



# Verifying host LUN path and multipath configuration verification

ONTAP

NetApp  
September 20, 2021

# Table of Contents

- Verifying host LUN path and multipath configuration verification . . . . . 1
  - Multipath verification for Windows hosts . . . . . 1
  - Multipath verification for Linux hosts . . . . . 2
  - Multipath verification for ESXi hosts . . . . . 3

# Verifying host LUN path and multipath configuration verification

Prior to any migrations, verify that multipathing is correctly configured and working properly. All available paths to LUNs should be active.

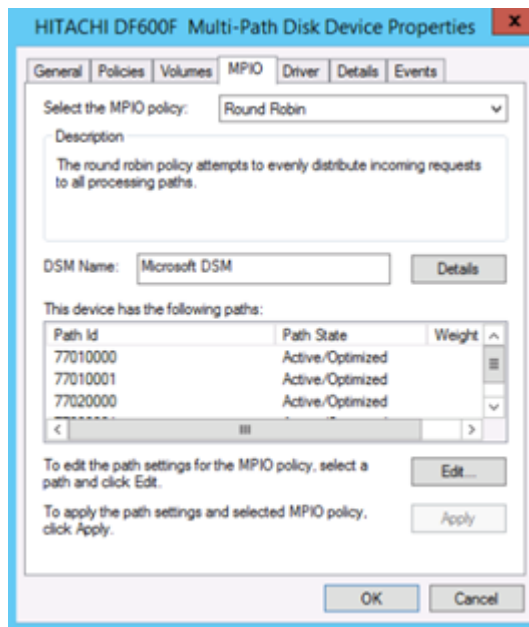
## Multipath verification for Windows hosts

As part of the Foreign LUN Import (FLI) process, you should verify that multipath is configured and functioning correctly on your hosts.

Complete the following steps for Windows hosts.

### Steps

1. Open Disk Management.
  - a. On the Windows desktop, click **Start**.
  - b. In the Start Search field, type `diskmgmt.msc`.
  - c. In the Programs list, click `diskmgmt`.
2. Right-click each disk for which you want to verify the multiple paths and then click **Properties**.
3. On the MPIO tab, in the Select the MPIO policy list, click all the paths that are active.



To verify multipathing using the command line, complete the following steps:

4. Open Windows command prompt.
5. Run `mpclaim.exe --v c:\multipathconfig.txt` to capture multipath configuration.

# Multipath verification for Linux hosts

As part of the Foreign LUN Import (FLI) process, you should verify that multipath is configured and functioning correctly on your hosts.

Complete the following steps for Linux hosts.

## Step

1. To verify that DM-MP multipath is configured and functioning correctly on a Linux host, run the following commands:`multipath -ll`

```
mpath2 (360060e801046b96004f2bf4600000012) dm-6 HITACHI,DF600F
[size=2.0G][features=0][hwhandler=0][rw]
\_ round-robin 0 [prio=1][active]
  \_ 0:0:1:2 sdg 8:96 [active][ready]
  \_ 1:0:1:2 sdo 8:224 [active][ready]
\_ round-robin 0 [prio=0][enabled]
  \_ 0:0:0:2 sdc 8:32 [active][ready]
  \_ 1:0:0:2 sdk 8:160 [active][ready]
mpath1 (360060e801046b96004f2bf4600000011) dm-5 HITACHI,DF600F
[size=2.0G][features=0][hwhandler=0][rw]
\_ round-robin 0 [prio=1][active]
  \_ 0:0:0:1 sdb 8:16 [active][ready]
  \_ 1:0:0:1 sdj 8:144 [active][ready]
\_ round-robin 0 [prio=0][enabled]
  \_ 0:0:1:1 sdf 8:80 [active][ready]
  \_ 1:0:1:1 sdn 8:208 [active][ready]
mpath0 (360060e801046b96004f2bf4600000010) dm-0 HITACHI,DF600F
[size=20G][features=0][hwhandler=0][rw]
\_ round-robin 0 [prio=1][active]
  \_ 0:0:1:0 sde 8:64 [active][ready]
  \_ 1:0:1:0 sdm 8:192 [active][ready]
\_ round-robin 0 [prio=0][enabled]
  \_ 0:0:0:0 sda 8:0 [active][ready]
  \_ 1:0:0:0 sdi 8:128 [active][ready]
mpath3 (360060e801046b96004f2bf4600000013) dm-7 HITACHI,DF600F
[size=3.0G][features=0][hwhandler=0][rw]
\_ round-robin 0 [prio=1][active]
  \_ 0:0:0:3 sdd 8:48 [active][ready]
  \_ 1:0:0:3 sdl 8:176 [active][ready]
\_ round-robin 0 [prio=0][enabled]
  \_ 0:0:1:3 sdh 8:112 [active][ready]
  \_ 1:0:1:3 sdp 8:240 [active][ready]
[root@dm-rx200s6-22 ~]#
```

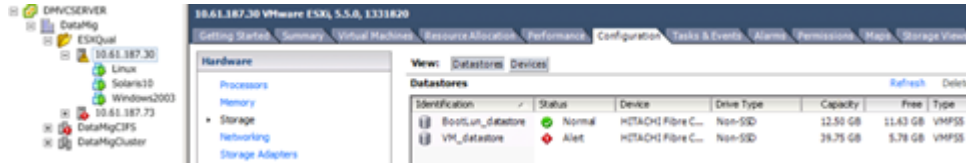
# Multipath verification for ESXi hosts

As part of the Foreign LUN Import (FLI) process, you should verify that multipath is configured and functioning correctly on your hosts.

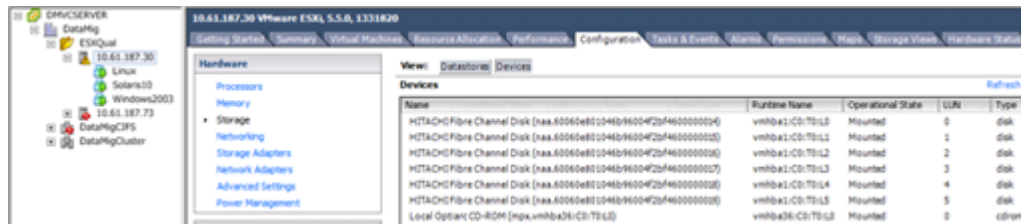
Complete the following steps for ESXi hosts.

## Steps

1. Determine ESXi and virtual machine using VMware vSphere Client.



2. Determine SAN LUNs to be migrated using vSphere Client.



3. Determine VMFS and RDM (vfat) volumes to be migrated: `esxcli storage filesystem list`

```

Mount Point                               Volume Name
UUID                                     Mounted Type                               Size
Free
-----
/vmfs/volumes/538400f6-3486df59-52e5-00262d04d700  BootLun_datastore
538400f6-3486df59-52e5-00262d04d700      true  VMFS-5  13421772800
12486443008
/vmfs/volumes/53843dea-5449e4f7-88e0-00262d04d700  VM_datastore
53843dea-5449e4f7-88e0-00262d04d700      true  VMFS-5  42681237504
6208618496
/vmfs/volumes/538400f6-781de9f7-c321-00262d04d700
538400f6-781de9f7-c321-00262d04d700      true  vfat    4293591040
4269670400
/vmfs/volumes/c49aad7f-afbab687-b54e-065116d72e55
c49aad7f-afbab687-b54e-065116d72e55      true  vfat    261853184
77844480
/vmfs/volumes/270b9371-8fbedc2b-1f3b-47293e2ce0da
270b9371-8fbedc2b-1f3b-47293e2ce0da      true  vfat    261853184
261844992
/vmfs/volumes/538400ef-647023fa-edef-00262d04d700
538400ef-647023fa-edef-00262d04d700      true  vfat    299712512
99147776
~ #

```



In case of VMFS with extends \(\spanned VMFS\), all LUNs that are part of the span should be migrated. To show all the extends in the GUI, go to Configuration \> Hardware \> Storage and click datastore to select the Properties link.



Post-migration, while adding them back to storage, you will see multiple LUN entries with the same VMFS label. In this scenario you should ask the customer to select only the entry marked as head.

4. Determine the LUN and size to be migrated: `esxcfg-scsidevs -c`

```

Device UID                               Device Type      Console Device
Size      Multipath PluginDisplay Name
mpx.vmhba36:C0:T0:L0                     CD-ROM
/vmfs/devices/cdrom/mpx.vmhba36:C0:T0:L0      0MB      NMP
Local Optiarc CD-ROM (mpx.vmhba36:C0:T0:L0)
naa.60060e801046b96004f2bf4600000014 Direct-Access
/vmfs/devices/disks/naa.60060e801046b96004f2bf4600000014 20480MB  NMP
HITACHI Fibre Channel Disk (naa.60060e801046b96004f2bf4600000014)
naa.60060e801046b96004f2bf4600000015 Direct-Access
/vmfs/devices/disks/naa.60060e801046b96004f2bf4600000015 40960MB  NMP
HITACHI Fibre Channel Disk (naa.60060e801046b96004f2bf4600000015)
~~~~~ Output truncated ~~~~~
~ #

```

5. Identify raw device mapping (RDM) LUNs to be migrated.

6. Find RDM devices: `find /vmfs/volumes -name *-rdm*`

```

/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_1-rdmp.vmdk
/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_2-rdm.vmdk
/vmfs/volumes/53843dea-5449e4f7-88e0-00262d04d700/Linux/Linux_1-rdm.vmdk
/vmfs/volumes/53843dea-5449e4f7-88e0-00262d04d700/Solaris10/Solaris10_1-
rdmp.vmdk

```

7. Remove `-rdmp` and `-rdm` from preceding output and run the `vmkfstools` command to find vml mapping and RDM type.

```

# vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_1.vmdk
vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_1.vmdk
Disk /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_1.vmdk is a Passthrough Raw Device
Mapping
Maps to: vml.020002000060060e801046b96004f2bf4600000016444636303046
~ # vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_2.vmdk
Disk /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_2.vmdk is a Non-passthrough Raw
Device Mapping
Maps to: vml.020003000060060e801046b96004f2bf4600000017444636303046
~ # vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Linux/Linux_1.vmdk
Disk /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Linux/Linux_1.vmdk is a Non-passthrough Raw Device Mapping
Maps to: vml.020005000060060e801046b96004f2bf4600000019444636303046
~ # vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Solaris10/Solaris10_1.vmdk
Disk /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Solaris10/Solaris10_1.vmdk is a Passthrough Raw Device
Mapping
Maps to: vml.020004000060060e801046b96004f2bf4600000018444636303046
~ #

```



Passthrough is RDM with physical \(\RDMP\), and nonpassthrough is RDM with virtual \(\RDMV\). VMs with virtual RDMs and VM Snapshot copies will break after migration due to VM Snapshot delta vmdk pointing to an RDM that has a stale naa ID. So before migration, ask the customer to remove all Snapshot copies in such VMs. Right-click VM and click the Snapshot --> Snapshot Manager Delete All button. Refer to NetApp KB 3013935 for details about hardware-accelerated locking for VMware on NetApp storage.

## 8. Identify LUN naa to RDM device mapping.



```

~ # esxcfg-scsidevs -u | grep
vml.020002000060060e801046b96004f2bf4600000016444636303046
naa.60060e801046b96004f2bf4600000016
vml.020002000060060e801046b96004f2bf4600000016444636303046
~ # esxcfg-scsidevs -u | grep
vml.020003000060060e801046b96004f2bf4600000017444636303046
naa.60060e801046b96004f2bf4600000017
vml.020003000060060e801046b96004f2bf4600000017444636303046
~ # esxcfg-scsidevs -u | grep
vml.020005000060060e801046b96004f2bf4600000019444636303046
naa.60060e801046b96004f2bf4600000019
vml.020005000060060e801046b96004f2bf4600000019444636303046
~ # esxcfg-scsidevs -u | grep
vml.020004000060060e801046b96004f2bf4600000018444636303046
naa.60060e801046b96004f2bf4600000018
vml.020004000060060e801046b96004f2bf4600000018444636303046
~ #

```

9. Determine virtual machine configuration: `esxcli storage filesystem list | grep VMFS`

```

/vmfs/volumes/538400f6-3486df59-52e5-00262d04d700  BootLun_datastore
538400f6-3486df59-52e5-00262d04d700      true  VMFS-5  13421772800
12486443008
/vmfs/volumes/53843dea-5449e4f7-88e0-00262d04d700  VM_datastore
53843dea-5449e4f7-88e0-00262d04d700      true  VMFS-5  42681237504
6208618496
~ #

```

10. Record the UUID of the datastore.

11. Make a copy of `/etc/vmware/hostd/vmlInventory.xml` and note the contents of file and vmx config path.

```

~ # cp /etc/vmware/hostd/vmInventory.xml
/etc/vmware/hostd/vmInventory.xml.bef_mig
~ # cat /etc/vmware/hostd/vmInventory.xml
<ConfigRoot>
  <ConfigEntry id="0001">
    <objID>2</objID>
    <vmxCfgPath>/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003.vmx</vmxCfgPath>
  </ConfigEntry>
  <ConfigEntry id="0004">
    <objID>5</objID>
    <vmxCfgPath>/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Linux/Linux.vmx</vmxCfgPath>
  </ConfigEntry>
  <ConfigEntry id="0005">
    <objID>6</objID>
    <vmxCfgPath>/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Solaris10/Solaris10.vmx</vmxCfgPath>
  </ConfigEntry>
</ConfigRoot>

```

## 12. Identify the virtual machine hard disks.

This information is required post-migration to add the removed RDM devices in order.

```

~ # grep fileName /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003.vmx
scsi0:0.fileName = "Windows2003.vmdk"
scsi0:1.fileName = "Windows2003_1.vmdk"
scsi0:2.fileName = "Windows2003_2.vmdk"
~ # grep fileName /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Linux/Linux.vmx
scsi0:0.fileName = "Linux.vmdk"
scsi0:1.fileName = "Linux_1.vmdk"
~ # grep fileName /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Solaris10/Solaris10.vmx
scsi0:0.fileName = "Solaris10.vmdk"
scsi0:1.fileName = "Solaris10_1.vmdk"
~ #

```

## 13. Determine RDM device, virtual machine mapping, and compatibility mode.

## 14. Using the preceding information, note the RDM mapping to device, virtual machine, compatibility mode, and order.

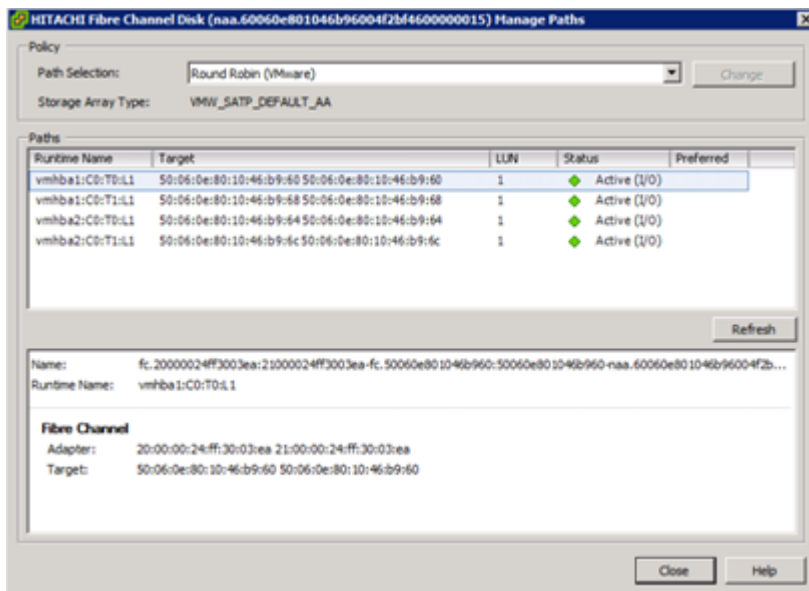
You will need this information later, when adding RDM devices to the VM.

```

Virtual Machine -> Hardware -> NAA -> Compatibility mode
Windows2003 VM -> scsi0:1.fileName = "Windows2003_1.vmdk" ->
naa.60060e801046b96004f2bf4600000016
-> RDM Physical
Windows2003 VM -> scsi0:2.fileName = "Windows2003_2.vmdk" ->
naa.60060e801046b96004f2bf4600000017
-> RDM Virtual
Linux VM -> scsi0:1.fileName = "Linux_1.vmdk" ->
naa.60060e801046b96004f2bf4600000019 -> RDM Virtual
Solaris10 VM -> scsi0:1.fileName = "Solaris10_1.vmdk" ->
naa.60060e801046b96004f2bf4600000018 -> RDM Physical

```

15. Determine multipath configuration.
16. Obtain multipath settings for your storage in the vSphere Client:
  - a. Select an ESX or ESXi host in the vSphere Client and click the Configuration tab.
  - b. Click **Storage**.
  - c. Select a datastore or mapped LUN.
  - d. Click **Properties**.
  - e. In the Properties dialog box, select the desired extent, if necessary.
  - f. Click **Extent Device > Manage Paths** and obtain the paths in the Manage Path dialog box.



17. Obtain LUN multipathing information from the ESXi host command line:
  - a. Log in to the ESXi host console.
  - b. Run `esxcli storage nmp device list` to get multipath information.

```

# esxcli storage nmp device list
naa.60060e801046b96004f2bf4600000014

```

```
Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000014)
Storage Array Type: VMW_SATP_DEFAULT_AA
Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
Path Selection Policy: VMW_PSP_RR
Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=3:
NumIOsPending=0,numBytesPending=0}
Path Selection Policy Device Custom Config:
Working Paths: vmhba2:C0:T1:L0, vmhba2:C0:T0:L0, vmhba1:C0:T1:L0,
vmhba1:C0:T0:L0
Is Local SAS Device: false
Is Boot USB Device: false
```

```
naa.60060e801046b96004f2bf4600000015
Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000015)
Storage Array Type: VMW_SATP_DEFAULT_AA
Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
Path Selection Policy: VMW_PSP_RR
Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=0:
NumIOsPending=0,numBytesPending=0}
Path Selection Policy Device Custom Config:
Working Paths: vmhba2:C0:T1:L1, vmhba2:C0:T0:L1, vmhba1:C0:T1:L1,
vmhba1:C0:T0:L1
Is Local SAS Device: false
Is Boot USB Device: false
```

```
naa.60060e801046b96004f2bf4600000016
Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000016)
Storage Array Type: VMW_SATP_DEFAULT_AA
Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
Path Selection Policy: VMW_PSP_RR
Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=1:
NumIOsPending=0,numBytesPending=0}
Path Selection Policy Device Custom Config:
Working Paths: vmhba2:C0:T1:L2, vmhba2:C0:T0:L2, vmhba1:C0:T1:L2,
vmhba1:C0:T0:L2
Is Local SAS Device: false
Is Boot USB Device: false
```

```
naa.60060e801046b96004f2bf4600000017
  Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000017)
  Storage Array Type: VMW_SATP_DEFAULT_AA
  Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
  Path Selection Policy: VMW_PSP_RR
  Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=1:
NumIOsPending=0,numBytesPending=0}
  Path Selection Policy Device Custom Config:
  Working Paths: vmhba2:C0:T1:L3, vmhba2:C0:T0:L3, vmhba1:C0:T1:L3,
vmhba1:C0:T0:L3
  Is Local SAS Device: false
  Is Boot USB Device: false
```

```
naa.60060e801046b96004f2bf4600000018
  Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000018)
  Storage Array Type: VMW_SATP_DEFAULT_AA
  Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
  Path Selection Policy: VMW_PSP_RR
  Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=1:
NumIOsPending=0,numBytesPending=0}
  Path Selection Policy Device Custom Config:
  Working Paths: vmhba2:C0:T1:L4, vmhba2:C0:T0:L4, vmhba1:C0:T1:L4,
vmhba1:C0:T0:L4
  Is Local SAS Device: false
  Is Boot USB Device: false
```

```
naa.60060e801046b96004f2bf4600000019
  Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000019)
  Storage Array Type: VMW_SATP_DEFAULT_AA
  Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
  Path Selection Policy: VMW_PSP_RR
  Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=1:
NumIOsPending=0,numBytesPending=0}
  Path Selection Policy Device Custom Config:
  Working Paths: vmhba2:C0:T1:L5, vmhba2:C0:T0:L5, vmhba1:C0:T1:L5,
vmhba1:C0:T0:L5
```

Is Local SAS Device: false

Is Boot USB Device: false

## Copyright Information

Copyright © 2021 NetApp, Inc. All rights reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means-graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system- without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

## Trademark Information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.