

Dell EMC Unity™ Family

Version 4.4

Configuring NDMP Backups

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CHAPTER 1

Introduction

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About NDMP

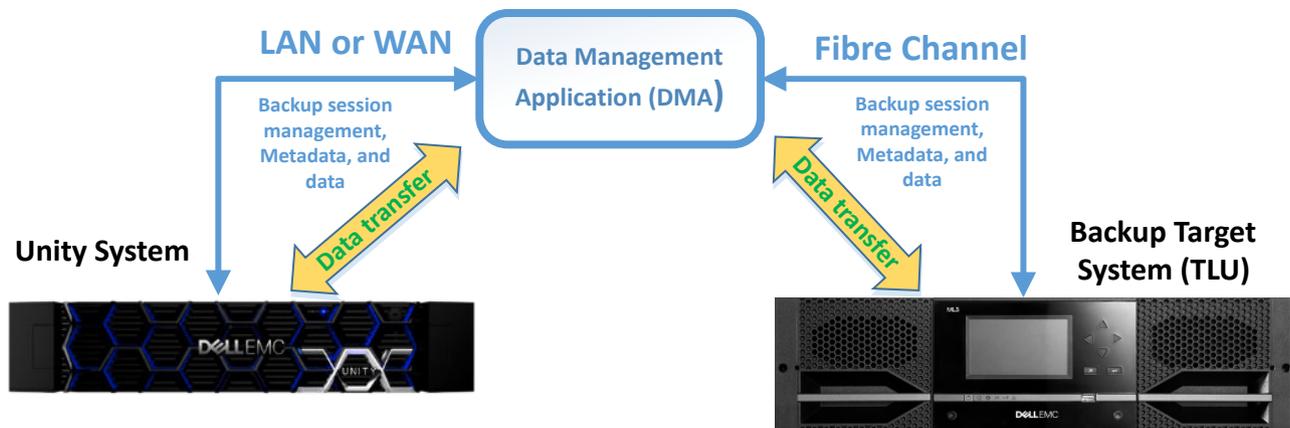
The Network Data Management Protocol (NDMP) is used for backup and recovery operations between two systems using a separate Data Management Application (DMA). Both 2-way and 3-way NDMP are supported on Unity systems. A Unity NAS server functions as the NDMP server on a Unity system. The DMA orchestrates the backup sessions between the Unity system and the destination system. The Unity system serves as the primary storage system (source), whereas Tape Library Units (TLUs) or Virtual Tape Library Units (VTLUs) serve as the secondary storage (destination).

For a complete list of supported DMAs and TLUs for Unity NDMP, refer to the *Dell EMC Unity Simple Support Matrix*.

Three-way NDMP

With three-way NDMP, both data and metadata are transferred from the source Unity system over a local area network (LAN) or wide area network (WAN). Data is also transferred through the DMA. In this configuration, the DMA and network can create a bottleneck, however a dedicated network can be set up for the NDMP data transfer to avoid network traffic congestion.

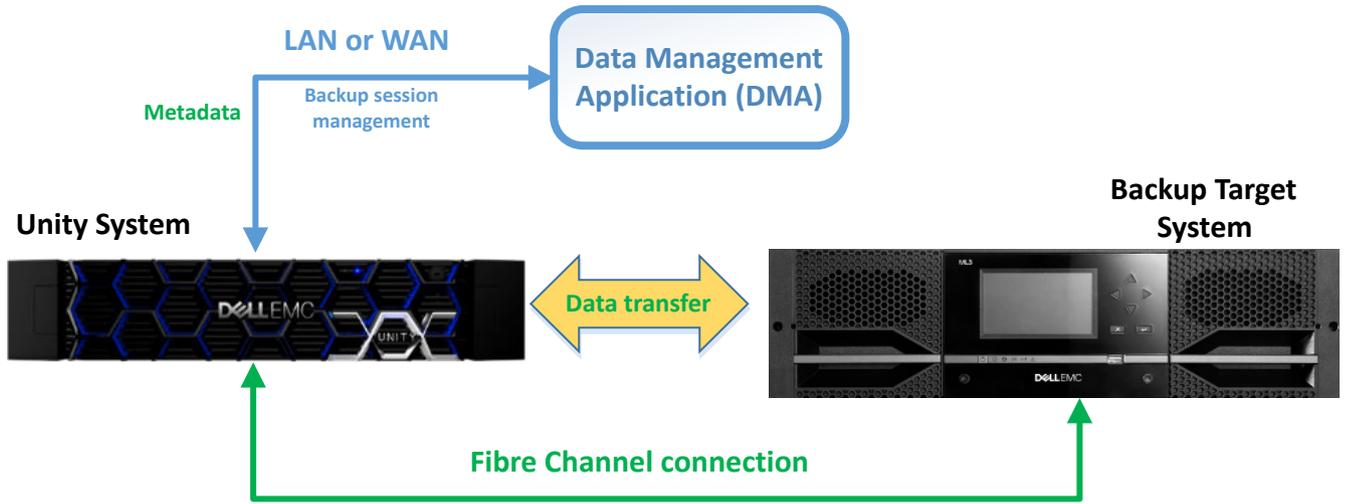
Figure 1 3-way NDMP diagram



Two-way NDMP

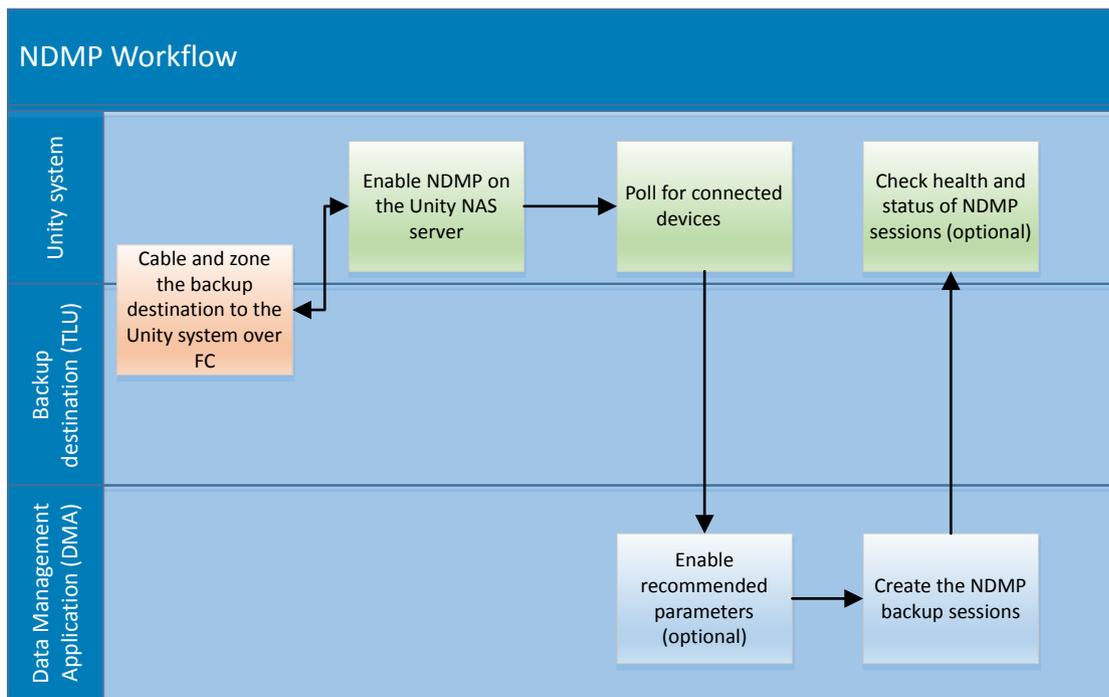
With 2-way NDMP, backup traffic is transferred directly from the Unity primary storage system to the TLU using a zoned Fibre Channel (FC) connection. This allows data to be transferred directly from the Unity system to the backup target (TLU), which may increase the speed of transfer compared to three-way NDMP as the LAN may be less congested. After the initial backup session, subsequent backups will be incremental.

Figure 2 2-way NDMP diagram



Process flow for two-way NDMP

Figure 3 2-way NDMP workflow



Requirements for using two-way NDMP on Unity

In order to use the two-way NDMP feature, the following are required:

- A Unity system running Operating Environment 4.4 or later
- Unity NAS servers with NFS, SMB, or multiprotocol file systems, or VMware NFS datastores with NDMP enabled
- A TLU or VTLU as the backup destination
- A backup application (DMA), such as Dell EMC NetWorker
- Fibre Channel (FC) connectivity using zoning of the Storage Processor (SP) FC ports to the TLU

Note

FC direct connect is not supported. Synchronous replication ports cannot be used for NDMP.

Two-way NDMP limitations and considerations

Be mindful of the following limitations and considerations for using two-way NDMP:

Limitations

- You can only use NDMP to back up file resources
- Synchronous replication ports cannot be used for FC connections to backup devices
- Concurrent backup sessions are limited to those supported by your model

For a full list of supported DMA vendors and supported concurrent NDMP backup sessions for your system, refer to the *Unity Support Matrix*.

Considerations

NDMP is compatible with the following features:

- Thin file systems
- Native synchronous and asynchronous replication
- Snapshot schedules
- Stubbed files
- Data reduction (data is decompressed and rehydrated before it is backed up)

Supported DMA operations and file types

The following backup operations from the DMA are supported by Unity:

- Full backups
- Incremental backups
- Restores
- Tape clones

Backup format types:

- Supported
 - Dump format
 - Tar format
- Not supported
 - VBB format
 - VBS format

Data management application parameters for two-way NDMP

It is recommended that you enable the following parameter settings on the DMA for management of NDMP sessions:

Table 1 DMA parameters

Parameter name and value	Justification
HIST = y	Allows the DMA to obtain the file history from the Unity system.
DIRECT = y	Allows a restore operation of a single file from backup.
UPDATE = y	Allows the DMA to obtain a file history for incremental backups from the Unity system.
SNAPSURE = y	Allows the DMA to request a snapshot of the file system in order to use it for backup.

Restore operations from VNX systems

When using NDMP to restore from VNX, consider the following:

- New UFS64 attributes in the inode will not be available, but UFS32 attributes will be available due to the difference in file system formats between VNX and Unity.
- You cannot restore from VNX deduplicated file systems. Any VNX files that have been deduplicated will be skipped in the restore backup operation.
- It is recommended that you use the same DMA software that was used for the original backups for the restore operations.

CHAPTER 2

Prepare and configure

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Configure connected backup devices

svc_nas -devconfig

The `svc_nas -devconfig` service command queries the available storage system devices and tape devices and their configurations, and saves the device configuration into the database of the NAS server.

```
svc_nas {<NAS_server_name> | ALL } | -devconfig
| -create -scsi [<chain_number>] {-nondisks|-all}
| -probe -scsi [<chain_number>] {-disks|-nondisks|-all}
| -list -scsi [<chain_number>] {-disks|-nondisks|-all}
```

-devconfig

Queries the available storage system devices and tape devices and their configurations, and saves the device configuration into the database of the NAS server.

-create -scsi [<chain number>] {-nondisks | -all}

Queries SCSI devices and saves them into the device table database on the NAS server. The `<chain_number>` specifies a SCSI chain number. The `-nondisks` option limits operations to non-disks such as tapes, and juke boxes. The `-all` option permits all SCSI devices (disks and non-disks).

-probe -scsi [<chain_number>] {-disks|-nondisks|-all}

Queries and displays the SCSI devices without saving them into the database. The `<chain_number>` specifies a SCSI chain number. The `-disks` option limits operations to disks. The `-nondisks` option limits operations to non-disks such as tapes, and juke boxes. The `-all` option permits all SCSI devices (disks and non-disks).

-list -scsi [<chain_number>] {-disks|-nondisks|-all}

Lists the SCSI device table database that has been saved on the NAS server. The `<chain_number>` specifies a SCSI chain number. The `-disks` option limits operations to disks. The `-nondisks` option limits operations to non-disks such as tapes, and juke boxes. The `-all` option permits all SCSI devices (disks and non-disks).

The following example shows configuration for all non-disk SCSI devices, such as tapes and juke boxes (TLUs).

```
19:22:25 service@unknown spa:~> svc_nas ALL -devconfig -probe -scsi -nondisks
```

```
SVDM_A :
SCSI_devices :
chain=2, scsi=2
tid/lun= 0/0, type= tape, info=
tid/lun= 0/1, type= jbox, info= 0055L3A7800004
tid/lun= 1/0, type= tape, info=
```

Enable NDMP

You can enable NDMP for a NAS server through either the Unisphere user interface or the Command Line Interface (CLI).

Enable NDMP for a NAS server in Unisphere

Select the NAS server that will be used for NDMP and enable it in the NAS server settings.

Procedure

1. Under **Storage**, select **File > NAS Servers**.
2. Select the relevant NAS server, and then select the **Edit** icon.
3. On the **Protection & Events** tab:
 - Select the **NDMP Backup** sub-tab to enable or disable NDMP, and to change the NDMP password.
 - Select the **DHSM** sub-tab to enable or disable Distributed Hierarchical Storage Management (DHSM) and to change the DHSM password.
 - Select the **Events Publishing** sub-tab to enable or disable Events Publishing, create or modify an event pool, and create or modify events policy settings.

Configure NDMP server settings using the CLI

Configure NDMP server settings, which includes enabling or disabling NDMP and changing the password for accessing the NDMP server.

Format

```
/net/nas/ndmp -server <value> set -enabled {yes {-passwd
<value> | -passwdSecure} | no}
```

Object qualifier

Qualifier	Description
-server	Type the ID of the associated NAS server.

Action qualifier

Qualifier	Description
-enabled	Enable NDMP. Value is yes or no. For yes, type the NDMP server password.
-passwd	Type the password for the NDMP server. You must specify the password when enabling NDMP.
-passwdSecure	Specify the password in secure mode - the user will be prompted to input the password and the password confirmation.

Example

The following command enables NDMP:

Prepare and configure

```
uemcli -d 10.0.0.1 -u Local/joe -p MyPassword456! /net/nas/ndmp -  
server nas_0 set -enabled yes -passwd "Password0123"
```

```
Storage system address: 10.0.0.1  
Storage system port: 443  
HTTPS connection  
  
Operation completed successfully.
```

CHAPTER 3

Manage NDMP

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Check NDMP sessions and configuration

svc_storagecheck -m -- ndmp

Use the `svc_storagecheck` service command to list information about active NDMP configuration, active NDMP sessions and NDMP parameter settings.

svc_storagecheck -m, -- ndmp

param_name	facility	default	current
configured			
checkUtf8FileNames	PAX	1	1
filter.caseSensitive	PAX	1	1
filter.numDirFilter	PAX	5	5
filter.numFileFilter	PAX	5	5
nFTSThreads	PAX	8	8
nPrefetch	PAX	8	8
nRestore	PAX	8	8
nThread	PAX	16	16

NAS server backup and restore statistics (svc_pax)

This service script displays or resets the counters for NDMP and PAX backup statistics.

Function: Diagnostic

Mode: Normal

Usage: General Use

Description

This service script displays the advanced statistics of NDMP and PAX backup sessions in progress in the NAS servers. The statistics counters can also be reset.

Use cases

Usage:

```
svc_pax { SVDM_A | SVDM_B | ALL }
[-h | -help | --help | <no option>]
| -stats [-reset | -verbose]
```

Options:

[-h | -help | --help | <no option>]

Display help and exit.

-stats

Display in progress NDMP/PAX backups statistics counters.

-reset

Reset NDMP/PAX backups statistics counters.

-verbose

Display in progress NDMP/PAX backups advanced statistics counters.

Example usage

Reset the advanced PAX statistics on SPA:

```
svc_pax SVDM_A -stats -reset
```

```
SVDM_A : commands processed: 1
command(s) succeeded
```

View the verbose statistics for an active NDMP restore session on SPA:

```
svc_pax SVDM_A -stats -verbose
```

```
SVDM_A : commands processed: 1
command(s) succeeded
output is complete

***** SUMMARY PAX STATS *****
---- NASS STATS ----
nass00 is not doing backup
nass01 is not doing backup
nass02 is not doing backup
nass03 is not doing backup
---- NASA STATS ----
** nasa thid 0 (RESTORE) **
Backup root directory: /16m_ok_1_0
Total bytes processed: 12140605440
Total file processed: 738
throughput: 68 MB/sec
average file size: 16065KB
Total nasa wait nass count: 0
Total nasa wait nass time: 0 msec
Total time since last reset: 170 sec
Tape device name: /dev/c80t010
0 size file processed: 13
1 -- 8KB size file processed: 1
8KB+1 -- 16KB size file processed: 0
16KB+1 -- 32KB size file processed: 0
32KB+1 -- 64KB size file processed: 0
64KB+1 -- 1MB size file processed: 0
1MB+1 -- 32MB size file processed: 724
32MB+1 -- 1GB size file processed: 0
1G more size file processed: 0
fs /16m_ok_1_0 size is: 120855445504 Bytes
Estimated time remain is 1524 sec

nasa01 is not doing backup/restore
nasa02 is not doing backup/restore
nasa03 is not doing backup/restore
---- NASW STATS ----
nasw00 RESTORE (in progress)
Session Total Time: 00:02:50 (h:min:sec)
Session Idle Time: 00:00:56 (h:min:sec)
KB Tranferred: 11858820 Block Size: 61440 (60 KB)
Average Transfer Rate: 68 MB/Sec 239 GB/Hour
Average Burst Transfer: 101 MB/Sec 357 GB/Hour
__Point-in-Time__ (over the last 10 seconds):
Rate=69 MB/Sec Burst=96 MB/Sec Idle=283 msec/sec
Get Pool: 17 buffers Put Pool: 29 buffers
Compression Page not available
ReadC=0.00 WriteC=0.00 Read=0 KB Written=0 KB
```

```
nasw01 BACKUP (terminated)
nasw02 BACKUP (terminated)
nasw03 BACKUP (terminated)
```

```
1488797790: ADMIN: 6: Command succeeded: printstats pax full
```

Value Definition

NASS STATS Thread responsible for traversing the file system and providing metadata for each directory and/or file.

Total file processed Total number of files and/or directories for which metadata was processed.

Total NASS wait NASA count The number of times NASS waited for NASA.

Total NASS wait NASA time Amount of time NASS waited for NASA.

Total time since last reset Time since the last reset; a reset occurs automatically when a backup completes.

fts_build time Time spent building the file system or directory tree.

getstatpool If the value is consistently zero, then NASA may be slowing down the backup.

putstatpool If the value is consistently zero, then NASS may be slowing down the backup.

NASA STATS Thread responsible for writing file header information, reading file data, and writing to the buffer.

Backup root directory Directory being backed up.

Total bytes processed Bytes backed up since the last reset or start of the current backup.

Total file processed Number of files backed up since the start or reset of the current backup.

Throughput How fast NASA processed data.

Average file size Average file size for the current backup.

Total nasa wait nass count time Number of times NASA waited for NASS.

Total nasa wait nass time Amount of time NASA waited for NASS.

Total time since last reset Amount of time since the backup statistics were reset; a reset occurs automatically when a backup completes.

Tape device name Target device for the backup data.

File size statistics Statistics on the size of files backed up since the start or reset of the current backup.

NASW STATS Thread responsible for getting data from the buffer pool, writing it to tape or sending it to a remote Data Mover.

Session total time Total time of the current session.

Session idle time Idle time for the current session.

KB transferred Total KB transferred.

Average transfer rate Per second and per hour transfer rate for the current session's data.

Average burst transfer Burst transfer rate in MB/s and GB/s.

Write block counters
(List/Direct) Scatter/gather write count.

Point-in-time_ (over the last Information on data processed during a 10
10 seconds) second interval.

Rate Transfer rate in MB/s.

Burst Burst transfer rate in MB/s.

Idle Amount of time NASW was idle in msec.

Get pool Number of buffers in get pool; if value is consistently 0, then NASA and NASS may be slowing down the backup.

Put pool Number of buffers in put pool; if value is

consistently 0, then the tape may be slowing down the backup.
 Compression rate retrieved Compression rate.
 ReadC Read compression rate at the tape device.
 WriteC Write compression rate at the tape device.
 Read Amount of data read in KB.
 Written Amount of data written in KB.

NAS server parameters for NDMP

The following new NAS server parameters are introduced for two-way NDMP.

Facility	Parameter name	Values	Description	Scope
ndmp	concurrentDataStreams	1–20 Default: 20	Displays the maximum number of concurrent backup or restore streams that are set. This parameter also enables the user to change the concurrent backup sessions from the default value of four up to a maximum of eight, provided the system has at least 8 GB memory. The default value is 4. Note Reboot the SP for changes to take effect.	Global
ndmp	IPv6	0 or 1 Default: 1	Enable or disable IPv6 connection address extension (CAE). <ul style="list-style-type: none"> 0 = Disable CAE. 1 = Enable CAE. 	Global
ndmp	CDBFsinfoBufSizeInKB	16-2048 Default: 1024	Used to adjust buffer size for SCSI/TAPE_EXECUTE_CDB and CONFIG_GET_FS_INFO. It can be increased if the system has a big tape library with thousands of slots and the backup software does not divide the CDB read_element_status into multiple requests. It can also be increased if the system has thousands of file systems mounted. It can be decreased if the system cannot boot up due to fragmented memory. Default value for this param is 1024 KB.	NAS server
ndmp	NdmpSnapTimer	1-525600 Default: 240	Value (in minutes) used to adjust the speed to make the NDMP snap self-destroy time longer. First, set the NDMP snap self-destroy time as (NdmpSnapTimer+60) minutes and start the timer. Then, every time the NdmpSnapTimer times out if the session is still active, make the NDMP snap self-destroy time (NdmpSnapTimer+60) minutes longer. When the NDMP session is closed, the NdmpSnapTimer will be canceled. This prevents the NDMP snap	NAS server

Facility	Parameter name	Values	Description	Scope
			from persisting forever when an SP reboot happens during an NDMP backup.	
ndmp	addBackupEnv	0 or 1 Default: 0	Specifies whether to add NDMP environment variables such as DIRECT=y and RECURSIVE=y to the DMA at the end of a backup. This internal parameter is added in cases where DDAR is wanted and the DMA depends on the two variables to perform a DDAR operation. The default value for this param is 0. If NDMP.addBackupEnv=0, this variable is not added to the DMA at the end of backup. If NDMP.addBackupEnv=1, this variable is added to DMA at the end of backup.	NAS server
ndmp	bufsz	64-1168 Default: 256	Size of the I/O buffer (in kilobytes) allocated for reading and writing on the tape as requested by TAPE_READ/ TAPE_WRITE from the NDMP client.	NAS server
ndmp	convDialect	Text string Default: 8859-1	Defines the conversion dialect when an ASCII-mode image is restored to a NAS server that has Internationalization turned on. This applies only when the conversion dialect you want to use is non-Latin1 dialect, such as big5.	NAS server
ndmp	dialect	Text string Default: null string	Sets the dialect on the NAS server to match the dialect of the backup client. This applies when the NAS server has Internationalization turned on. This applies only when the conversion dialect you want to use is non-Latin1 dialect such as big5.	NAS server
ndmp	envTakeLast	0 or 1 Default: 0	Specifies whether to take the last value for same NDMP environment variables with multiple values. This can be used as a workaround if the DMA runs into issues.	NAS server
ndmp	snapTimeout	2-60 5	NDMP backup SnapSure file system creation timeout value (in minutes). You can increase this parameter if the system is too busy to finish a SnapSure file system creation within the default timeout window. You can decrease this parameter (not recommended) if the system is idle most of the time.	NAS server
ndmp	v4OldTapeCompatible	0 or 1 Default: 1	For NDMP v2/v3, sets tape operation behaviors compatible with v4. v4OldTapeCompatible=0 disables v4 tape behaviors for NDMP v2/v3 v4OldTapeCompatible=1 enables v4 tape behaviors for NDMP v2/v3	NAS server

Facility	Parameter name	Values	Description	Scope
ndmp	snapsure	0 or 1 Default: 0	Determines whether SnapSure is used for backup if the NDMP environment variable SNAPSURE is not set or not supported by the DMA software. The NDMP environment variable, if set, overrides this parameter. <ul style="list-style-type: none"> 0 = Do not use SnapSure for backup. 1 = Use SnapSure for backup. 	Global
pax	checkUtf8FileNames	0 or 1 Default: 1	Specify whether to check if file names are in a valid UTF-8 format.	NAS server
pax	filter.caseSensitive	0 or 1 Default: 1	Sets whether or not the file filters become case-sensitive. 1=Filter is case-sensitive, 0=Filter is not case-sensitive.	NAS server
pax	filter.dialect	Text string Default: null string	Sets the dialect for translating PAX filter parameters. This applies when the NAS server operates in Internationalization mode. The filter-dialect is used to translate the filter value to UTF-8. If the translation fails, the filter cannot be used.	NAS server
pax	filter.numDirFilter	0-50 Default: 5	Specifies the number of directory filters that can be specified for a single backup.	NAS server
pax	filter.numFileFilter	0-50 Default: 5	Specifies the number of file filters that can be specified for a single backup.	NAS server
pax	maxCifsBufferLengthInKB	8-129 Default: 32	Maximum allowed CIFS ea/sd buffer length for NDMP backup/restore in kilobytes.	NAS server
pax	maxPaxHlkTableCnt	1024-4194304 Default: 1048576	Maximum allowed PAX hard link table count to control memory usage. Different memory settings will use different default and value ranges. 4GB={min=1024 max=4194304 default=1048576} 5GB={min=1024 max=5242880 default=1572864} 8GB={min=1024 max=6291456 default=2097152} 24GB={min=1024 max=14680064 default=6291456}	NAS server
pax	nFTSThreads	1-128 Default: 8	Specify the number of FTS worker threads per backup session.	NAS server
pax	nPrefetch	1-8 Default: 8	Specify the number of tape records prefetched for each worker thread.	NAS server

Facility	Parameter name	Values	Description	Scope
pax	nRestore	1-16 Default: 4	Specify the number of worker threads for each restore session.	NAS server
pax	nThread	1-128 Default: 16	Specify the number of worker threads for each backup session.	NAS server
pax	noFileStreams	0 or 1 Default: 0	Specify whether to allow CIFS file streams in a backup/restore.	NAS server
pax	paxReadBuff	16-128 Default: 64	Specify the number of buffers used to stream data for each restore job.	NAS server
pax	paxStatBuff	1-512 Default: 128	Specify the number of buffers in stat queue for each backup session.	NAS server
pax	paxWriteBuff	1-256 64	Specify the number of buffers in tape write queue for each backup session.	NAS server
pax	readWriteBlockSizeInKB	64-256 Default: 64	Specify the maximum allowed PAX buffer size for NDMP read/write in kilobytes.	NAS server
pax	scanOnRestore	0 or 1 Default: 1	Specify whether to scan for viruses upon restore.	NAS server