

Veritas™ Dynamic Multi-Pathing Release Notes

HP-UX

6.0

Veritas Dynamic Multi-Pathing Release Notes

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- Operating system
- Version and patch level
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- Router, gateway, and IP address information
- Problem description:
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Product guides are available on the media in PDF format. Make sure that you are using the current version of the documentation. The document version appears on page 2 of each guide. The latest product documentation is available on the Symantec Web site.

<https://sort.symantec.com/documents>

Your feedback on product documentation is important to us. Send suggestions for improvements and reports on errors or omissions. Include the title and document version (located on the second page), and chapter and section titles of the text on which you are reporting. Send feedback to:

doc_feedback@symantec.com

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<http://www.symantec.com/connect/storage-management>

Support agreement resources

If you want to contact Symantec regarding an existing support agreement, please contact the support agreement administration team for your region as follows:

Asia-Pacific and Japan

customercare_apac@symantec.com

Europe, Middle-East, and Africa

semea@symantec.com

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supportsolutions@symantec.com

Dynamic Multi-Pathing Release Notes

This document includes the following topics:

- [About this document](#)
- [About Veritas Dynamic Multi-Pathing](#)
- [About Symantec Operations Readiness Tools](#)
- [Important release information](#)
- [Changes introduced in 6.0](#)
- [System requirements](#)
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About this document

This document provides important information about Veritas Dynamic Multi-Pathing (Dynamic Multi-Pathing) version 6.0 for HP-UX 11i v3. Review this entire document before you install or upgrade Dynamic Multi-Pathing.

The information in the Release Notes supersedes the information provided in the product documents for Dynamic Multi-Pathing.

This is Document version: 6.0.3 of the *Veritas Dynamic Multi-Pathing Release Notes*. Before you start, make sure that you are using the latest version of this guide. The latest product documentation is available on the Symantec Web site at:

<https://sort.symantec.com/documents>

About Veritas Dynamic Multi-Pathing

Veritas Dynamic Multi-Pathing (DMP) provides multi-pathing functionality for the operating system native devices configured on the system. DMP creates DMP metadevices (also known as DMP nodes) to represent all the device paths to the same physical LUN.

DMP is available as a component of Storage Foundation. DMP supports Veritas Volume Manager (VxVM) volumes on DMP metadevices, and Veritas File System (VxFS) file systems on those volumes.

DMP is also available as a stand-alone product, which extends DMP metadevices to support the OS native logical volume manager (LVM). You can create LVM volumes and volume groups on DMP metadevices.

DMP does not support migrating the root LVM volume group onto DMP.

Veritas Dynamic Multi-Pathing can be licensed separately from Storage Foundation products. Veritas Volume Manager and Veritas File System functionality is not provided with a DMP license.

DMP functionality is available with a Storage Foundation Enterprise license, SF HA Enterprise license, and Standard license.

Veritas Volume Manager (VxVM) volumes and disk groups can co-exist with LVM volumes and volume groups, but each device can only support one of the types. If a disk has a VxVM label, then the disk is not available to LVM. Similarly, if a disk is in use by LVM, then the disk is not available to VxVM.

About Symantec Operations Readiness Tools

[Symantec Operations Readiness Tools \(SORT\)](#) is a Web site that automates and simplifies some of the most time-consuming administrative tasks. SORT helps you manage your datacenter more efficiently and get the most out of your Symantec products.

SORT can help you do the following:

- | | |
|---|--|
| Prepare for your next installation or upgrade | <ul style="list-style-type: none">■ List product installation and upgrade requirements, including operating system versions, memory, disk space, and architecture.■ Analyze systems to determine if they are ready to install or upgrade Symantec products.■ Download the latest patches, documentation, and high availability agents from a central repository.■ Access up-to-date compatibility lists for hardware, software, databases, and operating systems. |
| Manage risks | <ul style="list-style-type: none">■ Get automatic email notifications about changes to patches, array-specific modules (ASLs/APMs/DDIs/DDLs), and high availability agents from a central repository.■ Identify and mitigate system and environmental risks.■ Display descriptions and solutions for hundreds of Symantec error codes. |
| Improve efficiency | <ul style="list-style-type: none">■ Find and download patches based on product version and platform.■ List installed Symantec products and license keys.■ Tune and optimize your environment. |

Note: Certain features of SORT are not available for all products. Access to SORT is available at no extra cost.

To access SORT, go to:

<https://sort.symantec.com>

Important release information

- For important updates regarding this release, review the Late-Breaking News TechNote on the Symantec Technical Support website:
<http://www.symantec.com/docs/TECH164885>
- For the latest patches available for this release, go to:
<http://sort.symantec.com/>
- The hardware compatibility list contains information about supported hardware and is updated regularly. For the latest information on supported hardware visit the following URL:
<http://www.symantec.com/docs/TECH170013>

Before installing or upgrading Storage Foundation and High Availability Solutions products, review the current compatibility list to confirm the compatibility of your hardware and software.

Changes introduced in 6.0

This section lists the changes in Veritas Dynamic Multi-Pathing 6.0.

Changes related to Veritas Dynamic Multi-Pathing (DMP)

The following sections describe changes in this release related to Veritas Dynamic Multi-Pathing (DMP).

DMP detects "persist through power loss" storage device server capability

In this release, DMP detects when a storage device server has the capability "persist through power loss". Certain arrays, such as Oracle's Sun Storage 7310, use this capability to preserve the persistent reservation and registrations across power cycles, controller reboots, and other similar operations.

If DMP detects that the device supports this capability, then DMP sets the APTPL (Activate Persist Through Power Loss) bit to 1 in the PERSISTENT RESERVE OUT parameter data sent with a REGISTER, REGISTER AND IGNORE EXISTING KEY service action, according to SPC-3 specifications.

When APTPL is set to 1, the persistent reservation (PR) keys are preserved during array controller takeover or failback operations.

Tuning Dynamic Multi-Pathing with templates

Veritas Dynamic Multi-Pathing (DMP) has multiple tunable parameters and attributes that you can configure for optimal performance. In this release, DMP introduces a template method to update several tunable parameters and attributes with a single operation. The template represents a full or partial DMP configuration, showing the values of the parameters and attributes of the host.

To view and work with the tunable parameters, you can dump the configuration values of the DMP tunable parameters to a file. Edit the parameters and attributes, if required. Then, load the template file to a host to update all of the values in a single operation.

For more information about tuning DMP with templates, see the *Storage Foundation and High Availability Solutions Tuning Guide*.

Changes to DMP support for ALUA arrays

In this release, DMP has improved support for ALUA arrays. DMP now efficiently handles most implementations of the ALUA standard. The enhancements include the following:

- DMP now detects whether an ALUA array is A/A-A, A/A or A/P-F.
- DMP handles the array state correctly, when a node is taken out of the cluster. The enclosure level attribute failoverpolicy is now set internally.
- DMP handles Standby and unavailable LUN states for ALUA arrays.
- DMP monitors LUN ownership changes. DMP can shift the I/O load depending on the current state of the LUN.

Dynamic Multi-Pathing (DMP) detects and reports extended attributes from Veritas Operations Manager

If you have Veritas Operations Manager (VOM), and you have configured a central Management Server, the Device Discovery layer (DDL) of DMP can obtain extended attributes for managed hosts. DDL obtains these additional attributes out of band from the VOM database. DMP displays these attributes as output of the `vxdisk -p list` command.

See the *Administrator's Guide*.

DMP tunable parameter `dmp_enable_restore` renamed to `dmp_restore_state`

The DMP tunable parameter `dmp_enable_restore` has been renamed to `dmp_restore_state`. The `dmp_restore_state` tunable can have the following values:

- `enabled`
Enables and starts the DMP path restoration thread.
- `disabled`
Stops and disables the DMP path restoration thread.
- `stopped`
Stops the DMP path restoration thread until the next device discovery cycle.

Command completion for DMP commands

Veritas Dynamic Multi-Pathing (DMP) now supports command completion for DMP commands. In this release, command completion is supported only on the bash shell. The shell must be bash version 2.4 or later.

To use this feature, press **Tab** while entering a supported VxVM or DMP command. The command is completed as far as possible. When there is a choice, the command completion displays the next valid options for the command. Enter one of the displayed values. A value in brackets indicates a user-specified value.

Note: Platform-specific options are not supported with command completion in this release.

The following commands support command completion:

- `vxdisk`
- `vxdmpadm`
- `vxddladm`

DMP enhancements

The following DMP enhancements have been made in this release:

- The `vxdmpadm enable` command and the `vxdmpadm disable` command now accept multiple controllers on the command line.
- In addition, you can now enable or disable paths between a given controller and a port-id pair. If you specify both an HBA controller and an array port, DMP disables I/O on the specific portion of the Storage Area Network (SAN).
- The `vxdmpadm stat error` command and the `vxdmpadm stat restored` command are deprecated.
To see status for the restore tasks, use the `vxdmpadm gettune` command.

- Excluding or including paths from DMP is deprecated.

Excluding paths from DMP but not from VxVM can lead to unsupported configurations. The command operations to exclude or include paths from DMP are now deprecated. You can exclude or include paths from VxVM. The deprecated commands are as follows:

```
vxdmpadm exclude dmp
```

```
vxdmpadm include dmp
```

```
vxdiskadm: DMP options under Suppressing or including devices for VxVM
```

- `vxddladm list devices` command now displays the name of the ASL even if the device is skipped.
- `vxddladm status eventsource` is added to show the status of the `vxesd` daemon

- `vxscsiinq` diagnostic utility is enhanced to take hexadecimal page numbers as arguments.

Changes related to installation and upgrades

The product installer includes the following changes in 6.0.

Using the installer's postcheck option

You can use the installer's postcheck option to diagnose installation-related problems and to provide troubleshooting information.

Allow Response files to change tuning parameters

You can set non-default product and system tunable parameters using a tunables template file. With the file, you can set tunables such as the I/O policy or toggle native multi-pathing during or after the installation procedure.

See the *Installation Guide* for more information.

The installer can check product versions and hotfixes

You can check the existing product versions using the installer command with the `-version` option before or after you install. After you have installed the current version of the product, you can use the `showversion` script in the `/opt/VRTS/install` directory to find version information.

You can discover the following information with these commands:

- The installed version of all released Storage Foundation and High Availability Suite of products
- The missing required depots or patches as applicable for platform
- The available updates (including patches or hotfixes) from SORT for the installed products

Depending on the product, the script can identify versions from 3.5 onward.

Packaging updates

The following lists the package changes in this release.

- New `VRTSsfcp160` depot for product installer scripts
The `VRTSsfcp160` depot is introduced in this release. The `VRTSsfcp160` depot contains the installer scripts and libraries that the installer uses to install, configure and upgrade Veritas products.

For more information, see the *Installation Guide*.

Enhancements to collecting a VxExplorer troubleshooting archive

The Symantec Operations Readiness Tools (SORT) data collector contains functionality to collect and submit a VxExplorer archive. You can send this archive to Symantec Technical Support for problem diagnosis and troubleshooting. VxExplorer does not collect customer data.

The legacy `VxExplorer` script now works differently. When you run the script, it launches the SORT data collector on the specified local host with the `-vxexplorer` option.

To learn more about using the data collector to collect a VxExplorer archive, see:

www.symantec.com/docs/HOWTO32575

Changes related to product documentation

The Storage Foundation and High Availability Solutions 6.0 release includes the following changes to the product documentation.

[Table 1-1](#) lists the documents introduced in this release.

Table 1-1 New documents

New documents	Notes
<i>Veritas Storage Foundation Installation Guide</i>	Installation and upgrade information for Storage Veritas Foundation.
<i>Veritas Storage Foundation Administrator's Guide</i>	Administration information for Veritas Storage Foundation.
<i>Veritas Storage Foundation and High Availability Release Notes</i>	Release-specific information for Veritas Storage Foundation and High Availability users.
<i>Veritas Storage Foundation and High Availability Solutions Solutions Guide</i>	Solutions and use cases for Veritas Storage Foundation and High Availability Solutions.
<i>Veritas Storage Foundation and High Availability Solutions Troubleshooting Guide</i>	Troubleshooting information for Veritas Storage Foundation and High Availability Solutions.
<i>Veritas Storage Foundation and High Availability Solutions Virtualization Guide</i>	Virtualization-related information for Veritas Storage Foundation and High Availability Solutions.

[Table 1-2](#) lists the documents that are deprecated in this release.

Table 1-2 Deprecated documents

Deprecated documents	Notes
<i>Veritas File System Administrator's Guide</i>	Content now appears in the <i>Veritas Storage Foundation Administrator's Guide</i> and in the <i>Veritas Storage Foundation Cluster File System High Availability Administrator's Guide</i> .
<i>Veritas Volume Manager Administrator's Guide</i>	Content now appears in the <i>Veritas Storage Foundation Administrator's Guide</i> and in the <i>Veritas Storage Foundation Cluster File System High Availability Administrator's Guide</i> .
<i>Veritas Storage Foundation Advanced Features Administrator's Guide</i>	Content now appears in the <i>Veritas Storage Foundation and High Availability Solutions Solutions Guide</i> .
<i>Veritas Volume Manager Troubleshooting Guide</i>	Content now appears in the <i>Veritas Storage Foundation and High Availability Solutions Troubleshooting Guide</i> .
<i>Veritas Cluster Server Agents for Veritas Volume Replicator Configuration Guide</i>	Content now appears in the <i>Veritas Cluster Server Bundled Agents Reference Guide</i> .
<i>Veritas Volume Replicator Planning and Tuning Guide</i>	Content now appears in the <i>Veritas Storage Foundation and High Availability Solutions Replication Administrator's Guide</i> .
<i>Veritas Volume Replicator Advisor User's Guide</i>	Content now appears in the <i>Veritas Storage Foundation and High Availability Solutions Replication Administrator's Guide</i> .

[Table 1-3](#) lists documents that are no longer bundled with the binaries. These documents are now available online.

Table 1-3 Online documents

Document
<i>Veritas Cluster Server Agent Developer's Guide</i>
<i>Veritas File System Programmer's Reference Guide</i>

System requirements

The topics in this section describe the system requirements for this release.

Hardware compatibility list (HCL)

The hardware compatibility list contains information about supported hardware and is updated regularly. Before installing or upgrading Storage Foundation and High Availability Solutions products, review the current compatibility list to confirm the compatibility of your hardware and software.

For the latest information on supported hardware, visit the following URL:

<http://www.symantec.com/docs/TECH170013>

For information on specific High Availability setup requirements, see the *Veritas Cluster Server Installation Guide*.

Supported HP-UX 11i v3 operating systems

This section lists the supported operating systems for this release of Veritas products.

[Table 1-4](#) shows the supported HP-UX operating systems for this release.

Table 1-4 Supported HP-UX operating systems

Operating system	Operating system version	Architecture
HP-UX 11i Version 3 March 2011 Operating Environments Update Release or later	HP-UX B.11.31.1103	PA-RISC Itanium

Veritas Storage Foundation memory requirements

Symantec recommends 2 GB of memory over the minimum requirement for the operating system.

Fixed issues

This section covers the incidents that are fixed in this release.

See the corresponding Release Notes for a complete list of fixed incidents related to that product.

See [“Documentation”](#) on page 24.

Known issues

This section covers the known issues in this release.

See the corresponding Release Notes for a complete list of known issues related to that product.

See “[Documentation](#)” on page 24.

DMP path discovery behavior when a device is removed from PowerPath control (2144891)

To remove a device from PowerPath control, you use the `powermt unmanage` command. When you remove a device from PowerPath control, DMP requires two device discovery cycles to discover the attributes of the paths of the device correctly.

Work around:

Issue the following command to start the device discovery:

```
# vxdisk scandisks
```

After the discovery completes, issue the command again to start a second device discovery cycle.

Path name character limit when converting LVM volumes over DMP to VxVM volumes over DMP (2035399)

The HP-UX `lvdisplay` utility truncates physical volume path names to 22 characters. If a path name is truncated, utilities such as `vxvmconvert` or `vxautoconvert` that depend on the `lvdisplay` output may not function properly. If you intend to use the `vxvmconvert` utility or the `vxautoconvert` utility to convert LVM over DMP to VxVM over DMP, Symantec recommends that you reduce the length of the enclosure name to at most 8 characters before enabling native stack support.

I/O fails on some paths after array connectivity is restored, due to high restore daemon interval (2091619)

If a path loses connectivity to the array, the path is marked as suspected to fail and hence is not used for I/O. After the connectivity is restored, the restore daemon detects that the path is restored when the restore daemon probes the paths. The restore daemon makes the path available for I/O. The restore daemon probes the paths at the interval set with the tunable parameter `dmp_restore_interval`. If you

set the `dmp_restore_interval` parameter to a high value, the paths are not available for I/O until the next interval.

Changes in enclosure attributes are not persistent after an upgrade to VxVM 6.0 (2082414)

The Veritas Volume Manager (VxVM) 6.0 includes several array names that differ from the array names in releases prior to release 5.1SP1. Therefore, if you upgrade from a previous release to VxVM 6.0, changes in the enclosure attributes may not remain persistent. Any enclosure attribute set for these arrays may be reset to the default value after an upgrade to VxVM 6.0. Manually reconfigure the enclosure attributes to resolve the issue.

Table 1-5 shows the Hitachi arrays that have new array names.

Table 1-5 Hitachi arrays with new array names

Previous name	New name
TagmaStore-USP	Hitachi_USP
TagmaStore-NSC	Hitachi_NSC
TagmaStoreUSPV	Hitachi_USP-V
TagmaStoreUSPVM	Hitachi_USP-VM
<New Addition>	Hitachi_R700
Hitachi AMS2300 Series arrays	New array names are based on the Model Number 8x. For example, AMS_100, AMS_2100, AMS_2300, AMS_2500, etc.

In addition, the Array Support Library (ASL) for the enclosures XIV and 3PAR now converts the cabinet serial number that is reported from Hex to Decimal, to correspond with the value shown on the GUI. Because the cabinet serial number has changed, any enclosure attribute set for these arrays may be reset to the default value after an upgrade to VxVM 6.0. Manually reconfigure the enclosure attributes to resolve the issue.

The cabinet serial numbers are changed for the following enclosures:

- IBM XIV Series arrays
- 3PAR arrays

Enclosure name limitation when using HP-UX LVM pvcreate command on DMP device

For HP-UX LVM on a DMP device, you cannot use the `pvcreate` command if the enclosure-based name of the DMP device contains the 's' character. This is a limitation of the `pvcreate` utility on HP-UX LVM.

Work around:

Rename the enclosure to replace the 's' with some other character in the name of the enclosure before you run the `pvcreate` command. To rename the enclosure, use the following command:

```
# vxddm padm setattr enclosure enclr_name name=new_enclr_name
```

Adding a DMP device or its OS device path as a foreign disk is not supported (2062230)

When DMP native support is enable, adding a DMP device or its OS device path as a foreign disk using the `vxddladm addforeign` command is not supported. Using this command can lead to unexplained behavior.

The pvcreate command failed with DMP devices on IA machines (2482178)

When `dmp_native_support` is enabled on HP-UX 11i version 3 systems, you must run the `pvcreate` command on `/dev/disk/<disk#>` before creating a LVM volume group on the corresponding DMP device.

DMP native support is not persistent after upgrade to 6.0 (2526709)

The DMP tunable parameter `dmp_native_support` is not persistent after upgrade to DMP 6.0. After you upgrade, set the tunable parameter using the following command:

```
# vxddm padm settune dmp_native_support=on
```

The vxvmconvert utility fails if names are longer than 13 characters (2571334)

The `vxvmconvert` utility fails if enclosure-based naming (EBN) names or user-defined names are longer than 13 characters and `dmp_native_support` is on.

The `vxvmconvert` utility uses the LVM command `lvdisplay`, which limits the full DSF name length to 23 characters maximum.

Work-around:

Reduce the length of the EBN or user-defined names to less than or equal to 13 characters so that the full DSF names are less than 23 characters.

To change the name of the physical volumes (PVs)

- 1 Deport the volume group or vary it off.
- 2 Turn off `dmp_native_support`.

```
# vxddm padm settune dmp_native_support=off
```

- 3 Rename the DMP devices to reduce the length of the name.
- 4 Turn on `dmp_native_support`, which varies on the volume.

```
# vxddm padm settune dmp_native_support=on
```

- 5 Run `vxvmconvert`.

After disconnecting and reconnecting the Fibre Channel, DMP is unable to present the device tree (2509636)

On some HP-UX 11i version 3 systems, after disconnecting and reconnecting the Fibre Channel, DMP is unable to present the device tree.

Workaround:

Restart the `vxconfigd` daemon with the following command:

```
# vxconfigd -k
```

Issues related to installation

This section describes the known issues during installation and upgrade.

Warning messages may be seen during script-based installation (2615500)

When you install Dynamic Multi-Pathing using the script-based installer, you may see the following warning message:

```
interpreter "/opt/VRTSperl/bin/perl" not found
```

Workaround: You must install perl to resolve the issue.

To install perl

- 1 Exit the installer.
- 2 Install the `VRTSperl` depot from the product media manually:

```
# cd /dvd_path/depot
# /usr/sbin/swinstall -x enforce_dependencies=false
-x autoreboot=false -s `pwd` VRTSperl
```

- 3 Start the installer again.

Stopping the installer during an upgrade and then resuming the upgrade might freeze the service groups (2591399)

The service groups freeze due to upgrading using the product installer if you stopped the installer after the installer already stopped some of the processes and then resumed the upgrade.

Workaround: You must unfreeze the service groups manually after the upgrade completes.

To unfreeze the service groups manually

- 1 List all the frozen service groups

```
# hagrps -list Frozen=1
```

- 2 Unfreeze all the frozen service groups:

```
# haconf -makerw
# hagrps -unfreeze service_group -persistent
# haconf -dump -makero
```

Incorrect error messages: error: failed to stat, etc. (2120567)

During installation, you may receive errors such as, "error: failed to stat /net: No such file or directory." Ignore this message. You are most likely to see this message on a node that has a mount record of `/net/x.x.x.x`. The `/net` directory, however, is unavailable at the time of installation.

EULA changes (2161557)

The locations for all EULAs have changed.

The English EULAs now appear in `/product_dir/EULA/en/product_eula.pdf`

The EULAs for Japanese and Chinese now appear in those language in the following locations:

The Japanese EULAs appear in */product_dir/EULA/ja/product_eula.pdf*

The Chinese EULAs appear in */product_dir/EULA/zh/product_eula.pdf*

During product migration the installer overestimates disk space use (2088827)

The installer displays the space that all the product depots and patches needs. During migration some depots are already installed and during migration some depots are removed. This releases disk space. The installer then claims more space than it actually needs.

Workaround: Run the installer with `-nospacecheck` option if the disk space is less than that installer claims but more than actually required.

The `-help` option for certain commands prints an erroneous argument list (2138046)

For `installsf`, `installat`, and the `installdmp` scripts, although the `-help` option prints the `-security`, `-fencing`, `-addnode` options as supported, they are in fact not supported. These options are only applicable for high availability products.

Web installer does not ask for authentication after the first session if the browser is still open (2509330)

If you install or configure Dynamic Multi-Pathing and then close the Web installer, if you have other browser windows open, the Web installer does not ask for authentication in the subsequent sessions. Since there is no option to log out of the Web installer, the session remains open as long as the browser is open on the system.

Workaround: Make sure that all browser windows are closed to end the browser session and subsequently log in again.

Error message seen in `swagent.log` after removing the 6.0 VRTS packages (2324553)

After removing the 6.0 VRTS packages and before rebooting the system, you sometimes see the following message in the `swagent.log` file:

```
vxfs mount: V-3-21272: mount option(s) incompatible with file system  
/dev/vg00/lvo11
```

This message appears because the VRTS packages are removed and the kernel is not yet loaded.

Workaround: Reboot the system.

Stopping the Web installer causes Device Busy error messages (2633924)

If you start the Web installer, and then perform an operation (such as prechecking, configuring, or uninstalling), you may get an error message saying the device is busy.

Workaround:

Do one of the following:

- Kill the start.pl process.
- Start the webinstaller again. On the first Web page you see that the session is still active. Either take over this session and finish it or terminate it directly.

Software limitations

This section covers the software limitations of this release.

See the corresponding Release Notes for a complete list of software limitations related to that component or product.

See [“Documentation”](#) on page 24.

DMP settings for NetApp storage attached environment

To minimize the path restoration window and maximize high availability in the NetApp storage attached environment, set the following DMP tunables:

Table 1-6

Parameter name	Definition	New value	Default value
dmp_restore_internal	DMP restore daemon cycle	60 seconds.	300 seconds.
dmp_path_age	DMP path aging tunable	120 seconds.	300 seconds.

The change is persistent across reboots.

To change the tunable parameters

- 1 Issue the following commands:

```
# vxdmpadm settune dmp_restore_internal=60
# vxdmpadm settune dmp_path_age=120
```

- 2 To verify the new settings, use the following commands:

```
# vxdmpadm gettune dmp_restore_internal
# vxdmpadm gettune dmp_path_age
```

LVM volume group in unusable state if last path is excluded from DMP (1976620)

When a DMP device is used by a native LVM volume group, do not exclude the last path to the device. This can put the LVM volume group in an unusable state.

Documentation

Product guides are available in the PDF format on the software media in the `/product_name/docs` directory. Additional documentation is available online.

Make sure that you are using the current version of documentation. The document version appears on page 2 of each guide. The publication date appears on the title page of each document. The latest product documentation is available on the Symantec website.

<http://sort.symantec.com/documents>

Documentation set

Table 1-7 lists the documentation for Veritas Dynamic Multi-Pathing.

Table 1-7 Veritas Dynamic Multi-Pathing documentation

Document title	File name
<i>Veritas Dynamic Multi-Pathing Release Notes</i>	dmp_notes_60_hpux.pdf
<i>Veritas Dynamic Multi-Pathing Installation Guide</i>	dmp_install_60_hpux.pdf
<i>Veritas Dynamic Multi-Pathing Administrator's Guide</i>	dmp_admin_60_hpux.pdf

If you use Veritas Operations Manager (VOM) to manage Veritas Storage Foundation and High Availability products, refer to the VOM product documentation at:

<http://sort.symantec.com/documents>

Manual pages

The manual pages for Veritas Storage Foundation and High Availability Solutions products are installed in the `/opt/VRTS/man` directory.

Set the `MANPATH` environment variable so the `man(1)` command can point to the Veritas Storage Foundation manual pages:

- For the Bourne or Korn shell (`sh` or `ksh`), enter the following commands:

```
MANPATH=$MANPATH:/opt/VRTS/man
export MANPATH
```

- For C shell (`csh` or `tcsh`), enter the following command:

```
setenv MANPATH ${MANPATH}:/opt/VRTS/man
```

See the `man(1)` manual page.

