NDMP Configuration Guide for EMC Networker

Configuration Guide for EMC Networker® and Isilon IQ™
with OneFS® v5.0 and optional Backup Accelerator

By David Thomas, Solutions Architect

An Isilon Systems® Technical Configuration Guide
May 2009

Table of Contents

1. Introduction

Isilon Backup Accelerator

Isilon Systems® is the proven market leader in scale-out NAS. Isilon® products enable enterprises and research organizations worldwide to manage large amounts of rapidly growing, file-based data in a highly scalable, easy-to-manage, and cost-effective way. Large amounts of rapidly growing data require enterprise level backup capabilities. Isilon delivers with the Backup Accelerator.

The Backup Accelerator provides a significant value with its performance, ease of management, and scalability. It integrates seamlessly with a cluster as a dedicated backup processing node, offloading backup jobs from the rest of the storage nodes in the cluster. Its large memory cache and multiple processors allow it to pre-fetch data from the file system and efficiently push the data to tape. As a result, the storage nodes use less processing power for backup and have more processing power available for production use.

The Backup Accelerator scales linearly, allowing a single cluster to support multiple Backup Accelerators. It requires significantly less management than other NAS solutions because of OneFS ability to scale quickly and easily, and because OneFS supports a single volume size up to 5.2 PB.

The Backup Accelerator provides a high speed, low latency data path from the storage nodes via InfiniBand, and to a tape library via fiber channel. It significantly reduces backup windows with its ability to drive up to four Linear Tape-Open (LTO) format 4 (LTO-4) tape drives at throughput rates of up to 1.7 TB/hr. This ensures that Isilon IQ data is fully protected no matter the size of the Isilon cluster or the rate at which it grows.

The Backup Accelerator is supported and certified with several enterprise class backup software applications.

Figure 1 - Isilon IQ Backup Accelerator

Backup Accelerator Hardware Specifications

- 1U Node
- Dual Data Rate (DDR) InfiniBand Network
- Quad port 4Gbps Fiber Card
- Two Intel 2.3 GHz quad core processors
- Eight GB of ECC RAM

Note:

This guide is intended as a supplemental to the *Data Protection for Isilon Scale-out NAS* best practices paper and the *EMC Networker Administration Guide.* This guide will help in configuring an Isilon Scale-Out NAS for use with EMC Networker and will go into some detail about NDMP specific settings and functionality. However, a general understanding of how to perform backups and restores with EMC Networker is assumed.

It is also assumed that the Isilon nodes have already been unpackaged, mounted, and that all appropriate nodes have been successfully joined to the cluster. For assistance with installation, please reference the *Isilon Quick Installation Guide* and the *Isilon Installed Help.*

EMC Networker

EMC NetWorker® is an enterprise leading cross-platform backup and recovery suite of applications developed by EMC Corporation. Networker boasts a common platform that supports a wide range of data protection options including NDMP (Network Data Management Protocol) support.

Isilon® OneFS® been certified with EMC Networker. By using Isilon Scale-Out NAS combined with EMC Networker, businesses can experience an advanced level of data protection and archiving capabilities, giving them the ability to maximize the value of their strategic data assets and accelerate their business success.

The Isilon OneFS® and Networker certification with EMC is routinely validated by a series of test cases and test plans to demonstrate complete compatibility between Isilon Scale-Out NAS and EMC Networker. The certification process ensures customers can seamlessly deploy, manage and protect important business information within their storage environments.

Note: In this guide, EMC Networker may also be referred to as "backup application" or "Data Management Application" (DMA).

2. Isilon NDMP Support

Isilon primarily leverages and recommends the use of NDMP for backup and restore with OneFS, Isilon 5th generation scale-out operating system for Network Attached Storage. NDMP is a widely supported, open standards protocol developed for backup and restore of network-attached storage, and is widely supported by major enterprise backup applications. Backup and restore operations can be performed directly over Network File System (NFS) or Common Internet File System (CIFS) protocols without the use of NDMP.

While some backup software vendors may support backing up OneFS over CIFS and NFS the advantages of using NDMP are:

- Faster performance

- File attributes and permissions are backed up

- Backups are taken from automatically generated snapshots for point-in-time consistency.

- More extensive support by backup software vendors

Isilon supports NDMP version 4, and both direct NDMP (referred to as 2-way NDMP), and remote NDMP (referred to as 3-way NDMP) topologies.

For more information on NDMP specifications, please visit www.ndmp.org

Direct NDMP Model

This is the most efficient model and this model results in the fastest transfer rates. The DMA uses NDMP over the Local Area Network (LAN) to instruct the Backup Accelerator, which is also a NDMP tape server, to start backing up data to a tape library attached to the Backup Accelerator via fiber channel. The Backup Accelerator is an integral part of the Isilon IQ cluster and communicates with the other nodes in the cluster via the internal InfiniBand network. The DMA controls the tape library's media management. File History, which is information about files and directories, is transferred from the Backup Accelerator via NDMP and over the LAN to the DMA, where it is maintained in a catalog.

This is the recommended model for backups with Isilon and requires the purchase of a Backup Accelerator. As discussed in Section 2, backups performed with a Backup Accelerator are more efficient and much faster.
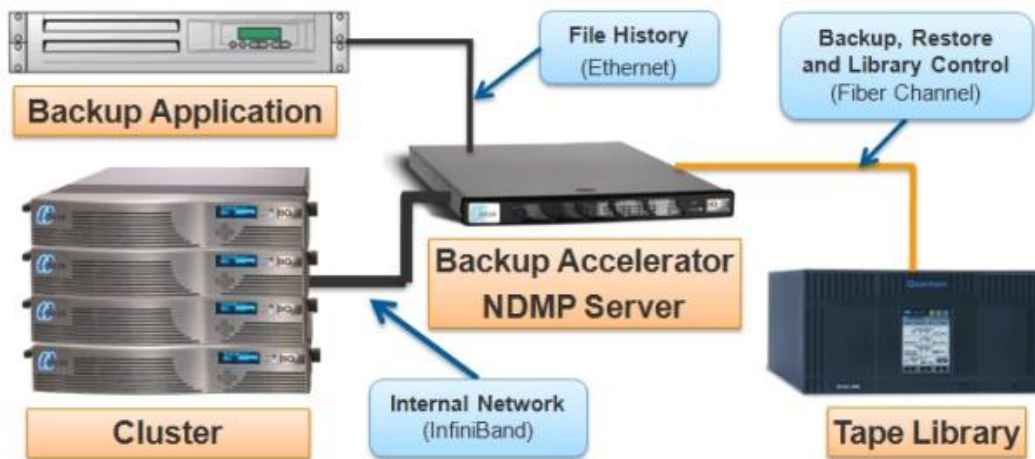
Figure 2 - Recommended Two-way NDMP with Backup Accelerator

Remote NDMP Model

In this model, there is no Backup Accelerator. The DMA uses NDMP over the LAN to instruct the cluster to start backing up data to the tape server either attached to the LAN or directly attached to the DMA host. In this model, the DMA also acts as the Backup/Media Server. During the backup, file history is transferred from the cluster via NDMP over the LAN to the backup server, where it is maintained in a catalog. In some cases, the backup application and the tape server software is on the same server.
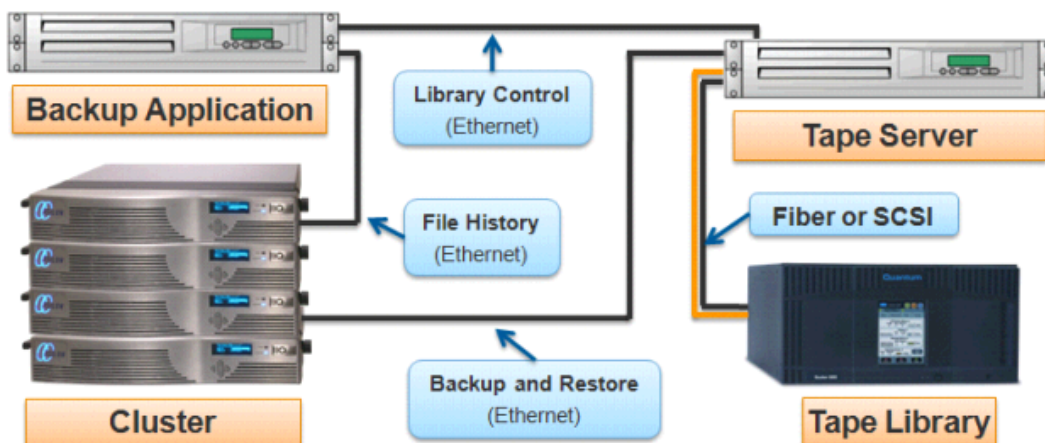
Figure 3 – Remote Three-way NDMP Backup

Incremental Backups

Isilon OneFS supports backup levels 0-9. Level 0 is a full backup, and levels 1-9 are incremental backups. Any level specified as 1-9 backs up all files modified since the previous backup performed at a lower level.

Note: EMC Networker also supports a level 10 backup, which refers to incremental backups forever. OneFS does not support this level of backup and any level specified that is not level 0-9 will be treated as a level 0 or full backup.

Cumulative incremental backups can be achieved by always specifying the same level (usually 1) for every incremental backup. Configuring backups this way results in each incremental backup containing all files changed since the last level 0 backup.

Differential incremental backups can be achieved by increasing the level for every incremental backup. Configuring backups in this manner will result in each incremental backup containing only those files that have changed since the last backup, whether it was a full backup or incremental backup.

Token-based incremental backups are achieved by configuring the DMA to maintain the timestamp database and to pass on to the cluster the reference time token for use during each incremental backup. This method does not rely on level based incremental backups at all. Not all backup vendors support token-based incremental backups.

Direct Access Recovery

Isilon OneFS fully supports Direct Access Recovery (DAR), which allows the NDMP server to go directly to the location of a file within an archive and quickly recover that file. It eliminates the need to scan through hundreds of GB of data, and multiple tapes in an archive, to recover a single file. This capability uses the offset information that is contained in the file history data passed to the DMA at backup time.

Directory DAR

Isilon OneFS NDMP also supports Directory DAR (DDAR), which is an extension of DAR. DDAR allows the NDMP server to go directly to the location of a directory within an archive and quickly recover all files/directories contained within the directory tree hierarchy.

Selective File Recovery

OneFS NDMP supports recovering a subset of files within a backup archive. Also supported is the ability to restore to alternate path locations.

Additional OneFS NDMP support:

- OneFS NDMP supports both NDMP tar and dump backup types as implemented by the DMA.
- OneFS NDMP supports both path-based and dir/node file history format.
- OneFS NDMP supports backup of File attributes, Access Control Lists (ACLs) and Alternate Data Streams (ADSs) entries.
- OneFS NDMP splits the total throughput across all concurrent sessions.

Limitations

- OneFS NDMP supports a maximum of 64 concurrent NDMP sessions per Backup Accelerator.

- OneFS NDMP supports a maximum tape block size of 128 Kilobytes (KB).

- File system configuration data, such as file protection level policies and quotas are not backed up.

- The Backup Accelerator supports up a maximum of 1024 tape device paths. If each tape device has one path, then 1024 tape devices are supported. If each tape device has 4 paths, then 256 devices tape devices are supported.

3. Partner Support

Supported Tape Devices

In the recommend configuration that includes a Backup Accelerator, only LTO-3 and LTO-4 tape devices are supported. If a Backup Accelerator is not part of the configuration and instead a remote (3-way) configuration is being used, then the question of tape library and device support is deferred to the backup application.

Supported Tape Libraries

Tape Library support is deferred to the backup application when a physical tape library is connected to a Backup Accelerator, since the backup application communicates either directly to the tape library or via SCSI pass-through.

When a Backup Accelerator is not part of the configuration, support is also deferred to the backup application since the backup software in this configuration is solely responsible for communicating with the tape library.

In addition to physical tape libraries, Isilon supports fibre-channel attached virtual tape libraries (VTLs). Vendor-specific support information for tape devices, tape libraries, and VTLs can be found in the NDMP Compatibility Guide.

Supported EMC Networker Versions

Version	OneFS 4.7	OneFS 5.0	OneFS 5.0.4
7.3	Certified	Certified	Certified
7.4	Certified	Certified	Certified
7.5	Supported	Supported	Supported

EMC Networker Software Compatibility Guide

EMC Networker versions 7.3 and later are supported or certified with Isilon OneFS 4.7 and later. EMC Networker 7.5 is fully supported, but not certified because certification scripts for 7.5 have not yet been released by EMC.

Note: EMC Networker® 7.3 with OneFS® 4.7 does not support DAR (Direct Access Restore)

4. Performance

The Backup Accelerator is all about performance! On a single backup stream with large files, the Backup Accelerator can achieve transfer rates of up to 170 Megabytes per second (MBps), and on multiple concurrent backup streams, the Backup Accelerator can achieve up to 480 MBps or 1.7 Terabytes per hour (TBph). Backup and restore performance scales linearly as the cluster scales.

Achieving Peak Performance

General recommendations to achieve peak performance using the Backup Accelerator are:

- I-Series: 5 nodes for each Backup Accelerator

- X-Series: 3 nodes for each Backup Accelerator

- NL-Series: 3 nodes for each Backup Accelerator

- S-Series: 2 nodes for each Backup Accelerator

- LTO-4: 4 Tape devices per Backup Accelerator

- LTO-3: 8 Tape devices per Backup Accelerator

Note: It is recommended to limit the number of concurrent backup/restore sessions to eight per Backup Accelerator.

Other Performance Considerations

The following scenarios can affect performance

- Workflows that overall include many small files

- DMA efficiency at moving storage to tape, managing tape devices and processing file history

If the optional Backup Accelerator is not used for backups, data will be routed across the Gigabit Ethernet (GigE) external network resulting in best-case transfer rates of about 90MBps. Significantly slower transfer rates are common based on highly variable workflows and DMA configurations.

Multiple Streams

Whether or not the optional Backup Accelerator is part of your configuration, multiple backup streams or jobs will likely become critical in designing a backup scheme. Proper attention given to file system hierarchy can significantly improve backup performance and backup windows. Carefully consider the tree or directory layout of the */ifs* file system. If hundreds or thousands of directories are created directly under the */ifs* share it will result in management of backups becoming cumbersome and inefficient.
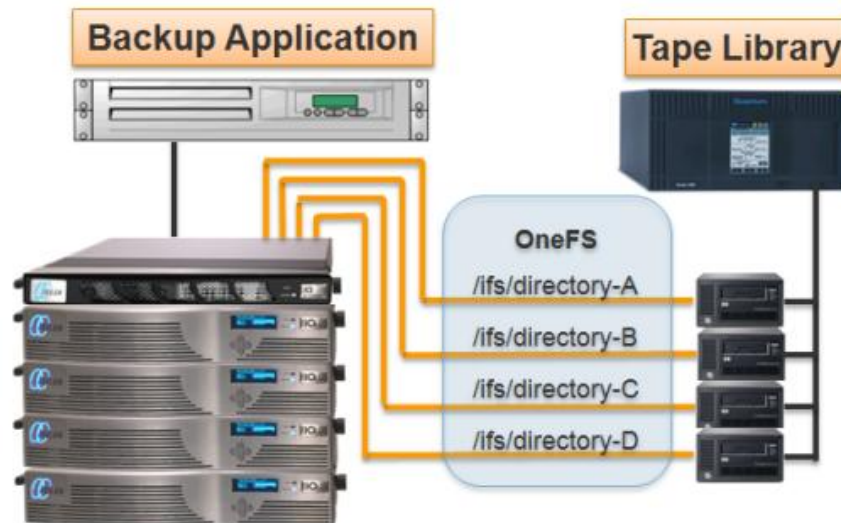

Figure 4 - Multiple Streams with Backup Accelerator

Scenario A:
If using a single Backup Accelerator connected to four tape devices via the four fiber channel ports, then it makes sense to create four large directories under */ifs,* so that the backup configuration can include four job policies using each of the four directories as a source and each of the four tape devices as a target.
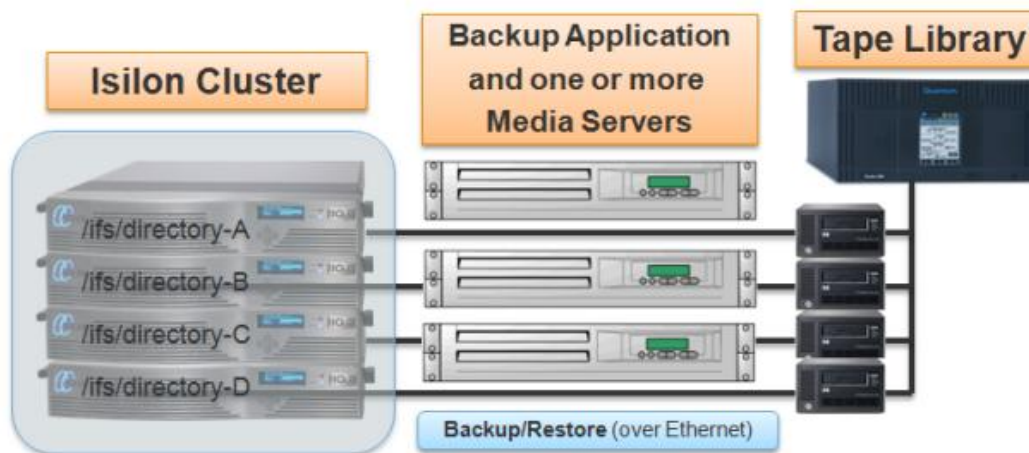

Figure 5 - Multiple Streams over Ethernet (No Backup Accelerator)

Scenario B:
(1) Not using a Backup Accelerator, (2) Four tape devices available as targets, (3) Four Isilon nodes available for backup. Here, it still makes sense to manage four large directories under */ifs* so that four backup jobs can run simultaneously using each of the four directories as a source, each of the four nodes as a transport of data, and each of the four tape devices as a target.

5. Snapshots

Before a backup begins, OneFS® leverages SnapshotIQ, which creates a directory-based snapshot. The backup is taken from this snapshot, which ensures a point-in-time consistent backup image. After the backup is completed or aborted, the snapshot expires. Backup snapshot functionality does not require a SnapshotIQ™ license and is included with OneFS.

If a backup of an existing snapshot is wanted, simply create a backup dataset that includes that path. If OneFS detects a *.snapshot* in the path, a snapshot is not taken and the existing snapshot is used for the source of the backup dataset.

6. Isilon NDMP Configuration

Configuring an Isilon Scale-Out NAS for NDMP backup can be done via the Isilon web administration interface or via the Isilon command-line interface. Please refer to the *Isilon Installed Product Help* for instructions on the steps necessary for the web interface. The steps required for configuring NDMP via the command prompt follows. Additional command-line interface help is available using the `man` command.

```
man isindmp
man isifc
man isitape
```

Create User

A NDMP user is required for backup via the NDMP protocol. OneFS supports multiple NDMP users. Any NDMP user created from one node can be seen across all nodes. To create a NDMP user from the command prompt, the command is:

```
isi ndmp user create <username> <password>
```

Set NDMP Port

The IANA (Internet Assigned Numbers Authority) designated port for NDMP is 10000. However, in some configurations this might need to be modified. Modifying the NDMP port on one node changes the setting on all nodes. To modify this setting from the command prompt, the command is:

```
isi ndmp settings set port 10000
```

Set DMA Vendor

The default setting for `dma` is `generic`. It is recommended that this be changed to `EMC` to ensure full compatibility. This setting is also a global setting and changing it on one node will change it across every node in the cluster. To change this setting from the command prompt, the command is:

```
isi ndmp settings set dma EMC
```

7. Backup Accelerator Configuration

The following commands are used only when the Backup Accelerator is installed. It is assumed that a tape device or tape library is correctly configured and connected via the fiber ports in the Backup Accelerator.

Ensure Fiber Channel Ports are Enabled

All four ports on the fiber channel card are enabled by default. Running this command as a sanity check is encouraged to ensure that these ports are in-fact enabled. From the command prompt the command is:

```
isi fc ls
```

Scan for Tape Devices

The next step is to scan the Backup Accelerator fiber channel ports for tape devices. This command will detect tape libraries and tape devices, and add them to the Backup Accelerator devices pool. If the `--reconcile` argument is added, any tape devices that are no longer detected will be removed from the Backup Accelerator devices pool. If `--reconcile` is not specified then no tape devices are removed from the Backup Accelerator devices pool. From the command prompt, the command is:

```
isi tape rescan [--reconcile]
```

Note: Depending on the configuration, tape libraries may only be visible to the backup application and may not be detected during a tape scan. In this case, the library and the tape drives will need to be manually matched within the backup application.

Rename a Tape Device to a Friendlier Name

The default name assigned to a tape device is sequential and in the form of tape001, tape002, etc. Tape libraries are also added sequentially but instead in the form of mc001, mc002, etc. It is recommended that these devices be renamed to a friendlier name, especially if there are several tape libraries attached to the backup accelerator. An example of the command prompt command follows:
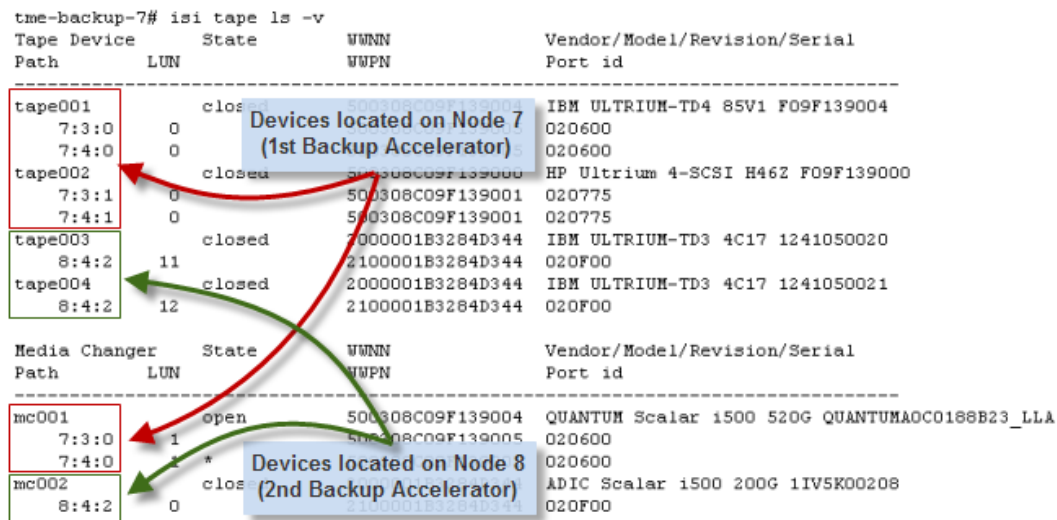
```
isi tape mv tape001 <more_descriptive_name>
```

List Tape Devices

After tape devices are added it is recommended that the tape devices are listed, to ensure the tape devices and tape libraries have been properly added. If the optional argument -v is added, the node to which that device resides is also listed. This can help in troubleshooting, especially when multiple Backup Accelerators exist in a single cluster. The command prompt command to list tape devices is:

```
isi tape ls -v
```

In the figure below, an `isi tape ls -v` command shows two Backup Accelerators. Devices mc001, tape001 and tape002 all belong to node seven (the first Backup Accelerator). Devices mc002, tape003, and tape004 all belong to node eight (the second Backup Accelerator).

Figure 6 - Multiple Backup Accelerators in a Single Cluster

This completes the Isilon NDMP and Backup Accelerator Configuration. Please refer to the *Isilon Installed Product Help* or man pages for more information.

8. EMC Networker Configuration

Typical configuration of EMC Networker® involves the use of both the Networker command-line interface and user interface. Basic configuration involves adding the tape library and tape devices, assigning tapes to a media pool, labeling the tapes, and creating backup datasets and groups. The example that follows is one simple scenario. Additional scenarios and information can be found in the *EMC Networker Administration Guide.*

Add a Tape Library or Tape Device

Tape libraries can be configured via the user interface or the preferred command-line interface in EMC Networker. The figure below shows an example of how to add a NDMP tape library connected to a Backup Accelerator. The command `jbconfig` is used to configure a tape library for use with EMC Networker. If `jbconfig` is run in a configuration that includes a Backup Accelerator, please ensure that automatic configuration is bypassed and the tape devices are configured to support NDMP.

```
# jbconfig

Jbconfig is running on host e420 (SunOS 5.9),
  and is using e420 as the NetWorker server.

        1) Configure an AlphaStor Library.
        2) Configure an Autodetected SCSI Jukebox.
        3) Configure an Autodetected NDMP SCSI Jukebox.
        4) Configure an SJI Jukebox.
        5) Configure an STL Silo.

What kind of Jukebox are you configuring? [1] 3
Enter NDMP Tape Server name: ? baint001.intop.isilon.com

Communicating to devices on NDMP Server 'baint001.intop.isilon.com', this may take a while...
14484:jbconfig: Scanning SCSI buses; this may take a while ...
These are the SCSI Jukeboxes currently attached to your system:
  1) scsidev@-24151.9.200: Standard SCSI Jukebox, QUANTUM / Scalar i500
  2) scsidev@-24151.9.200: Standard SCSI Jukebox, ADIC / Scalar i500
Which one do you want to install? 1
Installing 'Standard SCSI Jukebox' jukebox - scsidev@-24151.9.200.

What name do you want to assign to this jukebox device? mc001
15814:jbconfig: Attempting to detect serial numbers on the jukebox and drives ...

15815:jbconfig: Will try to use SCSI information returned by jukebox to configure drives.

Turn NetWorker auto-cleaning on (yes / no) [yes]? no

The following drive(s) can be auto-configured in this jukebox:
 1> LTO Ultrium-4 @ -24151.9.200 ==> tape002 (NDMP)
 2> LTO Ultrium-4 @ -24151.9.200 ==> tape001 (NDMP)
These are all the drives that this jukebox has reported.

To change the drive model(s) or configure them as shared or NDMP drives,
 you need to bypass auto-configure. Bypass auto-configure? (yes / no) [no] yes
Is (any path of) any drive intended for NDMP use? (yes / no) [no] yes
Is any drive going to have more than one path defined? (yes / no) [no]

Drive  1, element 256, system device name = tape002,
      local bus, target, lun value = -24151.9.200,
          WWNN=500308C09F139000 model LTO Ultrium-4
Drive path ? [baint001.intop.isilon.com:tape002]
Is this device configured as NDMP? (yes / no) [no]yes

Drive  2, element 257, system device name = tape001,
      local bus, target, lun value = -24151.9.200,
          WWNN=500308C09F139004 model LTO Ultrium-4
Drive path ? [baint001.intop.isilon.com:tape001]
Is this device configured as NDMP? (yes / no) [no]yes

Only model LTO Ultrium-4 drives have been detected.
Are all drives in this jukebox of the same model?  (yes / no) [yes]

Would you like to configure another jukebox? (yes/no) [no]
#
```

Inventory and Label Tapes

Before the library can be used for backups, tapes must be inventoried, labeled and added to a storage pool. This process can be performed with the command-line utility `nsrjb`, or via the Networker user interface.

The following examples are in a configuration that includes a Backup Accelerator. For more information on inventory and tape operations, including configurations without a Backup Accelerator, please refer to the *EMC Networker Administration Guide*.

This command is an example that will label tapes from slots 1-4, where the tapes are currently unlabeled, and will name them using tape002 based on their barcode and add them to the Default storage pool.

```
nsrjb -LYq -f "rd=baint001.intop.isilon.com:tape002 (NDMP)" -S 1-4 -b Default
```

This command adds the -R option and recycles tapes from slots 1-4, where the tapes are currently labeled, and will recycle them using tape002 based on their barcode and add them to the Default storage pool.

```
nsrjb -LRYq -f "rd=baint001.intop.isilon.com:tape002 (NDMP)" -S 1-4 -b Default
```

Create Backup Datasets

Backup datasets contain the FQDN or IP address of the data being backed up, and the paths that are being backed up. When creating a backup dataset using NDMP, special backup commands are used.

► To create a backup dataset:

1.   Open the Networker® Administration user interface for the host you want to manage.

2.   Click the **Configure** icon.
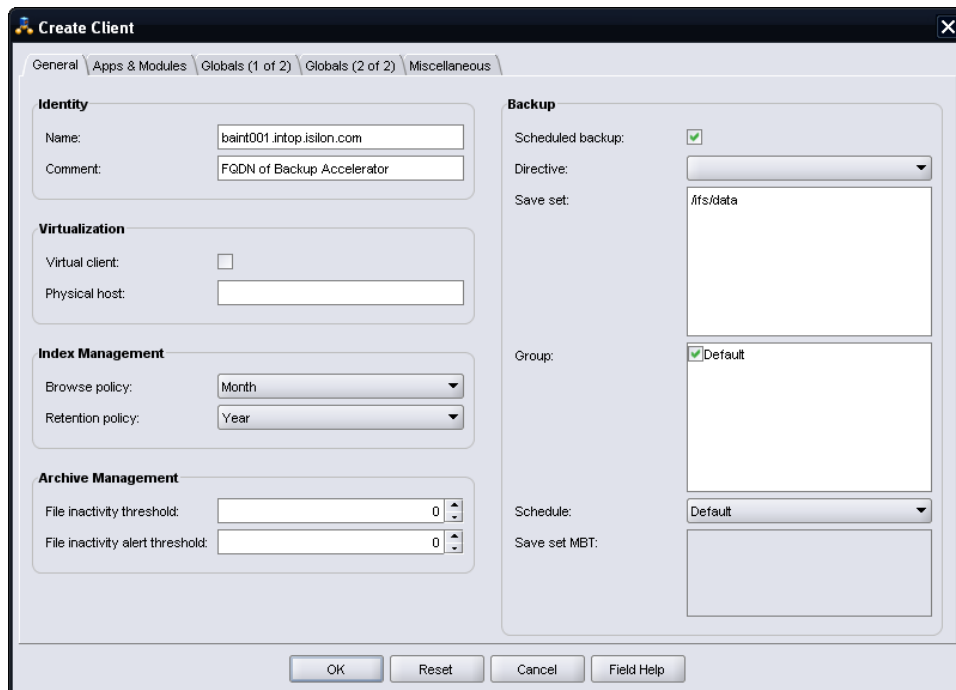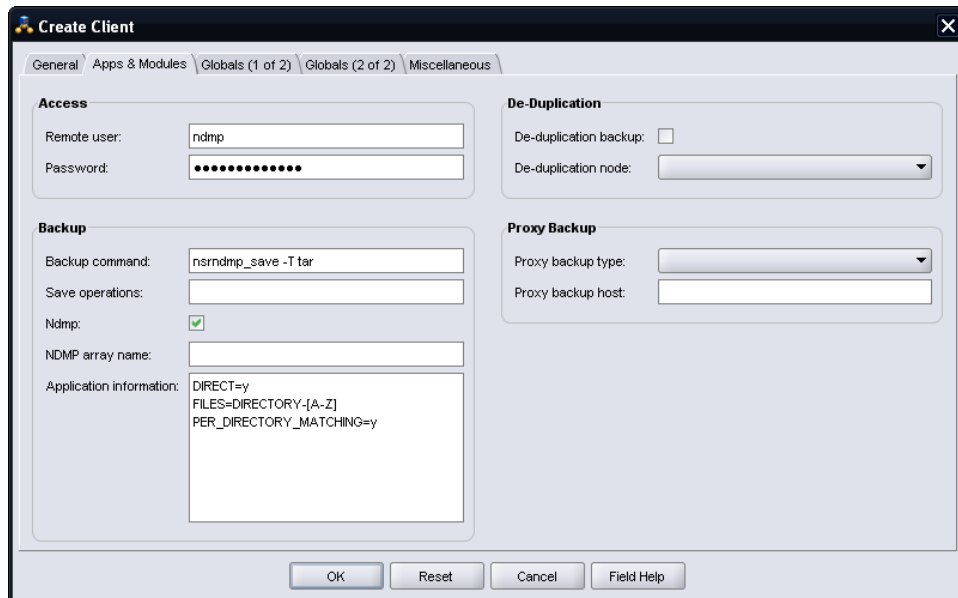
3.   Right-click on **Client,** and then click **New**.

Figure 7 - Create Client, General Tab

4. In the **Name** box, type the FQDN or IP address of the node that you want to back up. If a Backup Accelerator is installed then the node name of the Backup Accelerator must be used. Specifying a node other than a Backup Accelerator will result in remote NDMP backups.

5. In the **Save Set** box, type the path for the data to be backed up. Usually this will be `/ifs/<some_dir>` so that the data can be split into multiple data streams for backup.

6. In the **Group** area, click the check box of the group for which you want this client to belong.

7. Click on the **Apps and Modules** tab.

8. In the **Remote User** box, type the name of the NDMP user.

9. In the **Password** box, type the password of the NDMP user that was created within OneFS.

10. In the **Backup Command** box, type:
    `nsrndmp_save –T tar`.

11. Select the **NDMP** check box.

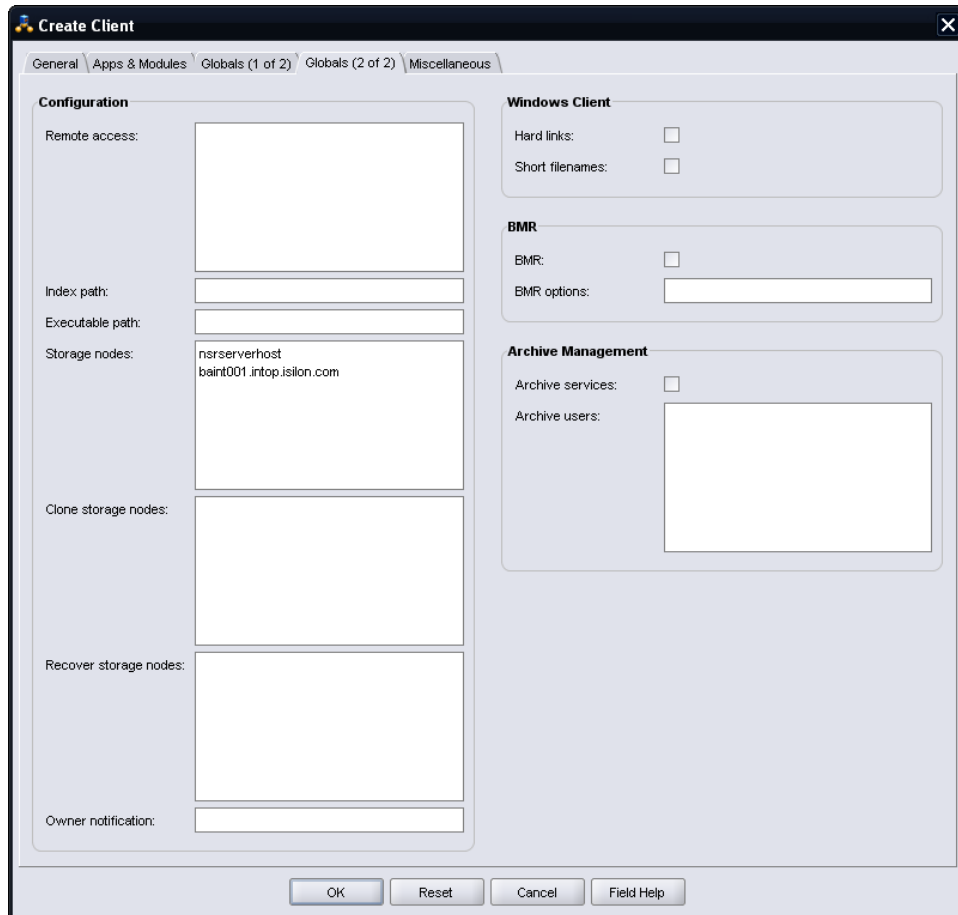12. In the **Application Information** box, type:
    `DIRECT=y`

    Note: Additional options are specified in this textbox. See the section in this document called *NDMP File Pattern and Wildcard Usage* for more information. The options specified in this figure will back up */ifs/data/DIRECTORY-A*, *ifs/data/DIRECTORY-B*, …, */ifs/data/DIRECTORY-Z.*

Figure 8 - Client Settings, Apps and Modules Tab

13. Click the **Globals (2 of 2)** tab

14. In the **Storage nodes** box, type:
    `nsrserverhost` ENTER
    and then type the FQDN or IP address of the tape server connected to the tape library. If a Backup Accelerator exists, this will be the FQDN or IP address of the Backup Accelerator.

15. Click **OK** to complete the creation of the backup dataset.

Figure 9 - Client Settings, Globals (2 of 2)

After the client is created and added to a group, a backup can be performed. The following command will perform a level 0 (Full) backup of the group `Default`**.**

```
savegrp –l 0 Default
```

9. Use Cases

NDMP File Pattern and Wildcard Usage

NDMP File Pattern and wildcard matching is a supported but limited feature to NDMP. The options below are environment variables and need to be entered in the backup software when configuring the backup dataset.

Basic Usage

Pattern based matching of files to be backed up depends on the environment variable FILES. Files must be set to a space-separated list of patterns relative to the value of the FILESYSTEM variable.

> **Example:**
> ```
> FILESYSTEM=/ifs/data
> FILES=space list patterns
> ```

This example matches exactly the files that are named */ifs/data/space*, */ifs/data/list*, */ifs/data/patterns*. Each word is treated as an exact pattern to match since there are no wild card characters.

Note: The FILESYSTEM variable typically does not need to be specified. It is typically extracted from elsewhere in the backup dataset.

Wild cards

> `foo*` will match `foo` followed by zero or more chars.
> `foo?` will match `foo` followed by zero or one char.
> `foo[abx]` will match either `fooa,` `foob` or `foox`
> `foo[a-z]` will match all patterns from `fooa` to `fooz`

Escaping Spaces

Spaces in the pattern can be escaped with a \

> `some\ file` will match a file named "`some file`"

> **Example:**
> ```
> FILES=some\ file another-file third file
> ```

The example will match exactly the files that are named */ifs/data/some file*, */ifs/data/another-file*, */ifs/data/third,* and */ifs/data/file*. Each word is treated as an exact pattern to match since there are no wild card characters.

Matching across Directories

Normally, patterns are matched across directories. A pattern like:

> `foo*` will match `foobar` and also `foo/bar`

if `foo` happens to be a directory, it will match all its dependents. To only match directories, set `PER_DIRECTORY_MATCHING` to `Y`. The result will be `foo*` matching `foo` and `foobar` but not `foo/bar`.

> **Example:**
> ```
> FILES=DIRECTORY-[A-Z]
> PER_DIRECTORY_MATCHING=Y
> ```

The example will match exactly the directories that are named */ifs/data/DIRECTORY-A*, */ifs/data/DIRECTORY-B*, */ifs/data/DIRECTORY-Z, etc*. Each word is treated as an exact pattern to match since there are no wild card characters.

Add a New Tape Device or Tape Library

A tape rescan is required when adding a tape device or tape library. After the tape device or library has been connected via fiber channel to the Backup Accelerator, issue the `isi tape rescan` command as described in the Backup Accelerator Configuration section. It is recommended that the newly added devices be renamed to a friendlier name and then added to EMC Networker using the `jbconfig` command.

Replace a Tape Drive

If a tape device must be replaced, first replace the tape drive, and then within the Isilon command-line interface or the web interface, perform a rescan. The rescan operation will add the new device. After this completes, there is no requirement to reconfigure Networker to see the device. Instead, delete the old device from the Backup Accelerator and rename the newly added device to the old name. In the following example, the old tape device is tape002 and the new tape device that replaces tape002 is tape017.

► To Replace a Tape Drive:

1. `ssh` to a node in the cluster

2. To scan for new tape device type:
    `isi tape rescan`
    Device tape017 is found and tape002 exists, but is no longer available.

3. To delete old tape device, type:
    `isi tape delete tape002`

4. To rename tape017 to tape002, type:
    `isi tape mv tape017 tape002`
    Now the backup application will be able to continue using tape002.

Note: The tape device must be of the same type as the old tape device to use this method.

Replace a Backup Accelerator

If a Backup Accelerator must be replaced, reconfiguration must occur since the new Backup Accelerator fiber channel ports will have different World Wide Node Name (WWNN) and World Wide Port Name (WWPN) names. The suggested course of action is to use the new WWNN and WWPN values and reconfigure the Storage Area Network (SAN) zoning as necessary. It is possible to rename the WWNN and WWPN for each port to match the values of the old Backup Accelerator, but this is fully dependent on having that information available. To reassign a WWNN or WWPN please refer to the man pages or the web interface.

Kill Orphaned NDMP Sessions

Occasionally, an orphaned session might be encountered where a backup has improperly aborted or an application crash has occurred. If a device is left open, it might not be available for a future backup. NDMP sessions can be killed from the web interface or via the command-line interface. Special care should be considered when ending NDMP sessions. If the wrong session is killed, that entire backup will be invalid. The elapsed time field can be useful in determining which sessions have been orphaned.

10. References

Isilon NDMP Compatibility Guide

Data Protection for Isilon Scale-Out NAS Guide

Isilon Quick Installation Guide

Isilon Installed Product Help

EMC Networker Software Compatibility Guide

EMC Networker Administration Guide

Isilon Systems® (NASDAQ: ISLN) is the proven leader in scale-out NAS. Isilon® clustered storage and data management solutions drive unique business value for customers by maximizing the performance of their mission-critical applications, workflows, and processes. Isilon enables enterprises and research organizations worldwide to manage large and rapidly growing amounts of file-based data in a highly scalable, easy-to-manage, and cost-effective way. Information about Isilon can be found at http://www.isilon.com.