library is needed for backing up NAS and non-NAS data.

You can do the following with DDS:

- Share drives and tape library unit (TLU) control seamlessly between the local Arcserve Backup server and the NAS server.
- Back up NAS data to the same tape that you backed up the non-NAS data to.
- Multi-stream the NAS and non-NAS jobs and package to run together. Arcserve Backup chooses the optimal data path on all backups and restores. All NAS servers can detect the drives and data. This eliminates the need for three-way backups, and only direct two-way data paths will be used for backing up data.

**Note:** DDS does not support restoring local backups to an NAS server, or NAS server backups to the local Arcserve Backup server. This limitation exists because NAS backups are third-party backups, and are written in a format that is proprietary to the NAS vendor.

**More information:**

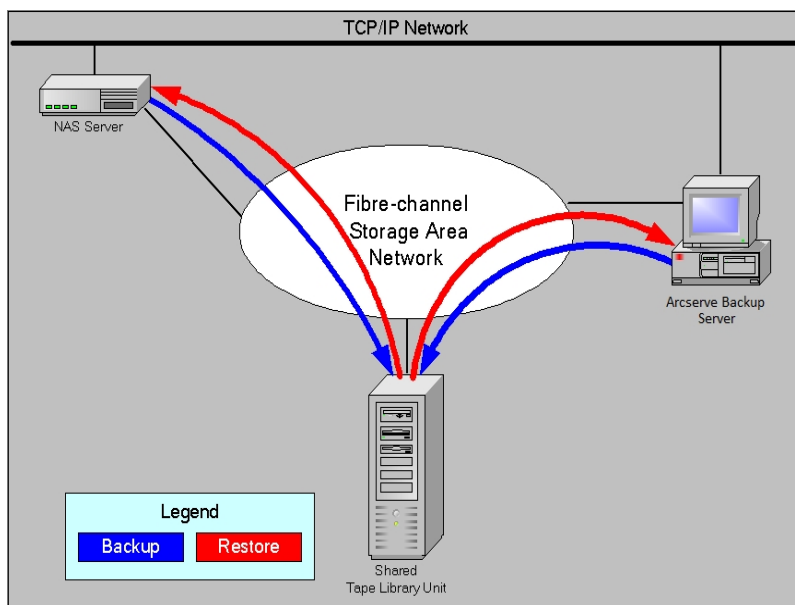
[Configure DDS](#)

## Supported DDS Configurations

The NDMP NAS Option supports two fundamental DDS configurations:

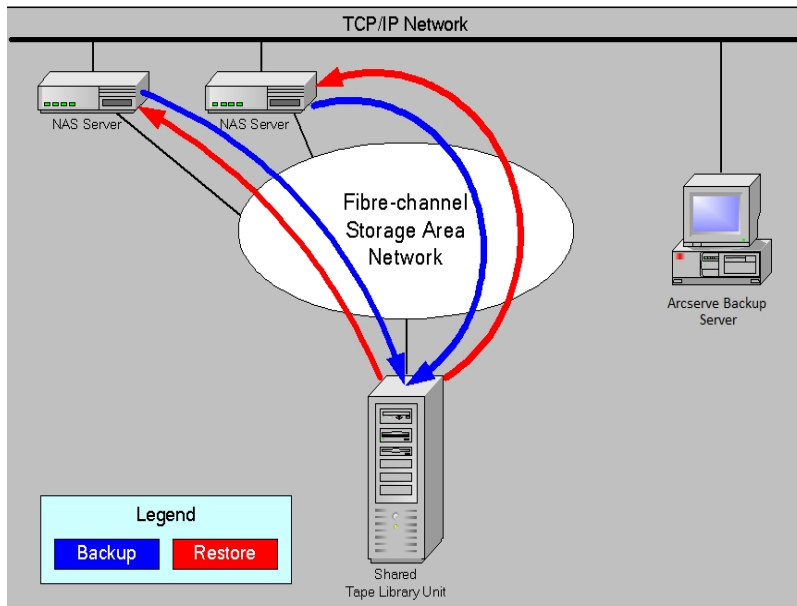
- One or more NAS servers connected to the SAN that share a tape drive or TLU, and the Arcserve Backup server is connected to the SAN.
- Two or more NAS servers connected to the SAN that share a tape drive or TLU, and the Arcserve Backup server is not connected to the SAN.

The following diagram shows an example of one or more NAS servers connected to the SAN that share a tape drive or TLU, and the Arcserve Backup server connected to the SAN.



The following diagram shows an example of two or more NAS servers connected to the SAN that share a tape drive or TLU, and the Arcserve Backup server not con-

nected to the SAN.



## Log Access

The NDMP NAS Option generates the information contained in logs in the <base install>/Logs directory. The available logs and the type of information provided in each log is as follows:

### **Tape.log**

Provides information in the DDS Device Map section that details whether or not the primary or secondary device reference chosen was optimal. This log is generated by the Tape Engine.

### **LibSetup.log**

Provides information about the scenario where duplicate device references are detected on all SCSI ports. This log is generated by the Arcserve Backup Tape Library Option.

## NAS Filer to Server Considerations

The NAS filer to server feature is an enhancement to the existing Arcserve Backup NDMP NAS Option. Filer to Server means you can back up the NAS filer directly to the Arcserve Backup server, where the destination of the NAS filer backup job can be any device attached to the backup server. NAS filer to server restore jobs restore NAS data back to an NAS filer from any type of Arcserve Backup media or migrated media. For example, if you back up NAS data to tape and then migrate it to disk, you can restore the data directly from the disk. You do not have to copy the data back to the tape and then restore it from the tape.

Consider the following when submitting an NAS filer to server job:

- Backup
  - Any device, such as a file system device, staging device, deduplication device, tape, or virtual tape library, attached to the Arcserve Backup server can be used as the destination for an NAS filer to server backup job.
  - If the destination is a DDS device (shared device via SAN), when the job is submitted, you are asked to select if you want to run the job with the data that was sent to the backup server (NAS filer to server backup job) or retain the backup at the NAS filer (regular NAS backup job). If you modify the job, and the destination is still a DDS device, you are asked again to select whether to submit a filer to server backup job.
  - If the destination is only attached to the NAS filer, the job runs as a regular NAS backup job. If the destination is only attached to the Arcserve Backup server, the job runs as an NAS filer to server backup job.
  - Both tape staging and disk staging can be enabled for filer to server backup jobs.
  - Rotation and GFS Rotation schemes can be used in a filer to server backup job.
  - One NAS session can span multiple tape sequences.
- Backward Compatibility
  - Provides backward compatibility for NAS sessions created in Arcserve releases r15, r16, 16.5, r17 and r17.5.
- Merge
  - Session details of filer to server sessions can be recreated by the merge job.

- Multistreaming
  - Source node level multistreaming is supported. Volume level multistreaming is not supported.
- Primary/Member Server
  - The NDMP NAS option is only installed on the primary server.
  - NAS filer to server jobs can be run on the primary or member server, but regular NAS jobs are still run on the primary server only.
  - The following jobs can run on the member server:
    - ◆ Backup
    - ◆ Restore
    - ◆ Scan
    - ◆ Merge
  - Restoring from a SAN device behaves the same way as it always did. You are able to select from which server to run the restore job.
- Restore
  - Sessions created by the filer to server backup job can be restored to the original location or to an alternate location.
  - You can restore directly from the following:
    - ◆ Non-NAS connected tapes
    - ◆ File system device, staging device, deduplication device
    - ◆ Cloud device
  - Individually selected files can be restored easily.
  - NAS sessions that span on several tapes can be restored.
  - When submitting a restore job, you do not need to indicate if it is a filer to server restore job. It is automatically detected based on the backup job.
- Server Side Encryption
  - NAS filer to server jobs support server side encryption, however, regular NAS jobs do not support server side encryption.
  - In a filer to server job, data is written by the tape engine at the backup server side. Therefore, server side encryption/compression is supported.
  - If you submit a non-filer to server job (regular NAS job) with encryption, encryption is skipped for NAS backups and you are prompted with a

message to click OK to continue. If you submit a filer to server job with server side encryption, the message is suppressed.

- Can also be used in a staging job.
- Agent Side Encryption
  - Not supported for NAS sessions.
- Session Password Management
  - A session password can be stored in a filer to server backup job.
  - A session password can be retrieved in a restore job for a filer to server session.
  - A session password can be retrieved in a merge job for a filer to server session.
- Additional functions supported:
  - Deduplication
  - Migration
  - Tapecopy





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## Chapter 2: Installing the Option

This section describes how you can install and configure the NDMP NAS Option. You should be familiar with the characteristics and requirements and with administrator responsibilities on the specified operating systems.

This section contains the following topics:

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<a href="#">File System Configuration</a> .....	36
<a href="#">Configuration</a> .....	41

## Installation Prerequisites

If you want to use the NDMP NAS Option, you must first prepare and configure the NAS server, and the Arcserve Backup server. Verify the following prerequisites:

- Your system meets the minimum hardware and software requirements needed to install the NDMP NAS Option. For a list of requirements, view [link](#).
- The NAS server's operating system is compatible with Arcserve Backup. For more information about hardware and software requirements for Network Appliance, EMC Celerra, EMC CLARiiON IP4700, and Procom NAS devices, refer [link](#).
- Arcserve Backup is installed and working properly.  
**Note:** You must install the option on the Arcserve Backup server.
- You have administrator rights or the proper authority to install software on the computers where you will be installing the option.
- You know the name and the password of the machine you are installing the option on.
- You have made a note of any changes to the default installation path.

## Installation

The NDMP NAS Option follows the standard installation procedure for the system components, agents, and options of Arcserve Backup. For more information about this procedure, see the *Implementation Guide*.

## File System Configuration

The NDMP NAS Option installs a configuration file named `nas.cfg` in the NAS Option folder. This is the file in which you specify the items that are displayed on the Source tab of the Backup Manager other than the default view. After configuring this file, you can browse the items entered in the Backup Manager.

## Configure NDMP Version 3

When an NAS server supports NDMP Version 3, you can configure the `nas.cfg` file for partial-volume backups. The NDMP NAS Option cannot determine volume mappings for these servers. To perform partial-volume backups, you must include the paths in the configuration file.

### To enter the path information

1. Open the `nas.cfg` file located in the `<base install>\NAS Option` folder.
2. On the first line, enter the host name of the NAS server.
3. Enter each absolute path, starting with the logical device name, on separate lines following the host name of the NAS server.
4. Enter a semicolon to end each server configuration.
5. Save the file.

### More information:

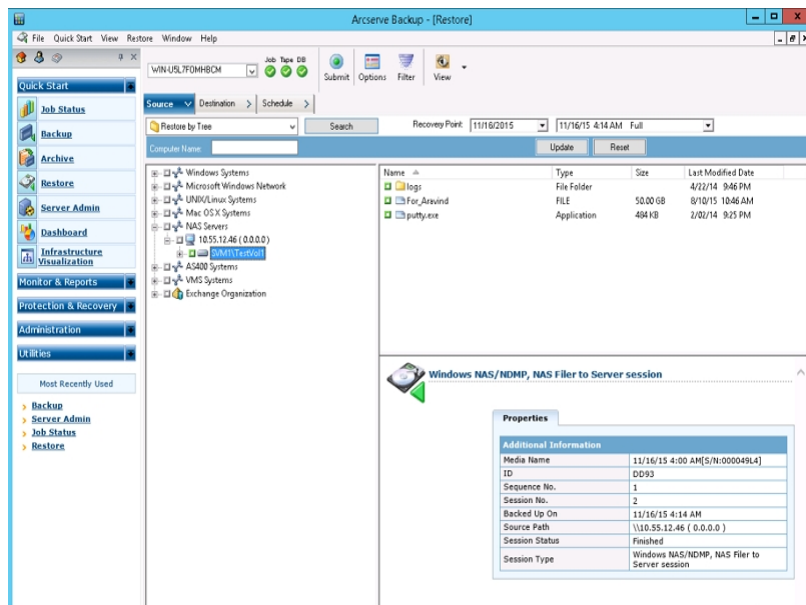
[Network Data Management Protocol \(NDMP\)](#)

## Example: How You Configure the nas.cfg File to Support NDMP Version 3

The following is an example of the nas.cfg file to back up a partial volume consisting of database files:

```
# Copyright (C) 2002 - 2006 CA
#
# This is a sample configuration file used by the BrightStor NAS Option
#
# This file contains the mappings of nodes to volumes or logical devices
# Each entry should be kept on an individual line. Starting with the
# Hostname of the NAS Server followed by the volume names on the
# successive lines. Node Configurations are separated by semi-colons.
# Additionally, comments (such as these) may be inserted on individual
# lines or following any node or volume name denoted by a '#' symbol.
#
# For example:
#
#           NODENAME           # NAS server
#           /LOGICAL_DEVICE_NAME1 # the volume name of the first logical device
#           /LOGICAL_DEVICE_NAME2 # the volume name of the second logical device
#           ;                   # semi-colon indicates the next node configuration
#
#           NASSERVER
#           /vol/myvol/.snapshot/hourly.1 # the backup path you want to show in source browse tree
#           /c.chkpt/daily
#           "/vol/vol0/I have a spaces in my path so I use quotes" # Use quotes on paths with spaces
#           /c/etc
#
<NAS SERVER NAME>
</volume name>
</volume name>
</volume name>
;
<NAS SERVER NAME>
</volume name>
</volume name>
</volume name>
;
qa-filer1
/vol/vol0/.snapshot/hourly.0
;
```

The following is an example of the corresponding Restore Manager window:



## Configure NDMP Version 4

If you are using an NAS server with NDMP Version 4, and support for Snapshot Management Extensions, you do not have to use the nas.cfg file. However, currently only Network Appliance NAS servers support this functionality.

**More information:**

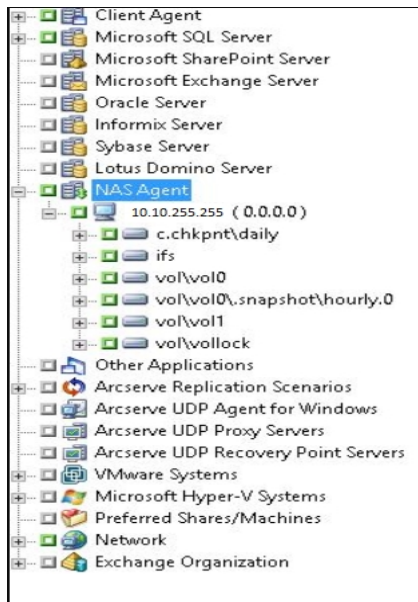
[Network Data Management Protocol \(NDMP\)](#)

## Snapshots and Checkpoints Configuration

A snapshot or a checkpoint is an online, read-only copy of an entire file system that protects against deletions or modifications of files without duplicating file contents. Snapshots let you restore files and back up the files to tape while the NAS server is in use. Snapshots of data on a file system can also be created and scheduled, as needed, by the NAS administrator.

**Note:** If you are backing up snapshots or checkpoints on your NAS server, you must configure the nas.cfg file. You edit the file like it was for a partial-volume backup. The names of the snapshot files are vendor-specific.

The following is an example of the Backup Manager window showing a Network Appliance snapshot named hourly.0 and a checkpoint named daily.





## Configuration

After you have completed installing the NDMP NAS Option, you must configure the NAS servers, tape drives, or tape library units.

Before you configure the devices and drives, confirm the following:

- You can ping or access the NAS server from the server on which the NDMP NAS Option is installed.
- The NAS server being used as the destination for backup data can detect its locally attached drives or tape library units.
- The tape library units and NAS servers are certified by Arcserve.
- The tape drives are certified by the NAS vendors.
- The tape drive is not already opened and in use by another NDMP session (only one connection is allowed at a time).

## Configure NAS Devices

You can configure the NAS drives and tape devices either immediately after you install the NDMP NAS Option or from the Device Configuration dialog.

**Note:** NAS device configuration is not required for NAS filer to server jobs. To run an NAS filer to server job, it is necessary to configure the Arcserve Backup devices, such as a file system device, deduplication device, staging device, cloud device, tape library or virtual tape library.

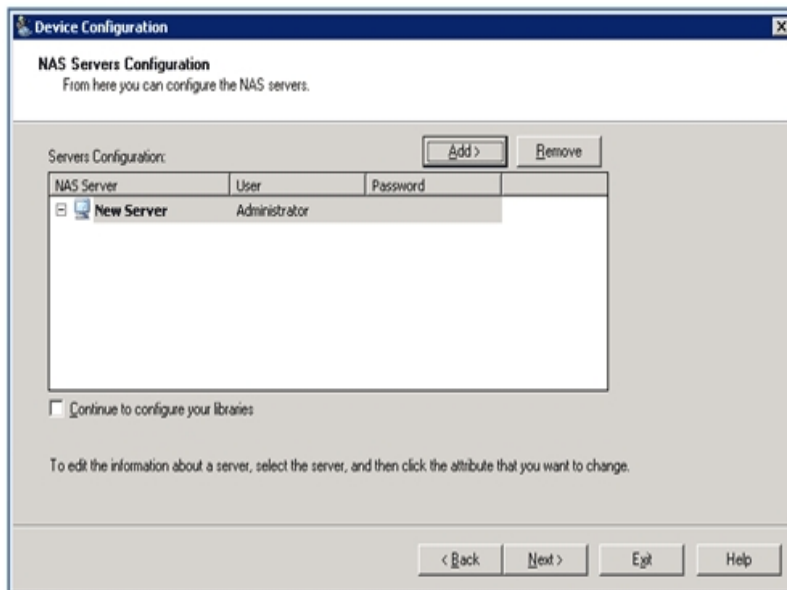
**Important!** You must add the NAS server to the backup server to use the DDS environment.

### To configure the NAS devices

**Note:** If you are configuring the devices and drives immediately after installation, you can skip to Step 5 of the following instructions.

1. Select Device Configuration from the Arcserve Backup Home Page.  
The Device Configuration Welcome window appears.
2. Select NAS Servers and click Next; click Yes to stop the tape engine service.
3. Provide your security credentials if necessary.  
The tape engine service is stopped and the NAS Servers Configuration dialog opens.
4. Click Add, and Select NAS Server from the drop-down list.
5. Highlight New Server and enter the name of the NAS server, user name, and password.

The user name and password must be associated with an NAS server account with NAS Administrative privileges.



Steps 6 and 7 are optional steps for NAS servers supporting NDMP Versions 3 and 4. NAS servers which are enabled for NDMP Version 3 or Version 4 allow the client to detect backup devices that are configured on the NAS server. The NDMP NAS Option detects and displays all the detected devices. The format and usage rules governing the logical device names differ from one vendor to another. After you complete this step, DDS will be enabled for use.

For information about how you can determine logical device names, see the vendor-specific appendixes.

If you are using NDMP Version 3 or Version 4, skip Steps 6 and 7 and continue with Step 8.

6. Click Add, and select Tape/Changer Device.
7. Highlight New Tape Device and enter the tape device information.

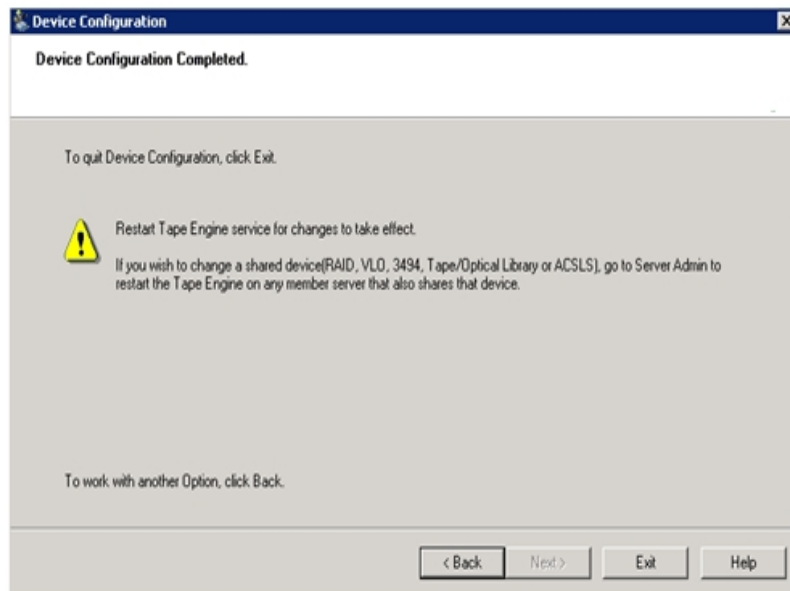
Enter a logical device name that represents the tape device or tape library unit. A logical device name refers to a unique string that the NAS server or NDMP server uses to refer to the device. For more information about how you can get drive and changer information, see [Get Drive and Changer Information for a Tape Device](#).

8. Repeat Steps 4 and 5 (and optionally 6 and 7) for all additional NAS servers that you want to configure for use with the NDMP NAS Option.

The Arcserve Backup server can interact with more than one NAS server over the network.

- When you have finished adding all the server and tape devices, clear the Continue to configure your libraries check box, and click Finish.

The Device Configuration Completed dialog opens.



- Click Exit. If you are sure that you want to exit Device Configuration, click Yes.
- Start the Tape Engine.

**More information:**

[Supported DDS Configurations](#)

## Get Drive and Changer Information for a Tape Device

When you add a tape or changer device, you must provide the drive and changer information for the device.

### To get the drive and changer information for a device

- run following command on your NAS server to get the tape drive information:  
`sysconfig -t`
- run following command on your NAS server to get the changer information:  
`sysconfig -m`

## Configure DDS

Before you start configuring DDS, verify if you have installed the following options:

- SAN Option
- Tape Library Option

### To configure your system to use DDS

1. Open the fibre switch.

All of the NAS servers and Arcserve Backup servers detect all of the attached devices and each other.

2. Configure a SCSI bridge or router such that it does not expose itself as a SCSI array device.

NAS servers may not be able to connect to the SCSI bridge or router if it exposes itself as an array device.

3. Verify that all NAS and Arcserve Backup servers can detect all devices.

4. Ensure that online TLUs are in the ready state.

5. Confirm that the devices are shared by enabling the Tape Engine Debug Log in Server Administration when starting the tape engine.

This log (labeled tape.log) provides you with details about devices that are shared and not shared. The details can be found in the List Dynamic Device Sharing Device Map section of the Tape Engine Debug Log.

6. Verify that the tape drive is not already opened and in use by another NDMP session.

**Note:** Shared SCSI devices are displayed under the local adapter. The group and adapter icon will be marked as shared.

## Limitations of Using DDS

Configuring your system to use DDS has the following restrictions:

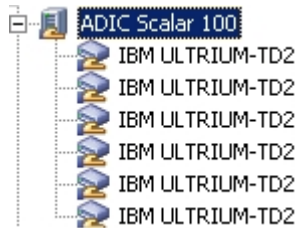
- If you have installed the Arcserve Backup SAN Option, then you must install the NDMP NAS Option on the primary backup server.
- The SAN must allow all member servers to detect attached backup devices.
- DDS does not function in a cross-platform environment.
- NAS servers must meet all of the vendor requirements by using certified devices and equipment to function properly and individually on the SAN.

## How You Can Identify Dynamically Shared Devices

You can use any of the following methods to identify dynamically shared devices.

### Device Manager directory tree

The directory tree of the Device Manager window identifies dynamically shared devices with the icon shown in the following example. This example represents one dynamically shared changer with six drives.



### Device Manager Properties pane

If a device is dynamically shared, you can view summary and detail information about the shared device in the Properties pane in the Device Manager window.



## Configure Custom Ports

Circumstances may arise when you want to specify a custom port or a range of ports for NAS filer to server backups. For example, there is a firewall between the backup server and the NAS filer.

### Follow these steps:

1. Log into the backup server and open the ports configuration file located in the following directory:

#### Windows x64 operating systems

C:\Program Files (x86)\CA\SharedComponents\ARCserve Backup\PortsConfig.cfg

and

C:\Program Files\CA\SharedComponents\ARCserve Backup\PortsConfig.cfg

#### Windows x86 operating systems

C:\Program Files\CA\SharedComponents\ARCserve Backup\PortsConfig.cfg

2. Set `ENABLE_CONFIGURABLE_PORTS=1`
3. Add one of the following lines to specify a custom port:
  - `filertoserver 10000`
  - `filertoserver 10001-10005` (range of ports)
4. Close and save `PortsConfig.cfg`.
5. Restart all Arcserve Backup services on the backup server using the `cstop.bat` and `cstart.bat` batch files.
6. Repeat Steps 1 through 5 on all primary and member servers.



---

## Chapter 3: Using the Option

This section describes you how you can perform backup and restore operations using the NDMP NAS Option. For more information about backing up and restoring data, see the *Administration Guide*.

This section contains the following topics:

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<a href="#">How You Manage Backup Operations</a>	52
<a href="#">How You Manage Restore Operations</a>	61
<a href="#">How You Manage Devices and Media</a>	71
<a href="#">How You Manage the Database and Reports</a>	74
<a href="#">How You Manage NAS Operations Using Arcserve Backup Utilities</a>	75

## How You Manage Backup Operations

To back up data from your network, use the Backup Manager to configure and submit a backup job. You can use any NAS server as your source and a tape device connected to either the same NAS server or another NAS server as your destination. Although all NAS servers use NDMP, it is advisable to perform backup and restore operations to the same vendor's type of server.

**Note:** You can use any device attached to the Arcserve Backup server as the destination for an NAS filer to server backup job.

## Backup Options

When you select an NAS server to back up, a customized set of standard Arcserve Backup options are available. Some of the standard options are not available due to the version of NDMP in use on the NAS server. Other options are not available due to the limitations of a vendor's particular server.

For example, Arcserve Backup does not support backing up multiple folders from the same volume as part of the same job on most NAS servers. You can select individual folders as part of separate jobs and schedule them to run concurrently. If you specify multiple folders, Arcserve Backup recognizes only the first folder in a volume and ignores the rest of the folders specified.

NDMP version 3 does not support multi-byte or Unicode names. This can cause the granularity of the backup session's restore view to be reduced.

Network Appliance NAS servers, however, enable you to back up multiple files and folders in a single volume.

**More information:**

[Supported Backup Features](#)

[Supported General Features](#)

## Backup Prerequisites

Before you start a backup job, verify the following:

- You are using the correct user name and password for security logins on the NAS server.
- You see the NAS devices in the Device Manager window.
- You can browse the NAS sever in the respective source and destination trees of the Backup Manager and Restore Manager.
- If you are backing up a snapshot or checkpoint, the server is configured to create these files.
- The tape drives that you are using are certified by the NAS vendor.
- The tape library unit and the NAS server that you are using are certified by Arcserve.

## Add an NAS Server

You must add the NAS server before it can be displayed in the Source tab of the Backup Manager.

### To add an NAS server

1. On the Backup Manager Source tab, right-click NAS Servers in the displayed tree.
2. Select Add Machine/Object.

The Add Server dialog opens.

3. Enter the Host name and IP address. In the absence of an IP address, select the Use Computer Name Resolution check box.

**Important!** You must specify the same server name for the NAS server in the Device Configuration dialog and in the Add Server dialog, especially in a shared environment of NAS servers and Data Mover servers. If the server names do not match, the NAS backup or restore job might fail. For example, if you specify the server name as 'Server A' in the Device Configuration dialog, you must specify 'Server A' in the Add Server dialog as well.

4. Click Add.

The server is registered.

**Note:** Arcserve Backup prompts you to enter security information when you attempt to browse or expand the NAS server that you just added.

For Network Appliance NAS servers that support the NDMP Version 4 Snapshot Management Interface Extension, Arcserve Backup enumerates the volumes, directories, and files on the NAS server. When using Network Appliance servers, you can select more than one subtree per volume. Other NAS vendors are limited to one selection per volume. For NAS servers that support NDMP Version 3, Arcserve Backup can automatically enumerate all the volumes that are defined on the NAS server.

### More information:

[Configuration](#)

[Snapshot Configuration](#)

## Back Up an NAS Server

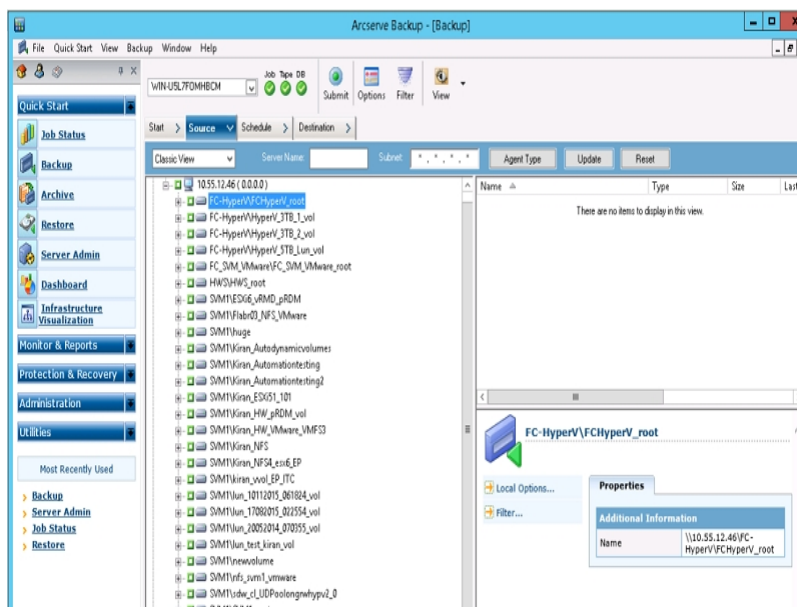
Arcserve Backup supports backing up individual NAS server volumes and an entire computer.

**Note:** You cannot select agents or the local file system on an Arcserve Backup server and back them up to a tape drive connected to the NAS servers.

### To back up an NAS server

1. Open the Backup Manager and expand an NAS server on the Source tab.

The volumes on the server display.



2. Select the volumes for backup and click the Destination tab.
3. From the list of available devices, select the device that you want to use for the backup.

**Note:** You can use any device attached to the Arcserve Backup server as the destination for an NAS filer to server backup job.

- If the destination is only attached to the NAS filer, the job runs as a regular NAS backup job.
- If the destination is only attached to the Arcserve Backup server, the job runs as an NAS filer to server backup job.
- If the destination is a DDS device, you are asked if you want to run this job with the data that was sent to the backup server or retain the backup at the NAS filer. Select Yes, to run the job as an NAS filer to server backup job. Select No, to run the job as a regular NAS backup job.



4. Select the Schedule tab and then select the desired Repeat or Rotation Method from the drop-down list.

**Note:** Rotation and GFS Rotation schemes can be used in an NAS filer to server backup job.

5. Select the Backup Method from the list and click Submit on the toolbar.

The Security and Agent Information dialog opens.

6. Edit the information, or click OK.

The Submit Job dialog opens.

7. Select one of the following Job Execution Time options:

**Run Now**

Starts the backup job immediately.

**Run On**

Lets you specify the date and time when you want to run the backup job.

**Note:** For more information about saving jobs and job templates, see the *Administration Guide*.

8. Click OK.

You have successfully submitted the backup job.

After you submit the backup job, you can monitor its progress by opening the Job Status Manager from the Arcserve Backup Home Page.

Arcserve Backup does not display a progress bar or percentage complete statistic in its Job Monitor when backing up EMC CLARiiON IP4700, Celerra, and Procom NAS servers.

**Note:** Although all NAS servers use NDMP protocol, you should perform backups and restores to the same vendor's servers or compatible hosts.

## Perform a Staging Backup of an NAS Server

Before you start this procedure, verify that the staging group has been dynamically shared between the Arcserve Backup Server and the NAS filer.

**Note:** Both tape staging and disk staging can be enabled for NAS filer to server backup jobs.

### To perform a staging backup of an NAS server

1. Open the Backup Manager and select Enable Staging.
2. Click the Source tab and then expand an NAS server.

The volumes on the server are displayed.

3. Select the volumes for backup.
4. Click the Schedule tab and then select the Repeat or Rotation Method.

If you have more than one drive in each group, the repeating job can be submitted as every 5 minutes. If you only have one drive in each group, the repeating rate can be longer.

5. Click the Staging Location tab and select the staging group that you want for the staging backup.
6. Click the Policies tab and specify the staging policies you want applied.

**Note:** For more information about the Staging Policy options, see the Administration Guide.

7. Click the Destination tab and select the destination for the staging backup job.

You can either select another NAS group or the same NAS group if it has more than one drive.

8. Click Submit in the toolbar.

The staging backup job starts or is scheduled to be executed.

## NAS Backup Job Limitations

NAS backup jobs have the following limitations:

- You cannot back up an NAS node and non-NAS source in a single backup job.
- You cannot back up an NAS node to a multiplexing tape.

## How You Can Archive Data on the NAS Server

You can use the NDMP NAS Option to archive the data on the NAS server to its locally attached tape device, to another NAS server with an attached tape device, or to any device attached on the Arcserve Backup server. If the data on the NAS server needs to be backed up to the device on the Arcserve Backup server, you can use the NAS filer to server job or the Preferred Shares to back up the NAS sever.

**Note:** To allow Arcserve Backup to connect to Network Appliance servers through Preferred Shares, you must create an ADMIN\$ share for the volume containing the /ETC folder on the NAS server. Additionally, you should not back up NAS devices through Preferred Shares, as it does not utilize the NAS-attached backup device or the NDMP protocol for proper NAS operating system backup procedures.

Arcserve Backup supports archiving and restoring data from an NAS server to its locally attached tape device and to a tape device attached to another NAS server. However, for non-NAS servers, you can archive data from the server to the tape device connected to the NAS server only if the backup device is shared.

## How You Manage Restore Operations

To restore data from an NAS server, use the Restore Manager for configuring and submitting the job.

The *Administration Guide* provides a description of the Arcserve Backup restore features. However, NAS server restores create some limitations for the normal functionality of Arcserve Backup. Some of these result from the NDMP protocol, while others result from limitations imposed by particular NAS servers.

## Restore Options

When an NAS server is selected for a restore job, the Arcserve Backup options are global options that apply to all restore jobs in general. Options default to overwrite mode for restore jobs. You should be very careful when picking your restore location.

**More information:**

[Supported Restore Features](#)

[Supported General Features](#)

## Restore Methods

You can restore NAS data using the following methods:

- **Restore by Tree**--Lets you restore specific files and directories.
- **Restore by Session**--Lets you restore files and directories from a particular backup session.
- **Restore by Query**--Lets you restore files and directories when there are various unknowns about the recovery data. For example, only the path, a partial path, the file name, or the directory that you want to restore is known.

After you select the files for recovery, you must specify the destination and then start the restore operation.

**More information:**

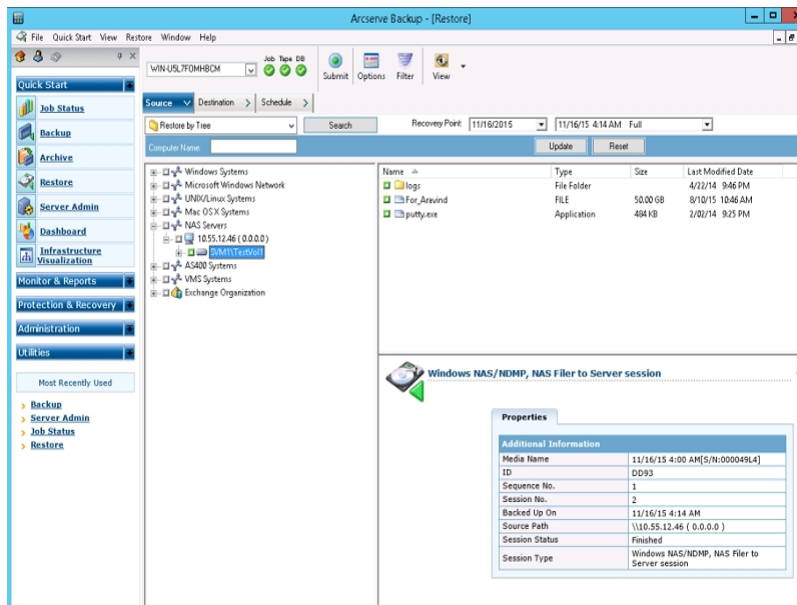
[NAS Restore Job Limitations](#)

## Restore by Tree

The Restore by Tree method lets you restore individual files and directories. Use this method when you do not know which media contains the data you need, but you know the machine from which the backup originated.

### Follow these steps:

1. From the Home Page, open the Restore Manager.
2. On the Source tab, select Restore by Tree.



3. Select the files and directories you want to restore by double-clicking the name of the file or directory.  
**Note:** A green light appears when a file or directory is selected.
4. Click Submit on the toolbar to open the Submit Job dialog.
5. Complete the required fields on the Submit Job dialog to restore the data.

### More information:

[Restore NAS Server](#)

[NAS Restore Job Limitations](#)



## Restore by Session

The Restore by Session method lets you restore backup sessions, individual files and directories. Use this method when you know the media name, but are not certain about the session you want to restore.

**Follow these steps:**

1. From the Home Page, open the Restore Manager.
2. On the Source tab, select Restore by Session.
3. Select the sessions or files that you want to restore.
4. Click Submit on the toolbar to open the Submit Job dialog.
5. Complete the required fields on the Submit Job dialog to restore the data.

**More information:**

[Restore NAS Server](#)

[NAS Restore Job Limitations](#)

## Restore by Query

With Restore by Query, you can restore files when you know the name of the file or directory that you want to restore. Restore by Query is most useful under the following conditions:

- The entire path, a partial path, or only the name of the file or directory to restore is known.
- The machine from which the data was backed up or to which media the data was backed up is unknown.

To restore data by query, the Database Engine must be running. As long as the file and directory information is logged in the database, you can effectively use this view to select files to restore.

### Follow these steps:

1. Open the Restore Manager. Select Restore by Query from the Source View drop-down list.
2. Specify your search criteria using these guidelines:
  - Restore by query is not a case-sensitive operation.
  - This dialog uses standard 8.3 conventions. For example, if you type \*.log in the File Name box, all the files with the .log extension appear.
  - In the Computer Name pull-down, when you select ANY, all the backup information on all computers is searched. When you pick the computer specifically, only the data from that computer is searched.
  - You specify a file name or wildcard in the File Name box.
  - Directory entry must be an exact string match starting with the drive letter.
  - Leading or trailing spaces in either filename or directory strings are not allowed.
  - Checking Include Subdirectories acts like adding an asterisk(\*) at the end of the directory string.

### 3. Click Query to search the Arcserve database.

Restore by Query

Computer Name: <<ANY>> Type: All Date: Last 14 Days(s)

Look in Directory:   Include subdirectories

File Name: \*.log

Name	Size	Date	Ses..	Media Name	Seq..	Serial No.	Path
B-D110630T1417-ND011309414629.log	7,040	6/29/11 11:21 PM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
B-D110630T1417-ND011309414629-NDMP.log	42,380	6/29/11 11:20 PM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
B-D110518T0303-ND011445871625.log	17,661	5/18/11 12:05 AM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
R-D110518T0321-ND0109-NDMP.log	2,007,670	5/18/11 12:31 AM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
R-D110518T0321-ND0109.log	64,393	5/18/11 12:31 AM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
R-D110518T0335-ND0110-NDMP.log	2,059,320	5/18/11 12:45 AM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
R-D110518T0335-ND0110.log	63,823	5/18/11 12:45 AM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
TskJob07_94.log	104,908	5/18/11 12:05 AM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
TskJob07_94_95.log	70,880	5/18/11 12:05 AM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
TskJob09_96.log	39,926	5/18/11 12:31 AM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/
TskJob10_97.log	39,760	5/18/11 12:45 AM	1	NAS	1	// NAS SERVER	(0.0.0.0)/vol/vol1/zq/
B-D110518T0303-ND011445871625-NDMP.log	358,648	5/18/11 12:05 AM	1	NAS	1	//	(0.0.0.0)/vol/vol1/zq/

### 4. Select the files and directories you want to restore by double-clicking the name of the file or directory.

**Note:** A green light appears when a file or directory is selected.

### 5. Click Submit on the toolbar to open the Submit Job dialog.

### 6. Complete the required fields on the Submit Job dialog to restore the data.

## Restore an NAS Server

This section describes how you can submit a job to restore NAS server data.

### To restore an NAS Server

1. Select the Destination tab.
2. Select the file system path for the restore.

You can specify a directory path for restore. When you manually specify a destination path, you can browse to select a restore destination, or enter the path to the restore destination in the following format:

```
\\TEST\vol\vol0\destination
```

3. From the Global Options dialog, select a supported restore option.
4. Click OK.
5. Click Submit in the toolbar.

The Restore Media dialog opens and lists the tapes required to restore the selected sessions.

6. Select the tapes and click OK.

The Session User Name and Password dialog opens.

7. Edit the information or click OK.

The Submit Job dialog opens.

8. Select one of the following Job Execution Time options:

#### Run Now

Starts the backup job immediately.

#### Run On

Lets you specify the date and time when you want to run the backup job.

**Note:**For more information about saving jobs and job templates, see the *Administration Guide*.

9. Click OK.

You have successfully submitted a job to restore the data.

After submitting the restore job, you can monitor its progress by opening the Job Status Manager from the Arcserve Backup Home Page.

Arcserve Backup does not display a progress bar or percentage complete statistics in the Job Monitor window when restoring EMC CLARiiON IP4700, Celerra, and Procom NAS servers.

**Note:** Although all NAS servers use NDMP protocol, you should perform backups and restores to the same vendor's servers or compatible hosts.

## NAS Restore Job Limitations

NAS restore jobs have the following limitations:

- You can restore NAS server data to the original or to a different NAS server.
- You cannot restore to the Arcserve Backup server, because it is not an NDMP server.  
**Note:** The same also applies to NAS filer to server jobs.
- You cannot restore to the original location with a snapshot or checkpoint. These are read-only copies of the file system.
- For snapshot sessions, you must use the default restore options. Select the Do not create base directories option.

- You can specify a directory path for restore. When you manually specify a destination path on the restore Destination tab, you can browse to select a restore destination, or enter the path to the restore destination using in the following format:

```
\\TEST\vol\vol0\destination
```

- When restoring using extract-restore mode, the original backup path is appended to the path specified in the restore destination tree.
- If the tape library or tape library unit and the NAS vendor support Direct Access Restore (DAR), and you are restoring files, the original path is only appended to the user-specified destination path if the restore options designate that behavior.

DAR supports file restore only. If you select to restore at least one folder, the restore reverts to scanning the session.

**Note:** Extract-restore mode scans the entire contents of a backup image to restore an item. Conversely, DAR traverses to the proper offset.

- You cannot restore an NAS session and a non-NAS session in a single restore job.
- You cannot restore an NAS session to a non-NAS destination.

## How You Manage Devices and Media

The Device Manager gives you information about storage devices that are connected to your network, the media in these devices, and the status of these devices. You can also use the Device Manager to manage the tape drives and media attached to NAS servers.

## Adapter, Device, and Group Views

The Device Manager shows adapter, device, and group information about tape devices attached to the NAS servers. This information updates after you run Device Configuration to configure devices attached to NAS servers and then restart the Tape Engine.



## Media Management

You can manage media by using the Device Manager to erase, format, and eject media from tape devices attached to NAS servers. The option also supports tape library units and all the media management functionality associated with it.

## How You Manage the Database and Reports

Arcserve Backup stores backup job information for each backup job you run, including media and media device information, in the Arcserve Backup database. You can use this information to perform intelligent restores by keeping track of each file and directory that you backed up to a specific media. When you want to restore a specific file, the database determines where the file is stored. For more information about the database, see the *Administration Guide*.

The information stored in the database can be used for many types of reports. You can access these reports with the Report Manager. The Report Manager provides several functions to help manage both reports and logs. For more information about reports, see the *Administration Guide*.

## How You Manage NAS Operations Using Arcserve Backup Utilities

Arcserve Backup offers several utilities that you can use to manage files. The utilities supported by the NDMP NAS Option include the Copy, Count, and Purge utilities. These utilities do not, however, use NDMP to complete their tasks. The NAS servers for these utilities are accessed through the Microsoft network tree.

**Note:** The Compare utility is not supported for sessions backed up using the option because the backup image is a third-party format.

## Merge Utility

Using the Merge utility, you can merge information from media attached to the NAS server into the Arcserve Backup database. The information from the media is appended to the existing database files. You can also use the Merge utility to restore data from an Arcserve Backuphost that is different from the host used to create the backup.

**Note:** Session details of filer to server sessions can be recreated by the merge job.

## Media Assure & Scan Utility

You can scan the NDMP NAS Option media for information about previously backed-up sessions with the Media Assure & Scan utility.

NAS sessions, by contrast, are third-party backups with content that cannot be interpreted by the Media Assure & Scan utility. The operation is limited to reporting the session-level details of the NAS session. You can also view the results of the media scan in the Report Manager under the Activity Log listing or under the User Log listing (if an additional log file is created). In addition, you can select a specific session or scan the entire media for session-level details.

**Note:** In an NAS filer to server job, the behavior has not changed for the Log All Activities option and Media Assure jobs.



---

## Chapter 4: Using Network Appliance NAS Devices

This appendix includes information about how you can configure and use Network Appliance NAS devices with the NDMP NAS Option.

This section contains the following topics:

---

<a href="#">Network Appliance Servers Configuration</a> .....	80
<a href="#">Limitations on Network Appliance Devices</a> .....	89

## Network Appliance Servers Configuration

Before the NDMP NAS Option can use a Network Appliance server, you must set certain parameters on the NAS server. You can specify most of these server settings from the NAS server's web-based Administrative Interface or from any Telnet console.



## Access the Administrative Interface

You must configure parameters through the administrative interface of the Network Appliance server before the NDMP NAS option can use it. For more information about this, see the Network Appliance documentation.

## User Accounts

The Network Appliance Data ONTAP operating system supports a system account named root. You can also configure optional administrative user accounts to control a server using either a Telnet session on the server console, or the server's web-access site.

## Enable NDMP on Network Appliance Devices

Network Appliance requires that you enable NDMP on the NAS server. You can do this using either the web-based Administrative Interface or the Telnet session. For more information about enabling NDMP on the NAS server, see the Network Appliance documentation.

## Configure Tape Library Device Names

For the NDMP NAS Option to be able to perform backup and restore operations on a Network Appliance server, the backup devices must be configured properly. Part of the configuration process involves identifying the logical device names of the attached tape library devices. You only need to do this if you have a tape library attached to the NAS server.

### To configure tape library device names

1. Activate a Telnet session.
2. Enter the following command:

```
sysconfig -m
```

The name of the tape logical unit displays.

## Configure the Drive Access Path

The drive access path is the path that Network Appliance servers use to communicate with NDMP drives.

### To find and configure the drive access path

1. Use either a Telnet session or the URL: `http://<NAShostname>/na_admin` and connect to the server.
2. Enter the following command:

```
sysconfig -t
```

All the tape access path information appears.

The tape logical device names listed by Network Appliance NAS servers use the following syntax:

`xxxx#@`

The following table explains the symbols and the corresponding values for the logical device names.

Symbol	Value	Description
xxxx	nrst	A no-rewind sequential tape device. Opening and closing the device does not result in the device being automatically rewound.
	rst	A logical, sequential tape device that positions the actual device at the start of the tape during every open operation.
	urst	A logical, sequential tape device that loads and unloads the physical device in its open and close calls.
#	numeric	The device number. Device numbers start at 0.
@	l	Low-density mode for tape writes.
	m	Medium-density mode for tape writes.
	h	High-density mode for tape writes.
	a	High-density mode with hardware compression for tape writes.

## Snapshot Configuration

You can use the NAS configuration file, `nas.cfg`, to browse the Network Appliance server's file system and snapshots. The `nas.cfg` file contains mappings of nodes to volumes or logical devices and their associated subdirectories that you may want to back up.

The configuration file allows you to do partial volume backups using the Backup Manager. If your Network Appliance server supports NDMP Version 4, you can automatically browse subdirectories and files in a volume and you do not need to configure the `nas.cfg` file for partial volume backups.

When you back up data from a file system, the Network Appliance NAS server creates a snapshot of that data set so that the backup reflects a consistent view of the data at the time of executing the backup job. The data is then indirectly backed up from this snapshot.

When you configure the `nas.cfg` file, you can auto-browse below the snapshot folder in the Backup Manager's source tree. To do this, enter the full path to the snapshot file under the Network Appliance server name in the configuration file.

The following is an example of configuring the Daily0 snapshot file:

```
/vol/vol0/.snapshot/Daily.0
```

The following rules apply when you enter information in the NAS configuration file for a Network Appliance NAS server:

- Keep each entry on an individual line.
- Start with the host name of the NAS server.
- Add the volume and directory names on the next lines.
- Separate configurations by semicolons.
- Insert comments using the `#` symbol on individual lines or following any line entry.

When performing a recovery operation using the configuration file, you can make multiple selections per volume for a job. If the configuration file has multiple snapshot paths, you can select any multiple of snapshot paths, as you would for normal Network Appliance backups.

### Example: Multiple-path Designations in an `NAS.cfg` File

The following is an example of multiple-path designations in an `NAS.cfg` file:

```
qa-server3  
/vol/vol0/.snapshot/Daily.0  
/vol/vol0/.snapshot/Monthly.1  
/vol/vol0/.snapshot/Weekly.3
```

;

**Note:** You must *not* restore snapshot backups to the original location, because they are read-only. You can, however, restore snapshot backups to an alternate location.

## View the Network Appliance System Log

If you encounter problems with the device, you can view the system log to diagnose the problem. For more information about how you can view the system log, see the Network Appliance documentation.



## Limitations on Network Appliance Devices

There are limitations when using a Network Appliance NAS device with the NDMP NAS Option. These limitations are based on the version of NDMP in use on the NAS server. Limitations include the following:

- For backups, the use of filters is limited to exclude file and directory entries.
- Filters are not supported on restores.
- Use of tape drives is limited to those that are supported by Network Appliance.
- Use of tape library units is limited to those supported by Arcserve.
- Although Network Appliance NAS devices support Direct Access Restore (DAR), the option supports file restore only. If you choose to restore at least one folder, the restore reverts to scanning the session.

**More information:**

[Supported Backup Features](#)

[Supported Restore Features](#)

[Supported General Features](#)



---

## Chapter 5: Using EMC Celerra NAS Devices

This appendix includes information about how you can use EMC Celerra NAS devices with the NDMP NAS Option.

This section contains the following topics:

---

<a href="#">How the EMC Celerra Host Data Mover Works</a>	92
<a href="#">Configure the EMC Celerra Data Mover</a>	93
<a href="#">Limitations on EMC Celerra Devices</a>	98

## How the EMC Celerra Host Data Mover Works

The Celerra File Server supports up to a maximum of four simultaneous backup operations on an NDMP Host Data Mover. You can connect multiple Host Data Movers to the same tape library unit. The tape library unit can have multiple SCSI host connections. The tape library unit can also have fibre-channel connections.

**Note:** Do not connect the Celerra File Server Control Station to the tape library unit.

For each tape library unit SCSI connection, you can attach a maximum of two drives. You cannot daisy-chain any of the Host Data Mover storage system SCSI connections to the tape library unit.

If an NDMP Host Data Mover fails over to its standby, you must physically connect the Host Data Mover's tape library unit cable to the standby.

The ability to connect a Host Data Mover to a tape library unit depends on the number of SCSI ports on a Host Data Mover. Some older models of a Host Data Mover may have only two SCSI ports. These are required for storage system connectivity and redundancy. You should not use these storage system SCSI ports for tape library unit connections.

## Configure the EMC Celerra Data Mover

Before you can use the NDMP NAS Option on an EMC Celerra NAS server, you must configure parameters on the NAS server. You can specify most of these settings from a Telnet console.

You can use Telnet to access the system by entering the following command:

```
c::/> telnet <IP address of the Celerra>
```

Enter the administrator name and password to log in.

## User Accounts

You must set a user name and password for each NDMP Host Data Mover at the Celerra File Server Control Station. The user name and password must match those you will enter for the NDMP NAS Option.

## Enable NDMP on EMC Celerra Devices

To access the NDMP Host Data Movers on an EMC Celerra server, you must first enable the server.

### To enable a device through a Telnet session

1. Verify that each NDMP Host Data Mover can recognize its tape library units by entering the following command:

```
$ server_devconfig <server_name> -probe -scsi-nondisks
```

**Example:** In the following example, the EMC Celerra server recognizes a two-drive library. The jbox value represents the tape library unit. In the next statements, tape represents the tape drives.

```
chain=1, scsi-1
```

```
symm_id= 0 symm_type= 0
```

```
tid/lun= 0/0 type= jbox info= ATL P1000 62200501.21
```

```
tid/lun= 4/0 type= tape info= QUANTUM DLT7000 245Fq_
```

```
tid/lun= 5/0 type= tape info= QUANTUM DLT7000 245Fq_
```

2. Configure the devices with the Celerra File Server by adding them to the host database using the following command:

```
$ server_devconfig <server_name> -create -scsi-nondisks
```

When a device is configured, the server responds with the following:

```
<server_name>: done
```

3. Enter the following command to verify that the configuration is set:

```
$ server_devconfig <server_name> -list -scsi-nondisks
```

The server responds with the following:

```
<server_name>:
```

```
Scsi Device Table
```

```
name addr type info
```

```
jbox1 c1t010 jbox ATL P1000 62200501.21
```

```
tape2 c1t410 tape QUANTUM DLT7000 245Fq_
```

```
tape3 c1t510 tape QUANTUM DLT7000 245Fq_
```

For more information about commands specific to the Celerra devices, see the EMC Celerra documentation.

## Logical Device Names Detection

If you do not want the NDMP NAS Option to automatically detect the drives, you can manually assign them when you configure the option. This is recommended if you are configuring your tape library unit and server on a SAN.

You must follow the previous instructions about how to determine the logical device names to be used in NDMP NAS Option. From the example in the previous section, they appear as c1t010, c1t410, and c1t510.



## **nas.cfg File Configuration EMC Celerra Devices**

Arcserve Backup can automatically determine the volumes mounted on the EMC Celerra NAS servers. Arcserve Backup employs NDMP Version 3 to interact with the volumes. To employ partial volume backups, you must configure the nas.cfg file.

## Limitations on EMC Celerra Devices

The following are the limitations when you use the EMC Celerran NAS servers with the NDMP NAS option:

**Note:** Some of these limitations are based on the NDMP version used on the NAS server.

- For backups, the use of filters is limited to exclude file and directory entries.
- Filters are not supported on restores.
- You can use only the tape drives that are certified by EMC Celerra and the NDMP NAS Option.
- You can use only Arcserve certified tape libraries.
- Although EMC Celerran NAS devices support Direct Access Restore (DAR), the option supports file restore only. If you choose to restore at least one folder, the restore reverts to scanning the session.
- The progress bar or percentage complete statistics in Arcserve Backup does not display during a backup.

**More information:**

[Supported Backup Features](#)

[Supported Restore Features](#)

[Supported General Features](#)

---

## Chapter 6: Using EMC CLARiiON IP4700 NAS Devices

This appendix describes how you can use EMC CLARiiON IP4700 NAS devices with the NDMP NAS Option.

This section contains the following topics:

---

<a href="#">Configure the EMC CLARiiON IP4700 NAS Server</a> .....	100
<a href="#">Limitations on EMC CLARiiON IP4700 Devices</a> .....	107

## Configure the EMC CLARiiON IP4700 NAS Server

Before you can use the NDMP NAS Option with the EMC CLARiiON IP4700 NAS server, you must configure certain parameters on the server. Most of these parameters can be configured either from the web-based Administrative Interface or directly from the console attached to the IP4700 NAS server.

To access the web-based Administrative Interface, type the following URL in your web browser address bar:

`http://<IP address of the IP4700>`

## Create User Accounts

To access the EMC CLARiiON IP4700 NAS server through the NDMP NAS Option, you must set the administrator password on the device. For the device to be accessible to the option, the administrator password must not be null or empty.

To configure the option, use the following information:

Username: Administrator

Password: *<As set on the IP4700>*

## Enable NDMP on EMC CLARiiON IP4700 Devices

If the NDMP NAS Option is properly installed on the device, NDMP is enabled by default on EMC CLARiiON IP4700 NAS servers.

## Logical Device Names

For NDMP NAS Option to be able to perform backup and restore operations on EMC CLARiiON IP4700 NAS servers, at least one server in the configuration must have tape drives or tape library units attached to it. You must specify the logical device names of the attached devices while configuring the NDMP NAS Option.

These logical device names are automatically assigned to the devices by IP4700 depending on the SCSI settings and the type of each device. The logical device names can also be determined from the Tape Drives menu of the web-based Administrative Interface.

### Example: Logical Device Names

The following is an example of a typical Tape Drives information screen:

```
SP-A (IP4700SPA) HP C1557A U709 /dev/c0b0t6d0
SP-A (IP4700SPA) SCSI Device /dev/c0b0t6d1
SP-B (IP4700SPB) QUANTUM SuperDLT1 1717 /dev/c0b0t3d0
SP-B (IP4700SPB) QUANTUM SuperDLT1 1717 /dev/c0b0t3d0
SP-B (IP4700SPB) SCSI Device /dev/c0b0t5d0
```

Each line consists of three components:

- Storage processor
- Device description
- Logical device name

For example, consider the first line:

```
SP-A (IP4700SPA) HP C1557A U709 /dev/c0b0t6d0
```

In this line:

Storage Processor = SP-A (IP4700SPA)

Device Description = HP C1557A U709

Logical Device Name = /dev/c0b0t6d0

The last part of the line has the logical device name (in this example, /dev/c0b0t6d0), which is used when you configure the NDMP NAS Option.

The second line in this example is:

```
SP-A (IP4700SPA) SCSI Device /dev/c0b0t6d1
```

This has the device description SCSI Device. This device description indicates that this device is a tape library unit, not a regular tape drive. You can use the logical device name to configure the tape library unit on the NDMP NAS Option.

## Network Configuration

When you configure the EMC CLARiiON IP4700 NAS server for the network, remember the following points:

- Assign a unique IP address to each of the storage processors in IP4700. Set up the IP address from the console attached to the server.
- Assign unique host names to each of the storage processors.
- Register the host names and IP addresses with the DNS server, so that they are accessible with the host name in any browser.

**Note:** If the host names are not properly configured in the DNS server and the storage processors are unable to resolve each other's names, backup and restore operations will not function properly.

If you have purchased the CIFS License from EMC, you should be able to access the volumes on the EMC CLARiiON IP4700 NAS server through Microsoft Windows. You must configure the domain name and WINS server on EMC CLARiiON IP4700 NAS server.



## Volume Configuration

Volumes are configured in accordance with the requirements of the NAS device. For NDMP NAS Option to function correctly, you must configure at least one volume on the server.

Depending on the operating system from which the volumes are accessed, you must configure CIFS shared directories and NFS exports with appropriate level of access rights.

## Tape Drives and Tape Libraries

You must connect at least one tape drive or a tape library unit with at least one tape drive to the SCSI bus of an IP4700 in the NAS server configuration. Use the Tape Drive menu from the web-based Administrative Interface to ensure that the device is properly connected and is recognized by the IP4700. All of the tape drives and the tape library units must have an entry in the list.

## Limitations on EMC CLARiiON IP4700 Devices

The following are the limitations when you use the EMC CLARiiON IP4700 Celerran NAS servers with the NDMP NAS option:

**Note:** Some of these limitations are based on the NDMP version used on the NAS server.

- You can perform only full volume backups. However, you can perform restore operations on selected files or folders.
- Backup and restore operations do not support any kind of filtering.
- Snapshot functionality is not supported.
- Direct Access Restore (DAR) is not supported.
- The option does not display a progress bar or percentage complete statistics in the Job Monitor dialog.
- EMC CLARiiON IP4700 restore operations only support the option Create Entire Path from the Root on the Destination tab of the Restore Manager Global Options dialog.

In addition, the NDMP NAS Option cannot determine the volumes created on the IP4700 server. You must determine these volumes manually and configure the file `nas.cfg`. View the web-based Administrative Interface to determine the volume names that you must include in the `nas.cfg` file.

The following is an example of volume information:

```
Name Label Size Space Used Status
A0 264910 15723 RDY
B0 264910 15569 RDY
```

In this case, you must add the volume names A0 and B0 in the `nas.cfg` file.

**More information:**

[Supported Backup Features](#)

[Supported Restore Features](#)

[Supported General Features](#)



---

## Chapter 7: Using Procom NAS Devices

This appendix describes how you can use Procom NAS devices with the NDMP NAS Option.

This section contains the following topics:

---

<a href="#">Procom Server Configuration</a> .....	110
<a href="#">nas.cfg File Configuration-Procom Devices</a> .....	118
<a href="#">Limitations on Procom Devices</a> .....	120

## Procom Server Configuration

Before you can use the NDMP NAS Option with Procom devices, you must set certain parameters on the NAS server. You can specify most of these settings from the web-based Administrative Interface. Additionally, you must configure some settings directly on the LCD panel available on the Procom device.

To access the web-based Administrative Interface, type the following URL in your web browser address bar:

http://<IP address of the Procom>

## User Accounts

To access a Procom server through the NDMP NAS Option, you must have a user account with administrator rights on the Procom server.

## Logical Device Names

For the NDMP NAS Option to be able to perform backup and restore operations on a Procom server, you must configure the tape drives and tape library units attached to the server. This configuration differs depending on the firmware on the NAS server.



## 4.1 Firmware Configuration

For Procom servers with 4.1 firmware, you must specify the logical device names in the configuration file. You can determine these names from the System Log, accessible through the web-based interface.

### **Example: System Log for Procom Servers with 4.1 Firmware**

The following example shows sample lines from this log:

```
1/09 12:27 | robotape isp1?061 type=8 desc='HP C1557A '  
1/09 12:27 | tape isp1t060 'HP C1557A '
```

The line with the word `robotape` indicates a tape library unit—not a regular tape device. Use the word after `robotape` to determine the logical device name for the tape library unit. In the example, it is `isp1?061`. To obtain the logical device name for the tape library unit, replace the `?` with `r`. Therefore, the logical device name is `isp1r061`.

The line with the word `tape` indicates a tape drive connected to the Procom server. The word after `tape` (`isp1t060` in this example) is the logical device name for the tape drive. There may be multiple entries in the log containing the word `tape`, if multiple tape drives were detected. In this situation, the log will contain one line for each detected tape drive.

## 4.2 Firmware Configuration

The NDMP NAS Option automatically detects connected tape devices attached to a Procom server with 4.2 firmware. Logical device names are automatically assigned to Procom servers, depending on the SCSI settings and type of each device.

## Network Configuration

Network configuration involves assigning a unique IP address to the Procom server. If the DHCP server is available in the network, the Procom server can automatically obtain an IP address. You can determine the DHCP-assigned IP address by using the LCD panel on the Procom server.

You can manually assign an IP address to the server. You must use the LCD panel on the Procom server the first time you assign an IP address. You can configure additional parameters (for example, the DNS server and routing table) from the web-based interface.

You can access the Procom file system using either Microsoft Windows or UNIX. Each operating system has the following specific requirements to enable the access:

- For Microsoft Windows, assign the WINS server and domain name correctly, and create at least one share.
- For UNIX, create the appropriate exports.

## Volume Configuration

Volumes are configured according to the requirements of the NAS server used. For the NDMP NAS Option to function correctly, you must configure at least one volume on the server serving as the data source of the backup operation.

NAS separates storage resources from network and application servers to simplify storage management and to provide file-level access to data, using standard protocols such as Network File System (NFS) or Common Internet File System (CIFS). A file system is located on the NAS server, and data is transferred to the client over standard network protocols. Depending on the operating system from which the volumes are to be accessed, CIFS shared directories and NFS exports must be configured with appropriate access rights.

## Tape Drives and Tape Library Units

You must connect at least one tape drive or a tape library unit with at least one tape drive to the SCSI bus of the Procom NAS server targeted as the destination for the backup data. You can read the System Log to verify that all the tape drives are properly connected and correctly detected by the Procom server.

## nas.cfg File Configuration-Procom Devices

You can use the NAS configuration file, `nas.cfg`, to virtually browse the file system and checkpoints. You can browse in the Backup Manager's and Restore Manager's respective source and destination trees. The `nas.cfg` file contains mappings of nodes to volumes or logical devices and their associated subdirectories that you may want to back up. This configuration file also allows you to perform partial volume backups from the Backup Manager.

The following rules apply when you add information in the NAS configuration file:

- Keep each entry on an individual line.
- Start with the host name of the NAS server.
- Add the volume and directory names on the next lines.
- Separate complete NAS server configurations by semicolons.
- Insert comments using the `#` symbol on individual lines or following any node or volume name.

For NAS servers, you can select only one path per file system for a backup job. You are encouraged to run multiple jobs if you have multiple, disparate sub-trees that need to be backed up under one file system.

### Example: Multiple Path Designations in the `nas.cfg` File

The following is an example of multiple path designations in an `NAS.cfg` file. You can select only one path under `/c` and one path under `/d` in the job.

```
/c/dir1  
/c/dir2  
/c/dir3  
/d/dir1  
/d/dir2  
/d/dir3  
;
```

### Example: Multiple Checkpoint Destinations in an `NAS.cfg` File

The following is an example of multiple checkpoint designations in an `NAS.cfg` file:

```
qaprocom15  
/c.chkpt/daily  
/c.chkpt/hourly  
/c.chkpt/monthly  
/c/etc  
/c/etc/xyz  
;
```

**Note:** You must not restore checkpoint backups to the original location, because they are read-only. You can, however, restore checkpoint backups to an alternate location.

## Limitations on Procom Devices

The following are some of the limitations when you use a Procom server with the NDMP NAS Option:

- Restore jobs do not support any kind of filtering.
- Direct access restores are not supported.
- Backup jobs support Exclude filters on directory and file names only.
- The NDMP NAS Option does not display a progress bar or percentage complete statistic in the Job Monitor dialog.
- Procom restore operations only support the option Create Entire Path from the Root on the Destination tab of the Restore Manager Global Options dialog.

Some of these limitations arise because of the version of NDMP in use on the Procom server. If the Procom server firmware version is earlier than 4.02.10, the NDMP NAS Option cannot automatically determine the volumes created on the Procom server. You must determine the volume names and use the names to configure the nas.cfg file. These volume names can be determined from the web-based Administrative Interface.

To determine the names of the volumes, use the web-based Administrative Interface to display the File Volume Usage window. Volume names of file volumes available on the Procom server appear in the name column. Add these names to the nas.cfg file.

**More information:**

[Supported Backup Features](#)

[Supported Restore Features](#)

[Supported General Features](#)



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## Chapter 8: Troubleshooting

This appendix describes how you can troubleshoot the Arcserve Backup NDMP NAS Option.

This section contains the following topics:

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<a href="#">Devices Do Not Display in the Device Manager</a> .....	122
<a href="#">NAS Server Does Not Reinitialize</a> .....	123
<a href="#">Debugging is Not Enabled on the NAS Server</a> .....	124
<a href="#">Cannot Access the Procom System Log and Environmental Log</a> .....	125
<a href="#">Unable to Restore QTree Information Using the NDMP NAS Option</a> .....	126
<a href="#">NAS Timeout Error During Large NDMP Backups</a> .....	127

## Devices Do Not Display in the Device Manager

### Valid on Windows

#### Symptom:

NAS servers or tape libraries attached to an NAS server do not display in the Device Manager. How can I correct this problem?

#### Solution:

There are two probable causes:

- The server name, user name, or user password is incorrect or not configured.
- The device may be in use.

If the devices do not appear in the Device Manager, verify the following:

- The name of the server, with the corresponding user name and password were configured correctly using the Arcserve Backup Device Configuration dialog. For more information about configuring an NAS device, see [Configure NAS Devices](#).
- The tape drive is not already opened and in use by another NDMP session (only one connection is allowed at one time). Check to see if there are any leading or trailing spaces in the logical device name strings.
- If you configured the NAS server using a hostname, rather than an IP address, you must use the Backup Manager to configure the option to use the NAS server's hostname.

## NAS Server Does Not Reinitialize

### Valid on Windows

#### Symptom:

The NAS server does not reinitialize.

#### Solution:

You must manually reinitialize the NAS server.

#### To reinitialize the NAS server

1. Stop all of the sessions on the Network Appliance NAS server by connecting to the server using Telnet and entering the following command:  
`ndmpd -killall`
2. Restart the NDMP NAS Option universal agent service.
3. [Optional] Delete the device references under the following registry key:  
`Computer Associates\CA ARCserve\Base\Tape Engine`
4. If you are reconfiguring tape library units, run Device Configuration.
5. Restart the Tape Engine using the Arcserve Backup Server Admin.

## Debugging is Not Enabled on the NAS Server

### Valid on Windows

#### Symptom:

Debugging is not enabled on the NAS server.

#### Solution:

You must manually enable debugging on the NAS server.

#### To enable debugging on the NDMP server

Log into the remote NAS server using Telnet and enter the following command:

```
ndmpd debug 50
```

**Note:** The number 50 indicates the level of debugging information.

The debugging information is written to a file that can be found in the root directory of the volume. The format of the file name is:

```
ndmpd.#####
```

where ##### represents the date and time of the log.

## Cannot Access the Procom System Log and Environmental Log

### Valid on Windows

#### Symptom:

Cannot access the Procom System Log and Environmental Log.

#### Solution:

You can access the Procom System Log and Environment Log by opening the web-based Administrative Interface and selecting the Monitoring and Notification option.

#### To view the Procom System Log and Environmental Log

1. Open a browser window and enter the following:  
`http://<machine>>`  
where <machine> is the URL of the Procom server.
2. Log into the server.
3. Select Monitoring and Notification, View System Events, and Display Log.  
The System Log and Environmental Log open.

## Unable to Restore QTree Information Using the NDMP NAS Option

### Valid on Windows

#### Symptom

Arcserve Backup cannot restore Qtree information when I select only the folder that represents the Qtree information from the backup session, and the entire volume is selected.

#### Solution

You can use any of the following solutions:

- Restore the entire volume from the backup sessions with the entire volume selected.
- Set the following registry key value to restore the qtree information properly.

#### Key:

HKEY\_LOCAL\_MACHINE\SOFTWARE\ComputerAssociates\CA ARCserve Backup\NASAgent\Parameters

#### Value Name:

bForceSelectiveFileRestore

#### Type:

DWORD

#### Value:

1 (Default is 0)

**Note:** After you set the above registry key, Arcserve Backup records the following message in the Activity Log when the restore job runs:

At least one of the source files or directories selected does not support direct positioning, using Selective file restore instead.

## NAS Timeout Error During Large NDMP Backups

### Valid on Windows

#### Symptom

During a backup, you receive a timeout error in either the activity log or the NAS Agent log.

#### Activity log error:

Failed to receive data from the agent. (Node=<node name>)

#### NAS Agent log errors:

[2828] ndmpMoverGetState returned error (NDMP\_TIMEOUT\_ERR)

[2828] ndmpDataGetState returned error (NDMP\_TIMEOUT\_ERR)

#### Solution

Increase the default value in the *BKReceiveTimeOut* registry key. The default value is 6, however if your backup contains a large number of files or data, then the default value should be increased to a value appropriate for the size of the backup. This value indicates in minutes how long the server should wait before a timeout error, since a larger workload can mean a longer backup time. This key is located in the registry here:

HKEY\_LOCAL\_MACHINE\SOFTWARE\ComputerAssociates\CA ARCServe  
Backup\NASAgent\Parameters





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## Chapter 9: Feature Support Summary

This appendix presents the supported and unsupported features of the NDMP NAS Option for Network Appliance, EMC, and Procom NAS servers. The backup and restore tables are organized by a dialog tab and the features available in each tab. “All” indicates that everything on that dialog tab is either supported or unsupported.

This section contains the following topics:

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## Supported Backup Features

The following table lists the backup features for the NAS servers that the NDMP NAS Option supports:

Key:

- S—Supported options
- N—Unsupported options
- W—Supported on Windows platforms only

Tab	Feature	Network Appliance	EMC Celerra	EMC IP470-0	Pro-com	EMC Isilon
Backup Media						
	Options for First Backup Media (All)	S	W	W	W	W
	Options for Additional Backup Media (All)	S	W	W	W	W
	Compression/Encryption Password (All)	N	N	N	N	N
Verification	(All)	N	N	N	N	N
Retry	(All)	N	N	N	N	N
Operation	Delete Files After Backup/Disable File Estimate/Calculate and Store CRC on the Backup Media/Backup of the Arcserve Backup database	N	N	N	N	N
	Eject Backup Media upon Completion	S	W	W	W	W
	Database	S	W	W	W	W
Pre/Post	(All)	S	W	W	W	W
Job Log	(All)	S	W	W	W	W
Virus	(All)	N	N	N	N	N
Replication	(All)	N	N	N	N	N
Alert	(All)	S	W	W	W	W
Volume Shadow Copy Service						
	(All)	N	N	N	N	N
Media						

---

Exporting						
	Option	N	N	N	N	N
	Media Option	S	W	W	W	W
Advanced	(All)	N	N	N	N	N
Filter	Exclude File and Directory Pattern	S	N	N	W	N
	Include File and Directory Pattern	N	N	N	N	N
	All Other Filters	N	N	N	N	N
Not Applicable	NAS Filer to Server	W	W	W	W	W

## Supported General Features

The following table lists the major options supported by the NDMP NAS Option.

Key:

- S—Supported options
- N—Unsupported options
- W—Supported on Windows platforms only

Description	Network Appli- ance	EMC Cel- erra	EMC IP4700	Pro- com	EMC Isi- lon
Rotation Backup	S	W	N	W	W
GFS Rotation Backup	S	W	W	W	W
Custom Incremental Backup	N	W	N	W	W
Custom Differential Backup	N	W	W	W	W
Volume-Level Backup	S	W	W	W	W
Directory and File-Level Backup	S	W	N	W	W
Volume-Level Restore	S	W	W	W	W
Directory and File-Level Restore	S	W	W	W	N
Snapshot/Checkpoint	S	N	N	W	N
Direct-Access Restore	S	W	N	N	W

## Supported Restore Features

The following table lists the restore features for the NAS servers that the NDMP NAS Option supports.

Key:

- S— Supported options
- N— Unsupported options
- W— Supported on Windows platforms only

Tab	Feature	Network Appliance	EMC Celerra	EMC IP470-0	Pro-com	EMC Isilon
Backup Media	(All)	S	W	W	W	W
Destination	Directory Structure	S	W	N	N	W
	File Conflict Resolutions	N	N	N	N	N
Operation	Restore and Preserve Directory Attributes / Restore Registry and Event Logs	N	N	N	N	N
	Database	S	W	W	W	W
Pre/Post	(All)	S	W	W	W	W
Job Log	(All)	S	W	W	W	W
Virus	(All)	N	N	N	N	N
Alert	(All)	S	W	W	W	W
Filter	(All)	N	N	N	N	N

## Support for NDMP V4

The Arcserve Backup NDMP NAS Option supports NDMP version 4 in addition to NDMP version 3.

**Note:** The NDMP NAS Option no longer supports NDMP version 2. If you are using NDMP version 2, contact Arcserve Support before you upgrade to the latest version of Arcserve Backup for Windows.

## Certified NAS Devices

For the list of certified NAS devices, click the following link to the CDL:

<https://arcserve.zendesk.com/hc/en-us/articles/115000596703-r17-5-Arcserve-Backup-Certified-Device-List#>





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## Chapter 10: Glossary

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## Direct Access Restore (DAR)

*Direct Access Restore (DAR)* is a Network Data Management Protocol (NDMP) feature that allows backup applications to store the file history and tape offset information in its catalogs.

## NetApp Filer

*NetApp Filers* also known as NetApp Fabric-Attached Storage (FAS), are used as Storage Area Network (SAN) and networked storage appliances. Filers use Network Appliance's Data ONTAP microkernel OS and Write Anywhere File Layout file system (WAFL). Filers use file-based protocols such as NFS, CIFS, FTP, TFTP and HTTP to serve storage over a network.

## Network Attached Storage (NAS)

*Network-attached storage (NAS)* is file-level computer data storage device connected to a network. It uses NFS and CIFS/SMB protocols to manage file operations.

## Network Data Management Protocol (NDMP)

*Network Data Management Protocol (NDMP)* is an open protocol used to transport data between NAS devices and backup devices. It separates the data path from the control path and reduces the dependency on network resources.



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