



# **Set up LUNs for FC and iSCSI**

## **ONTAP 9**

NetApp  
July 13, 2022

# Table of Contents

- Set up LUNs for FC and iSCSI . . . . . 1
  - LUN guidelines . . . . . 1
  - LUN setup workflow . . . . . 1
  - Configure switches for FCoE . . . . . 2
  - Prerequisites for setting up LUNs . . . . . 3
  - Verify the license for FC or iSCSI . . . . . 3
  - Configure an SVM for iSCSI . . . . . 4
  - Configure an SVM for FC . . . . . 4
  - Create LUNs and mapping to igroups . . . . . 5
  - Enable block access for a specific host . . . . . 6
  - Convert a LUN into a namespace . . . . . 7

# Set up LUNs for FC and iSCSI

## LUN guidelines

The FC protocol and iSCSI protocol both provision storage through the use of LUNs. After you have setup your LUNs, you can perform various management tasks, such as increasing or decreasing the size of a LUN. After configuring your volume and setting the appropriate OS type, you must complete the steps that are necessary to setup your LUN.

### Guidelines for assigning LUN IDs

Typically, the default LUN ID begins with 0 and is assigned in increments of 1 for each additional mapped LUN. The host associates the LUN ID with the location and path name of the LUN. The range of valid LUN ID numbers depends on the host. For detailed information, see the documentation provided with your Host Utilities.

### Guidelines for mapping LUNs to igroups

- You can map a LUN to only one igroup.
- You can map a LUN to only one specific initiator through the igroup.
- You can add a single initiator to multiple igroups, but the initiator can be mapped to only one LUN.
- You cannot use the same LUN ID for two LUNs mapped to the same igroup.
- You should use the same protocol type for igroups and port sets.

## LUN setup workflow

To set up your LUN, you must determine the best LUN type for your needs. Then you can follow a series of tasks to verify your protocol license, enable block access, create and map your LUN, and enable block access on your host. You can also optionally create and bind portsets as part of the LUN setup workflow.



## Other ways to do this in ONTAP

To complete this task using...	Refer to...
The redesigned System Manager (available with 9.7 and later)	<ul style="list-style-type: none"><li>• <a href="#">Provision SAN storage for VMware datastores</a></li><li>• <a href="#">Provision SAN storage for Linux servers</a></li><li>• <a href="#">Provision SAN storage for Windows servers</a></li></ul>
System Manager Classic (available with 9.7 and earlier)	<ul style="list-style-type: none"><li>• <a href="#">FC configuration for ESXi using VSC</a></li><li>• <a href="#">FC configuration for Red Hat Enterprise Linux</a></li><li>• <a href="#">FC configuration for Windows</a></li><li>• <a href="#">iSCSI configuration for ESXi using VSC</a></li><li>• <a href="#">iSCSI configuration for Red Hat Enterprise Linux</a></li><li>• <a href="#">iSCSI configuration for Windows</a></li></ul>

## Configure switches for FCoE

You must configure your switches for FCoE before your FC service can run over the existing Ethernet infrastructure.

### What you'll need

- Your SAN configuration must be supported.

For more information about supported configurations, see the Interoperability Matrix.

- A Unified Target Adapter (UTA) must be installed on your storage system.

If you are using a UTA2, it must be set to `cna` mode.

- A converged network adapter (CNA) must be installed on your host.

### Steps

1. Use your switch documentation to configure your switches for FCoE.
2. Use the `dcb show` command to verify that the DCB settings for each node in the cluster have been correctly configured.

```
run -node node1 -command dcb show
```

DCB settings are configured on the switch. Consult your switch documentation if the settings are incorrect.

3. Use the `fcp adapter show` command to verify that the FCoE login is working when the FC target port online status is `true`.

```
cluster1::> fcp adapter show -fields node,adapter,status,state,speed,fabric-established,physical-protocol
```

If the FC target port online status is `false`, consult your switch documentation.

**Related information**

- [NetApp Interoperability Matrix Tool](#)
- [NetApp Technical Report 3800: Fibre Channel over Ethernet \(FCoE\) End-to-End Deployment Guide](#)
- [Cisco MDS 9000 NX-OS and SAN-OS Software Configuration Guides](#)
- [Brocade products](#)

**Prerequisites for setting up LUNs**

Setting up LUNs involves creating a LUN, creating an igroup, and mapping the LUN to the igroup. Your system must meet certain prerequisites before you can set up your LUNs.

- The Interoperability Matrix must list your SAN configuration as supported.
- Your SAN environment must meet the SAN host and controller configuration limits specified in [NetApp Hardware Universe](#) for your version of the ONTAP software.
- A supported version of Host Utilities must be installed.

The Host Utilities documentation provides more information.

- You must have SAN LIFs on the LUN owning node and the owning node’s HA partner.

**Related information**

- [NetApp Interoperability Matrix Tool](#)
- [ONTAP SAN Host Configuration](#)
- [NetApp Technical Report 4017: Fibre Channel SAN Best Practices](#)

**Verify the license for FC or iSCSI**

Before you can enable block access for a storage virtual machine (SVM) with FC or iSCSI, you must have a license.

**Steps**

1. Use the `system license show` command to verify that you have a license for FC or iSCSI.

```
system license show
```

Package	Type	Description	Expiration
Base	site	Cluster Base License	-
NFS	site	NFS License	-
CIFS	site	CIFS License	-
iSCSI	site	iSCSI License	-
FCP	site	FCP License	-

2. If you do not have a license for FC or iSCSI, use the `license add` command.

```
license add -license-code your_license_code
```

## Configure an SVM for iSCSI

To configure a storage virtual machine (SVM) for iSCSI, you must create LIFs for the SVM and assign the iSCSI protocol to those LIFs.

### About this task

You need a minimum of one iSCSI LIF per node for each SVM serving data with the iSCSI protocol. For redundancy, you should create at least two LIFs per node.

### Steps

1. Enable the SVMs to listen for iSCSI traffic:

```
vserver iscsi create -vserver vserver_name -target-alias vserver_name
```

2. Create a LIF for the SVMs on each node to use for iSCSI:

```
network interface create -vserver vserver_name -lif lif_name -role data -data  
-protocol iscsi -home-node node_name -home-port port_name -address ip_address  
-netmask netmask
```

3. Verify that you set up your LIFs correctly:

```
network interface show -vserver vserver_name
```

4. Verify that iSCSI is up and running and the target IQN for that SVM:

```
vserver iscsi show -vserver vserver_name
```

5. From your host, create iSCSI sessions to your LIFs.

### Related information

[NetApp Technical Report 4080: Best practices for modern SAN](#)

## Configure an SVM for FC

To configure a storage virtual machine (SVM) for FC, you must create LIFs for the SVM and assign the FC protocol to those LIFs.

### Before you begin

You must have an FC license and it must be enabled. If the FC license is not enabled, the LIFs and SVMs appear to be online but the operational status is `down`. The FC service must be enabled for your LIFs and SVMs to be operational. You must use single initiator zoning for all of the FC LIFs in the SVM to host the initiators.

### About this task

NetApp supports a minimum of one FC LIF per node for each SVM serving data with the FC protocol. You

must use two LIFs per node and two fabrics, with one LIF per node attached. This provides for redundancy at the node layer and the fabric.

### Steps

1. Enable FC service on the SVM:

```
vserver fcp create -vserver vserver_name -status-admin up
```

2. Create two LIFs for the SVMs on each node serving FC:

```
network interface create -vserver vserver_name -lif lif_name -role data -data  
-protocol fcp -home-node node_name -home-port port
```

The `-role` parameter should be `data` and the `data-protocol` parameter should be `fcp`.

3. Verify that your LIFs have been created and that their operational status is online:

```
network interface show -vserver vserver_name lif_name
```

### Related information

[NetApp Support](#)

[NetApp Interoperability Matrix Tool](#)

[Considerations for LIFs in cluster SAN environments](#)

## Create LUNs and mapping to igroups

As part of configuring your SAN environment, you must create LUNs, create your initiator groups (igroups), and map your LUNs to your igroups.

### What you'll need

- You must have created your aggregates, volumes, and storage virtual machines (SVMs).
- You must have enabled block access with FC or iSCSI.
- You must have created SAN LIFs on all of the nodes in the cluster.

### About this task

When you create a LUN, you must specify the LUN OS type. The actual size of the LUN might vary slightly based on the OS type of the LUN. The LUN OS type cannot be modified after the LUN is created.

The metadata for each LUN requires approximately 64 KB of space in the containing aggregate. When you create a LUN, you must ensure that the containing aggregate has enough space for the LUN's metadata. If the aggregate does not contain enough space for the LUN's metadata, some hosts might not be able to access the LUN.

In ONTAP 9.4 and earlier, if necessary, you can grow your LUN up to 10 times its original size. For example, if you create a 100 GB LUN, you can grow that LUN to 1,000 GB. You cannot exceed 16 TB, which is the maximum LUN size. This limitation does not apply to ONTAP 9.5 and later.



The actual maximum size of the LUN might not be exactly 16 TB. ONTAP rounds down the limit to be slightly less.

Asymmetric logical unit access (ALUA) is always enabled during LUN creation. You cannot change the ALUA setting.

### Steps

1. Create your LUNs:

```
lun create -vserver vserver_name -volume volume_name -lun lun_name -size lun_size -ostype lun_ostype -space-reserve enabled|disabled
```

Your LUN name cannot exceed 255 characters and cannot contain spaces.

If your host operating system is Windows 2008 or later, use the `windows_2008` ostype. The `space-reserve` option is enabled by default. If you want a non-space-reserved LUN, you must set the `space-reserve` option to `disabled`.



The NVFAIL option is automatically enabled when a LUN is created in a volume.

2. Create your igroups:

```
igroup create -vserver vserver_name -igroup igroup_name -protocol fcp|iscsi|mixed -ostype lun_ostype -initiator initiator_name
```

If your host operating system is Windows 2008 or later, use the `windows_2008` ostype.

3. Map your LUNs to igroups:

```
lun mapping create -vserver vserver_name -volume volume_name -lun lun_name -igroup igroup_name
```

4. Verify that your LUNs are configured correctly:

```
lun show -vserver vserver_name
```

### Related information

[Disk and aggregate management](#)

[Logical storage management](#)

[Network management](#)

## Enable block access for a specific host

You must enable block access on your specific host so that your initiators can access your targets.

### What you'll need

- You must have network connectivity between the host and the LIFs on the SVM.
- Your FC or iSCSI service must be on and operational.
- You must have LUNs that are mapped to initiator groups (igroups).

### Steps



1. Follow steps in your host documentation for enabling block access on your specific hosts.
2. Use the Host Utilities to complete the FC or iSCSI mapping and to discover your LUNs on the host.

#### Related information

[ONTAP SAN host configuration](#)

## Convert a LUN into a namespace

Beginning with ONTAP 9.11.1, you can use the ONTAP CLI to in-place convert an existing LUN to an NVMe namespace.

#### What you'll need

- Specified LUN should not have any existing maps to an lgroup.
- LUN should not be in a MetroCluster configured Vserver or in an SMBC relationship.
- LUN should not be a protocol endpoint or bound to a protocol endpoint.
- LUN should not have non-zero prefix and/or suffix stream.
- LUN should not be part of a snapshot or on the destination side of SnapMirror relationship as a read-only LUN.

#### Steps

1. You enter the following command to convert a LUN to an NVMe namespace:

```
vserver nvme namespace convert-from-lun -vserver -lun-path
```

## Copyright Information

Copyright © 2022 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.