



ESXi

ONTAP SAN Host Utilities

NetApp
January 30, 2026

Table of Contents

ESXi	1
NVMe-oF Host Configuration for ESXi 8.x with ONTAP	1
Supportability	1
Features	1
Known limitations	1
Enable NVMe/FC	1
Configure Broadcom/Emulex and Marvell/Qlogic	2
Validate NVMe/FC	2
Configure NVMe/TCP	5
Validate NVMe/TCP	5
NVMe deallocate	7
Known issues	8
NVMe-oF Host Configuration for ESXi 7.x with ONTAP	9
Supportability	9
Features	9
Known limitations	9
Enable NVMe/FC	9
Validate NVMe/FC	11
Configure NVMe/TCP	13
Validate NVMe/TCP	14
Known issues	15

ESXi

NVMe-oF Host Configuration for ESXi 8.x with ONTAP

You can configure NVMe over Fabrics (NVMe-oF) on initiator hosts running ESXi 8.x and ONTAP as the target.

Supportability

- Beginning with ONTAP 9.16.1 space allocation is enabled by default for all newly created NVMe namespaces.
- Beginning with ONTAP 9.9.1 P3, NVMe/FC protocol is supported for ESXi 8 and later.
- Beginning with ONTAP 9.10.1, NVMe/TCP protocol is supported for ONTAP.

Features

- ESXi initiator hosts can run both NVMe/FC and FCP traffic through the same adapter ports. See the [Hardware Universe](#) for a list of supported FC adapters and controllers. See the [NetApp Interoperability Matrix Tool](#) for the most current list of supported configurations and versions.
- For ESXi 8.0 and later releases, HPP (high performance plugin) is the default plugin for NVMe devices.

Known limitations

- RDM mapping is not supported.

Enable NVMe/FC

NVMe/FC is enabled by default in vSphere releases.

Verify host NQN

You must check the ESXi host NQN string and verify that it matches with the host NQN string for the corresponding subsystem on the ONTAP array.

```
# esxcli nvme info get
```

Example output:

```
Host NQN: nqn.2014-08.org.nvmexpress:uuid:62a19711-ba8c-475d-c954-0000c9f1a436
```

```
# vserver nvme subsystem host show -vserver nvme_fc
```

Example output:

```
Vserver Subsystem Host NQN
-----
-----
nvme_fc nvme_ss nqn.2014-08.org.nvmeexpress:uuid:62a19711-ba8c-475d-c954-
0000c9f1a436
```

If the host NQN strings do not match, you should use the `vserver nvme subsystem host add` command to update the correct host NQN string on your corresponding ONTAP NVMe subsystem.

Configure Broadcom/Emulex and Marvell/Qlogic

The `lpfc` driver and the `qlnativefc` driver in vSphere 8.x have the NVMe/FC capability enabled by default.

See [Interoperability Matrix Tool](#) to check whether the configuration is supported with the driver or firmware.

Validate NVMe/FC

You can use the following procedure to validate NVMe/FC.

Steps

1. Verify that the NVMe/FC adapter is listed on the ESXi host:

```
# esxcli nvme adapter list
```

Example output:

Adapter	Adapter Qualified Name	Transport Type	Driver
Associated Devices			
-----	-----	-----	-----
-----	-----	-----	-----
vhba64	aqn:lpfc:100000109b579f11	FC	lpfc
vhba65	aqn:lpfc:100000109b579f12	FC	lpfc
vhba66	aqn:qlnativefc:2100f4e9d456e286	FC	qlnativefc
vhba67	aqn:qlnativefc:2100f4e9d456e287	FC	qlnativefc

2. Verify that the NVMe/FC namespaces are correctly created:

The UUIDs in the following example represent the NVMe/FC namespace devices.

```
# esxcfg-mpath -b
uuid.116cb7ed9e574a0faf35ac2ec115969d : NVMe Fibre Channel Disk
(uuid.116cb7ed9e574a0faf35ac2ec115969d)
    vmhba64:C0:T0:L5 LUN:5 state:active fc Adapter: WWNN:
    20:00:00:24:ff:7f:4a:50 WWPN: 21:00:00:24:ff:7f:4a:50 Target: WWNN:
    20:04:d0:39:ea:3a:b2:1f WWPN: 20:05:d0:39:ea:3a:b2:1f
    vmhba64:C0:T1:L5 LUN:5 state:active fc Adapter: WWNN:
    20:00:00:24:ff:7f:4a:50 WWPN: 21:00:00:24:ff:7f:4a:50 Target: WWNN:
    20:04:d0:39:ea:3a:b2:1f WWPN: 20:07:d0:39:ea:3a:b2:1f
    vmhba65:C0:T1:L5 LUN:5 state:active fc Adapter: WWNN:
    20:00:00:24:ff:7f:4a:51 WWPN: 21:00:00:24:ff:7f:4a:51 Target: WWNN:
    20:04:d0:39:ea:3a:b2:1f WWPN: 20:08:d0:39:ea:3a:b2:1f
    vmhba65:C0:T0:L5 LUN:5 state:active fc Adapter: WWNN:
    20:00:00:24:ff:7f:4a:51 WWPN: 21:00:00:24:ff:7f:4a:51 Target: WWNN:
    20:04:d0:39:ea:3a:b2:1f WWPN: 20:06:d0:39:ea:3a:b2:1f
```

In ONTAP 9.7, the default block size for an NVMe/FC namespace is 4K. This default size is not compatible with ESXi. Therefore, when creating namespaces for ESXi, you must set the namespace block size as **512B**. You can do this using the `vserver nvme namespace create` command.



Example,

```
vserver nvme namespace create -vserver vs_1 -path
/vol/nsvol/namespace1 -size 100g -ostype vmware -block-size 512B
```

Refer to the [ONTAP 9 Command man pages](#) for additional details.

3. Verify the status of the individual ANA paths of the respective NVMe/FC namespace devices:

```
# esxcli storage hpp path list -d uuid.df960bebb5a74a3eaaa1ae55e6b3411d

fc.20000024ff7f4a50:21000024ff7f4a50-
fc.2004d039ea3ab21f:2005d039ea3ab21f-
uuid.df960bebb5a74a3eaaa1ae55e6b3411d
  Runtime Name: vmhba64:C0:T0:L3
  Device: uuid.df960bebb5a74a3eaaa1ae55e6b3411d
  Device Display Name: NVMe Fibre Channel Disk
(uuid.df960bebb5a74a3eaaa1ae55e6b3411d)
  Path State: active unoptimized
  Path Config: {ANA_GRP_id=4, ANA_GRP_state=ANO, health=UP}

fc.20000024ff7f4a51:21000024ff7f4a51-
fc.2004d039ea3ab21f:2008d039ea3ab21f-
uuid.df960bebb5a74a3eaaa1ae55e6b3411d
  Runtime Name: vmhba65:C0:T1:L3
  Device: uuid.df960bebb5a74a3eaaa1ae55e6b3411d
  Device Display Name: NVMe Fibre Channel Disk
(uuid.df960bebb5a74a3eaaa1ae55e6b3411d)
  Path State: active
  Path Config: {ANA_GRP_id=4, ANA_GRP_state=AO, health=UP}

fc.20000024ff7f4a51:21000024ff7f4a51-
fc.2004d039ea3ab21f:2006d039ea3ab21f-
uuid.df960bebb5a74a3eaaa1ae55e6b3411d
  Runtime Name: vmhba65:C0:T0:L3
  Device: uuid.df960bebb5a74a3eaaa1ae55e6b3411d
  Device Display Name: NVMe Fibre Channel Disk
(uuid.df960bebb5a74a3eaaa1ae55e6b3411d)
  Path State: active unoptimized
  Path Config: {ANA_GRP_id=4, ANA_GRP_state=ANO, health=UP}

fc.20000024ff7f4a50:21000024ff7f4a50-
fc.2004d039ea3ab21f:2007d039ea3ab21f-
uuid.df960bebb5a74a3eaaa1ae55e6b3411d
  Runtime Name: vmhba64:C0:T1:L3
  Device: uuid.df960bebb5a74a3eaaa1ae55e6b3411d
  Device Display Name: NVMe Fibre Channel Disk
(uuid.df960bebb5a74a3eaaa1ae55e6b3411d)
  Path State: active
  Path Config: {ANA_GRP_id=4, ANA_GRP_state=AO, health=UP}
```

Configure NVMe/TCP

In ESXi 8.x, the required NVMe/TCP modules are loaded by default. To configure the network and the NVMe/TCP adapter, refer to the VMware vSphere documentation.

Validate NVMe/TCP

You can use the following procedure to validate NVMe/TCP.

Steps

1. Verify the status of the NVMe/TCP adapter:

```
esxcli nvme adapter list
```

Example output:

Adapter Associated Devices	Adapter Qualified Name	Transport Type	Driver
vmhba65	aqn:nvmetcp:ec-2a-72-0f-e2-30-T	TCP	nvmetcp
vmnic0			
vmhba66	aqn:nvmetcp:34-80-0d-30-d1-a0-T	TCP	nvmetcp
vmnic2			
vmhba67	aqn:nvmetcp:34-80-0d-30-d1-a1-T	TCP	nvmetcp
vmnic3			

2. Retrieve a list of NVMe/TCP connections:

```
esxcli nvme controller list
```

Example output:

Name	Controller Number
Adapter Transport Type Is Online Is VVOL	
-----	-----
nqn.2014-08.org.nvmeexpress.discovery#vhba64#192.168.100.166:8009	256
vhba64 TCP true false	
nqn.1992-	
08.com.netapp:sn.89bb1a28a89a11ed8a88d039ea263f93:subsystem.nvme_ss#vhba64#192.168.100.165:4420	258
258 vhba64 TCP true false	
nqn.1992-	
08.com.netapp:sn.89bb1a28a89a11ed8a88d039ea263f93:subsystem.nvme_ss#vhba64#192.168.100.168:4420	259
259 vhba64 TCP true false	
nqn.1992-	
08.com.netapp:sn.89bb1a28a89a11ed8a88d039ea263f93:subsystem.nvme_ss#vhba64#192.168.100.166:4420	260
260 vhba64 TCP true false	
nqn.2014-08.org.nvmeexpress.discovery#vhba64#192.168.100.165:8009	261
vhba64 TCP true false	
nqn.2014-08.org.nvmeexpress.discovery#vhba65#192.168.100.155:8009	262
vhba65 TCP true false	
nqn.1992-	
08.com.netapp:sn.89bb1a28a89a11ed8a88d039ea263f93:subsystem.nvme_ss#vhba64#192.168.100.167:4420	264
264 vhba64 TCP true false	

3. Retrieve a list of the number of paths to an NVMe namespace:

```
esxcli storage hpp path list -d uuid.f4f14337c3ad4a639edf0e21de8b88bf
```

Example output:

```

tcp.vmnic2:34:80:0d:30:ca:e0-tcp.192.168.100.165:4420-
uuid.f4f14337c3ad4a639edf0e21de8b88bf
  Runtime Name: vmhba64:C0:T0:L5
  Device: uuid.f4f14337c3ad4a639edf0e21de8b88bf
  Device Display Name: NVMe TCP Disk
(uuid.f4f14337c3ad4a639edf0e21de8b88bf)
  Path State: active
  Path Config: {ANA_GRP_id=6, ANA_GRP_state=AO, health=UP}

tcp.vmnic2:34:80:0d:30:ca:e0-tcp.192.168.100.168:4420-
uuid.f4f14337c3ad4a639edf0e21de8b88bf
  Runtime Name: vmhba64:C0:T3:L5
  Device: uuid.f4f14337c3ad4a639edf0e21de8b88bf
  Device Display Name: NVMe TCP Disk
(uuid.f4f14337c3ad4a639edf0e21de8b88bf)
  Path State: active unoptimized
  Path Config: {ANA_GRP_id=6, ANA_GRP_state=ANO, health=UP}

tcp.vmnic2:34:80:0d:30:ca:e0-tcp.192.168.100.166:4420-
uuid.f4f14337c3ad4a639edf0e21de8b88bf
  Runtime Name: vmhba64:C0:T2:L5
  Device: uuid.f4f14337c3ad4a639edf0e21de8b88bf
  Device Display Name: NVMe TCP Disk
(uuid.f4f14337c3ad4a639edf0e21de8b88bf)
  Path State: active unoptimized
  Path Config: {ANA_GRP_id=6, ANA_GRP_state=ANO, health=UP}

tcp.vmnic2:34:80:0d:30:ca:e0-tcp.192.168.100.167:4420-
uuid.f4f14337c3ad4a639edf0e21de8b88bf
  Runtime Name: vmhba64:C0:T1:L5
  Device: uuid.f4f14337c3ad4a639edf0e21de8b88bf
  Device Display Name: NVMe TCP Disk
(uuid.f4f14337c3ad4a639edf0e21de8b88bf)
  Path State: active
  Path Config: {ANA_GRP_id=6, ANA_GRP_state=AO, health=UP}

```

NVMe deallocate

The NVMe deallocate command is supported for ESXi 8.0u2 and later with ONTAP 9.16.1 and later.

Deallocate support is always enabled for NVMe namespaces. Deallocation also allows the guest OS to perform 'UNMAP' (sometimes called 'TRIM') operations on VMFS datastores. Deallocation operations allow a host to identify blocks of data that are no longer required because they no longer contain valid data. The storage system can then remove those data blocks so that the space can be consumed elsewhere.

Steps

1. On your ESXi host, verify the setting for DSM deallocate with TP4040 support:

```
esxcfg-advcfg -g /Scsi/NVmeUseDsmTp4040
```

The expected value is 0.

2. Enable the setting for DSM deallocate with TP4040 support:

```
esxcfg-advcfg -s 1 /Scsi/NvmeUseDsmTp4040
```

3. Verify that the setting for DSM deallocate with TP4040 support is enabled:

```
esxcfg-advcfg -g /Scsi/NVmeUseDsmTp4040
```

The expected value is 1.

For more information on NVMe deallocate in VMware vSphere, refer to [Storage Space Reclamation in vSphere](#)

Known issues

The NVMe-oF host configuration for ESXi 8.x with ONTAP has the following known issues:

NetApp Bug ID	Title	Description
1420654	ONTAP node non-operational when NVMe/FC protocol is used with ONTAP version 9.9.1	ONTAP 9.9.1 has introduced support for the NVMe "abort" command. When ONTAP receives the "abort" command to abort an NVMe fused command that is waiting for its partner command, an ONTAP node disruption occurs. The issue is noticed only with hosts that use NVMe fused commands (for example, ESX) and Fibre Channel (FC) transport.
1543660	I/O error occurs when Linux VMs using vNVMe adapters encounter a long all paths down (APD) window	Linux VMs running vSphere 8.x and later and using virtual NVMe (vNVME) adapters encounter an I/O error because the vNVME retry operation is disabled by default. To avoid a disruption on Linux VMs running older kernels during an all paths down (APD) or a heavy I/O load, VMware has introduced a tunable "VSCSIDisableNvmeRetry" to disable the vNVMe retry operation.

Related information

[VMware vSphere with ONTAP](#)

[VMware vSphere 5.x, 6.x and 7.x support with NetApp MetroCluster \(2031038\)](#)

[VMware vSphere 6.x and 7.x support with NetApp SnapMirror active sync](#)

NVMe-oF Host Configuration for ESXi 7.x with ONTAP

You can configure NVMe over Fabrics (NVMe-oF) on initiator hosts running ESXi 7.x and ONTAP as the target.

Supportability

- Beginning with ONTAP 9.7, NVMe over Fibre Channel (NVMe/FC) support is added for VMWare vSphere releases.
- Beginning with 7.0U3c, NVMe/TCP feature is supported for ESXi Hypervisor.
- Beginning with ONTAP 9.10.1, NVMe/TCP feature is supported for ONTAP.

Features

- ESXi initiator host can run both NVMe/FC and FCP traffic through the same adapter ports. See the [Hardware Universe](#) for a list of supported FC adapters and controllers. See the [Interoperability Matrix Tool](#) for the current list of supported configurations and versions.
- Beginning with ONTAP 9.9.1 P3, NVMe/FC feature is supported for ESXi 7.0 update 3.
- For ESXi 7.0 and later releases, HPP (high performance plugin) is the default plugin for NVMe devices.

Known limitations

The following configurations are not supported:

- RDM mapping
- VVols

Enable NVMe/FC

1. Check the ESXi host NQN string and verify that it matches with the host NQN string for the corresponding subsystem on the ONTAP array:

```
# esxcli nvme info get
Host NQN: nqn.2014-08.com.vmware:nvme:nvme-esx

# vserver nvme subsystem host show -vserver vserver_nvme
Vserver Subsystem          Host NQN
-----
vserver_nvme ss_vserver_nvme nqn.2014-08.com.vmware:nvme:nvme-esx
```

Configure Broadcom/Emulex

1. Check whether the configuration is supported with required driver/firmware by referring to [Interoperability Matrix Tool](#).
2. Set the lpfc driver parameter `lpfc_enable_fc4_type=3` for enabling NVMe/FC support in the `lpfc` driver and reboot the host.



Starting with vSphere 7.0 update 3, the `brcm_nvme_fc` driver is no longer available. Therefore, the `lpfc` driver now includes the NVMe over Fibre Channel (NVMe/FC) functionality previously delivered with the `brcm_nvme_fc` driver.



The `lpfc_enable_fc4_type=3` parameter is set by default for the LPe35000-series adapters. You must perform the following command to set it manually for LPe32000-series and LPe31000-series adapters.

```
# esxcli system module parameters set -m lpfc -p lpfc_enable_fc4_type=3

#esxcli system module parameters list -m lpfc | grep lpfc_enable_fc4_type
lpfc_enable_fc4_type           int      3      Defines what FC4 types
are supported

#esxcli storage core adapter list
HBA Name  Driver  Link State  UID
Capabilities          Description
-----  -----  -----  -----
-----  -----  -----
vmhba1    lpfc    link-up    fc.200000109b95456f:100000109b95456f
Second Level Lun ID (0000:86:00.0) Emulex Corporation Emulex LPe36000
Fibre Channel Adapter    FC HBA
vmhba2    lpfc    link-up    fc.200000109b954570:100000109b954570
Second Level Lun ID (0000:86:00.1) Emulex Corporation Emulex LPe36000
Fibre Channel Adapter    FC HBA
vmhba64   lpfc    link-up    fc.200000109b95456f:100000109b95456f
(0000:86:00.0) Emulex Corporation Emulex LPe36000 Fibre Channel Adapter
NVMe HBA
vmhba65   lpfc    link-up    fc.200000109b954570:100000109b954570
(0000:86:00.1) Emulex Corporation Emulex LPe36000 Fibre Channel Adapter
NVMe HBA
```

Configure Marvell/QLogic

Steps

1. Check whether configuration is supported with required driver/firmware by referring to [Interoperability Matrix Tool](#).
2. Set the `qlnativefc` driver parameter `ql2xnvmesupport=1` for enabling NVMe/FC support in the `qlnativefc` driver and reboot the host.

```
# esxcfg-module -s 'ql2xnvmesupport=1' qlnativefc
```



The `qlnativefc` driver parameter is set by default for the Qle 277x-series adapters. You must perform the following command to set it manually for Qle 277x series adapters.

```
esxcfg-module -l | grep qlnativefc
qlnativefc          4      1912
```

3. Check whether nvme is enabled on the adapter:

```
#esxcli storage core adapter list
HBA Name  Driver      Link State  UID
Capabilities      Description
-----  -----
-----  -----
vmhba3    qlnativefc  link-up      fc.20000024ff1817ae:21000024ff1817ae
Second Level Lun ID (0000:5e:00.0) QLogic Corp QLE2742 Dual Port 32Gb
Fibre Channel to PCIe Adapter      FC Adapter
vmhba4    qlnativefc  link-up      fc.20000024ff1817af:21000024ff1817af
Second Level Lun ID (0000:5e:00.1) QLogic Corp QLE2742 Dual Port 32Gb
Fibre Channel to PCIe Adapter FC Adapter
vmhba64   qlnativefc  link-up      fc.20000024ff1817ae:21000024ff1817ae
(0000:5e:00.0) QLogic Corp QLE2742 Dual Port 32Gb Fibre Channel to PCIe
Adapter      NVMe FC Adapter
vmhba65   qlnativefc  link-up      fc.20000024ff1817af:21000024ff1817af
(0000:5e:00.1) QLogic Corp QLE2742 Dual Port 32Gb Fibre Channel to PCIe
Adapter      NVMe FC Adapter
```

Validate NVMe/FC

1. Verify that NVMe/FC adapter is listed on the ESXi host:

```
# esxcli nvme adapter list

Adapter  Adapter Qualified Name          Transport Type  Driver
Associated Devices
-----  -----
-----  -----
vmhba64  aqn:qlnativefc:21000024ff1817ae  FC          qlnativefc
vmhba65  aqn:qlnativefc:21000024ff1817af  FC          qlnativefc
vmhba66  aqn:lpfc:100000109b579d9c       FC          lpfc
vmhba67  aqn:lpfc:100000109b579d9d       FC          lpfc
```

2. Verify that the NVMe/FC namespaces are properly created:

The UUIDs in the following example represent the NVMe/FC namespace devices.

```
# esxcfg-mpath -b
uuid.5084e29a6bb24fbca5ba076eda8ecd7e : NVMe Fibre Channel Disk
(uuid.5084e29a6bb24fbca5ba076eda8ecd7e)
    vmhba65:C0:T0:L1 LUN:1 state:active fc Adapter: WWNN:
    20:00:34:80:0d:6d:72:69 WWPN: 21:00:34:80:0d:6d:72:69 Target: WWNN:
    20:17:00:a0:98:df:e3:d1 WWPN: 20:2f:00:a0:98:df:e3:d1
    vmhba65:C0:T1:L1 LUN:1 state:active fc Adapter: WWNN:
    20:00:34:80:0d:6d:72:69 WWPN: 21:00:34:80:0d:6d:72:69 Target: WWNN:
    20:17:00:a0:98:df:e3:d1 WWPN: 20:1a:00:a0:98:df:e3:d1
    vmhba64:C0:T0:L1 LUN:1 state:active fc Adapter: WWNN:
    20:00:34:80:0d:6d:72:68 WWPN: 21:00:34:80:0d:6d:72:68 Target: WWNN:
    20:17:00:a0:98:df:e3:d1 WWPN: 20:18:00:a0:98:df:e3:d1
    vmhba64:C0:T1:L1 LUN:1 state:active fc Adapter: WWNN:
    20:00:34:80:0d:6d:72:68 WWPN: 21:00:34:80:0d:6d:72:68 Target: WWNN:
    20:17:00:a0:98:df:e3:d1 WWPN: 20:19:00:a0:98:df:e3:d1
```



In ONTAP 9.7, the default block size for a NVMe/FC namespace is 4K. This default size is not compatible with ESXi. Therefore, when creating namespaces for ESXi, you must set the namespace block size as 512b. You can do this using the `vserver nvme namespace create` command.

Example

```
vserver nvme namespace create -vserver vs_1 -path /vol/nsvol/namespacel -size 100g -ostype vmware -block-size 512B
```

Refer to the [ONTAP 9 Command man pages](#) for additional details.

3. Verify the status of the individual ANA paths of the respective NVMe/FC namespace devices:

```

esxcli storage hpp path list -d uuid.5084e29a6bb24fbca5ba076eda8ecd7e
fc.200034800d6d7268:210034800d6d7268-
fc.201700a098dfe3d1:201800a098dfe3d1-
uuid.5084e29a6bb24fbca5ba076eda8ecd7e
    Runtime Name: vmhba64:C0:T0:L1
    Device: uuid.5084e29a6bb24fbca5ba076eda8ecd7e
    Device Display Name: NVMe Fibre Channel Disk
(uuid.5084e29a6bb24fbca5ba076eda8ecd7e)
    Path State: active
    Path Config: {TPG_id=0,TPG_state=AO,RTP_id=0,health=UP}

fc.200034800d6d7269:210034800d6d7269-
fc.201700a098dfe3d1:201a00a098dfe3d1-
uuid.5084e29a6bb24fbca5ba076eda8ecd7e
    Runtime Name: vmhba65:C0:T1:L1
    Device: uuid.5084e29a6bb24fbca5ba076eda8ecd7e
    Device Display Name: NVMe Fibre Channel Disk
(uuid.5084e29a6bb24fbca5ba076eda8ecd7e)
    Path State: active
    Path Config: {TPG_id=0,TPG_state=AO,RTP_id=0,health=UP}

fc.200034800d6d7269:210034800d6d7269-
fc.201700a098dfe3d1:202f00a098dfe3d1-
uuid.5084e29a6bb24fbca5ba076eda8ecd7e
    Runtime Name: vmhba65:C0:T0:L1
    Device: uuid.5084e29a6bb24fbca5ba076eda8ecd7e
    Device Display Name: NVMe Fibre Channel Disk
(uuid.5084e29a6bb24fbca5ba076eda8ecd7e)
    Path State: active unoptimized
    Path Config: {TPG_id=0,TPG_state=ANO,RTP_id=0,health=UP}

fc.200034800d6d7268:210034800d6d7268-
fc.201700a098dfe3d1:201900a098dfe3d1-
uuid.5084e29a6bb24fbca5ba076eda8ecd7e
    Runtime Name: vmhba64:C0:T1:L1
    Device: uuid.5084e29a6bb24fbca5ba076eda8ecd7e
    Device Display Name: NVMe Fibre Channel Disk
(uuid.5084e29a6bb24fbca5ba076eda8ecd7e)
    Path State: active unoptimized
    Path Config: {TPG_id=0,TPG_state=ANO,RTP_id=0,health=UP}

```

Configure NVMe/TCP

Starting 7.0U3c, the required NVMe/TCP modules will be loaded by default. For configuring the network and the NVMe/TCP adapter, refer to the VMware vSphere documentation.

Validate NVMe/TCP

Steps

1. Verify the status of the NVMe/TCP adapter.

```
[root@R650-8-45:~] esxcli nvme adapter list
Adapter      Adapter Qualified Name
-----
vmhba64      aqn:nvmetcp:34-80-0d-30-ca-e0-T
vmhba65      aqn:nvmetc:34-80-13d-30-ca-e1-T
list
Transport Type  Driver      Associated Devices
-----
TCP           nvmetcp    vmnzc2
TCP           nvmetcp    vmnzc3
```

2. To list the NVMe/TCP connections, use the following command:

```
[root@R650-8-45:~] esxcli nvme controller list
Name
-----
nqn.1992-
08.com.netapp:sn.5e347cf68e0511ec9ec2d039ea13e6ed:subsystem.vs_name_tcp_
ss#vmhba64#192.168.100.11:4420
nqn.1992-
08.com.netapp:sn.5e347cf68e0511ec9ec2d039ea13e6ed:subsystem.vs_name_tcp_
ss#vmhba64#192.168.101.11:4420
Controller Number  Adapter      Transport Type  IS Online
-----
1580            vmhba64    TCP          true
1588            vmhba65    TCP          true
```

3. To list the number of paths to an NVMe namespace, use the following command:

```
[root@R650-8-45:~] esxcli storage hpp path list -d
uuid.400bf333abf74ab8b96dc18ffadc3f99
tcp.vmnic2:34:80:0d:30:ca:eo-tcp.unknown-
uuid.400bf333abf74ab8b96dc18ffadc3f99
  Runtime Name: vmhba64:C0:T0:L3
  Device: uuid.400bf333abf74ab8b96dc18ffadc3f99
  Device Display Name: NVMe TCP Disk
(uuid.400bf333abf74ab8b96dc18ffadc3f99)
  Path State: active unoptimized
  Path config: {TPG_id=0,TPG_state=ANO,RTP_id=0,health=UP}

tcp.vmnic3:34:80:0d:30:ca:el-tcp.unknown-
uuid.400bf333abf74ab8b96dc18ffadc3f99
  Runtime Name: vmhba65:C0:T1:L3
  Device: uuid.400bf333abf74ab8b96dc18ffadc3f99
  Device Display Name: NVMe TCP Disk
(uuid.400bf333abf74ab8b96dc18ffadc3f99)
  Path State: active
  Path config: {TPG_id=0,TPG_state=AO,RTP_id=0,health=UP}
```

Known issues

The NVMe-oF host configuration for ESXi 7.x with ONTAP has the following known issues:

NetApp Bug ID	Title	Workaround
1420654	ONTAP node non-operational when NVMe/FC protocol is used with ONTAP version 9.9.1	Check and rectify any network issues in the host fabric. If this does not help, upgrade to a patch that fixes this issue.

Related information

[VMware vSphere with ONTAP](#)

[VMware vSphere 5.x, 6.x and 7.x support with NetApp MetroCluster \(2031038\)](#)

[VMware vSphere 6.x and 7.x support with NetApp® SnapMirror active sync](#)

Copyright information

Copyright © 2026 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.

LIMITED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (b)(3) of the Rights in Technical Data -Noncommercial Items at DFARS 252.227-7013 (FEB 2014) and FAR 52.227-19 (DEC 2007).

Data contained herein pertains to a commercial product and/or commercial service (as defined in FAR 2.101) and is proprietary to NetApp, Inc. All NetApp technical data and computer software provided under this Agreement is commercial in nature and developed solely at private expense. The U.S. Government has a non-exclusive, non-transferrable, nonsublicensable, worldwide, limited irrevocable license to use the Data only in connection with and in support of the U.S. Government contract under which the Data was delivered. Except as provided herein, the Data may not be used, disclosed, reproduced, modified, performed, or displayed without the prior written approval of NetApp, Inc. United States Government license rights for the Department of Defense are limited to those rights identified in DFARS clause 252.227-7015(b) (FEB 2014).

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.