



Global Leader in Software-Defined Storage.

# FC Client Configuration Guide 5.x

Date: May, 2018

Subject: FC Client Config Guide

Software: Initiator FC

Software Version: 5.x

Part Number: 3000-Init\_fc-5.x-000051-A

Copyright © 2018 Nexenta Systems, ALL RIGHTS RESERVED

Notice: No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or stored in a database or retrieval system for any purpose, without the express written permission of Nexenta Systems (hereinafter referred to as "Nexenta").

Nexenta reserves the right to make changes to this document at any time without notice and assumes no responsibility for its use. Nexenta products and services only can be ordered under the terms and conditions of Nexenta Systems' applicable agreements. All of the features described in this document may not be available currently. Refer to the latest product announcement or contact your local Nexenta Systems sales office for information on feature and product availability. This document includes the latest information available at the time of publication.

Nexenta is a registered trademark of Nexenta Systems in the United States and other countries.

All other trademarks, service marks, and company names in this document are properties of their respective owners

### Product Versions Applicable to this Documentation:

| Product      | Version Supported |
|--------------|-------------------|
| NexentaStor™ | 5.x               |
| Initiator FC | 5.x               |

# Contents

|          |  |          |
|----------|--|----------|
| <b>1</b> | <b>Configuration of FC Client</b>        | <b>1</b> |
|          | About this Document                      | 1        |
|          | Prerequisites                            | 2        |
|          | List of Supported FC Initiators          | 2        |
|          | Setting Up RedHat FC Initiator           | 3        |
|          | Edit RedHat /etc/multipath.conf File     | 3        |
|          | Start Multipath Daemon                   | 4        |
|          | Ensure Multipath Daemon Starts at Bootup | 4        |
|          | Verify Multipathed Devices               | 4        |
|          | List Devices                             | 6        |
|          | VMware ESX                               | 7        |
|          | Setting Up SUSE Linux 11 SP4             | 8        |
|          | Edit SuSe/etc/multipath.conf File        | 8        |
|          | Edit /etc/lvm/lvm.conf                   | 8        |
|          | Setting Up XenServer 6.1.0               | 9        |
|          | Check Version of XenServer               | 9        |
|          | Edit /etc/multipath.conf                 | 9        |
|          | Configuring Windows                      | 10       |
|          | Install MPIO                             | 11       |
|          | Add Support for COMSTAR                  | 11       |
|          | View NEXENTA COMSTAR as Supported Device | 12       |
|          | Troubleshoot                             | 13       |
|          | Configure MPIO Load Balancing            | 14       |

This page intentionally left blank

# Configuration of FC Client

This section includes the following topics:

- [About this Document](#)
- [Prerequisites](#)
- [Setting Up RedHat FC Initiator](#)
- [Setting Up SUSE Linux 11 SP4](#)
- [Setting Up XenServer 6.1.0](#)
- [Configuring Windows](#)
- [VMware ESX](#)

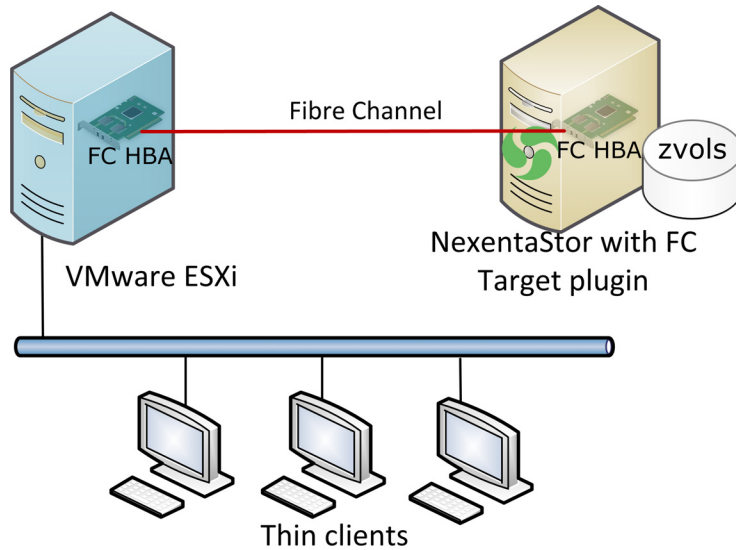
## About this Document

This document covers the details to configure different supported FC initiators. The FC initiator /client operating system does not recognize NexentaStor natively nor detect the ALUA-nature of the FC LUNs presented. So **the steps discussed here must be executed on the client OS (FC initiator)** so that when a LUN is associated with a specific initiator group it will be visible to initiators in the group. Properly configuring an FC initiator in an ALUA environment requires initiator-specific tuning.

This documentation also covers the following details:

- NexentaStor configuration used for the different supported FC initiators
- Settings for each of the FC initiators enabling them to recognize Nexenta FC LUNs correctly

Figure 1-1: Reference architecture of FC Set up with VMware ESX as Client Initiator OS



## Prerequisites

When setting up FC ensure that you use the following:

- Supported client operating systems and versions that have been tested by Nexenta and qualified with FC
- Supported hardware components (including firmware revisions)

### List of Supported FC Initiators

- Red Hat
- SUSE Linux 11 SP4
- Xen 6.1.0
- Windows
- VMware ESX

No special configuration required.

## Setting Up RedHat FC Initiator

You must set up client multipathing as shown here for a CentOS 7 system to consume FC exclusively from NexentaStor.

### Edit RedHat /etc/multipath.conf File

Edit /etc/multipath.conf to add the blacklist and devices entries:

---

If NexentaStor is added to a system that sees other storage that results in multipathing being already configured, do the following:

- Note:**
- add a device description to the devices section,
  - add NexentaStor into a blacklist exception,
  - set "find\_multipaths" to "yes" in the defaults.

For further details on the directives used, see the multipath.conf man page for the initiator distribution.

---

```
defaults {
    user_friendly_names    no
    find_multipaths        yes
    verbosity              2
}
blacklist {
    devnode "^ (ram|raw|loop|fd|md|dm-|sr|scd|st) [0-9] *"
    devnode "^hd[a-z] "
}
blacklist_exceptions {
    device {
        vendor    "NEXENTA"
        product   "COMSTAR"
    }
}
devices {
    device {
        vendor            "NEXENTA"
        product           "COMSTAR"
        hardware_handler  "1 alua"
        path_selector     "round-robin 0"
```

```

        path_grouping_policy    group_by_prio
        failback                 immediate
        rr_weight                uniform
        no_path_retry            queue
        rr_min_io                1000
        path_checker             tur
        prio                     alua
    }
}

```

After reconfiguring the linux client, start the multipath daemon.

## Start Multipath Daemon

Start the mutipath daemon by running the following commands:

```

# modprobe dm-multipath
# service multipathd start

```

## Ensure Multipath Daemon Starts at Bootup

Ensure the multipath daemon starts at bootup, run the following command:

```

# chkconfig multipathd on

```

## Verify Multipathed Devices

Finally, to list multipathed devices, run the command:

```

# multipath -ll

```

Following is an output example for a deployment with redundant connectivity to two NS heads running with ALUA.

```

root@lrtsrh01]# multipath -ll
3652c261cb6ae22c23473764266f4db2c dm-15 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
| |- 0:0:0:0 sdg 8:96 active ready running
| `-- 8:0:0:0 sdm 8:192 active ready running
`+- policy='round-robin 0' prio=1 status=enabled
  |- 8:0:1:0 sds 65:32 active ready running
  `-- 0:0:1:0 sdy 65:128 active ready running

```



```

3652c261cb6ae22c2b8666b4ddf6c1540 dm-14 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
| |- 0:0:0:1 sdh 8:112 active ready running
| `~ 8:0:0:1 sdn 8:208 active ready running
`+- policy='round-robin 0' prio=1 status=enabled
  |- 8:0:1:1 sdt 65:48 active ready running
  `~ 0:0:1:1 sdz 65:144 active ready running
36283879fcbd8be32f4c9bb9ac7a2c024 dm-13 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
| |- 8:0:1:5 sdx 65:112 active ready running
| `~ 0:0:1:5 sdad 65:208 active ready running
`+- policy='round-robin 0' prio=1 status=enabled
  |- 0:0:0:5 sdl 8:176 active ready running
  `~ 8:0:0:5 sdr 65:16 active ready running
36283879fcbd8be32d2ceb5f60e10b93a dm-11 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
| |- 8:0:1:3 sdv 65:80 active ready running
| `~ 0:0:1:3 sdab 65:176 active ready running
`+- policy='round-robin 0' prio=1 status=enabled
  |- 8:0:0:3 sdp 8:240 active ready running
  `~ 0:0:0:3 sdj 8:144 active ready running
36283879fcbd8be325f41080d948601f4 dm-12 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
| |- 8:0:1:4 sdw 65:96 active ready running
| `~ 0:0:1:4 sdac 65:192 active ready running
`+- policy='round-robin 0' prio=1 status=enabled
  |- 0:0:0:4 sdk 8:160 active ready running
  `~ 8:0:0:4 sdq 65:0 active ready running
3652c261cb6ae22c215ed0dcc3739d62 dm-10 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active

```

```
| |- 0:0:0:2 sdi 8:128 active ready running
| `~ 8:0:0:2 sdo 8:224 active ready running
`-+- policy='round-robin 0' prio=1 status=enabled
  |- 8:0:1:2 sdu 65:64 active ready running
  `~ 0:0:1:2 sdaa 65:160 active ready running
```

## List Devices

In the above example, you will see two sets of ports, one active (that's the node that owns the LUN), one standby), with all ports in an "active ready running" state. This results in the device mapper creating the following nodes in `/dev/disk/by-id` (note that their IDs line up clearly with those used in the multipath output):

```
[root@lrtsrh01]# ls /dev/disk/by-id/dm-uuid-mpath-*
/dev/disk/by-id/dm-uuid-mpath-36283879fcbd8be325f41080d948601f4 /
dev/disk/by-id/dm-uuid-mpath-36283879fcbd8be32f4c9bb9ac7a2c024 /
dev/disk/by-id/dm-uuid-mpath-3652c261cb6ae22c23473764266f4db2c
/dev/disk/by-id/dm-uuid-mpath-36283879fcbd8be32d2ceb5f60e10b93a /
dev/disk/by-id/dm-uuid-mpath-3652c261cb6ae22c215ed0dccb3739d62 /
dev/disk/by-id/dm-uuid-mpath-3652c261cb6ae22c2b8666b4ddf6c1540
```

If each of these LUNs is then given a single partition, you can use these devices to reference them for filesystem or raw device consumers.

```
[root@lrtsrh01]# ls /dev/disk/by-id/dm-uuid-part1-mpath-*
/dev/disk/by-id/dm-uuid-part1-mpath-
36283879fcbd8be325f41080d948601f4 /dev/disk/by-id/dm-uuid-part1-
mpath-36283879fcbd8be32f4c9bb9ac7a2c024 /dev/disk/by-id/dm-uuid-
part1-mpath-3652c261cb6ae22c23473764266f4db2c
/dev/disk/by-id/dm-uuid-part1-mpath-
36283879fcbd8be32d2ceb5f60e10b93a /dev/disk/by-id/dm-uuid-part1-
mpath-3652c261cb6ae22c215ed0dccb3739d62 /dev/disk/by-id/dm-uuid-
part1-mpath-3652c261cb6ae22c2b8666b4ddf6c1540
```

The device identifiers are the same as the GUIDs used by COMSTAR with a protocol prefix of "3" for FC:

```
CLI@nexenta> for LU in $(logicalunit list -O basic | nawk '{print
$1}')
do
logicalunit get guid -O basic $LU
done
tank/esx/vol05      guid      62AA25D4F509A14B15EBA5E64A47D736
tank/esx/vol04      guid      62AA25D4F509A14B39A8663D9A996F60
```

```
tank/esx/vol02      guid      62AA25D4F509A14B472C24E4E5BB9A35
tank/esx/vol00      guid      62AA25D4F509A14B50E30343224A0E2A
tank/esx/vol01      guid      62AA25D4F509A14B74575CF4BA14D5B0
tank/myvolumegroup/ubuntu70      guid
62AA25D4F509A14BB369395D6AF40387
tank/myvolumegroup/newlun      guid
62AA25D4F509A14BCB0CAB07401A4E92
```

In case of any issues, set verbosity to 5, restart multipathd, run "multipath -ll", and attach output to the bug report.

## VMware ESX

No special configuration required. VMware recognizes NexentaStor natively and the LUNs are visible to initiators in the group.

## Setting Up SUSE Linux 11 SP4

### Edit SuSe/etc/multipath.conf File

Edit SuSe/etc/multipath.conf to add the blacklist and devices entries.

```
blacklist {
    devnode "^(ram|raw|loop|fd|md|dm-|sr|scd|st) [0-9] *"
    devnode "^hd[a-z] [0-9] *"
    devnode "^cciss.c[0-9]d[0-9].*"
}

devices {
    device {
        vendor "NEXENTA"
        product "COMSTAR"
        path_grouping_policy "group_by_prio"
        path_selector "round-robin 0"
        path_checker tur
        features "1 queue_if_no_path"
        hardware_handler "1 alua"
        prio "alua"
        failback immediate
        rr_weight "priorities"
        no_path_retry "queue"
        rr_min_io 100
    }
}
```

### Edit /etc/lvm/lvm.conf

Edit /etc/lvm/lvm.conf to ensure that lvm ignores the direct paths since we are ALUA and handles the multipath devices correctly.

1. Add the following:

```
multipath_component_detection = 1
```

2. Change the filter line to:

```
/etc/lvm/lvm.conf filter
filter = [ "r|/dev/sd.*|" ]
```

## Setting Up XenServer 6.1.0

### Check Version of XenServer

```
[root@xenserver-zhplilev ~]# cat /etc/redhat-release
XenServer release 6.1.0-59235p (xenenterprise)
```

### Edit /etc/multipath.conf

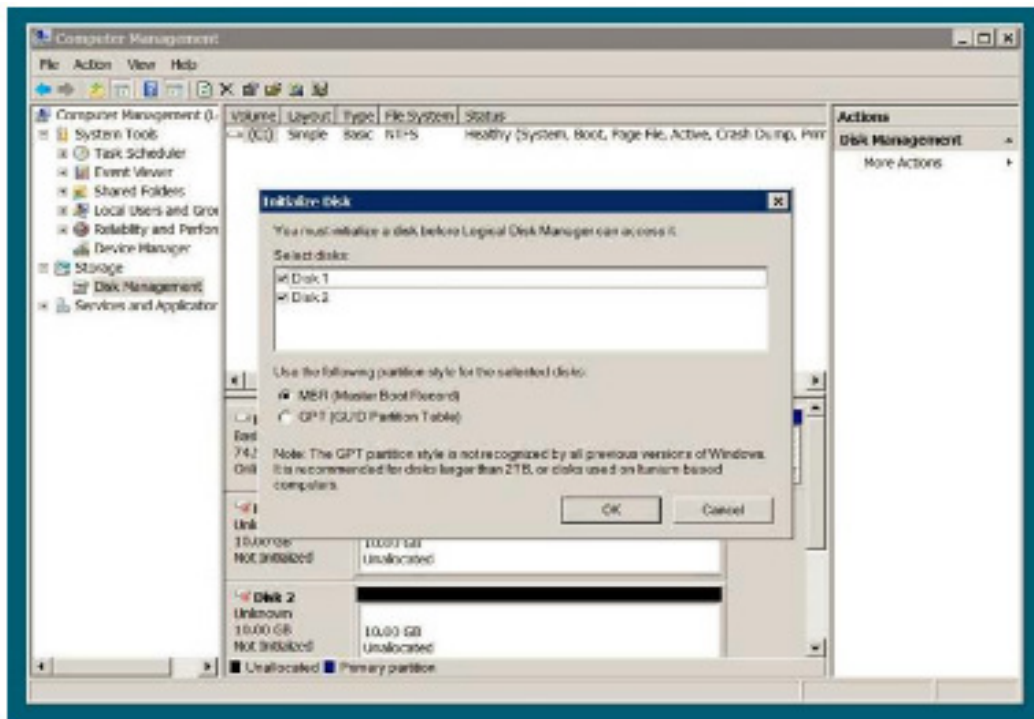
Add the following to /etc/multipath.conf

```
device {
    vendor "NEXENTA"
    product "COMSTAR"
    getuid_callout "/sbin/scsi_id -g -u -s /block/%n"
    prio_callout "/sbin/mpath_prio_alua /dev/%n"
    hardware_handler "0"
    path_grouping_policy group_by_prio
    failback immediate
    no_path_retry queue
    rr_min_io 100
    path_checker tur
    rr_weight uniform
}
```

## Configuring Windows

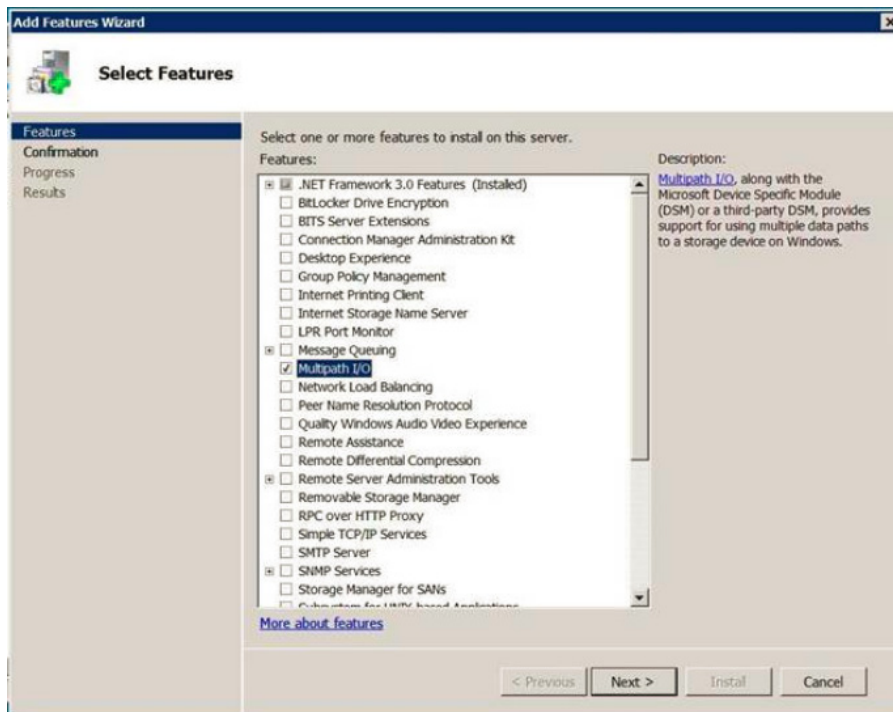
Prior to enabling Multipath I/O on Windows Server 2008, any COMSTAR Fibre Channel target accessible through the SAN fabric by more than one physical path is displayed as multiple disks in the Storage section of Computer Management. Each disk represents a different physical path to the same Fibre Channel target; therefore the total number of disks represents the total number of physical paths through the SAN fabric to the Fibre Channel target.

In the example below there are two physical paths to the same disc shown:



## Install MPIO

To install MPIO on Windows Server 2008, start Server Manager and select Multipath I/O from the Add Features wizard. Once Multipath I/O is installed, the MPIO applet will then be added to the Control Panel.



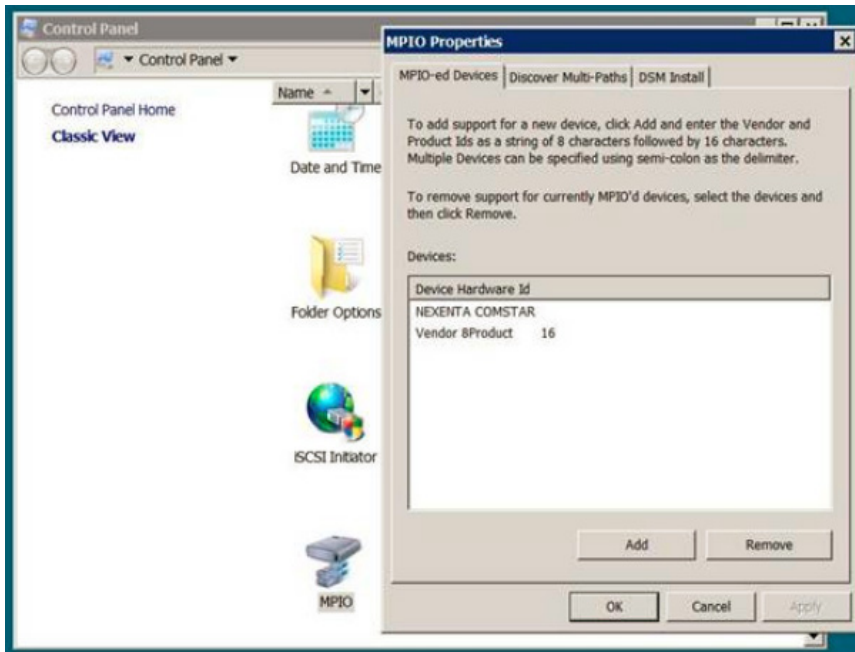
## Add Support for COMSTAR

To add support for COMSTAR Fibre Channel targets on Windows Server 2008, start the MPIO applet from the Control Panel:



## View NEXENTA COMSTAR as Supported Device

The Discover Multi-Paths tab should list NEXENTA COMSTAR as an SPC-3 compliant device, click Add and then reboot the server if prompted, the Devices list under the MPIO-ed Devices tab will now show NEXENTA COMSTAR as a supported device.



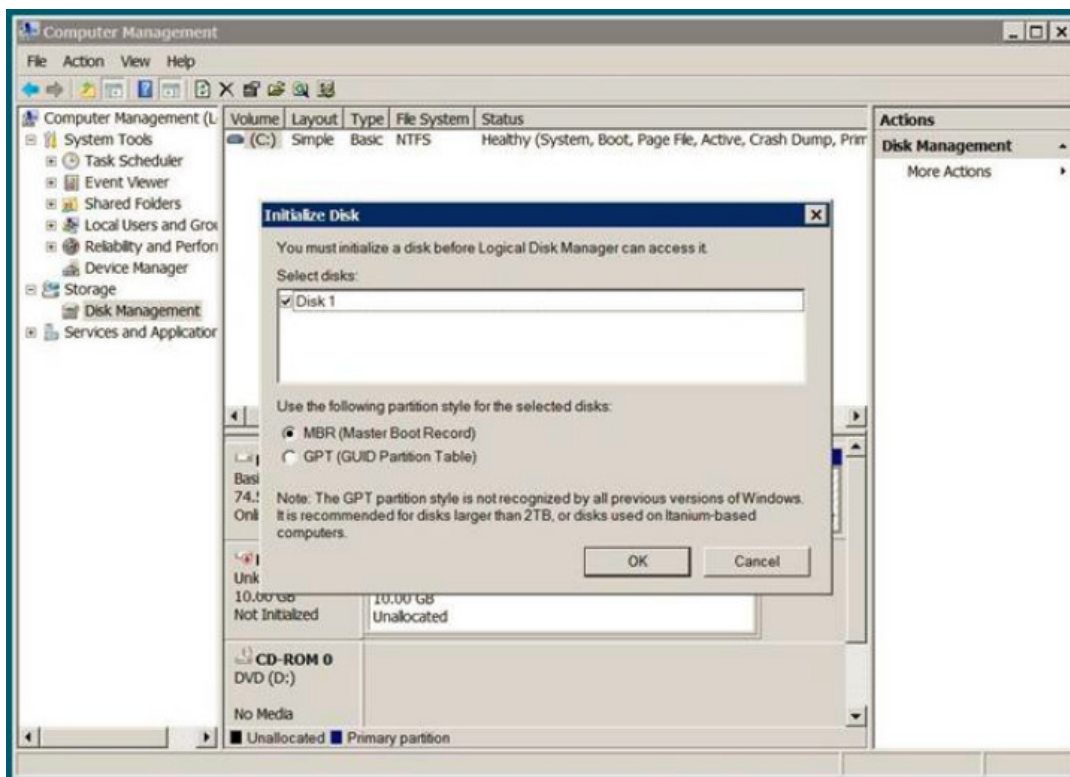


## Troubleshoot

If COMSTAR does not appear in the above list, do the following:

- On the Nexenta heads ensure all cards are set to target mode.
- Check all cabling to ensure there are physical paths to the COMSTAR fibre channel targets.
- If cables are not keyed (i.e. a cable can be plugged into either of the A/B ports on the GBIC) try swapping over the A/B ports.
- Ensure any fibre switches are not blocking the path due to zoning.

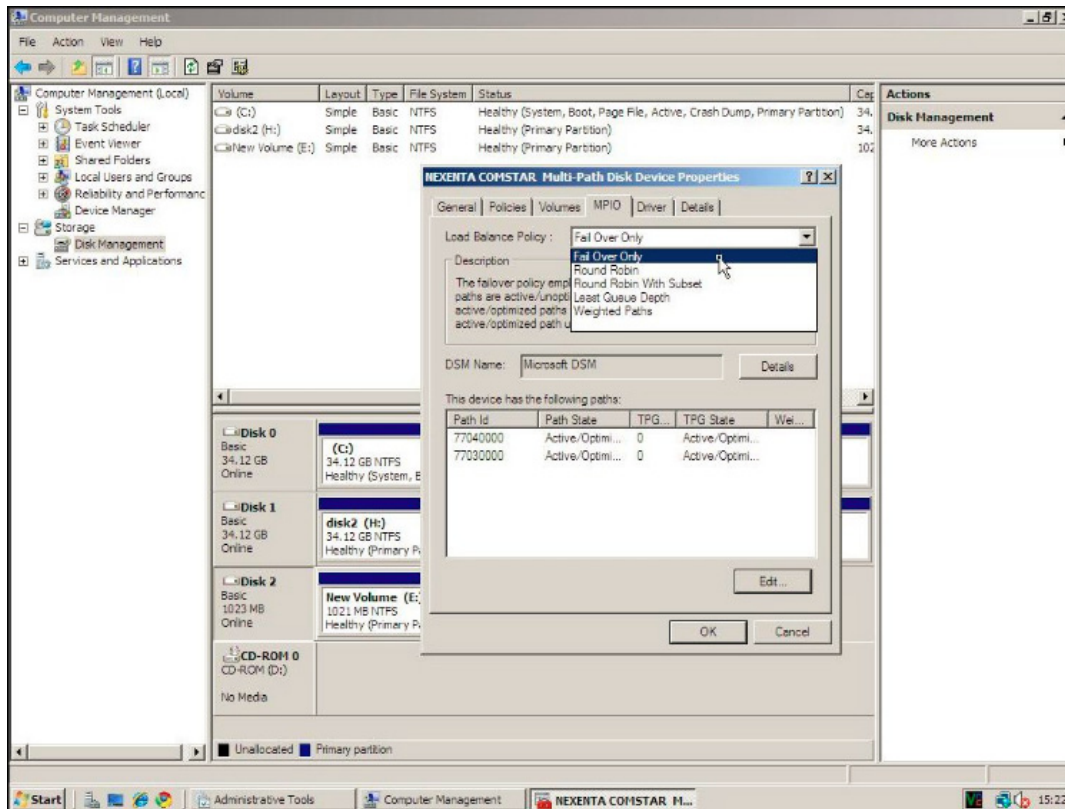
After enabling Multipath I/O on Windows Server 2008, any COMSTAR Fibre Channel target accessible through the SAN fabric by more than one physical path is now displayed as a single disk in the Storage section of Computer Management, irrespective of the total number of physical paths through the SAN fabric to the Fibre Channel target.



## Configure MPIO Load Balancing

Finally configure MPIO load balancing policy from the disc properties (in this example we choose fail over only, however, the other available policies will also work):

Note: “Round Robin With Subset” is now preferred as failover only will use a single active path.



---

**Global Headquarters**

2025 Gateway Place,  
Suite 160,  
San Jose, CA 95110,  
USA

7000-nxs-5.x-000010-A