

How to create and use the iSCSI target service on a QNAP NAS

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"A quick, simple method of implementing network storage solutions with high ROI"

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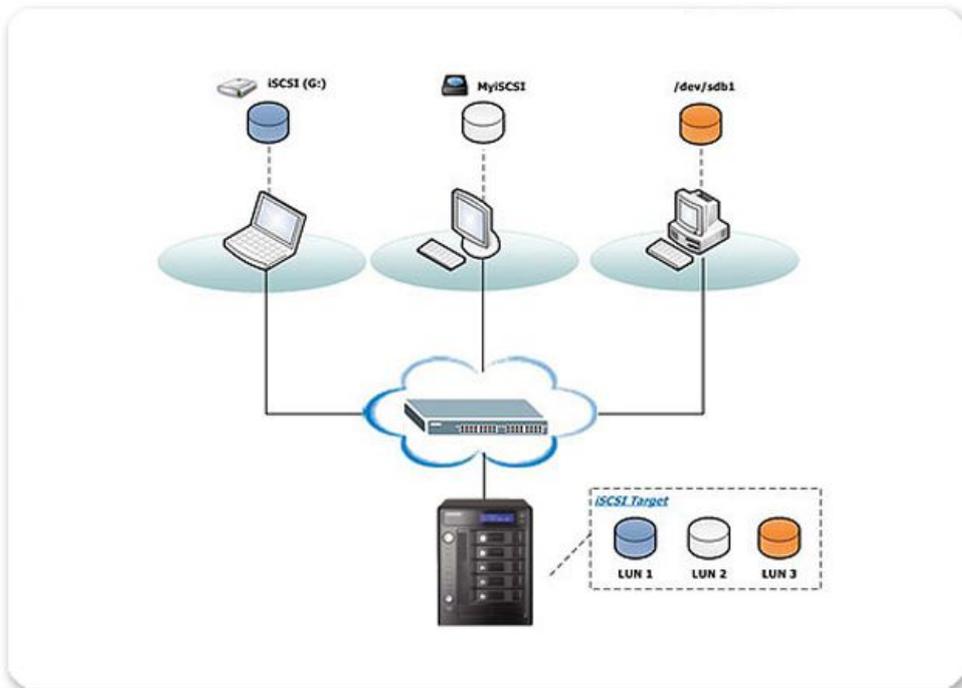
8. [Reference: A Comparison of Block-based and File-based LUN Features](#)

1. An Introduction to iSCSI and its Benefits

iSCSI (Internet Small Computer System Interface) is an IP-based (Internet Protocol) storage networking standard for linking data storage facilities. By carrying SCSI commands over IP networks, iSCSI is used to facilitate location-independent data storage and retrieval over LANs (Local Area Networks) and WANs (Wide Area Networks).

iSCSI enables clients such as computers, servers, and virtual machines to use storage from your QNAP NAS as virtual disks. Clients can partition, format, and use virtual disks exactly like local disks, and then use them for storage expansion or as backup destinations.





Before you get started

iSCSI Target: An iSCSI storage server. In this tutorial the target is your NAS.

iSCSI initiator: An iSCSI client. Initiators connect to targets and use their storage.

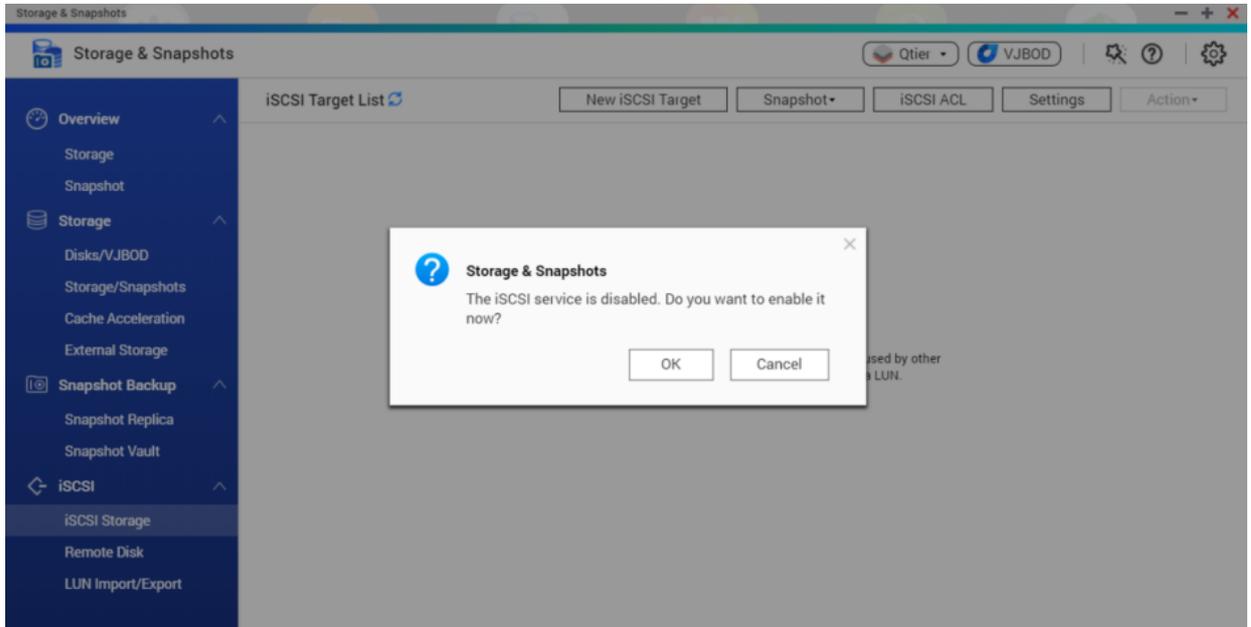
Warning: Connecting more than one initiator to the same target might result in data loss or damage to the NAS disks.

2. Creating an iSCSI Target

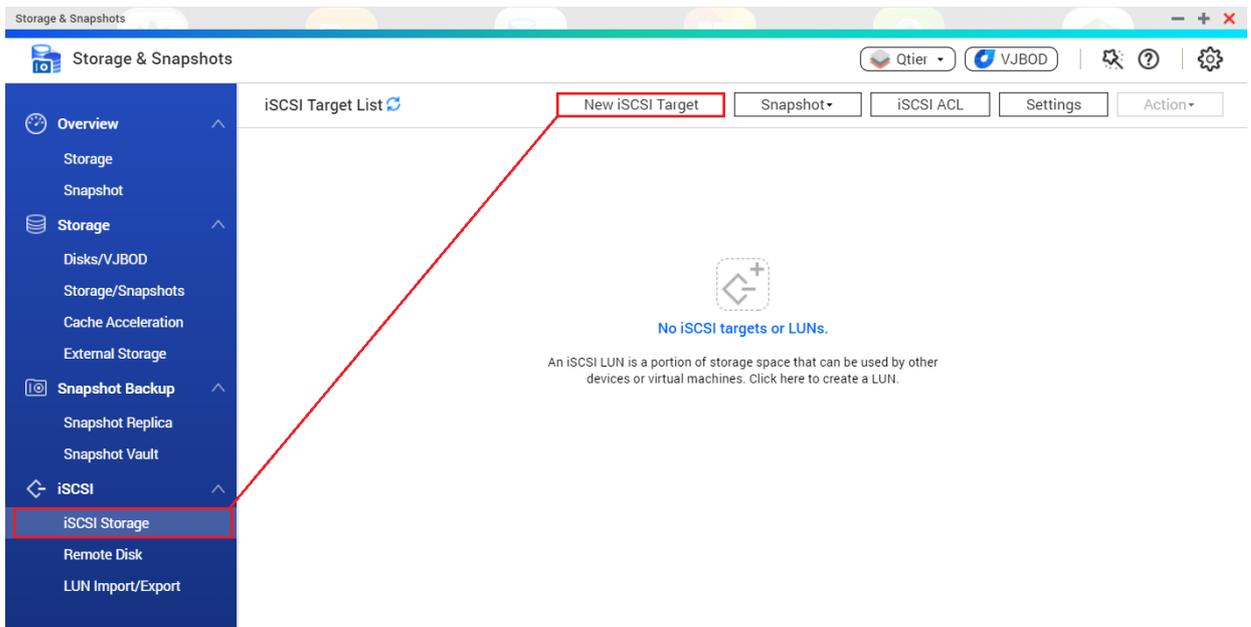
1. Go to **Storage & Snapshot > iSCSI Storage**.

If this is the first time you have used iSCSI then QTS will prompt you to enable the iSCSI service.





2. Click **New iSCSI Target**.



The **iSCSI Target Creation Wizard** opens.

3. Click **Next**.

4. Specify a name and alias, and then click **Next**.



iSCSI Target Creation Wizard

Introduction **Configure** CHAP Summary

Configure:

An iSCSI target is identified using its full iSCSI Qualified Name (IQN). For easier identification you can also give it a shorter alias.

iSCSI Target Profile:

| | |
|-------|--|
| Name | <input type="text" value="Demo"/> |
| IQN | iqn.2004-04.com.qnap:tes-3085u:iscsi.demo.0b4322 |
| Alias | <input type="text" value="Demo"/> |

Allow clustered access to this target i

Advanced Settings ▼

CRC/Checksum: Data is checked after transmission to prevent data corruption in an unstable network environment. Header Digest should be enabled first, then Data Digest if there are still issues.

Data Digest

Header Digest

5. **Optional:** Configure CHAP authentication, and then click **Next**.

Initiators must authenticate with the specified username and password when connecting.

iSCSI Target Creation Wizard

Introduction Configure **CHAP** Summary

CHAP :

CHAP forces iSCSI initiators to authenticate when connecting to this target. This provides security, as iSCSI initiators do not require a NAS username or password.

Use CHAP authentication

| | |
|--------------------|---|
| Username: | <input type="text" value="Demo"/> |
| Password: | <input type="password" value="....."/> 👁 |
| Re-enter Password: | <input type="password" value="....."/> 👁 |

Mutual CHAP

| | |
|--------------------|---|
| Username: | <input type="text"/> |
| Password: | <input type="password"/> 👁 |
| Re-enter Password: | <input type="password"/> 👁 |

6. Optional: Select **Create an iSCSI LUN and map it to this target**.

After you have finished creating the target, QTS opens the **Block-Based iSCSI**

LUN Creation Wizard. Follow this wizard to create a block-based LUN.

iSCSI Target Creation Wizard

Introduction Configure CHAP Summary

Summary:

iSCSI Target Profile:

Name: Demo

IQN: iqn.2004-04.com.qnap.tes-3085u:iscsi.demo.0b4322

Alias: Demo

Allow clustered access to this target: **Yes**

Advanced Settings:

Data Digest: **X Disable** Header Digest: **X Disable**

CHAP authentication: **✓ Enabled** Mutual CHAP authentication: **X Disable**

Create an iSCSI LUN and map it to this target.

Cancel Back Apply

7. Click **Apply**.

QTS creates the target. You can view it at **Storage & Snapshots > iSCSI Storage > iSCSI Target List**.

3. Creating an iSCSI LUN

An iSCSI LUN is a portion of storage space that can be utilized by initiators by connecting it to a target. There are two types of LUNs available in QTS.

Block-based LUNs use space from a storage pool.

File-based LUNs use space from a volume.

Generally speaking, block-based LUNs should be used instead of file-based LUNs, as they support more snapshot and virtualization features. For a more detailed comparison, see the table at the end of this tutorial.

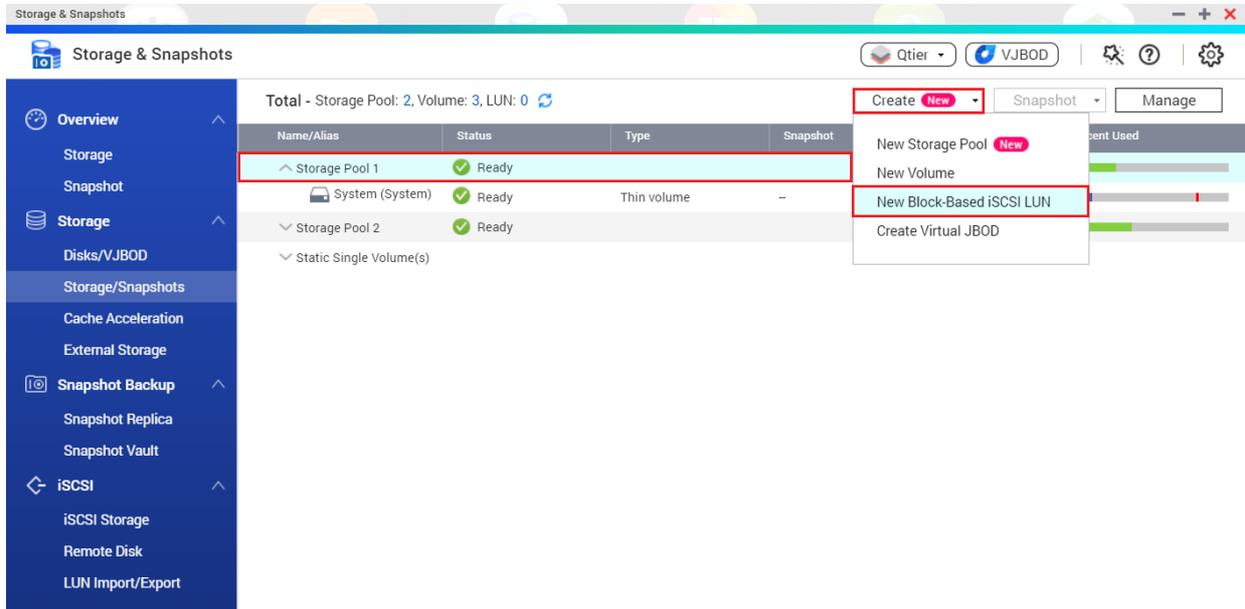
1. Go to **Storage & Snapshots > Storage/Snapshots**.
2. Create a LUN by performing one of the following methods.

| LUN Type | Steps |
|-------------|---|
| Block-based | <ol style="list-style-type: none">1. Select a storage pool.2. Select Create > New Block-Based iSCSI LUN. |



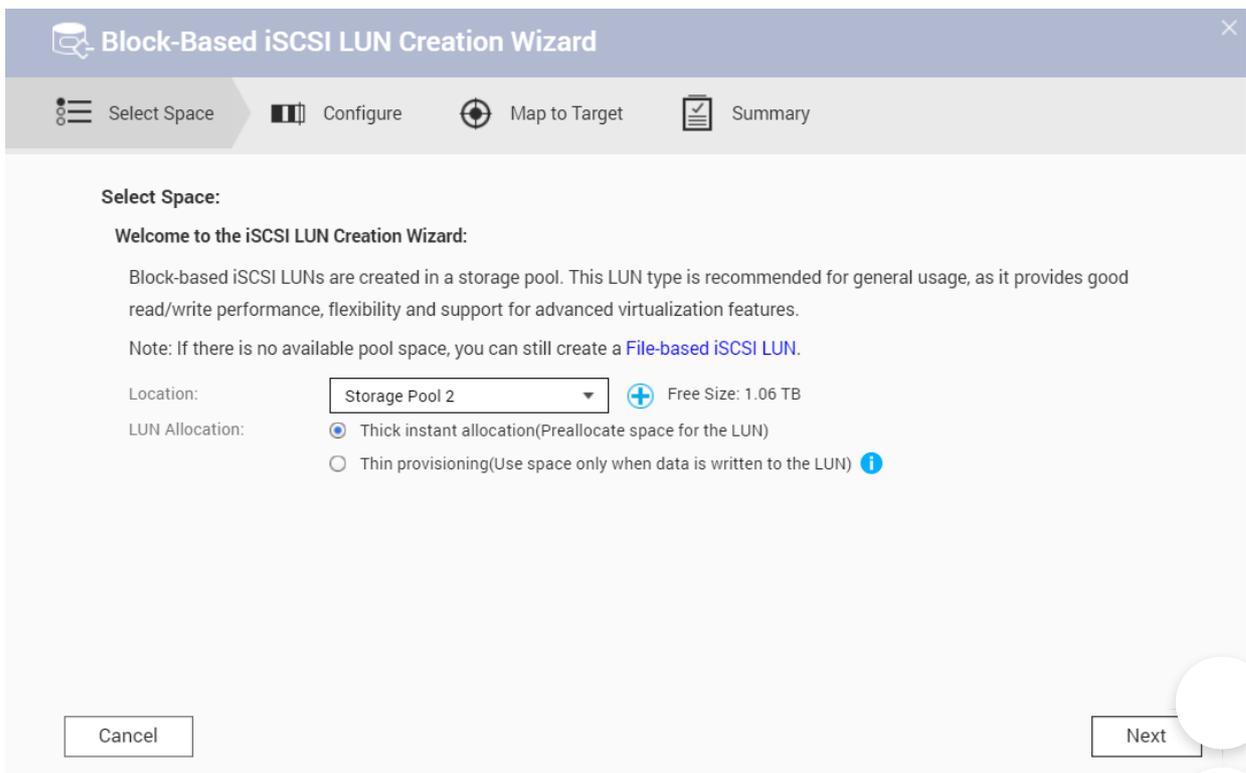
| LUN Type | Steps |
|------------|---|
| File-based | <ol style="list-style-type: none"> 1. Select a volume. 2. Select Create > New File-Based iSCSI LUN. |

In this tutorial we will create a block-based LUN.



The iSCSI creation wizard opens.

3. Select a storage pool.



4. Select the allocation type, and then click **Next**.

| Allocation Type | Description |
|--------------------------|---|
| Thick Instant Allocation | QES allocates pool space when creating the LUN. This guarantees that the space will be available for connected iSCSI initiators. |
| Thin provisioning | QTS allocates storage pool space to a LUN only when it is needed. This offers greater flexibility as empty space is not wasted. However, QTS cannot save data to the LUN if the storage pool runs out of space. |

5. Specify the LUN name.

The screenshot shows the 'Configure' step of the 'Block-Based iSCSI LUN Creation Wizard'. The wizard has four steps: 'Select Space', 'Configure', 'Map to Target', and 'Summary'. The 'Configure' step is active. The 'Capacity' section includes a 'LUN Name' field with 'LUN_0', a 'LUN Capacity' field with '500' and 'GB' selected, and a checkbox for 'Maximum (987.43 GB)'. A 'Storage pool capacity' bar shows 67.93% allocated and 32.07% free. A note states: 'Note: Storage features such as expansion, thin allocation and snapshots can be affected by low storage pool space. You should try to leave some space free and perform expansion later when needed.' The 'Advanced Settings' section includes a 'Sector Size' dropdown set to '512 bytes (Default)', and three checkboxes: 'Accelerate performance with SSD cache' (checked), 'Report volatile write cache for data safety' (unchecked), and 'FUA bit support' (unchecked). At the bottom are 'Cancel', 'Back', and 'Next' buttons.

6. Specify the LUN capacity.

7. Optional: Configure advanced settings.

For more information on a setting, click its tip.

8. Click **Next**.

9. Map the LUN to a target.

Mapping an iSCSI LUN to a target allows iSCSI initiators to connect to it.



Block-Based iSCSI LUN Creation Wizard

Select Space Configure **Map to Target** Summary

Map to Target:
Map the new iSCSI LUN to a target. If no targets are available, you can create a new one at "iSCSI Storage"

Do not map it to a target for now.

| | Target Alias | Target IQN | Initiator IP | Status |
|----------------------------------|--------------|--|--------------|---------|
| <input checked="" type="radio"/> | Demo | iqn.2004-04.com.qnap:tes-3085u:iscsi.demo.0b4322 | -- | ✓ Ready |

Cancel Back Next

10. Click **Next**.

11. Review the summary, and then click **Finish**.

Block-Based iSCSI LUN Creation Wizard

Select Space Configure Map to Target **Summary**

Summary:

Configure LUN Settings:

LUN Name: LUN_0
 LUN Type: Block-based iSCSI LUN
 LUN Location: Storage Pool 2
 LUN Allocation: Thick instant allocation
 LUN Capacity: 500.00 GB
 Sector Size: 512 bytes (Default)

Advanced Settings:

Accelerate performance with SSD cache: ✓ Enabled
 Report volatile write cache for data safety: ✗ Disable FUA bit support: ✗ Disable

Map to Target: Demo (iqn.2004-04.com.qnap:tes-3085u:iscsi.demo.0b4322)

Cancel Back Finish

QTS creates the iSCSI LUN. You can view it at **Storage & Snapshots > iSCSI Storage > iSCSI Target List**.

4. Managing iSCSI Targets and LUNs

Go to **Storage & Snapshots > iSCSI Storage > iSCSI Target List** to view and modify iSCSI targets, iSCSI LUNs, and their mappings. Mapped LUNs appear nested under their target.



Storage & Snapshots

Overview

Storage

Snapshot

Storage

Disks/VJBOD

Storage/Snapshots

Cache Acceleration

External Storage

Snapshot Backup

Snapshot Replica

Snapshot Vault

iSCSI

iSCSI Storage

Remote Disk

LUN Import/Export

iSCSI Target List

New iSCSI Target

Snapshot

iSCSI ACL

Settings

Action

| Alias (IQN) | Type | Snapshots | Capacity | Allocated | Status | Initiator IP |
|---|-----------|-----------|-----------|-----------|---------|--------------|
| ^ Demo (iqn.2004-04.com.qnap.tes-3085u.iscsi.demo.0b4322) | | | | | Ready | -- |
| ID: 0 - LUN_0 (Block-based LUN fro--) | Thick LUN | -- | 500.00 GB | 100 % | Enabled | |

You can also go to **Storage & Snapshots > Storage/Snapshots** to view the storage status of block-based iSCSI LUNs.

Storage & Snapshots

Overview

Storage

Snapshot

Storage

Disks/VJBOD

Storage/Snapshots

Cache Acceleration

External Storage

Snapshot Backup

Snapshot Replica

Snapshot Vault

iSCSI

iSCSI Storage

Remote Disk

LUN Import/Export

Total - Storage Pool: 2, Volume: 3, LUN: 1

Create New

Snapshot

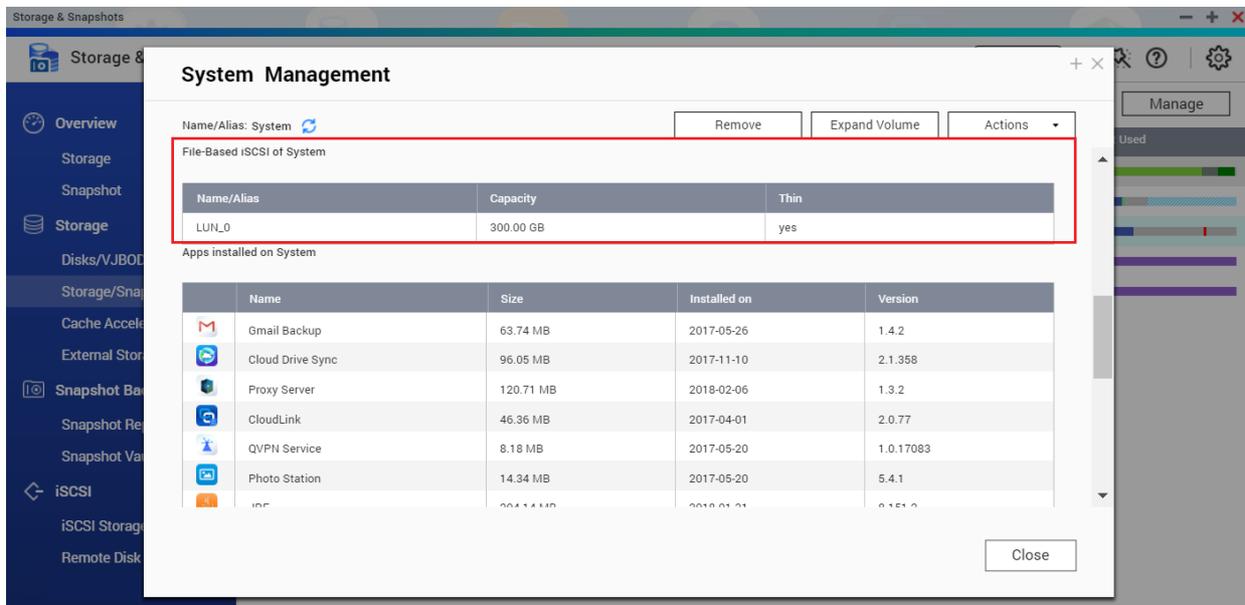
Manage

| Name/Alias | Status | Type | Snapshot | Snapshot Re... | Capacity | Percent Used |
|-------------------------|--------|-----------------------|----------|----------------|-----------|--------------|
| ^ Storage Pool 1 | Ready | | | | 228.97 GB | |
| System (System) | Ready | Thin volume | -- | -- | 98.57 GB | |
| ^ Storage Pool 2 | Ready | | | | 1.79 TB | |
| DataVol1 | Ready | Thin volume | -- | -- | 1.59 TB | |
| LUN_0 (Mapped t--) | Ready | Block-based Thick LUN | -- | -- | 500.00 GB | |
| Static Single Volume(s) | | | | | | |

Note:

- File-based LUNs do not appear in the list at **Storage & Snapshots > Storage/Snapshots**.
- The health status of a file-based LUN is always the same as its parent volume.





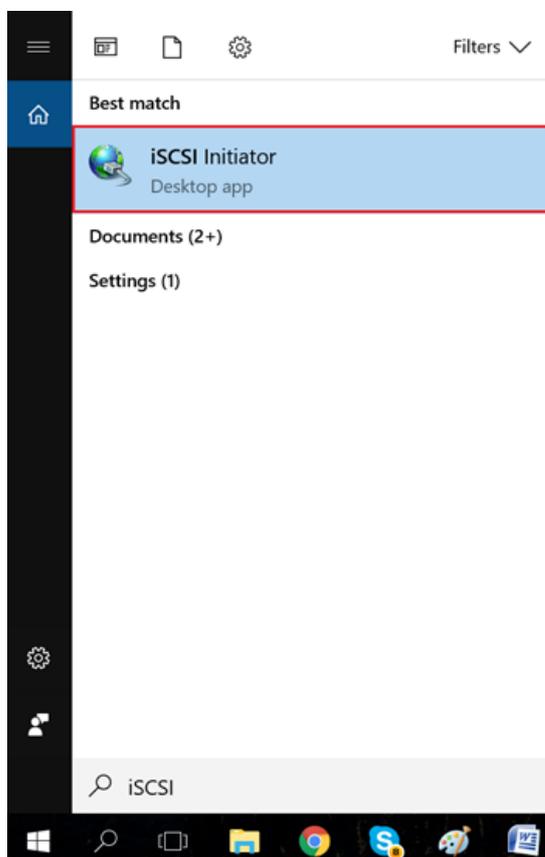
5. Connecting to an iSCSI target using Microsoft iSCSI initiator in Windows

Microsoft iSCSI Initiator is built into all versions of Windows, starting from Windows Vista and Windows Server 2008. You can download and install it on Windows 2003, Windows XP and Windows 2000.

1. In Windows, locate and run **iSCSI Initiator**.

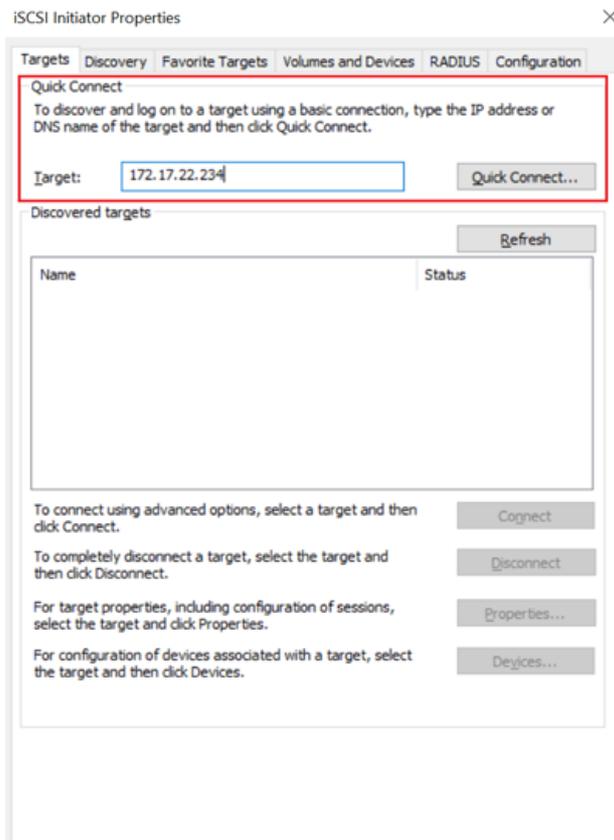
Depending on your Windows version, you can search for it in the Windows program search or find it at

Control Panel” > Administrative Tools.

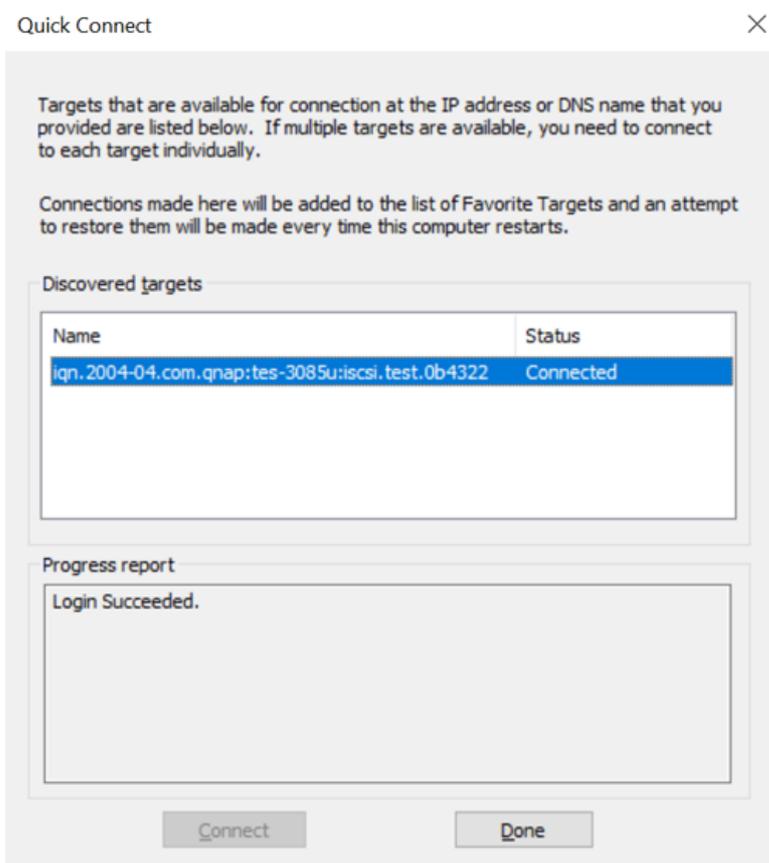


2. Optional: Click **Yes** if Windows prompts you to start the iSCSI service.

3. Enter the NAS IP address under **Targets > Target**, and then click **Quick Connect**.



iSCSI Initiator searches for available iSCSI targets and adds them to the **Discovered Targets list**.

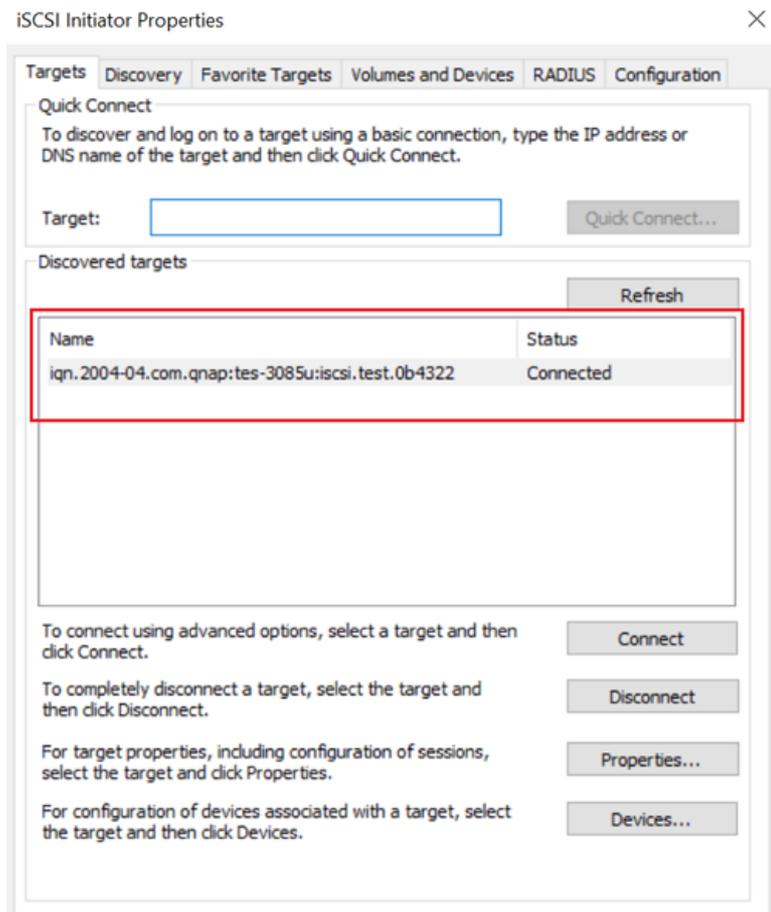


4. Optional: Add CHAP authentication credentials to the target.



If you configured CHAP authentication on the NAS, then the target will have the status Inactive. You must specify the CHAP username and password to connect.

- a. Select a target in **the Discovered Targets List**.
- b. Click **Connect**.
- c. Click **Advanced**.
- d. Select **Enable CHAP log on**.
- e. Under **Name**, specify the CHAP username.
- f. Under **Target Secret**, specify the CHAP password.
- g. Click **OK** and then **OK**.



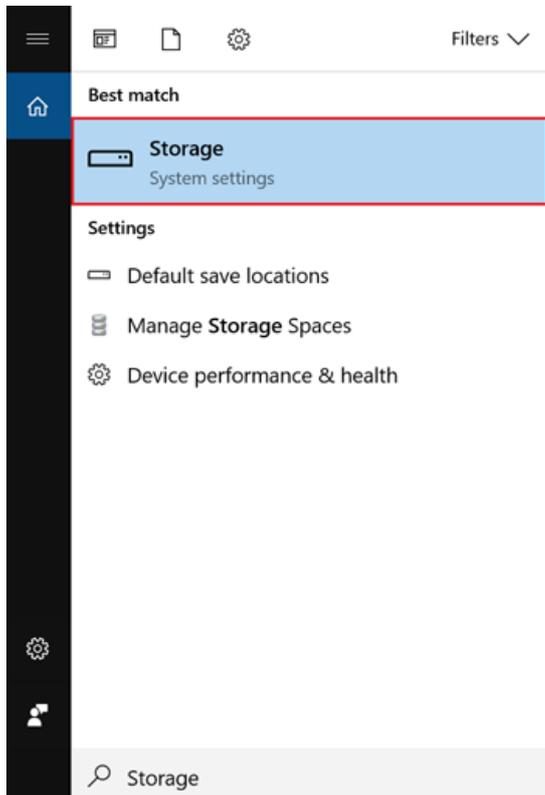
The target now has the status Connected.

5. Format the connected LUN as a disk in Windows.

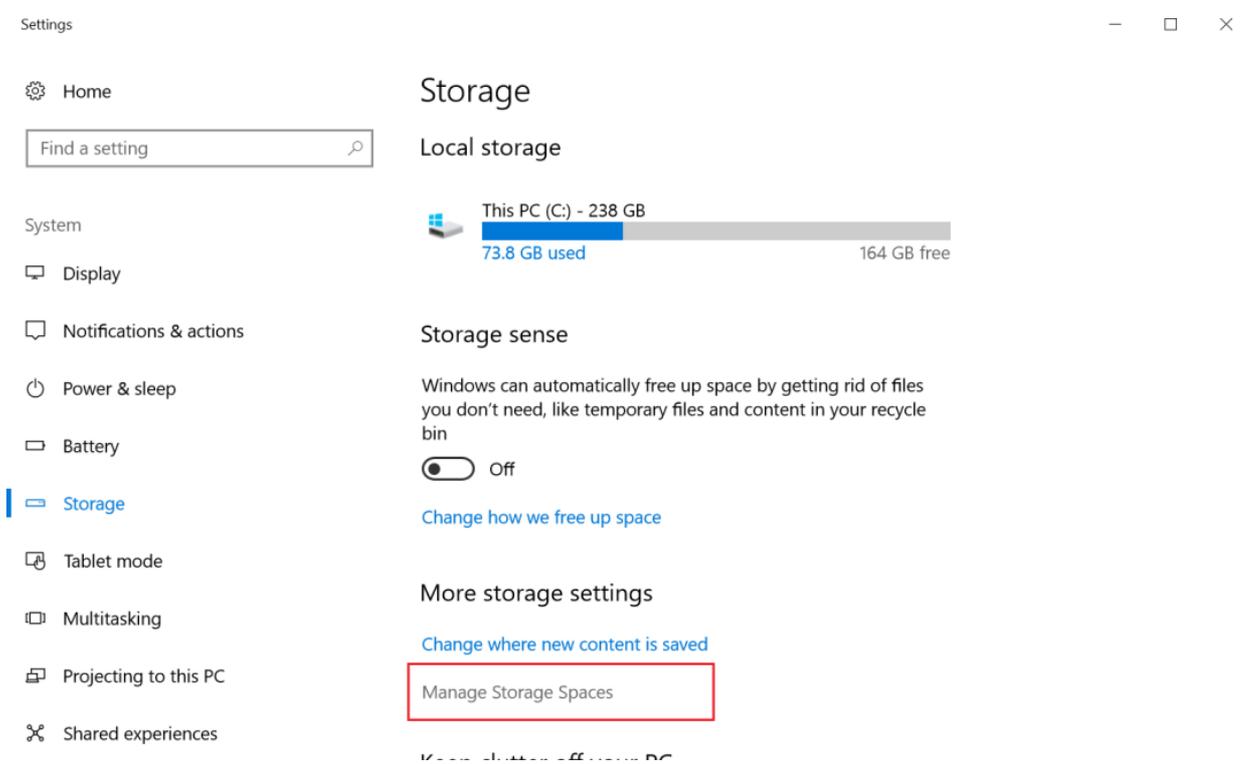
For this guide, we will be using Windows 10. For older Windows versions you must use **Disk Management**.

- a. Search for and run **Storage**.





b. Click **Manage Storage Spaces**.



c. Click **Create a new pool and storage space**.

d. Select one or more iSCSI LUNs, and then click **Create Pool**.



Select drives to create a storage pool

Unformatted drives

QNAP iSCSI Storage SCSI ... Disk 1
Attached via iSCSI
500 GB

e. Specify the pool formatting options, and then click **Create Storage Space**.

Create a storage space

« Storage Spaces » Create a storage space

Search Control Panel

Enter a name, resiliency type, and size for the storage space

Name and drive letter

Name: QNAP

Drive letter: E: ▾

File system: NTFS ▾

Resiliency

Resiliency type: Simple (no resiliency) ▾

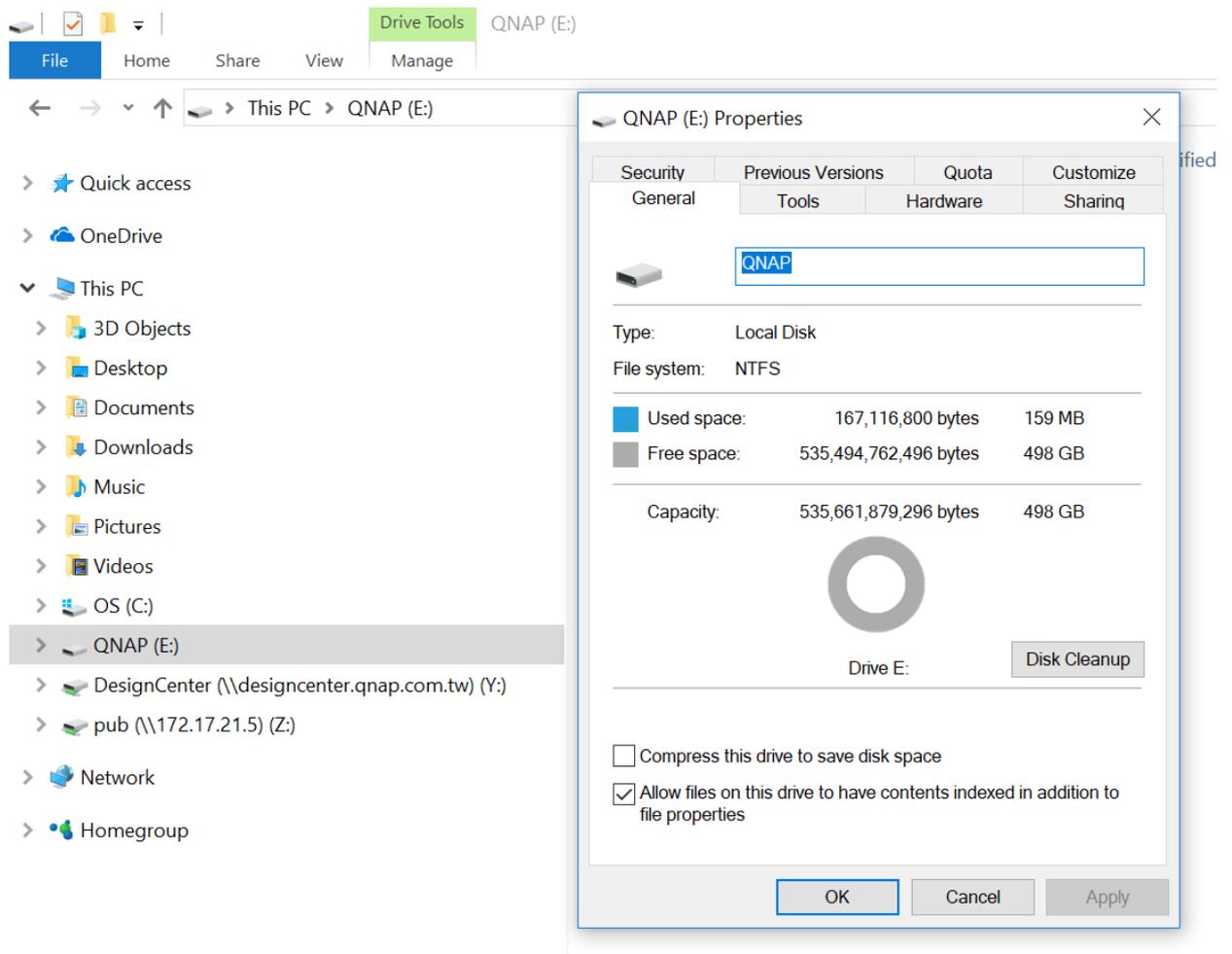
i A simple storage space writes one copy of your data, and doesn't protect you from drive failures. A simple storage space requires at least one drive.

Size

| | | |
|--------------------------|-----|------|
| Total pool capacity: | 499 | GB |
| Available pool capacity: | 499 | GB |
| Size (maximum): | 499 | GE ▾ |
| Including resiliency: | 499 | GB |

Create storage space Cancel

The iSCSI LUN space appears as a drive in Windows.



6. Connecting to an iSCSI target using globalSAN iSCSI initiator in Mac OS

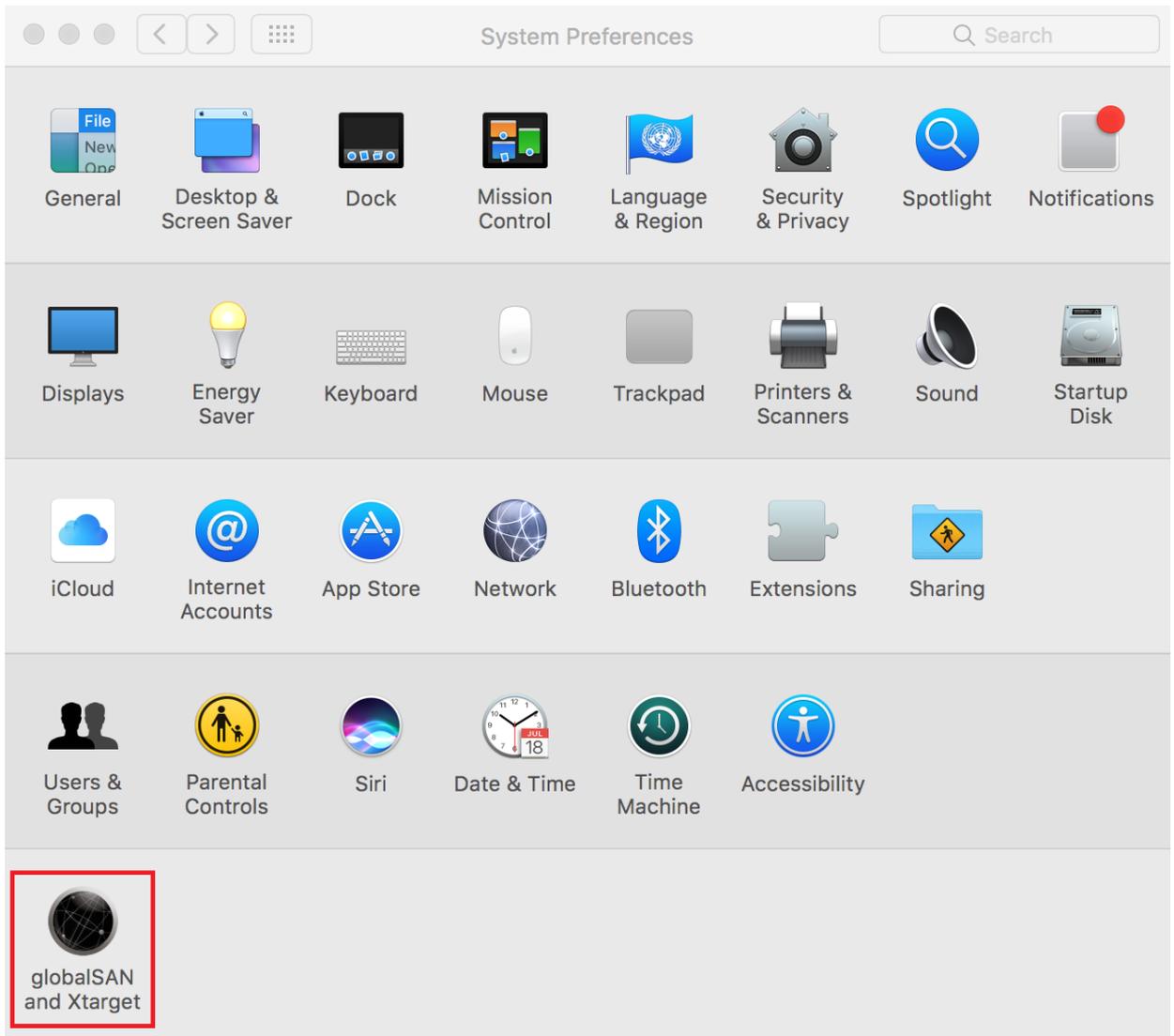
Mac OS does not include an iSCSI initiator client by default. You will need to install third-party iSCSI initiator software to connect the iSCSI target on your QNAP NAS. For this tutorial we will use GlobalSAN iSCSI Initiator.

1. In Mac OS, download and install globalSAN iSCSI Initiator for OS X.

This software requires Mac OS X 10.4 or later. For details, see <http://www.studionetworksolutions.com/globalSAN-iscsi-initiator>.

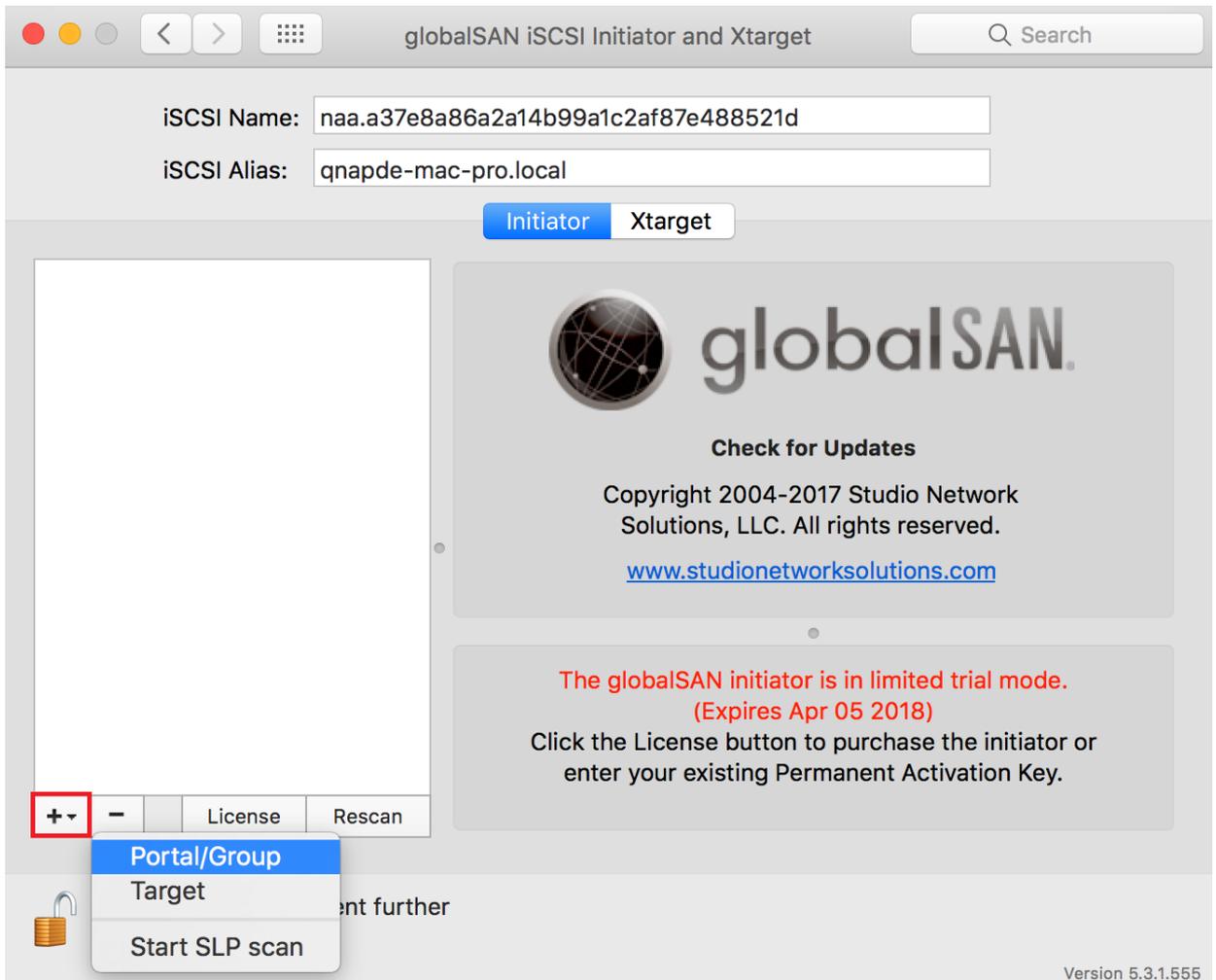
2. Go to **System Preferences**.
3. Double-click on globalSAN iSCSI initiator.





4. Click **+**, and then select **Portal/Group**.

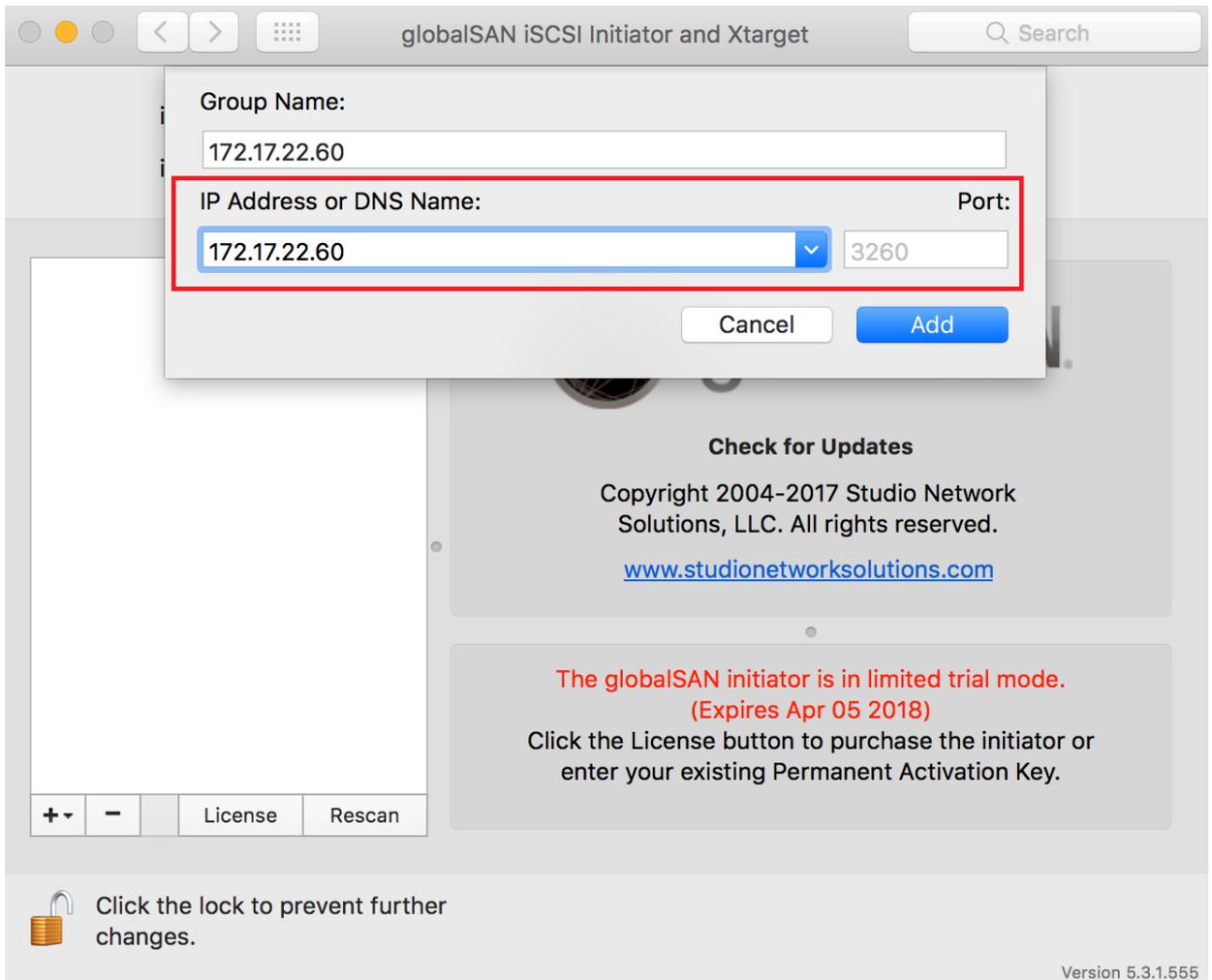




5. Specify a name.

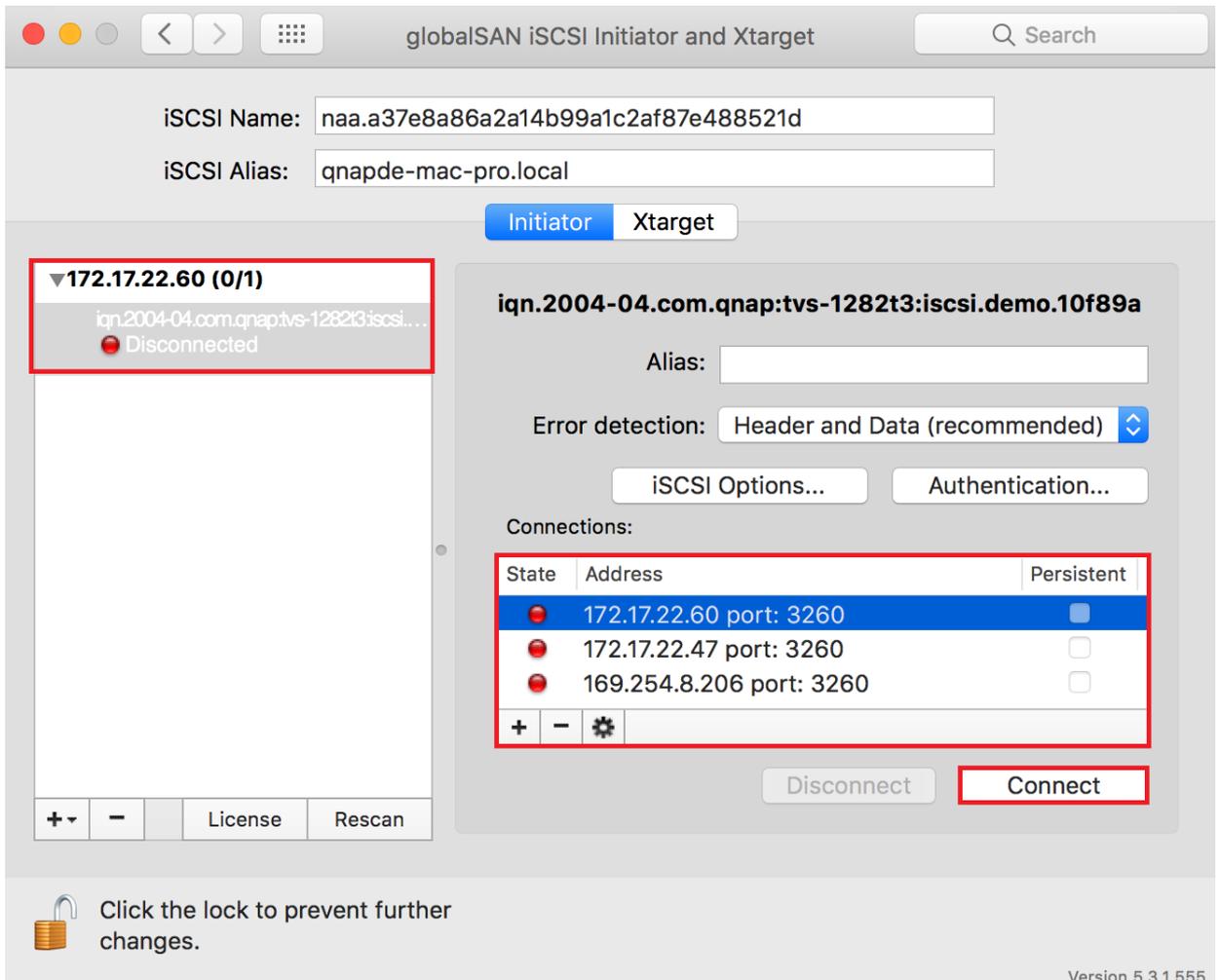
6. Specify the NAS DNS name or IP address, and then click **Add**.





7. Select a target in the left list.





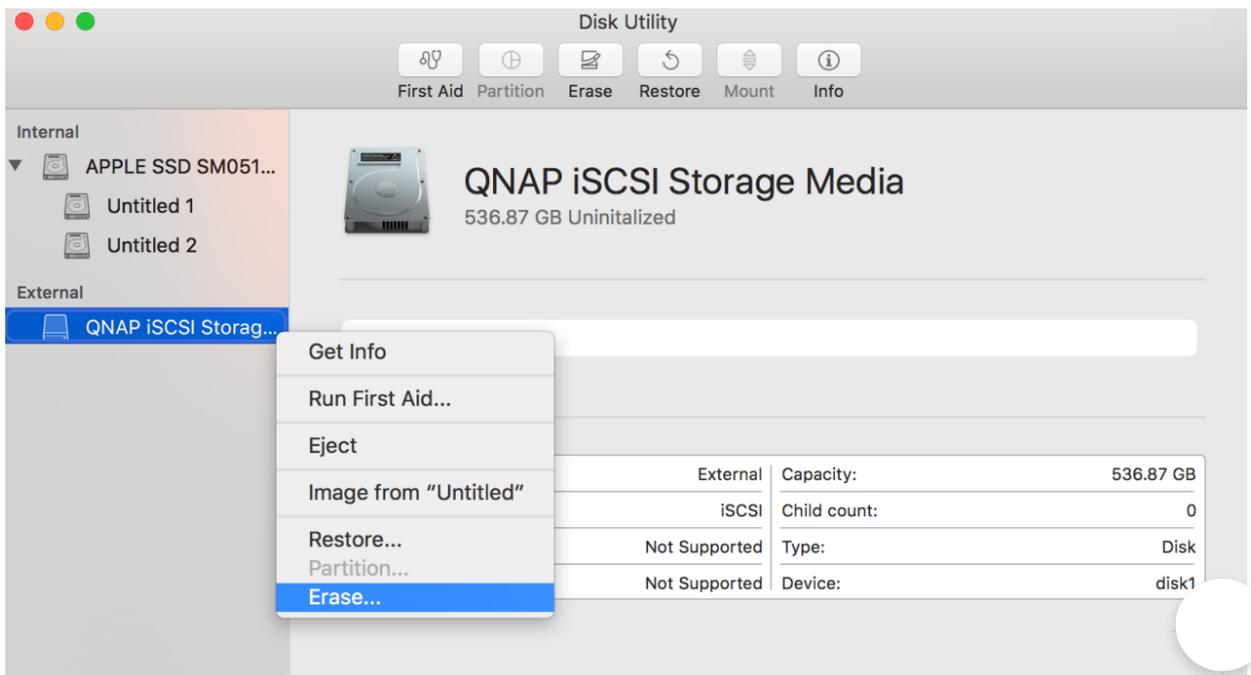
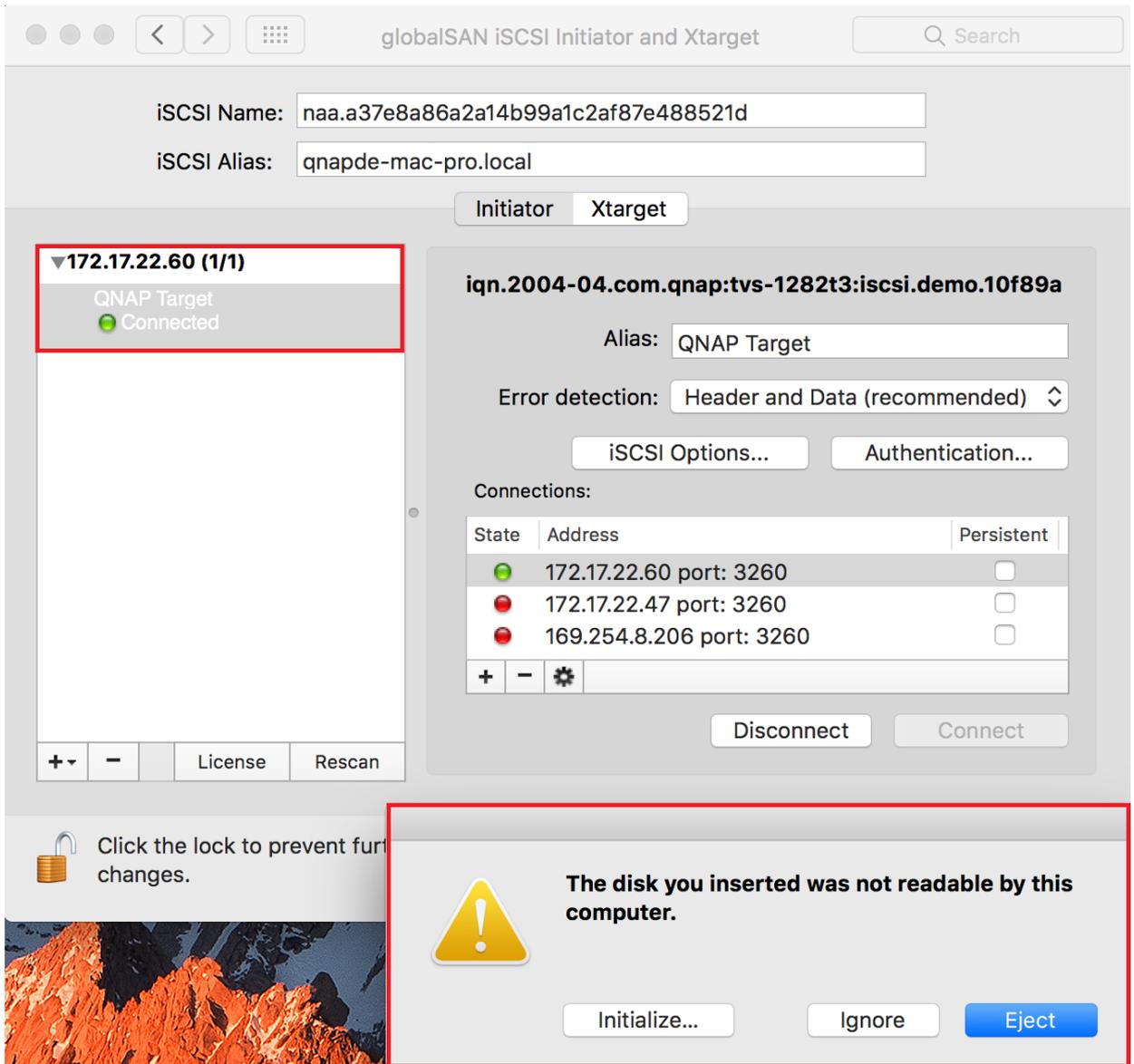
8. Select the IP address to use to connect to the iSCSI target.

9. Click **Connect**.

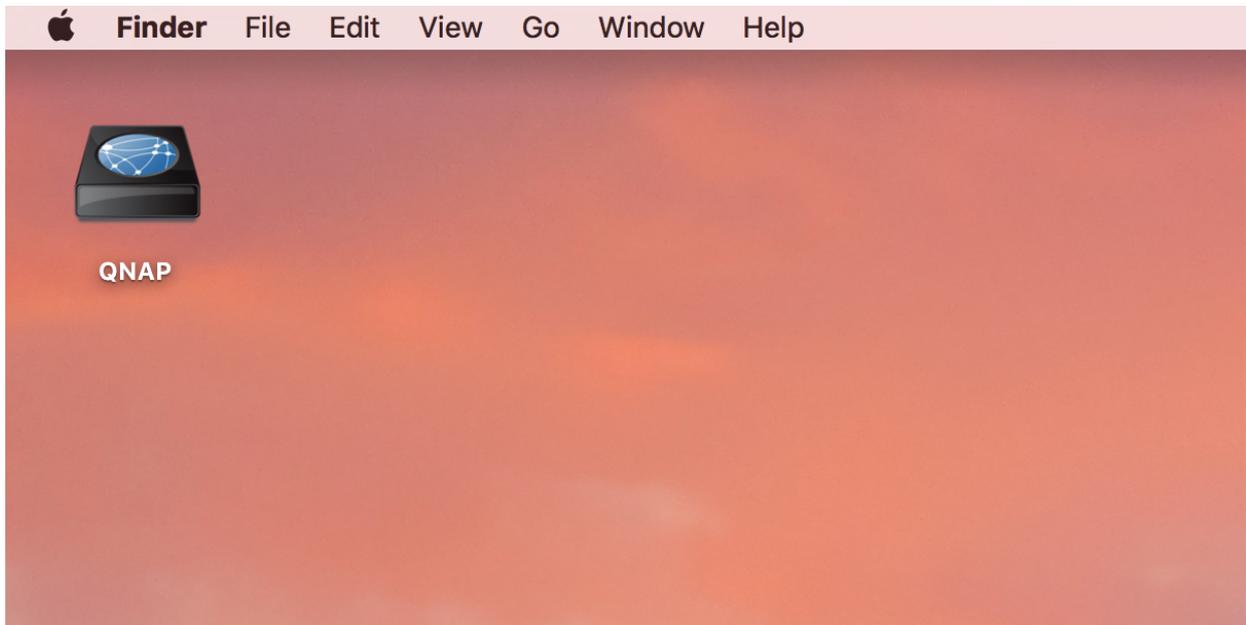
10. Optional: Click **Initialize**.

If this is the first time you have connected to the target then Mac OS will prompt you to format the disk.





The target's status changes to Connected. The new drive is ready to use and appears on the Mac OS desktop.



7. Connecting to an iSCSI Target using Open-iSCSI Initiator on Linux

The Linux Open-iSCSI Initiator is a built-in package in Ubuntu 8.04 LTS and later. For more information on Ubuntu, see <http://www.ubuntu.com>.

1. Install the open-iscsi package.
Run the following command.

```
# sudo apt-get install open-iscsi
```

2. Optional: Add CHAP credentials to iscsid.conf.

- a. Edit the file.
Run the following command.

```
# vi /etc/iscsi/iscsid.conf
```

- b. Add the target CHAP username under node.session.auth.username.
- c. Add the CHAP password under node.session.auth.password.
- d. Save and then close the file.
- e. Restart the open-iscsi service.
Run the following command.

```
# /etc/init.d/open-iscsi restart
```

3. Discover all iSCSI targets on the NAS.



In this example the NAS IP address is 10.8.12.31 and the default iSCSI port is 3260.
Run the following command.

```
# iscsiadm -m discovery -t sendtargets -p 10.8.12.31:3260
```

4. Check the available iSCSI nodes.
Run the following command.

```
# iscsiadm -m node
```

5. Optional: Delete nodes that you do not want to connect to.
Run the following command.

```
# iscsiadm -m node --op delete --targetname THE_TARGET_IQN
```

6. Restart the open-iscsi service to log into all of the available nodes.
Run the following command.

```
# /etc/init.d/open-iscsi restart
```

Linux displays a login message. Example:

```
Login session [iface: default, target: iqn.2004-04.com:NAS:iSCSI.ForUbuntu.B9281B, portal: 10.8.12.31,3260] [ OK ]
```

7. Check the device status with dmesg.
Run the following command.

```
# dmesg | tail
```

8. Create a partition.
In this example, the device name is /dev/sdb. Run the following command.

```
# fdisk /dev/sdb
```

9. Format the partition.
Run the following command.



```
# mkfs.ext3 /dev/sdb1
```

10. Mount the file system.

Run the following two commands.

```
# mkdir /mnt/iscsi
```

```
# mount /dev/sdb1 /mnt/iscsi/
```

The storage is now available to use.

Additional Linux commands.

| Action | Command |
|--------------------------------------|--|
| Test the I/O speed of the iSCSI LUN. | <pre># hdparm -tT /dev/sdb1</pre> |
| Discover targets on the host | <pre># iscsiadm -m discovery --type sendtargets --portal HOST_IP</pre> |
| Log into a target | <pre># iscsiadm -m node --targetname THE_TARGET_IQN --login</pre> |
| Log out of a target | <pre># iscsiadm -m node --targetname THE_TARGET_IQN --logout</pre> |
| Delete a Target | <pre># iscsiadm -m node --op delete --targetname THE_TARGET_IQN</pre> |

8. Reference: A Comparison of Block-based and File-based LUN Features

| Feature Name | Block-Based LUN | File-Based LUN |
|------------------------|-----------------|----------------|
| VAAI Full Copy | ✓ | ✓ |
| VAAI Block Zeroing | ✓ | ✓ |
| VAAI Hardware Assisted | ✓ | ✓ |

| Feature Name | Block-Based LUN | File-Based LUN |
|--|--|--|
| Locking | | |
| VAAI Thin Provisioning and Space Reclamation | ✓ | |
| Thin provisioning | ✓ | ✓ |
| Space reclamation | ✓ Supported in: VMware ESXi with VAAI, Windows Server 2012 or later, Windows 8 or later | |
| Microsoft ODX | ✓ | |
| LUN Import/Export | ✓ | ✓ |
| LUN snapshots | ✓ | You must take a snapshot of the parent volume. |

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