

The QNAP logo is located in the top-left corner of the page. It consists of the letters "QNAP" in a bold, white, sans-serif font, set against a solid blue square background.

**QNAP**

# **QES 2.1.1**

## **User Guide**

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# 1. Preface

## Audience

This document is intended for consumers and storage administrators. This guide assumes that the user has a basic understanding of storage and backup concepts.

## Document Conventions

Symbol	Description
	Notes provide default configuration settings and other supplementary information.
	Important notes provide information on required configuration settings and other critical information.
	Tips provide recommendations or alternative methods of performing tasks or configuring settings.
	Warnings provide information that, when ignored, may result in potential loss, injury, or even death.

## 2. Overview

### NAS Access

Method	Description	Requirements
Web browser	You can access the NAS using any computer on the same network if you have the following information: <ul style="list-style-type: none"> <li>NAS name (Example: http://example123/) or IP address</li> <li>Logon credentials of a valid user account</li> </ul>	<ul style="list-style-type: none"> <li>Computer that is connected to the same network as the NAS</li> <li>Web browser</li> </ul>
Qfinder Pro	Qfinder Pro is a desktop utility that enables you to locate and access QNAP NAS devices on a specific network. The utility supports Windows, macOS, Linux, and Chrome OS. To download Qfinder Pro, go to <a href="https://www.qnap.com/utilities">https://www.qnap.com/utilities</a> .	<ul style="list-style-type: none"> <li>Computer that is connected to the same network as the NAS</li> <li>Web browser</li> <li>Qfinder Pro</li> </ul>
Explorer (Windows)	You can map a NAS shared folder as a network drive to easily access files using Explorer.	Windows computer that is connected to the same network as the NAS
Finder (macOS)	You can mount a NAS shared folder as a network drive to easily access files using Finder.	Mac computer that is connected to the same network as the NAS

### Accessing the NAS Using a Browser

You can access the NAS using any computer on the network if you know its IP address and the logon credentials of a valid user account.



#### Tip

- By default, you can access the NAS using the NAS management interface, which usually supports 1 Gbps. To access the NAS using a different interface (for example, one that supports 10 Gbps), enable service binding and then configure **NAS Web Management Interface**. For details, see [Service Binding](#).
- If you do not know the IP address of the NAS, you can locate it using Qfinder Pro. For details, see [Accessing the NAS Using Qfinder Pro](#).

- Verify that your computer is connected to the same network as the NAS.
- Open a web browser on your computer.
- Type the IP address of the NAS in the address bar.  
The QES login screen appears.
- Specify your username and password.  
The default username and password is `admin`.
- Click **Login**.

The QES desktop appears.

## Accessing the NAS Using Qfinder Pro

1. Install Qfinder Pro on a computer that is connected to the same network as the NAS.



### Tip

To download Qfinder Pro, go to <https://www.qnap.com/en/utilities>.

2. Open Qfinder Pro.  
Qfinder Pro automatically searches for all QNAP NAS devices on the network.
3. Locate the NAS in the list, and then double-click the name or IP address.  
The QES login screen opens in the default web browser.
4. Specify your username and password.
5. Click **Login**.  
The QES desktop appears.

## Accessing the NAS Using myQNAPcloud

The myQNAPcloud service allows you to use the internet to access a NAS device outside a local area network (LAN).

1. Optional: Verify that myQNAPcloud is enabled.
  - a. Go to **Control Panel > System > myQNAPcloud** .  
The **myQNAPcloud** window opens.
  - b. Locate the device URL.  
The default URL format is `<device name>.myqnapcloud.com`.



### Important

The device URL is only available if myQNAPcloud is enabled.

For details, see [Enabling myQNAPcloud](#).

2. On your web browser, type the URL and then press **Enter**.

## Enabling myQNAPcloud

The myQNAPcloud service allows you to use the internet to access a NAS device outside a local area network (LAN).

1. Go to **Control Panel > System > myQNAPcloud** .  
The **myQNAPcloud** window opens.
2. Click **Get Started**.  
The **myQNAPcloud wizard** opens.
3. Perform the following steps.
  - a. Click **Start**.
  - b. Type your QID and password.  
For details on creating a myQNAPcloud account, see <https://support.myqnapcloud.com/features?&focus=howto>.



- c. Click **Next**.
- d. Type a device name.
- e. Click **Next**.

myQNAPcloud generates the device URL.  
The default URL format is <device name>.myqnapcloud.com.

## Enabling My DDNS

The My DDNS service allows you to connect to network services on the NAS using the myQNAPcloud device URL.

1. Go to **Control Panel > System > myQNAPcloud** .
2. Verify that myQNAPcloud is enabled.  
For details, see [Enabling myQNAPcloud](#).
3. Go to **Control Panel > System > myQNAPcloud > Remote Access Services** .  
The **myQNAPcloud** window opens.
4. Click **My DDNS**.  
The **My DDNS** tab appears.
5. Select **Enable myQNAPcloud DDNS service** and then click **Apply**.  
myQNAPcloud generates the device URL.  
The default URL format is <device name>.myqnapcloud.com.

## Accessing Shared Folders on the NAS

To access a shared folder on a NAS, you must first map the folder as a network drive.

For details on drive mapping, see the following:

- [Mapping a Shared Folder on a Windows Computer](#)
- [Mounting a Shared Folder on a Mac Computer](#)
- [Mounting a Shared Folder on a Linux Computer](#)

To access a mapped drive, use a file manager on your computer.

- On a Windows computer, open **Windows Explorer** and then locate the mapped drive.
- On a Mac computer, open **Finder** and then locate the mapped drive.
- On a Linux computer, open your preferred file manager and then locate the mapped drive.

## About QES

QNAP Enterprise System (QES) is an operating system that is based on FreeBSD Kernel and ZFS to provide the stability and functionality of traditional Linux operating systems and native file systems.

## Features and Benefits

QES provides the following features and benefits.

Feature	Description
Remote data synchronization	Block-level SnapSync provides remote backup and disaster recovery at any time.
Application consistent snapshots	Snapshot Agent provides data consistency when taking snapshots.
Higher-capacity efficiency	Block-level deduplication, real-time data compression, and thin provisioning provide increased efficiency.
High availability, high reliability, and high serviceability	QES supports dual active controllers and dual Mini-SAS channel backups, and tolerates single-node failure to ensure uninterrupted mission-critical enterprise tasks and productivity.
Minimal backup configuration	The minimum requirements for a QNAP Snapshot Agent and VSS Hardware Provider operating environment include a QNAP ES NAS and a server. You can deploy all applications, including VSS Service, Requestor, Provider and QNAP Snapshot Agent, on the same server.
Excellent random write performance	QES uses a battery-protected DRAM write cache with cache data protection, and flash read acceleration.
Well-rounded networking support	QES supports 10 Gigabit Ethernet and iSCSI to provide storage deployment flexibility.

**Note**

The “high availability” and “battery-protected DRAM write-cache” features are only available on dual-controller ES NAS devices.

## New Features in QES 2.1.1

QES 2.1.1 introduces the following new features:

- Added notifications for dual-path changes.
- The Active Directory feature supports organization units (OUs).
- TES-x85U series NAS devices running QES support installing QM2-4P-384 cards.
- Added iSER support to Mellanox CX4 network expansion cards.
- Added support for updating disk compatibility, by uploading a disk profile file in Storage Manager.
- Inconsistent installed memory or CPU model on the storage controllers now triggers a storage controller takeover.
- You can set a custom UID or GID when creating a user or group.
- L2 ARC I/O alignment can be enabled to improve the performance of certain PCIe SSDs.
- 

For a full list of new features, enhancements, and fixed issues, see <https://www.qnap.com/en/release-notes/qes/2.1.1/>.

## QES Installation

You can install QES using any of the following methods.

Method	Description	Requirements
Qfinder Pro installation	<p>If the NAS is connected to your local area network, you can do the following:</p> <ul style="list-style-type: none"> <li>• Locate the NAS using Qfinder Pro.</li> <li>• Complete the steps in the Smart Installation Guide wizard.</li> </ul> <p>For details, see <a href="#">Installing QES Using Manual Setup</a>.</p>	<ul style="list-style-type: none"> <li>• Computer</li> <li>• Network cable</li> <li>• Qfinder Pro installer</li> </ul>
Switch from QTS	<p>If the NAS is currently installed with QTS, you can switch to QES.</p> <p>For details, see <a href="#">System Reset and Restore to Factory Default</a>.</p>	N/A

## Installing QES Using Manual Setup



### Warning

Installing QES deletes all data on the drives. Back up your data before proceeding.

1. Power on the NAS.
2. Connect the NAS to your local area network.
3. Run Qfinder Pro on a computer that is connected to the same local area network.



### Tip

To download Qfinder Pro, go to <https://www.qnap.com/utilities>.

4. Locate the NAS in the device list, and then double-click the name or IP address. The setup wizard opens.
5. Click **Manual Setup**.  
The **Enter the NAS name and administrator's password** screen appears.
6. Specify a NAS name and password.

Field	Requirements
<b>NAS name</b>	<ul style="list-style-type: none"> <li>• Length: 1-14 characters</li> <li>• Valid characters: A-Z, a-z, 0-9</li> <li>• Valid special characters: Hyphen (-)</li> <li>• Not allowed: The last character is a hyphen (-)</li> </ul>
<b>Password</b>	<ul style="list-style-type: none"> <li>• Length: 5-64 characters</li> <li>• Valid characters: All ASCII characters</li> </ul>

7. Click **Next**.  
The **Set the date and time** screen appears.
8. Specify the time zone, date, and time.

**Tip**

QNAP recommends connecting to an NTP server to ensure that the NAS follows the Coordinated Universal Time (UTC) standard.

9. Click **Next**.  
The **Configure the network settings** screen appears.
10. Select **Obtain an IP address automatically (DHCP)**.
11. Click **Next**.  
The **Cross-platform file transfer service** screen appears.
12. Select the types of devices that you will use to access shared folders on the NAS.
13. Click **Next**.  
The **Check system disk status** screen appears.
14. Select a storage pool to install QES on.

**Important**

Once the installation process starts, the selected storage pool cannot be modified. Reinitialize the NAS before selecting a different disk group.

15. Click **Next**.  
The **Summary** screen appears.
16. Review the settings.
17. Click **Apply**.  
A confirmation message appears.

**Warning**

Clicking **Confirm** deletes all data on the drive before installing QES.

18. Click **Confirm**.  
The wizard installs QES and restarts the NAS.

**Note**


You must initialize any unused disks upon your next login.


## QES Navigation

### Task Bar



No.	Element	User Actions
1	<b>Main Menu</b>	Click the button to open the <b>Main Menu</b> panel on the left side of the desktop.

No.	Element	User Actions
2	<b>Search</b>	<ul style="list-style-type: none"> <li>• Type key words to locate settings, applications, and help content.</li> <li>• Click an entry in the search results to open the application or system utility.</li> </ul>
3	<b>Background Tasks</b>	<ul style="list-style-type: none"> <li>• Position the mouse pointer over the button to see the number of background tasks that are running. Examples of background tasks are file backup and multimedia conversion.</li> <li>• Click the button to see the following details for each background task: <ul style="list-style-type: none"> <li>• Task name</li> <li>• Task description</li> <li>• Progress (percentage of completion)</li> </ul> </li> <li>• Click  to stop a task.</li> </ul>
4	<b>External Devices</b>	<ul style="list-style-type: none"> <li>• Position the mouse pointer over the button to view the number of external storage devices and printers that are connected to the USB and SATA ports on the NAS.</li> <li>• Click the button to view the details for each connected device.</li> <li>• Click a listed device to open File Station and view the contents of the device.</li> <li>• Click <b>Settings</b> to open the <b>UPS</b> screen.</li> </ul>
5	<b>Event Notifications</b>	<ul style="list-style-type: none"> <li>• Position the mouse pointer over the button to see the number of recent errors, warnings, and notices.</li> <li>• Click the button to view the following details for each event: <ul style="list-style-type: none"> <li>• Event type</li> <li>• Description</li> <li>• Timestamp</li> <li>• Number of instances</li> </ul> </li> <li>• Click a list entry to view the related utility or application screen.</li> <li>• Clicking a warning or error log entry opens the <b>System Logs</b> window.</li> <li>• Click <b>More&gt;&gt;</b> to open the <b>System Logs</b> window.</li> <li>• Click <b>Clear All</b> to delete all list entries.</li> </ul>
6	<b>Options</b>	Click your profile picture to open the <b>Options</b> screen.

No.	Element	User Actions
7	[USER_NAME]	<p>Click the button to view the last login time and the following menu items:</p> <ul style="list-style-type: none"> <li>• <b>Options:</b> Opens the <b>Options</b> window</li> <li>• <b>Sleep:</b> Keeps the NAS powered on but significantly reduces power consumption This feature is only available on models with certain hardware specifications.</li> <li>• <b>Restart:</b> Restarts the NAS</li> <li>• <b>Shutdown:</b> Shuts down QES and then powers off the NAS</li> </ul> <p> <b>Note</b> You can also power off the NAS using one of the following methods:</p> <ul style="list-style-type: none"> <li>• Press and hold the power button for 1.5 seconds.</li> <li>• Open Qfinder Pro, and then go to <b>Tools &gt; Shut down Device</b> .</li> <li>• Open Qmanager, and then go to <b>Menu &gt; System Tools &gt; System</b> . Tap <b>Shutdown</b>.</li> </ul> <ul style="list-style-type: none"> <li>• <b>Logout:</b> Logs the user out of the current session</li> </ul>

No.	Element	User Actions
8	<b>More</b>	<p>Click the button to view the following menu items:</p> <ul style="list-style-type: none"> <li>• <b>Help:</b> Displays links to the Quick Start Guide, Virtualization Guide, QES Help, and online tutorials page</li> <li>• <b>Language:</b> Opens a list of supported languages and allows you to change the language of the operating system</li> <li>• <b>Desktop Preferences:</b> Opens a list of display modes and allows you to select your preferred mode of displaying the QES desktop based on your device type</li> <li>• <b>Feedback:</b> Opens the QNAP Feature Request / Bug Report web page</li> <li>• <b>Data &amp; Privacy:</b> Opens the <b>QNAP Privacy Policy</b> page</li> <li>• <b>About:</b> Displays the following information: <ul style="list-style-type: none"> <li>• Operating system</li> <li>• Hardware model</li> <li>• Operating system version</li> <li>• Number of installed drives</li> <li>• Number of empty drive bays</li> <li>• System volume name</li> <li>• Used disk space</li> <li>• Available disk space</li> </ul> </li> </ul>
9	<b>Dashboard</b>	Click the button to display the dashboard.

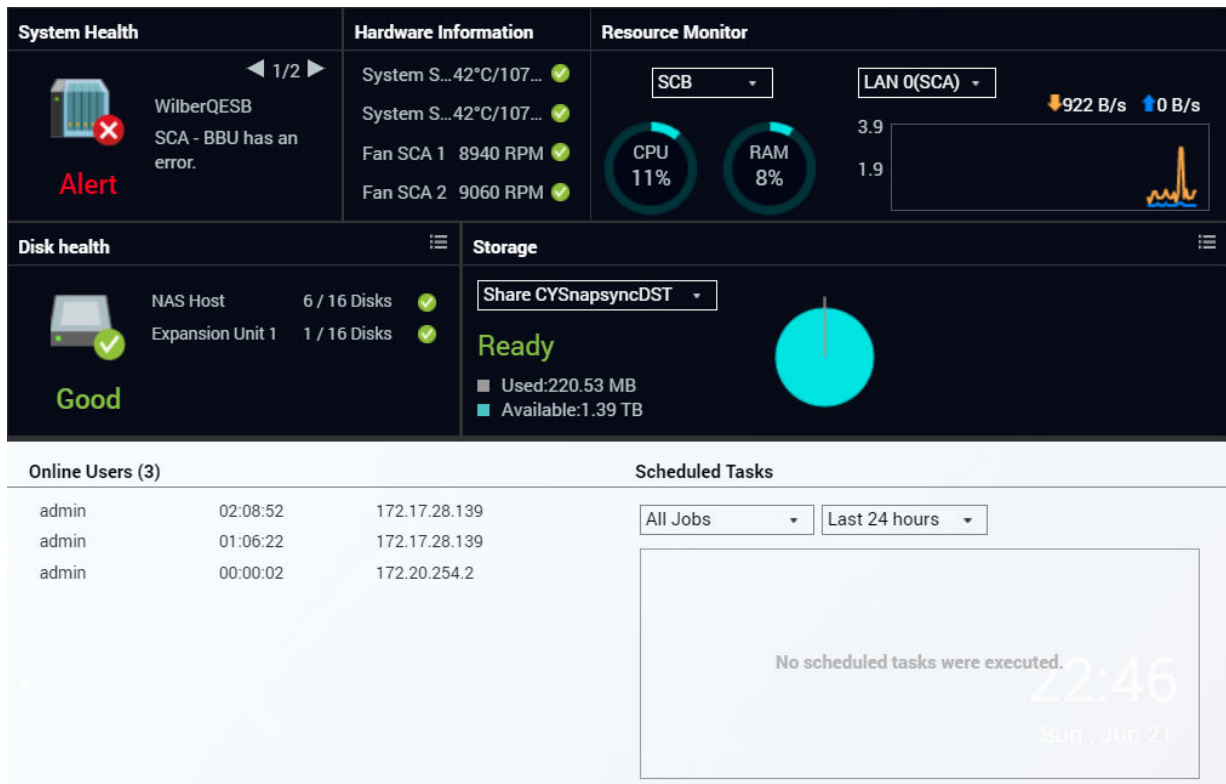
## Options

#	Tab	User Actions
1	<b>Profile</b>	<ul style="list-style-type: none"> <li>• Specify the following optional information: <ul style="list-style-type: none"> <li>• Profile picture</li> <li>• E-mail</li> <li>• Phone number</li> </ul> </li> <li>• Click <b>View</b> to open the <b>System Connection Logs</b> screen.</li> <li>• Click <b>Edit login screen</b> to open the <b>Login Screen</b> configuration screen in the <b>Control Panel</b> window.</li> <li>• Click <b>Apply</b> to save all changes.</li> </ul>
2	<b>Wallpaper</b>	<ul style="list-style-type: none"> <li>• Select a wallpaper from the built-in options or upload a photo.</li> <li>• Click <b>Apply</b> to save all changes.</li> </ul>

#	Tab	User Actions
3	<b>Change Password</b>	<ul style="list-style-type: none"> <li>• Specify the following information: <ul style="list-style-type: none"> <li>• <b>Old password</b></li> <li>• <b>New password:</b> Specify a password with a maximum of 64 characters. QNAP recommends using passwords with at least 6 characters.</li> <li>• Click <b>Apply</b> to save all changes.</li> </ul> </li> </ul>
4	<b>Miscellaneous</b>	<ul style="list-style-type: none"> <li>• Enable the following settings. <ul style="list-style-type: none"> <li>• <b>Auto logout after an idle period of:</b> You can specify the duration of inactivity after which the user is automatically logged out.</li> <li>• <b>Warn me when leaving QES:</b> When enabled, QES prompts users for confirmation whenever they try to leave the desktop (by clicking the Back button or closing the browser). QNAP recommends enabling this setting.</li> <li>• <b>Reopen windows when logging back into QES:</b> When enabled, the current desktop settings (including all open windows) are retained until the next session.</li> <li>• <b>Show the desktop switching button:</b> When enabled, QES displays the desktop switching buttons &lt; &gt; on the left and right sides of the desktop.</li> <li>• <b>Show the link bar on the desktop:</b> When enabled, QES displays the link bar on the bottom of the desktop.</li> <li>• <b>Show the Dashboard button:</b> When enabled, QES displays the <b>Dashboard</b> button on the task bar.</li> <li>• <b>Show the NAS time on the desktop:</b> When enabled, QES displays the server date and time on the desktop.</li> </ul> </li> <li>• <b>Keep Main Menu open after selection:</b> When enabled, QES keeps the main menu pinned to the desktop after you open it.</li> <li>• Click <b>Apply</b> to save all changes.</li> </ul>



## Dashboard





The dashboard opens in the lower right corner of the desktop.



### Tip

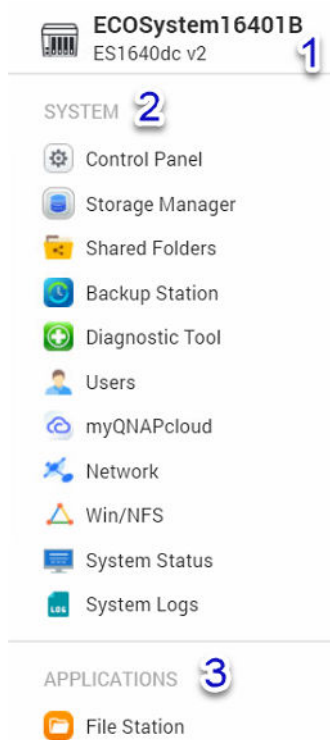
You can click and drag a section onto any area of the desktop.

Section	Displayed Information	User Actions
System Health	<ul style="list-style-type: none"> <li>NAS name</li> <li>Health status</li> </ul>	Click the heading to open <b>Control Panel &gt; System &gt; System Status &gt; System Information</b> . If disk-related issues occur, click the heading to open <b>Storage Manager</b> . If a hardware issue occurs, click the heading to open <b>High Availability</b> .
Hardware Information	For each storage controller: <ul style="list-style-type: none"> <li>CPU temperature</li> <li>System fan speed</li> </ul>	Click the heading to open <b>Control Panel &gt; System &gt; System Status &gt; Hardware Information</b> .
Resource Monitor	For each storage controller: <ul style="list-style-type: none"> <li>CPU usage in %</li> <li>Memory usage in %</li> <li>Network upload and download speeds for each adapter.</li> </ul>	Click the heading to open <b>Control Panel &gt; System &gt; Resource Monitor &gt; Overview</b> .

Section	Displayed Information	User Actions
Disk Health	<ul style="list-style-type: none"> <li>• Number of installed disks</li> <li>• Health status of installed disks</li> </ul>	<ul style="list-style-type: none"> <li>• Click the heading to open the <b>Disk Health</b> screen in <b>Storage Manager</b>.</li> <li>• Click  to switch between disk and NAS information.</li> <li>• Click a disk name to view the following information for each installed disk: <ul style="list-style-type: none"> <li>• Capacity/size</li> <li>• Temperature</li> <li>• Health status</li> </ul> </li> <li>• Click <b>Details</b> to open <b>Storage Manager &gt; Overview</b> .</li> </ul>
Storage	<p>For each shared folder:</p> <ul style="list-style-type: none"> <li>• Status</li> <li>• Used space</li> <li>• Available space</li> <li>• Folder size</li> </ul> <p>For each storage pool:</p> <ul style="list-style-type: none"> <li>• Status</li> <li>• Used space</li> <li>• Available space</li> <li>• Shared folder size</li> </ul> <p>For each LUN:</p> <ul style="list-style-type: none"> <li>• Status</li> <li>• Used space</li> <li>• Available space</li> </ul>	<ul style="list-style-type: none"> <li>• Click the heading to open <b>Storage Manager &gt; Storage &gt; Storage Space</b> .</li> <li>• Click  to switch between shared folder and storage pool information.</li> </ul>
Online Users	<ul style="list-style-type: none"> <li>• User name</li> <li>• Session duration</li> <li>• IP address</li> </ul>	Click the heading to open <b>Control Panel &gt; System &gt; System Logs &gt; Online Users</b> .

Section	Displayed Information	User Actions
Scheduled Tasks	<ul style="list-style-type: none"> <li>• Task type</li> <li>• Task summary</li> <li>• Task name</li> <li>• Timestamp</li> <li>• Status</li> </ul>	Use the filters to view tasks that were executed within a specific period.

## Main Menu



No.	Section	Description	User Actions
1	NAS Information	Displays the NAS name and model number.	N/A

No.	Section	Description	User Actions
2	System	<p>Displays a list of system utilities and other programs that enable you to manage the NAS.</p> <p>The following are the default system utilities:</p> <ul style="list-style-type: none"> <li>• Control Panel</li> <li>• Storage Manager</li> <li>• Shared Folders</li> <li>• Backup Station</li> <li>• Diagnostic Tool</li> <li>• Users</li> <li>• myQNAPcloud</li> <li>• Network</li> <li>• Win/NFS</li> <li>• System Status</li> <li>• System Logs</li> </ul>	<ul style="list-style-type: none"> <li>• Open a system utility or application in the QES desktop               <ul style="list-style-type: none"> <li>• Click a menu item.</li> <li>• Right-click a menu item and then select <b>Open</b>.</li> </ul> </li> <li>• Create a shortcut on the desktop               <ul style="list-style-type: none"> <li>• Right-click a menu item and then select <b>Create shortcut</b>.</li> <li>• Click and drag a menu item to the desktop.</li> </ul> </li> </ul>
3	Applications	<p>Displays a list of applications developed by QNAP or third-party developers.</p> <p>When an app is installed, it is automatically added to the applications list.</p> <p>The following are the default applications:</p> <ul style="list-style-type: none"> <li>• File Station</li> </ul>	

## Desktop



#	Element	Description	User Actions
1	Wallpaper	This is a digital image that is used as a background for the QES desktop. Users can either select from one of the provided wallpapers or upload an image	Change the wallpaper in the <b>Options</b> window.
2	Shortcut icons	This opens an app or a utility. When you install an application, QES automatically creates a shortcut on the desktop. The following are the default shortcuts: <ul style="list-style-type: none"> <li>• Control Panel</li> <li>• File Station</li> </ul>	<ul style="list-style-type: none"> <li>• Click an icon to open the application window.</li> <li>• Right-click an icon and then select one of the following: <ul style="list-style-type: none"> <li>• <b>Open:</b> Opens the application window</li> <li>• <b>Open in a new browser tab:</b> Opens the application in a new tab</li> <li>• <b>Remove:</b> Deletes the icon from the desktop</li> </ul> </li> <li>• Click and drag an icon to another desktop.</li> </ul>
3	Desktop	This area contains open system utilities and applications. The desktop consists of three separate screens.	Click < or > to move to another desktop.
4	Date and time	This displays the date and time that the user configured during installation of the operating system.	N/A
5	Notifications	This notifies the user about important system events that may or may not require user action. Notifications appear in the lower right corner of the desktop.	Click the notification to open the corresponding utility or app.

## QES Utilities

QES is compatible with the following QNAP utilities.



### Tip

To download QNAP utilities that are compatible with your NAS model, go to <https://www.qnap.com/download>.

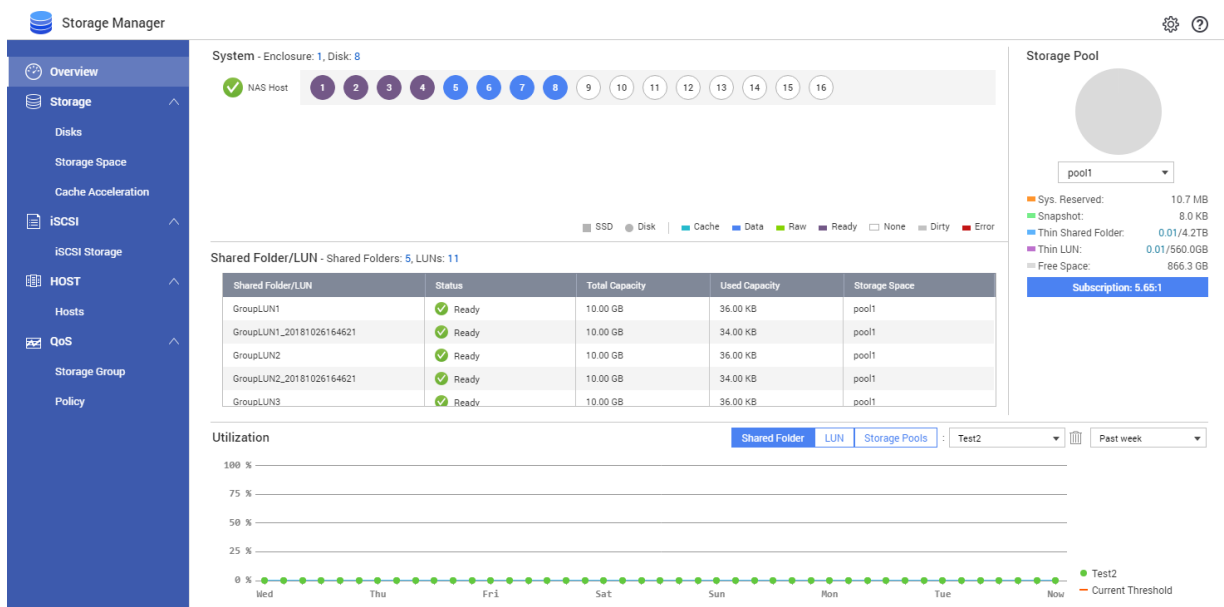
Utility	Description	Supported Operating System or Platform
Qfinder Pro	Locate and access QNAP NAS devices on a local area network (LAN).	<ul style="list-style-type: none"> <li>• Windows</li> <li>• MacOS</li> <li>• Ubuntu</li> <li>• Chromebook</li> </ul>
QNAP VMware Storage Replication Adapter (SRA)	Deploy a VMware remote backup and disaster recovery solution with QNAP NAS and VMware Site Recovery Manager (SRM).	VMware ESXi

Utility	Description	Supported Operating System or Platform
QNAP SMI-S Provider	Enable communication between System Center Virtual Machine Manager (SCVMM) and QES NAS devices.	Windows
QNAP Snapshot Agent	Create application-consistent LUN snapshots for data backup and restoration.	<ul style="list-style-type: none"> <li>• Windows</li> <li>• VMware ESXi</li> </ul>
Qmanila (QNAP Manila driver)	Use a QNAP NAS as part of a shared filesystem for OpenStack. The driver supports CIFS, NFS, and advanced features such as snapshots, compression, deduplication, and thin provisioning.	Manila
QNAP Cinder Driver	Use a QNAP NAS to provide block-storage to OpenStack. The driver supports advanced features such as snapshots, compression, deduplication, and thin provisioning.	Cinder
Qutil	Configure a Windows server connected to a dual-controller QES NAS using MPIO to handle events such as data delays, data loss, and storage controller failover, and apply MPIO load balancing policies to iSCSI LUNs.	Windows
QNAP VAAI NFS Plugin	Allow ESXi hosts to access the following VAAI features when connected to a QES NAS using NFS: Full File Clone, Space Reserve, Extended Statistic.	VMware ESXi
myQNAPcloud Connect	Access published NAS services over the internet using a VPN.	Windows
vSphere (Web) Client plug-in	Directly manage VMware datastores on the NAS from the vSphere client console.	Windows

### 3. Storage Manager

Storage Manager is a QES utility that helps you create, manage, and monitor storage on your NAS. With Storage Manager you can perform the following tasks:

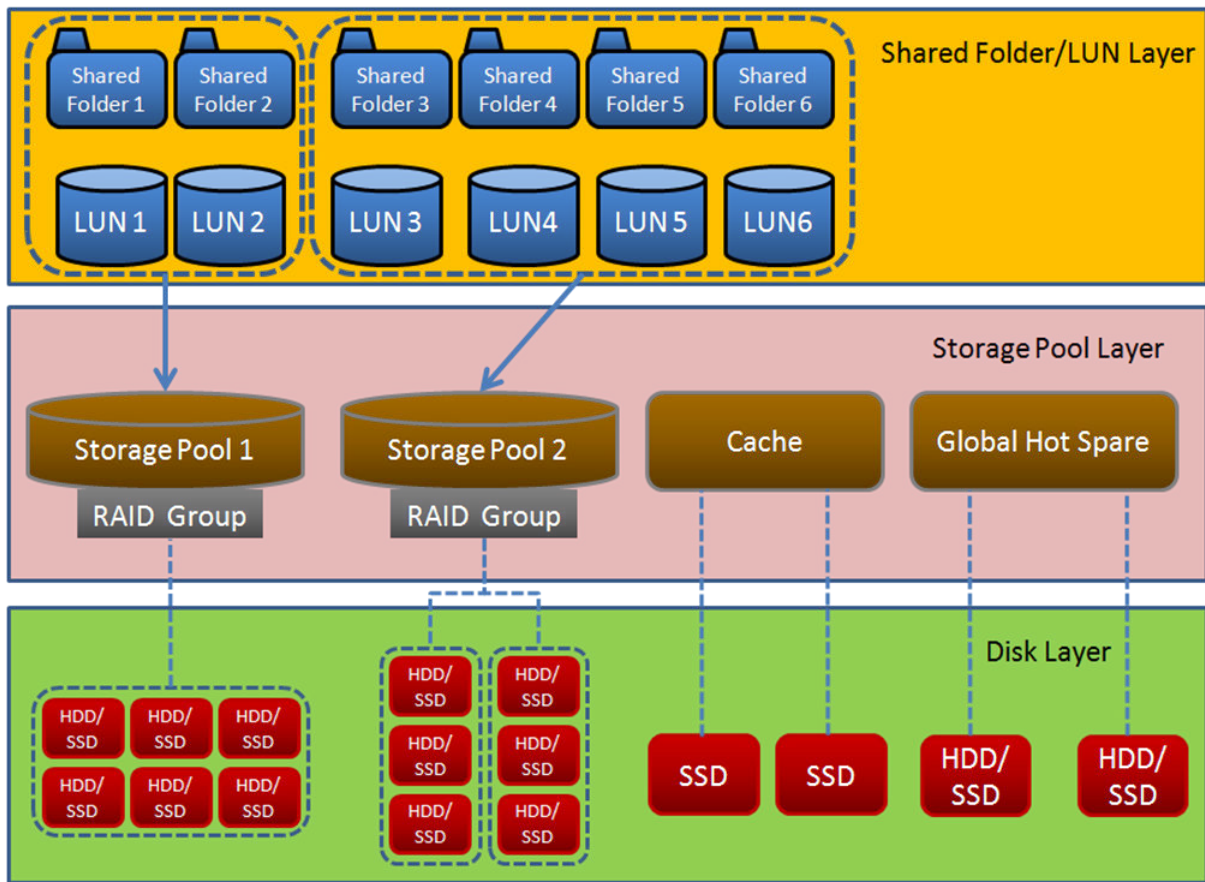
- Create RAID groups, storage pools, and shared folders.
- Monitor storage usage and access speeds.
- Back up data using snapshots.
- Accelerate the performance of your NAS by creating an SSD cache.
- Share NAS storage space with other storage devices using iSCSI.
- Specify which hosts (computers, servers, other NAS devices) are allowed to access the NAS.
- Allocate I/O resources to specific LUNs and shared folders by creating QoS policies.



### QNAP Flexible Storage Architecture

QNAP flexible storage architecture consists of three layers, which combine to offer storage flexibility and data protection.

- Disks
- Storage pools
- Shared folders and LUNs



**Tip**



You can expand the storage capacity of your NAS by connecting a QNAP expansion unit. For details on compatible models, see [www.qnap.com/compatibility](http://www.qnap.com/compatibility) or your NAS hardware user guide.

## Storage Manager Global Settings

You can access global settings screen by clicking  in the upper-right corner of the Storage Manager window.


Setting	Description
Predictive S.M.A.R.T. Migration	If S.M.A.R.T. errors are detected on a disk, or if an SSD has exceeded its endurance limit, QES issues a warning notification and then starts migrating data from the disk to a spare disk. After the migration is finished, the healthy disk replaces the faulty disk in the RAID group.
Disk S.M.A.R.T. polling time	Specify how often QES checks disks for S.M.A.R.T. errors, in minutes.



Setting	Description
TLER/ERC timer (seconds)	<p>When a disk encounters a read or write error, it may become unresponsive while the disk firmware attempts to correct the error. QES might interpret this unresponsiveness as a disk failure. Enabling this feature ensures that a disk has sufficient time to recover from a read or write error before QES marks it as failed and initiates a RAID group rebuild.</p> <p> <b>Tip</b></p> <ul style="list-style-type: none"> <li>• This setting is also known as Error recovery control (ERC), Time-limited error recovery (TLER) or Command completion time limit (CCTL).</li> <li>• You should specify values according to the disk manufacturer's recommendations.</li> </ul>
Delete the oldest snapshots when a storage pool is full	<p>When enabled, QES automatically deletes old snapshots when no storage pool space is available. You can choose to delete snapshots taken on a schedule, snapshots taken manually by a user, or both.</p>
Enable Scrub Pool schedule	<p>Pool scrubbing detects and automatically repairs damaged data blocks in the ZFS file system.</p> <p> <b>Important</b></p> <p>While the scrubbing task is running, the read and write performance of the storage pool may be reduced. You should schedule pool scrubbing to run during times of low NAS usage.</p> <p>For details on manually scrubbing a pool, see <a href="#">Scrubbing a Storage Pool</a>.</p>
Enable temperature alarm for hard disk drives	<p>Enable this feature to monitor HDD temperatures. QES issues a warning notification when the temperature of a HDD exceeds the specified threshold.</p> <p>To set disk temperature alarms on individual disks, see <a href="#">Disk Health Information</a>.</p>
Enable temperature alarm for solid state drives	<p>Enable this feature to monitor SSD temperatures. QES issues a warning notification when the temperature of a SSD exceeds the specified threshold.</p> <p>To set disk temperature alarms on individual disks, see <a href="#">Disk Health Information</a>.</p>
Enable SSD Life	<p>When enabled, QES monitors the remaining lifespan of SSDs in the NAS.</p>

# Overview

The screenshot displays the Storage Manager interface. On the left is a navigation menu with categories like Overview, Storage, iSCSI, and HOST. The main area shows 'System - Enclosure: 1, Disk: 8' with a row of 16 disk icons. Below this is a table for 'Shared Folder/LUN' with columns for Shared Folder/LUN, Status, Total Capacity, Used Capacity, and Storage Space. To the right, the 'Storage Pool' section shows a pie chart and various statistics like Sys. Reserved, Snapshot, Thin Shared Folder, Thin LUN, and Free Space. At the bottom, there is a 'Utilization' graph showing percentage usage over time for 'Test2'.

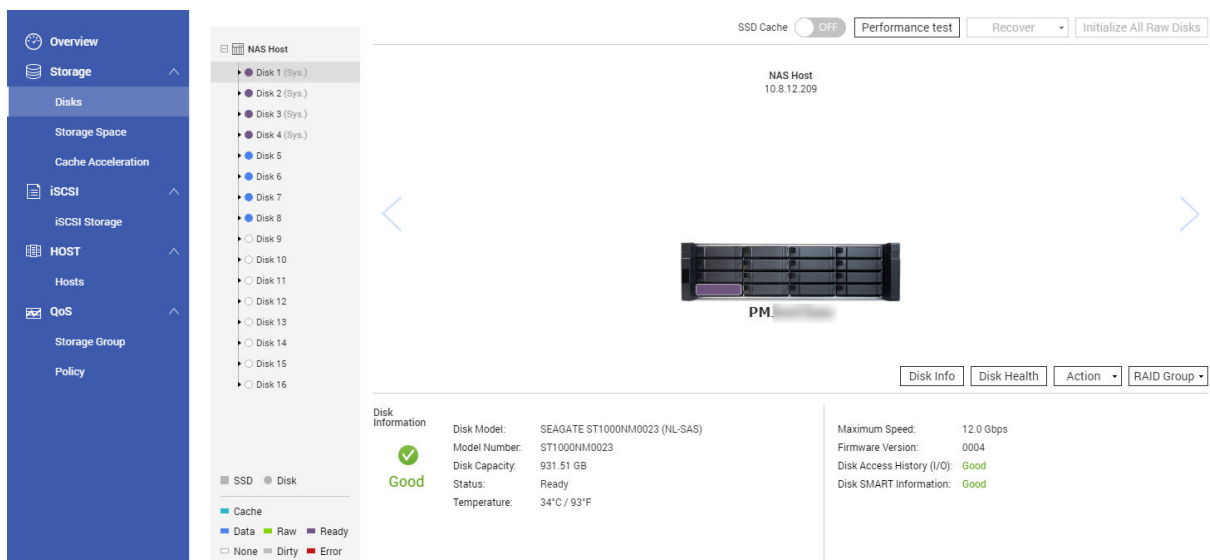
Section	Description	More Information	User Actions
System	<p>View the status of disks installed in the NAS and connected expansion enclosures.</p> <ul style="list-style-type: none"> <li>Maximum capacity</li> <li>Used capacity</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Disks</a></li> <li><a href="#">Disk Status Information</a></li> <li><a href="#">Disk Health Information</a></li> </ul>	<ul style="list-style-type: none"> <li>Click on an enclosure name to open the <b>Enclosure Information</b> window.</li> <li>Click on a disk icon to open <b>Disk Health Information</b></li> </ul>
Storage Pool	<p>View how space is being used in the selected storage pool.</p> <p> <b>Tip</b> Subscription is the ratio of allocated space to total storage space in the pool. For example, if a 100GB storage pool has 50GB allocated to shared folders and LUNs, the subscription will be 0.5:1.</p>	<p><a href="#">Storage Pools</a></p>	<p>Select a storage pool from the list.</p>

Section	Description	More Information	User Actions
Shared Folder/LUN	<p>A list of all shared folders and LUNs on the NAS, with the following information:</p> <ul style="list-style-type: none"> <li>• Name</li> <li>• Status</li> <li>• Total capacity</li> <li>• Used space</li> <li>• Storage pool</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Storage Pools</a></li> <li>• <a href="#">iSCSI Targets and LUNs</a></li> </ul>	No actions.
Utilization	View how much storage space has been used over a specified time period.	N/A	<ul style="list-style-type: none"> <li>• Select a storage type.</li> <li>• Select a time period.</li> </ul>

## Storage

### Disks

This screen enables you to monitor and manage disks and connected expansion units.



### Disk Types

QES restricts which types of disks can be used to create an SSD cache.



#### Important

- For compatibility reasons, PCIe form-factor SSDs and M.2 SSDs cannot be used to create SSD cache on dual-controller ES NAS devices.

Disk Type	Installation Method	SSD Cache	Storage Pools
SATA/SAS/NL-SAS 3.5" HDD	NAS drive bay	No	Yes
SATA/SAS 2.5" HDD	NAS drive bay	No	Yes
SATA/SAS 2.5" SSD	NAS drive bay	Yes	Yes
PCIe NVMe M.2 SSD	QM2 card	Dual-controller NAS: No Single-controller NAS: Yes	No
PCIe NVMe M.2 SSD	Third-party M.2 to PCIe adapter card	Dual-controller NAS: No Single-controller NAS: Yes	No
SATA M.2 SSD	QM2 card	Dual-controller NAS: No Single-controller NAS: Yes	No
SATA M.2 SSD	NAS internal M.2 slot	Dual-controller NAS: No Single-controller NAS: Yes	No
PCIe form-factor SSD	PCIe slot	Dual-controller NAS: No Single-controller NAS: Yes	Yes









## Disk Management

### Disk Information

Information	Description
Disk Health Status	The general health status of the disk. <ul style="list-style-type: none"> <li>• Good: The disk is healthy.</li> <li>• Warning: QES has detected an error. Run a full S.M.A.R.T. test and a disk scan.</li> <li>• Error: QES has detected a critical error. You must replace the disk immediately.</li> </ul>
Disk Model	The manufacturer and model of the disk.
Disk Capacity	The storage capacity of the disk.
Status	The hardware status of the disk.
Temperature	The current temperature of the disk. Disk temperature is retrieved from the disk's firmware using S.M.A.R.T.
Maximum Speed	The maximum transfer speed supported by the drive bay or slot that the disk is installed in.
Firmware Version	The firmware version of the disk.
Disk Access History (I/O)	<ul style="list-style-type: none"> <li>• Good: QES has not detected any errors on the disk.</li> <li>• Warning: QES has detected and recovered errors on the disk.</li> <li>• Error: QES has detected unrecoverable errors on the disk.</li> </ul>


Information	Description
Disk SMART Information	The S.M.A.R.T. status of the disk. If any of the S.M.A.R.T. attribute values reach the threshold set by the disk manufacturer or a predefined threshold determined by QES, this field changes to <code>Warning</code> .
Life Remaining	The remaining life of the disk, as calculated by the disk's firmware. When the value reaches 0, you should replace the disk. This information is only available for solid-state drives (SSDs).
SSD life indicator	The value that QES is using to estimate remaining SSD life. For details, see <a href="#">Disk Health Information</a> .

### Disk Status Information

Status	Color	Description
Cache		The disk is used as an SSD cache.
Data		The disk contains data and is part of a storage pool.
Raw		The disk is uninitialized due to one of the following reasons: <ul style="list-style-type: none"> <li>The disk is new and has not been initialized yet.</li> <li>The disk was removed from a storage pool.</li> <li>The disk was removed from the SSD cache.</li> <li>The disk had the status <code>Dirty</code> and then Disk Clean was used to erase it.</li> </ul> To initialize a disk, see <a href="#">Initializing Raw Disks</a> .
Ready		The disk is not in use.   <b>Note</b> QES uses all ready disks as global RAID hot spares.
None		There is no disk in the drive bay.
Dirty		The disk was removed from a storage pool and was then replaced by a spare disk. This occurred due to one of the following reasons: <ul style="list-style-type: none"> <li>QES detected I/O errors on the disk and automatically removed it from the storage pool.</li> <li>Someone physically removed the disk from the NAS.</li> <li>Someone manually removed the disk from the storage pool using the <b>Replace Disk</b> feature.</li> </ul> To use this disk again, you must run Disk Clean. For details, see <a href="#">Disk Actions</a>
Error		QES has detected bad sectors or I/O errors. You should replace the disk immediately.


## Disk Actions

Select a disk to perform one of the following actions.

Action	Description
Disk Info	View disk details, including the disk model, model number, serial number, disk capacity, firmware version, ATA version and ATA standard.
Disk Health	View disk S.M.A.R.T. information, check SSD life, run disk tests, set temperature alerts. For more information, see <a href="#">Disk Health Information</a> .
Scan Now	Scan the disk for bad blocks.   <b>Tip</b> Run this scan if the disk's status changes to <code>Warning</code> or <code>Error</code> . If QES does not detect any bad blocks, it will change the disk's status back to <code>Ready</code> .  To view the number of bad blocks, go to <b>Disk Health &gt; Summary</b> .
Locate	Prompt the drive LEDs to blink so that you can locate the drive in a NAS or expansion unit.
RAID Group	Select a RAID group to view its capacity, RAID type, and member disks.
Disk Clean	Delete all stored data on a disk that has the status <code>Dirty</code> . You can also choose to delete partition data.

## NAS and Enclosure Actions

On the disk screen, select a NAS or expansion unit to perform one of the following actions.

Action	Description
<b>Enclosure Info</b>	View full hardware details of the NAS or expansion unit, including the model, serial number, firmware version, BUS type, CPU temperature, system temperature, power status, and fan speeds.
<b>Action &gt; Locate</b>	Prompt the expansion unit or NAS chassis LEDs to blink, so that you can locate the device in a server room or rack.
<b>Action &gt; Rename Enclosure</b>	Rename the selected expansion unit.
<b>RAID Group</b>	View details about each RAID group on the expansion unit, including its RAID type, capacity, and member disks.
<b>Recover &gt; Reinitialize enclosure ID</b>	Reset all expansion unit IDs, and then give each unit a new ID number starting from 1 based on the order than they are physically connected.   <b>Tip</b> Use this action if the expansion unit IDs appear out of sequential order in the enclosure list.

## Initializing Raw Disks

Initializing a disk allows it to be used in a storage pool or SSD cache. When initializing an SSD, QES uses SSD Trim to indicate which data blocks are safe to erase. This helps maintain SSD write performance and life span.


1. Go to **Main Menu > Storage Manager > Storage > Disks** .
2. Click **Initialize All Raw Disks**.  
A confirmation message appears.
3. Click **Yes**.


QES initializes all raw disks on the NAS. The status of the disks changes from *Raw* to *Ready*.

## Disk Health

### Disk Health Information

S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) is a disk health monitoring system built into all modern disks. QES uses S.M.A.R.T. to continuously monitor all NAS disks for problems.

Tab	Description	Actions
Summary	View S.M.A.R.T. disk information and the results of the last disk test	No actions
SSD Life	<p>QES displays the estimated remaining life of the SSD formatted as both a number of days and a percentage. SSD life is estimated by the following:</p> <ul style="list-style-type: none"> <li>• If the SSD's TBW (Terabytes written) rating is available, QES uses the formula Estimated Life Remaining = (TBW - Total Data Written) / Average Data Written Per Day.</li> <li>• If the TBW rating is unavailable, QES estimates life using the disk's S.M.A.R.T. life remaining attribute. The ID of this attribute varies by disk manufacturer.</li> <li>• If the TBW rating and S.M.A.R.T. life remaining attributes are both unavailable, QES uses an Opcode such as <code>NVME_ADMIN_GET_LOG_PAGE</code> to get the health information of the disk.</li> <li>• If the TBW rating and S.M.A.R.T. life remaining attribute are both unavailable, and it is not possible to get disk health information using an Opcode, then QES cannot estimate SSD life.</li> </ul>	<p>Enter the disk's TBW (Terabytes written) rating for a more accurate life estimate.</p> <div style="border-left: 2px solid orange; padding-left: 10px; margin-top: 10px;">  <p><b>Tip</b> You can find the TBW rating in the disk's hardware specifications.</p> </div>
Disk Information	View disk hardware information, including model, capacity, serial number, firmware version, ATA version, and ATA standard	No actions
SMART Information	Displays S.M.A.R.T. disk information and supported attributes.	No actions

Tab	Description	Actions
Test	Run a S.M.A.R.T. disk self-test.	<p>Select one of the following options, and then click <b>Test</b>.</p> <ul style="list-style-type: none"> <li>• <b>Rapid Test:</b> Test the electrical and mechanical properties of the disk, and a small portion of the disk surface. The test takes approximately one minute.</li> <li>• <b>Complete Test:</b> Test the electrical and mechanical properties of the disk, and the full disk surface. The test duration varies depending on the capacity of the disk and the storage environment.</li> </ul>
Settings	Apply disk settings to this disk or all disks.	<p>Configure the following settings:</p> <ul style="list-style-type: none"> <li>• <b>Enable temperature alarm:</b> QES issues a warning notification when the disk temperature is above the specified threshold.</li> <li>• <b>S.M.A.R.T. Test schedule:</b> Schedule periodic rapid and complete S.M.A.R.T. disk tests. The results are displayed on the <b>Summary</b> screen.</li> </ul> <p> <b>Tip</b> You can apply these settings to the current disk, all disks, or to disks with the same type as the current disk (HDD or SSD).</p>

## Testing Disk Performance

1. Go to **Main Menu > Storage Manager > Storage > Disks** .
2. Click **Performance Test**.  
The **Performance Test** screen appears.
3. Select one or more disks.
4. Click **Performance Test** and then select a test type.

Test Type	Description	Test Results Format
Sequential read	Test sequential read speed.	MB/s



A confirmation message appears.

5. Click **OK**.
6. Optional: Schedule a weekly sequential read test for all disks. The weekly test runs every Monday at 6:30 AM.
  - a. Click **Weekly Test**.
  - b. Click **OK**.

QES runs the test and then displays the results on the **Performance Test** screen.

## Disk Profiles

Disk profiles allow you to expand which disks QES is compatible with, without having to perform a full QES firmware update.

### Disk Profiles Screen

**Storage Manager > Storage > Disks > Disk Profiles**

UI Element	Description
Current Version	The version of the disk profiles file that QES is currently using.
Date	The date when the current QES disk profile file was created.
Last updated	The time and date when QES last updated its disk profile file.
Browse	This button opens a file browser window on the local computer to select a new disk profile file.
Update	This button updates the QES disk profile file. For details, see <a href="#">Updating Disk Profiles</a> .

## Updating Disk Profiles

1. Go to <https://www.qnap.com/download>.
2. Download the latest disk profile file for your NAS.
3. Go to **Storage Manager > Storage > Disks > Disk Profiles** .
4. Click **Browse**.  
A local file browser window opens.
5. On your computer, select the disk profile file.
6. Click **Update**.  
A confirmation window appears.
7. Click **OK**.

## Drive Bay Compatibility and Expansion

- QNAP dual-controller ES NAS models only support SAS disks. To install a SATA disk in an ES NAS with full S.M.A.R.T. compatibility, use a QNAP QDA-SA SATA-to-SAS adapter. You can check the hardware status, health, and temperature of disks that are using QNAP QDA-SA adapters on the **Disks** screen.
- TES-x85U series NAS devices running on QES support the QNAP QM2-4P-384 cards. Installing a QMP-4P-384 card adds four more M.2 SSD slots.

## Storage Pools

A storage pool is designed to aggregate multiple disks into one large storage space. Disks are joined together using RAID technology to form a RAID group. Storage pools may contain more than one RAID group.

The screenshot shows the Storage Manager interface. On the left is a navigation menu with options: Overview, Storage, Disks, Storage Space, Cache Acceleration, iSCSI, iSCSI Storage, HOST, Hosts, QoS, Storage Group, and Policy. The main area displays a table of storage pools and disks. At the top, it shows 'Total - Storage Pool : 2, Shared Folder : 5, LUN : 11'. Below this are buttons for 'Create', 'Snapshot', 'System Pool Info', and 'Manage'. The table has columns for Name/Alias, Status, Capacity, and Percent Used. It lists two controllers: Controller A (SCA) and Controller B (SCB). Under Controller A, there are two storage pools: pool2 (866.33 GB) and pool1 (866.33 GB). Pool1 contains several shares (Test2, share1-4) and RAID groups (GroupLUN1-3). Under Controller B, there are LUNs (LUN\_0-3) and a snapshot (snap-20181030-190645\_c1).

Name/Alias	Status	Capacity	Percent Used
Controller A (SCA)			
pool2	Ready	866.33 GB	
pool1	Ready	866.33 GB	
Test2	Ready	866.33 GB	
share1	Ready	866.33 GB	to .1
share2	Ready	866.33 GB	
share3	Ready	866.33 GB	to .1
share4	Ready	866.33 GB	
GroupLUN1	Ready	10.00 GB	to .2
GroupLUN1_20181026164621	Ready	10.00 GB	to .30
GroupLUN2	Ready	10.00 GB	to .2
GroupLUN2_20181026164621	Ready	10.00 GB	to .30
GroupLUN3	Ready	10.00 GB	to .2
GroupLUN3_20181026164621	Ready	10.00 GB	to .30
LUN_0	Ready	100.00 GB	
LUN_1	Ready	100.00 GB	
LUN_2	Ready	100.00 GB	
LUN_3	Ready	100.00 GB	to .1
snap-20181030-190645_c1	Ready	100.00 GB	
Controller B (SCB)			

## Storage Pool Creation

## Creating a Storage Pool

1. Go to **Storage Manager > Storage > Storage Space** .
2. Perform one of the following actions.

NAS State	Action
No volumes or storage pools	Click <b>New Storage Pool</b> .
One or more storage pools.	Click <b>Create</b> , and then select <b>New Storage Pool</b> .

The **Create Storage Pool** window opens.

3. Specify a pool name.  
The must consist of 1 to 31 characters from any of the following groups:

- Letters: a-z, A-Z
- Numbers: 0-9
- Special characters: dash -, underscore \_, period

4. Optional: Select an expansion unit from the **Enclosure Unit** list.



### Important

- You cannot select disks from multiple expansion units.
- If the expansion unit is disconnected from the NAS, the storage pool becomes inaccessible until it is reconnected.

5. Select one or more disks.



### Warning

All data on the selected disks will be deleted.

6. Select a RAID type.  
QES displays all available RAID types and automatically selects the most optimized RAID type.





### Tip

For details, see [RAID Types](#).

7. Click **Next**.
8. Optional: Configure SSD over-provisioning.

Setting	Description
SSD over-provisioning	<p>QES reserves the specified percentage of space on each SSD to increase random write performance and to extend SSD lifespan.</p> <div style="display: flex; align-items: flex-start;"> <div> <p><b>Tip</b> You should set this value according to the SSD manufacturer's recommendation.</p> </div> </div>

Setting	Description
Pool over-provisioning	<p>QES reserves the specified percentage of space in the storage pool to ensure consistent random write performance when the pool is nearly full.</p> <p> <b>Tip</b> For best results, set pool over-provisioning to 20% or higher.</p>
Enable Write Coalescing	<p>Write Coalescing optimizes the pool for SSD storage, which improves pool random write performance and extends SSD lifespan.</p> <p> <b>Important</b> You cannot modify this setting after storage pool creation.</p>

For more information, see [QES SSD Features](#).



**Warning**

SSD over-provisioning and pool over-provisioning both reduce the total storage capacity of the storage pool.

9. Click **Next**.
10. Verify the storage pool information.
11. Click **Create**.  
A confirmation message appears.
12. Click **OK**.

QES creates the storage pool and then displays the information on the **Storage Space** screen.

**Creating a RAID 50 or RAID 60 Storage Pool**

RAID 50 and RAID 60 groups are created by adding two or more RAID 5 or 6 sub-groups to a storage pool. QES stripes the sub-groups using RAID 0.

1. Go to **Storage Manager > Storage > Storage Space** .
2. Perform one of the following actions.

NAS State	Action
No volumes or storage pools	Click <b>New Storage Pool</b> .
One or more storage pools.	Click <b>Create</b> , and then select <b>New Storage Pool</b> .

The **Create Storage Pool** window opens.

3. Click **Create > New Storage Pool** .  
The **Create Storage Pool** window opens.
4. Specify a pool name.  
The must consist of 1 to 31 characters from any of the following groups:
  - Letters:, a-z, A-Z

- Numbers: 0-9
- Special characters: dash -, underscore \_, period

5. Optional: Select an expansion unit from the **Enclosure Unit** list.



**Important**

If the expansion unit is disconnected from the NAS, the storage pool becomes inaccessible until it is reconnected.

6. Create the first sub-group.

- a. Select disks.  
For information on the minimum and maximum allowed number of disks, see [RAID Types](#).



**Warning**

All data on the selected disks will be deleted.

- b. Select a RAID type of RAID 50 or RAID 60.
- c. Click **Next**.

7. Create the second sub-group.

- a. Select disks.  
For the best performance, the number of disks should be the same as the first sub-group.






**Warning**

All data on the selected disks will be deleted.

- b. Click **Next**.

8. Optional: Configure SSD over-provisioning.

Setting	Description
SSD over-provisioning	<p>QES reserves the specified percentage of space on each SSD to increase random write performance and to extend SSD lifespan.</p> <div style="display: flex; align-items: flex-start;">  <p><b>Tip</b> You should set this value according to the SSD manufacturer's recommendation.</p> </div>
Pool over-provisioning	<p>QES reserves the specified percentage of space in the storage pool to ensure consistent random write performance when the pool is nearly full.</p> <div style="display: flex; align-items: flex-start;">  <p><b>Tip</b> For best results, set pool over-provisioning to 20% or higher.</p> </div>

Setting	Description
Enable Write Coalescing	<p>Write Coalescing optimizes the pool for SSD storage, which improves pool random write performance and extends SSD lifespan.</p> <p> <b>Important</b> You cannot modify this setting after storage pool creation.</p>

For more information, see [QES SSD Features](#).



**Warning**

SSD over-provisioning and pool over-provisioning both reduce the total storage capacity of the storage pool.

9. Click **Next**.
10. Verify the storage pool information.
11. Click **Create**.  
A confirmation message appears.
12. Click **OK**.  
QES creates the storage pool and then displays the information on the **Storage Space** screen.
13. Optional: Add more RAID 5 or RAID 6 sub-groups to the storage pool.  
You can add additional using the **Expand Storage Pool** wizard. For details, see [Expanding a Storage Pool](#).

## Storage Pool Management

## Storage Pool Management Screen

**Storage Pool pool1 Management**

Name/Alias: pool1

Remove Pool Expand Pool Actions

Controller: SCA

Capacity: 1.21 TB

Allocated: 501.46 GB

Unallocated: 740.37 GB

Snapshot Used: 821.13 KB

Metadata: 0 MB

Data Reduction: 0 KB (0%)

Pool over-provisioning: 30 %

Write Coalescing: Enabled

Status: **Ready**

RAID Group of pool1

Name/Alias	Capacity	RAID Type	Status
RAID Group pool1-0	1.76 TB	RAID 5	Ready
NAS Host Disk 7	931.51 GB	Good	
NAS Host Disk 11	821.13 KB	Good	

Close

Storage Manager > Storage > Storage Space > Manage

UI Element	Description
Name/Alias	The name of the storage pool. This name is automatically generated by QES.
	Refreshes all of the information on this screen.
Controller	The storage controller that is currently managing the storage pool.
Capacity	The usable capacity of the storage pool. Usable capacity = Raw capacity - Pool Over-Provisioning Space.
Allocated	The amount of storage pool space allocated to shared folders and LUNs.
Unallocated	The amount of storage pool space not allocated to shared folders and LUNs.
Snapshot Used	The amount of storage pool space used for storing snapshots.
Metadata	The amount of storage pool space used for storing system, file system, snapshot, and storage pool metadata.
Data Reduction	The amount of storage pool space saved by compression and deduplication.
Pool over-provisioning	The amount of storage pool space reserved for over-provisioning. For details, see <a href="#">QES SSD Features</a> .
Write Coalescing	The status of write coalescing in the storage pool. For details, see <a href="#">QES SSD Features</a> .

UI Element	Description
Status	The status of the storage pool.

## Removing a Storage Pool



### Important

Before removing a storage pool you must remove all shared folders and LUNs from the pool.

1. Go to **Main Menu > Storage Manager > Storage > Storage Space** .
2. Select a storage pool.
3. Click **Manage**.  
The **Storage Pool Management** window opens.
4. Click **Remove Pool**.  
The **Storage Pool Removal Wizard** window opens.
5. Click **Apply**.

## Expanding a Storage Pool

You can expand the capacity of a storage pool by creating a new RAID group and adding it to the pool. QES combines the new group with the other RAID groups in the storage pool using striping (RAID 0).



### Important

- The new RAID group must have the same RAID type as all existing RAID groups in the pool.
- Adding a RAID group to a pool may change the RAID type of the pool.
- You cannot add HDDs and SSDs to the same storage pool.
- To ensure performance and data integrity, QES limits the maximum number of disks allowed in a group for certain RAID types. For details, see [RAID Types](#).

The number of required disks for expansion depends on the current RAID type of the specified pool.

Pool RAID Type	Disks Required to Expand Pool	Pool RAID Type After Expansion
RAID 0	≥ 1	RAID 0
RAID 1	2	RAID 10
RAID 5	≥ 3	RAID 50
RAID 6	≥ 5	RAID 60
RAID-TP	≥ 8	RAID-TP
Triple Mirror	Can't be expanded	N / A
RAID 10	Multiple of 2	RAID 10
RAID 50	≥ 3 for each additional RAID 5 group	RAID 50
RAID 60	≥ 5 for each additional RAID 6 group	RAID 60

1. Go to **Storage Manager > Storage > Storage Space** .



2. Select a storage pool.
3. Click **Manage**.  
The **Storage Pool Management** window opens.
4. Click **Expand Pool**.  
The **Expand Storage Pool Wizard** window opens.
5. Optional: Select an expansion unit from the **Enclosure Unit** list.



#### Important

- You cannot select disks from multiple expansion units.
- If the expansion unit is disconnected from the NAS, the storage pool becomes inaccessible until it is reconnected.

6. Select one or more disks.



#### Warning

All data on the selected disks will be deleted.

7. Click **Expand**.  
A confirmation message appears.
8. Click **OK**.

### Scrubbing a Storage Pool

Scrubbing a storage pool scans the file system of each RAID group in the pool. QES automatically attempts to repair bad blocks to maintain data consistency.



#### Important

- While the scrubbing task is running, the read and write performance of the storage pool may be reduced. You should schedule pool scrubbing to run during times of low NAS usage.
- To perform storage pool scrubbing automatically on a schedule, see Global Storage Settings.

1. Go to **Storage Manager > Storage > Storage Space** .
2. Select a storage pool.
3. Click **Manage**.  
The **Storage Pool Management** window opens.
4. Click **Actions**, and then select **Scrub Pool**.  
The **Start Storage Pool Scrub** window opens.
5. Click **Scrub**.

### Taking a Storage Pool Offline

Taking a pool offline enables you to perform maintenance, such as changing SAS cables, without powering off the NAS or losing data.

1. Go to **Main Menu > Storage Manager > Storage > Storage Space** .

2. Select a storage pool.  
The storage pool must be online.
3. Click **Manage**.  
The **Storage Pool Management** window opens.
4. Select **Actions > Offline Pool** .  
The **Take Storage Pool Offline** window opens.
5. Click **Take Offline**.  
A confirmation message appears.
6. Click **Yes**.

The status of the storage pool changes to *Offline*. The status of each RAID group in the storage pools changes to *Unmounted*.

### Bringing a Storage Pool Online

1. Go to **Main Menu > Storage Manager > Storage > Storage Space** .
2. Select a storage pool.  
The storage pool must be offline.
3. Click **Manage**.  
The **Storage Pool Management** window opens.
4. Select **Actions > Online Pool** .  
A confirmation message appears.
5. Click **Yes**.

The statuses of the storage pool and all RAID groups in the pool change to *Ready*.

### Configuring a Pool Space Alert Threshold

QES issues a warning when the percentage of used storage pool space reaches the specified value.

1. Go to **Main Menu > Storage Manager > Storage > Storage Space** .
2. Select a storage pool.
3. Click **Manage**.  
The **Storage Pool Management** window opens.
4. Select **Actions > Set Threshold** .  
The **Alert Threshold** window opens.
5. Select **Please input the alert threshold [1-100]**.
6. Specify a space alert threshold.  
The default threshold is 80.
7. Click **Apply**.  
A confirmation message appears.

## Replacing a Disk in a Storage Pool

You can replace a disk in a storage pool with a spare disk. QES will then initiate a rebuild of the disk's RAID group. Requirements:

- The RAID type of the storage pool cannot be RAID 0.
- The spare disk must have the status `Ready`.
- The capacity of the spare disk must be greater than or equal to the capacity of the disk it is replacing.
- The spare disk must be of the same type (HDD, SSD, SAS) as the disk it is replacing.



### Note

After performing this task, the disk that was replaced will have the status `Dirty`. To use this disk again, you need to run **Disk Clean**. For details, see [Disk Actions](#).

1. Go to **Main Menu > Storage Manager > Storage > Storage Space** .
2. Select a storage pool.
3. Click **Manage**.  
The **Storage Pool Management** window opens.
4. Click **Actions**, and then select **Replace Disk**.
5. Select a disk to be replaced.
6. Optional: Select an enclosure.
7. Select a spare disk.
8. Click **Apply**.  
A confirmation message appears.
9. Click **OK**.

QES replaces the disk in the RAID group, and then starts a RAID group rebuild. The status of the RAID group changes to `Rebuilding`.

## Storage Pool Status

Status	Description
Ready	The storage pool is working normally. All RAID groups in the pool have the status <code>Ready</code> .
Degraded	One or more RAID groups in the storage pool have the status <code>Degraded</code> . There are not enough spare disks available to QES to rebuild all of the RAID groups.
Degraded (Rebuilding)	One or more RAID groups in the storage pool have the status <code>Degraded (Rebuilding)</code> . QES is currently rebuilding them due to disk failure.
Error	One or more RAID groups in the storage pool have the status <code>Not Active</code> .

## The System Pool

The system pool is a hidden storage pool that QES uses to store application data and settings. QES creates the system pool when the NAS is initialized by combining 13 GB from each system disk in a four-way mirror RAID configuration.



### Important

- The system disks are usually located in the first four drive bays of your NAS. For details, see the NAS hardware user guide.
- Using the system disks for general data storage may affect system pool performance. For ES NAS containing both SSDs and HDDs, QNAP recommends installing four SSDs as system disks and then configuring them as the SSD read cache.
- To view the status of the system pool, go to **Main Menu > Storage Manager > Storage > Storage Space** and then click **System Pool Info**.

## RAID

### RAID Types



### Important

- To ensure best performance and data integrity, QES limits the maximum number of disks allowed in a group for certain RAID types.
- For best performance and space efficiency, you should use disks of the same brand and capacity when creating a RAID group.
- Increasing the number of disks in a RAID group increases the risk of simultaneous disk failure and lengthens rebuild times. When creating a storage pool with a large number of disks, you should split the disks into sub-groups using RAID 50 or RAID 60.

RAID Type	Number of Disks	Disk Failure Tolerance	Overview
RAID 0	≥ 1	0	<ul style="list-style-type: none"> <li>• Disks are combined together using striping.</li> <li>• RAID 0 offers the fastest read and write speeds, and uses the total capacity of all the disks.</li> <li>• Provides no disk failure protection. This RAID type must be paired with a data backup plan.</li> </ul>
RAID 1	2	1	<ul style="list-style-type: none"> <li>• An identical copy of data is stored on each disk.</li> <li>• Half of the total disk capacity is lost, in return for a high level of data protection.</li> <li>• Recommended for storing important data.</li> </ul>

RAID Type	Number of Disks	Disk Failure Tolerance	Overview
RAID 5	3–16	1	<ul style="list-style-type: none"> <li>• Data and parity information are striped across all disks.</li> <li>• The capacity of one disk is lost to store parity information.</li> <li>• Striping means read speeds are increased with each additional disk in the group.</li> <li>• Recommended for a good balance between data protection, capacity, and speed.</li> <li>• Ideal for running databases and other transaction-based applications.</li> </ul>
RAID 6	5–16	2	<ul style="list-style-type: none"> <li>• Data and parity information are striped across all disks.</li> <li>• The capacity of two disks are lost to store parity information.</li> <li>• Recommended for critical data protection, business and general storage use. It provides high disk failure protection and read performance.</li> </ul>
RAID 10	4–16 (Creating) 2–16 (Expanding)	1 per pair of disks	<ul style="list-style-type: none"> <li>• Every two disks are paired using RAID 1 for failure protection. Then all pairs are striped together using RAID 0.</li> <li>• Excellent random read and write speeds and high failure protection, but half the total disk capacity is lost.</li> <li>• Recommended for applications that require high random access performance and fault tolerance, such as databases.</li> </ul>
RAID 50	3–16 per subgroup	1 per disk subgroup	<ul style="list-style-type: none"> <li>• Multiple small RAID 5 groups are striped to form one RAID 50 group.</li> <li>• Better failure protection and faster rebuild times than RAID 5. More storage capacity than RAID 10.</li> <li>• Recommended for applications that require high fault tolerance, capacity, and random access performance.</li> </ul>
RAID 60	5–16 per subgroup	2 per disk subgroup	<ul style="list-style-type: none"> <li>• Multiple small RAID 6 groups are striped to form one RAID 60 group.</li> <li>• Better failure protection and faster rebuild time than RAID 6. More storage capacity than RAID 10.</li> <li>• Recommended if you need higher fault tolerance than RAID 50.</li> </ul>


RAID Type	Number of Disks	Disk Failure Tolerance	Overview
Triple Mirror	3	2	<ul style="list-style-type: none"> <li>• An identical copy of data is stored on three disks.</li> <li>• There is also no degradation in performance while the RAID group is being rebuilt.</li> <li>• Read performance is increased, but capacity is greatly decreased.</li> <li>• Triple Mirror is suitable for storing critical data.</li> </ul>
RAID-TP	8–16	3	<ul style="list-style-type: none"> <li>• Data and parity information are striped across all disks.</li> <li>• The capacity of three disks are lost to store parity information.</li> <li>• RAID-TP adds an extra level of redundancy over RAID 6.</li> </ul>

## RAID Group Capacity

QES uses the ZFS RAID scheme RAID-Z. RAID-Z capacity is calculated differently from normal RAID. To estimate the storage capacity of a RAID group in QES, use our online calculator at <https://enterprise-nas.qnap.com/en/calculator>.

## RAID Disk Failure Protection

All RAID types except for RAID 0 can tolerate a specific number of disk failures without losing data. When a disk in a RAID group fails, the RAID group status changes to `degraded` and then QES performs one of the following actions.

Spare Disk Available	Actions
Yes	<ul style="list-style-type: none"> <li>• QES automatically replaces the failed disk with a spare disk and then starts rebuilding the RAID group.</li> </ul> <p> <b>Note</b> QES considers all ready disks to be spare disks.</p> <ul style="list-style-type: none"> <li>• The status of the RAID group changes to <code>rebuilding</code>, and then changes back to <code>Ready</code> after rebuilding has finished.</li> </ul>
No	You must replace the failed disk manually. QES starts rebuilding the RAID group after you have installed a working disk.

## RAID Group Status

Status	Description
Ready	The RAID group is working normally.

Status	Description
Degraded	One or more disks in the RAID group have failed. The number of disk failures are within the disk failure tolerance of the RAID group. There are not enough spare disks available to QES to replace all the failed disks.
Degraded (Rebuilding)	One or more disks in the RAID group have failed. The number of disk failures are within the disk failure tolerance of the RAID group. QES has replaced the failed disks with spare disks, and is now rebuilding the RAID group.
Not active	One or more disks in the RAID group have failed. The number of disk failures exceeds the disk failure tolerance of the RAID group.

## Shared Folders

A shared folder is a portion of storage space created from the space of a storage pool. Shared folders enable users to store data on the NAS and allow connected clients to access that data.



### Tip

- To create and configure shared folders, go to **Storage Manager > Storage > Storage Space**.
- A QES shared folder is the same as a QTS volume that contains one shared folder.

## Creating a Shared Folder




1. Go to **Storage Manager > Storage > Storage Space**.
2. Click **Create**, and then select **New Shared Folder**.
3. Specify a shared folder name.
  - The name can be in any Unicode language.
  - The maximum length is 64 bytes. In English, this equals 64 characters.
  - The following special characters are not allowed: @ " + = / \ : | \* ? < > ; [ ] % , ` ' non-breaking space
  - The last character cannot be a period (.) or space.
  - The first characters cannot be a space.
4. Optional: Specify a description.
5. Select a storage pool.  
The shared folder is created using storage space from this pool.






### Tip

**SMB Path** and **NFS Path** show you how to access the folder using SMB and NFS. These paths are for reference only and cannot be modified. On dual controller ES-NAS, there will be separate paths for storage controller A and B.

6. Optional: Configure any of the following storage settings and services.

Setting	Description
Thin provision	<p>In thin provisioning, QES allocates storage pool space for the shared folder on demand, while data is being written, instead of during shared folder creation.</p> <p> <b>Important</b></p> <ul style="list-style-type: none"> <li>• A thin provisioned folder can be over-allocated, which means that its maximum capacity can be 20 times larger than the amount of free space in the parent storage pool.</li> <li>• Enabling thin provisioning may affect shared folder access speeds.</li> </ul>
Folder quota	<p>The folder quota determines the amount of data that the folder can store. If folder quota is not enabled, the maximum capacity of the shared folder will be equal to that of the parent storage pool.</p>
Compression	<p>QES compresses the data in the shared folder to reduce the size of stored data. Enabling compression also reduces the total number of blocks that QES needs to read and write, increasing read and write speeds.</p> <p> <b>Tip</b></p> <ul style="list-style-type: none"> <li>• Compressions is enabled by default for all new shared folders and LUNs.</li> <li>• Compression does not impact read/write and processor performance on ZFS filesystems. Only disable this setting when necessary.</li> </ul>
Deduplication	<p>QES reduces the amount of storage needed by eliminating duplicate copies of repeated data. You can select one of the following hash algorithms.</p> <ul style="list-style-type: none"> <li>• SHA256: A common algorithm which belongs to the NIST SHA-2 family.</li> <li>• SHA512: This algorithm can take advantage of 64-bit architecture. Performance is 50% faster than SHA-256 on 64-bit hardware.</li> <li>• Skein: A high-performance algorithm which belongs to the NIST SHA-3 family. Performance is 80% faster than SHA256. This is the default option.</li> </ul> <p> <b>Warning</b></p> <ul style="list-style-type: none"> <li>• Before QES 1.1.3, the default deduplication algorithm was SHA256. If you update a pre-QES 1.1.3 NAS to QES 1.1.3 or later and then change the deduplication algorithm to SHA512 or Skein, data might become inaccessible.</li> <li>• Deduplication is only available if <b>Performance profile</b> is set to <b>VDI</b> or <b>Custom</b>, and <b>Thin provision</b> is selected.</li> </ul>





Setting	Description
Enable Fast Clone	<p>Fast Clone enables QES to create copies of files faster. It also saves storage space by modifying file metadata, allowing original and copied files to share the same data blocks.</p> <p> <b>Important</b></p> <ul style="list-style-type: none"> <li>To enable this setting, <b>Thin provision</b> must be selected.</li> <li>Fast Clone only works when the copied file is created in the shared folder containing the original file.</li> <li>Fast Clone does not improve the speed of snapshot restoration operations such as restoring files from a snapshot, snapshot revert, and snapshot clone.</li> </ul>
SSD cache	<p>QES adds data from this folder to the SSD cache to improve read performance.</p> <p> <b>Important</b></p> <p>Shared folders and LUNs created in an all-SSD storage pool cannot use the SSD cache.</p>
Performance profile	<p>Specify how the shared folder will be used. Each option results in a different record size, optimizing performance for the specified application.</p> <ul style="list-style-type: none"> <li>Generic (Default, 128k)</li> <li>VMware (32k)</li> <li>Custom (Choose from: 8k, 16k, 32k, 64k, 128k)</li> </ul> <p> <b>Tip</b></p> <p>Select <b>Generic</b> if you are unsure of which option to choose.</p>
CIFS/SMB	Allow Windows, Mac, and Linux clients to access this shared folder using CIFS or SMB.
NFS	Allow clients to access this shared folder using NFS.
FTP/FTPS	Allow clients to access this shared folder using FTP or FTPS.

#### 7. Configure user access permissions.

You can grant users read-only access, read/write access, or deny access. By default, only the QES admin account can access the shared folder.

#### 8. Optional: Configure advanced settings.

Setting	Description
Hidden Folder	Hide the shared folder from Microsoft Windows clients. The folder can still be accessed using its full path, for example: \\NAS_IP\share_name.
Lock File (Oplocks)	Opportunistic lock (Oplocks) is a Windows file locking mechanism that facilitates caching and access control to improve performance. This feature is enabled by default and should only be disabled in networks where multiple users simultaneously access the same files.

Setting	Description
Synchronous I/O	<p>Select the ZFS Intent Log I/O mode to improve data consistency or performance. There are three modes:</p> <ul style="list-style-type: none"> <li>• <b>Always:</b> All I/O transactions are treated as synchronous and are always written and flushed to a non-volatile storage (such as a SSD or HDD). This option gives the best data consistency, but might have a small impact on performance.</li> <li>• <b>Standard:</b> QES uses synchronous I/O or asynchronous I/O based on the application and the type of I/O request.</li> <li>• <b>Disabled:</b> All I/O transactions are treated as asynchronous. This option gives the highest performance, but has a higher risk of data loss in the event of a power outage. Ensure that a UPS (uninterrupted power supply) is installed when using this option.</li> </ul> <p> <b>Tip</b></p> <ul style="list-style-type: none"> <li>• The default option on dual-controller NAS devices is <i>Always</i>.</li> <li>• The default option on single-controller NAS devices is <i>Standard</i>.</li> </ul>
Enable recycle bin	<p>Enable the network recycle bin for this shared folder. Files can be recovered from the recycle bin after being deleted. If <b>Restrict the access of Recycle Bin to administrators only for now</b> is enabled, only NAS administrators can recover deleted files.</p> <p> <b>Tip</b></p> <ul style="list-style-type: none"> <li>• To enable this option you must first enable the network recycle bin at <b>Control Panel &gt; Network Services &gt; Network Recycle Bin &gt; Enable Network Recycle Bin</b> .</li> <li>• For more details, see <a href="#">Network Recycle Bin</a></li> </ul>
Path	This shows the UNIX file system path to the folder. It is for reference only and cannot be modified.

### 9. Optional: Configure WORM (Write Once Read Many).

WORM prevents anyone from modifying or deleting files or folders after they have been written to the shared folder.



#### Important

This setting cannot be modified after shared folder creation.

- a. Select **WORM**.
- b. Select a WORM type.

Type	Description
Enterprise	Users can delete the shared folder.
Compliance	Users cannot delete the shared folder. An administrator must remove the storage pool to delete the WORM shared folder.

- c. Optional: Specify a retention time.  
Limit how long WORM applies to each file and folder. Files and folders can be modified after the specified time period.

10. Configure folder encryption.  
QES encrypts the folder using 256-bit AES encryption. Encrypted folders can be locked and unlocked using a password or an encryption key file.



#### Important

You cannot change the folder path if encryption is enabled.

- a. Select **Encryption**.
- b. Specify an encryption password.  
The password must contain 8 to 16 characters, and can be any combination of letters, numbers and special characters. Spaces are not allowed.



#### Warning

If you forget this password, the shared folder will become inaccessible and all data will be lost.

- c. Optional: Select **Save encryption key**.  
Saving a local copy of the encryption key enables QES to automatically unlock and mount the encrypted shared folder when the NAS starts up. If the encryption key is not saved, you must specify the encryption password whenever the NAS restarts.



#### Warning

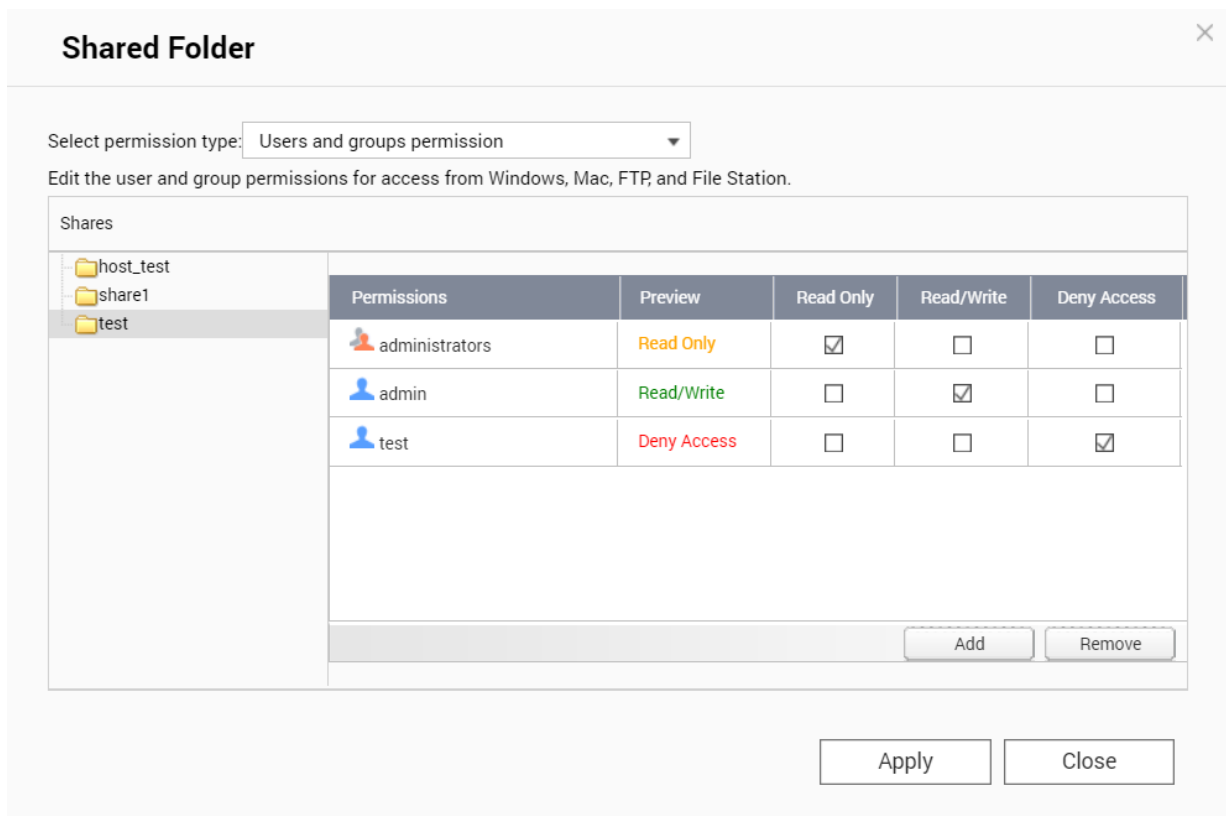
Storing the encryption key on the NAS can result in unauthorized access to data if the entire NAS is stolen.

11. Click **Create**.

## Shared Folder Permissions

This screen enables you to assign folder access permissions for three different sets of users.

Permissions	Applies To
User and group permissions	All NAS users
NFS host access	Users accessing the NAS using NFS
Microsoft networking host access	Users accessing the NAS using SMB



### Configuring User and Group Permissions

1. Go to **Storage Manager > Storage Space** .
2. Select a shared folder.  
The **Shared Folder Manager** window opens.
3. Click **Permissions**.  
The **Shared Folder Permissions** window opens.
4. Ensure **Users and groups permission** is selected in **Select permission type**.
5. Select a shared folder.
6. Specify shared folder access permissions for each user and group.

Permissions	Abbreviation	Description
Read/Write	RW	Users can view, modify, add and delete files and folders.
Read Only	RO	Users can view files and folders.
Deny Access	Deny	Users cannot access the folder.

Shared folder user and group permissions override permissions set at the file system level. Setting deny access permissions on this screen will prevent a user from accessing any sub-folders even if you set read/write permissions on the sub-folders in File Station.



**Tip**

To specify read-only permissions on the root of a shared folder and read/write permissions on its sub-folders, first set the user and group permissions to read/write. Then set the root folder to read-only at the file system level using File Station.

7. Optional: Click **Add** to add a new user or group permission.
8. Optional: Click **Remove** to remove a user or group permission.



**Tip**

You can use the following keyboard shortcuts.

- Selecting multiple users: Press and hold the SHIFT key.
- Selecting a range of users: Press and hold the CTRL key.

**Configuring NFS Host Access Permissions**

1. Go to **Storage Manager > Storage Space** .
2. Select a shared folder.  
The **Shared Folder Manager** window opens.
3. Click **Permissions**.  
The **Shared Folder Permissions** window opens.
4. Select **NFS host access**.
5. Select a shared folder.
6. Configure the following permission settings.

Setting	Description
Support NFSv4 ACL Inheritance	Deselecting this option disables NFSv4 ACL inheritance and enables umask settings.
Enable Map_Root and Map_All	Users that access shared folders using NFS can use the permissions associated with their NAS accounts. This can cause security risks, especially if a user has root privileges. Selecting this option allows you to restrict permissions of users that access the folder using NFS. Choose from: <ul style="list-style-type: none"> <li>• Map_Root: The root user receives the specified user and group permissions.</li> <li>• Map_All: All users receive the specified user and group permissions.</li> </ul>

7. Configure NFS host access permissions.
  - a. Select access permissions for all NFS hosts.

Permission	Description
No limit	Users can view, modify, add and delete files and folders.
Read Only	Users can view files and folders.

Permission	Description
Deny Access	Users cannot access the folder. This is the default permission for NFS hosts.

- b. Optional: Add a new NFS host.
  - c. Select an NFS host in the table.
  - d. Optional: Select **All hosts can access the shared folder**.  
QES applies the selected permission to all NFS hosts that attempt to access the folder.
8. Click **Apply**.

### Configuring SMB Host Access Control

Windows and Mac hosts use SMB to access shared network folders. Linux hosts can also use SMB using Samba. By default all SMB hosts can access all SMB shared folders.

1. Go to **Storage Manager > Storage Space** .
2. Select a shared folder.  
The **Shared Folder Manager** window opens.
3. Click **Permissions**.  
The **Shared Folder Permissions** window opens.
4. Select **Microsoft Networking host access**.
5. Deselect **All hosts can access the shared folder**.
6. Optional: Click **Create Host** to add a new host IP address or IP range.
7. Select the hosts that are allowed to access this folder.
8. Click **Apply**.

### Shared Folder Management

#### Deleting a Shared Folder

1. Go to **Storage Manager > Storage > Storage Space** .
2. Select a shared folder.
3. Click **Manage**.  
The **Shared Folder Management** window opens.
4. Click **Remove**.  
A confirmation message appears.



#### Warning

All data in the shared folder will be deleted.

5. Click **Apply**.

#### Editing Shared Folder Properties

1. Go to **Main Menu > Storage Manager > Storage > Storage Space** .

2. Select a shared folder.
3. Click **Manage**.  
The **Shared Folder Management** window opens.
4. Click **Actions**.
5. Select **Edit Properties**.  
The **Shared Folder Properties** window opens.
6. Modify shared folder settings.  
For details on folder settings, see [Creating a Shared Folder](#).



### Important

- Disabling compression only affects new data. Existing data in the folder remains compressed.
- Disabling deduplication only affects new data. Existing data in the folder remains deduplicated.

7. Click **Apply**.

## Shared Folder Encryption

QES can encrypt shared folders with 256-bit AES encryption, which protects data from unauthorized access if individual drives or the entire NAS are stolen. Users must specify the encryption password to access encrypted shared folders.



### Important

You can only enable encryption during the folder creation process. For details, see [Creating a Shared Folder](#).

## Shared Folder Access

### Mapping a Shared Folder on a Windows Computer

1. Perform the following actions, depending on your Windows version.

Windows Version	Action
Windows 7	<ol style="list-style-type: none"> <li>a. Click <b>Start</b>.</li> <li>b. Click <b>Computer</b>.</li> </ol>
Windows 10	<ol style="list-style-type: none"> <li>a. Press <code>Windows Key + E</code>.</li> <li>b. Select <b>This PC</b> from the left pane.</li> </ol>

2. Click **Map Network Drive**.  
The **Map Network Drive** window opens.
3. Select a drive letter.
4. Specify the SMB path to the shared folder.  
The path will be either `\\NAS_NAME\FOLDER_NAME` or `\\NAS_IP_ADDRESS\FOLDER_NAME`.

**Tip**

To get the SMB path to a shared folder:

- a. Go to **Main Menu > Storage Manager > Storage > Storage Space** .
- b. Select a shared folder.
- c. Click **Manage**.
- d. Click **Actions**, and then select **Edit Properties**.
- e. In the **Shared Folder Properties** window under **SMB Path**, click **Copy Link**.

5. Click **Finish**.

6. Optional: Specify your NAS user name and password if prompted.

Windows maps the shared folder to the specified drive letter. The drive can be accessed using Windows Explorer.

### Mounting a Shared Folder on a Mac Computer

1. Open **Finder**.
2. Select **Go > Connect to Server** .
3. Specify your NAS address.  
The address must include the sharing protocol followed by the NAS data interface IP address.

Sharing Protocol	Address Format
SMB	smb://NAS IP Address
NFS	nfs://NAS IP Address

4. Click **Connect**.
5. Specify your NAS user name and password.
6. Select a shared folder.
7. Click **OK**.

MacOS mounts the shared folder.

### Mounting a Shared Folder on a Linux Computer

1. Open a terminal with root privileges.
2. Run the following command.  

```
mount <NAS Ethernet Interface IP>:/share/<Shared Folder Name> <Directory to Mount>
```

Example: If the NAS Ethernet interface IP address is 192.168.0.42 and you want to connect to a shared folder "public" under the /mnt/pub directory, enter the following command: `mount -t nfs 192.168.0.42:/share/public /mnt/pub`

**Note**

A dual controller QES NAS has two kinds of network interface:

- Management interface



- Ethernet interface (dedicated to data transfer)

You can connect to the Ethernet interface on either controller.



#### Tip

To get the NFS path to a shared folder:

- Go to **Main Menu > Storage Manager > Storage > Storage Space** .
- Select a shared folder.
- Click **Manage**.
- Click **Actions**, and then select **Edit Properties**.
- In the **Shared Folder Properties** window under **NFS Path**, click **Copy Link**.

- Specify your NAS username and password.

You can connect to the shared folder using the mounted directory.

## SSD Over-Provisioning

When the blocks in an SSD are full with old data, the disk's firmware frees up space in a process called garbage collection. Garbage collection results in an effect called write amplification, which reduces the lifespan and random write performance of the SSD. Write amplification can be reduced by over-provisioning, which means reserving space on the disk for garbage collection. Most SSDs are manufactured with 7% or more of their capacity reserved for over-provisioning.

### QES SSD Features

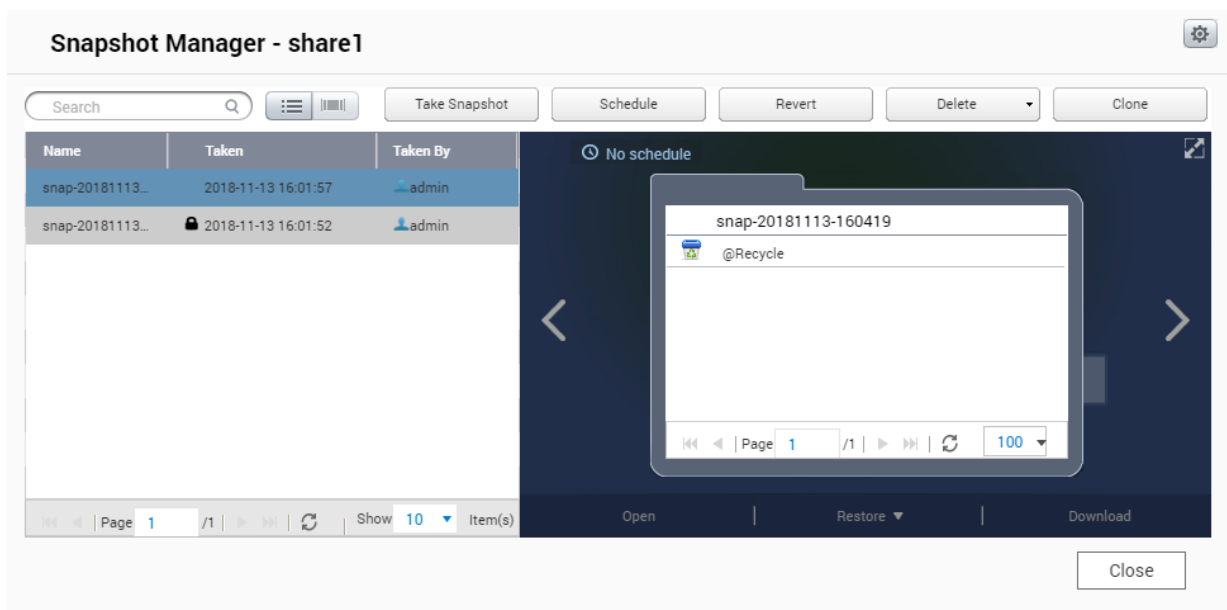
QES has the following features to improve the performance of all-SSD storage pools.

Feature	Description	Benefits	Recommended Settings	Reduces Storage Capacity
SSD over-provisioning	QES reserves a percentage of space on each SSD by issuing a command to the disk's firmware.	<ul style="list-style-type: none"> <li>• Increases SSD random write performance</li> <li>• Extends SSD lifespan</li> </ul>	Follow the SSD manufacturer's recommendations	Yes
Write Coalescing	Write Coalescing optimizes a storage pool for SSD storage by converting random writes into sequential writes, and reducing the total number of I/O requests.	<ul style="list-style-type: none"> <li>• Increases storage pool random write performance</li> <li>• Extends SSD lifespan</li> </ul>	Enable this feature on all-SSD storage pools.	No

Feature	Description	Benefits	Recommended Settings	Reduces Storage Capacity
Pool over-provisioning	QES reserves a percentage of space in the storage pool to ensure consistent random write performance when the pool is nearly full.	<ul style="list-style-type: none"> <li>Ensures consistent random write performance when a storage pool is nearly full</li> <li>Lowers the total number of SSD writes</li> <li>Extends SSD lifespan</li> </ul>	Pool over-provisioning should be set to 20-30%.	Yes

## Snapshots

Snapshots protect data by recording the state of a shared folder at a specific point in time. You can restore data to a previous state if it is unintentionally modified or deleted. You can also use snapshots to back up data to another NAS using SnapSync.



## Snapshot Creation

### Taking a Snapshot


1. Go to **Storage Manager > Storage > Storage Space** .
2. Select a shared folder or LUN.
3. Click **Snapshot** and then select **Take a Snapshot**.  
The **Take a Snapshot** window opens.

4. Optional: Specify a name.

The name must consist of 1 to 24 characters from the following groups:


- Letters: A-Z, a-z
- Numbers: 0-9
- Special Characters: Dash (-), period (.), underscore (\_)

5. Specify a retention time.

Option	Description
Keep For	QES retains the snapshot for the specified time period.
Keep this snapshot permanently	<p>QES retains the snapshot indefinitely.</p> <p> <b>Important</b> QES will still delete the snapshot when the following two conditions are met:</p> <ul style="list-style-type: none"> <li>• <b>Delete the oldest snapshots when a storage pool is full</b> is enabled at <b>Storage Manager &gt; Global Settings</b> .</li> <li>• Storage space is low.</li> </ul>

6. Select the LUN snapshot type.

This setting is only available when taking a snapshot of a block-based LUN.

Type	Description
Crash consistent	The snapshot records the state of the data on the LUN.
Application consistent	<p>The snapshot records the state of data and applications on the LUN. The iSCSI host flushes data in memory to the LUN before QES takes a snapshot. If VMware vCenter is using the LUN, vCenter takes a virtual machine snapshot.</p> <p> <b>Important</b> This option is only available for VMware vCenter, or for Volume Shadow Copy Service (VSS) aware applications running on a Windows server. You must install QNAP Snapshot Agent on the iSCSI initiator.</p>

7. Click **OK**.

QES takes the snapshot. The snapshot appears in **Snapshot Manager**.


## Configuring a Snapshot Schedule



**Tip**

You can configure a separate snapshot schedule for each shared folder and LUN.

1. Go to **Storage Manager > Storage > Storage Space** .
2. Select a shared folder or LUN.
3. Click **Snapshot**, and then select **Snapshot Manager**.  
The **Snapshot Manager** window opens.
4. Click **Schedule**.  
The **Schedule Snapshot** window opens.
5. Select **Enable schedule**.
6. Specify how often QES will take a snapshot.
7. Select the LUN snapshot type.  
This setting is only available when taking a snapshot of a block-based LUN.

Type	Description
Crash consistent	The snapshot records the state of the data on the LUN.
Application consistent	<p>The snapshot records the state of data and applications on the LUN. The iSCSI host flushes data in memory to the LUN before QES takes a snapshot. If VMware vCenter is using the LUN, vCenter takes a virtual machine snapshot.</p> <div style="border-left: 2px solid red; padding-left: 10px;"> <p> <b>Important</b> This option is only available for VMware vCenter, or for Volume Shadow Copy Service (VSS) aware applications running on a Windows server. You must install QNAP Snapshot Agent on the iSCSI initiator.</p> </div>

8. Specify a retention time.  
QES retains the snapshot for the specified time period. If you deselect **Keep for**, QES retains the snapshot indefinitely.
9. Click **OK**.

QES takes snapshots according to the specified schedule.

## Snapshot Management

### Deleting Snapshots

1. Go to **Storage Manager > Storage > Storage Space** .
2. Select a shared folder or LUN.
3. Click **Snapshot**, and then select **Snapshot Manager**.  
The **Snapshot Manager** window opens.
4. Select a snapshot.
5. Click **Delete**.


6. Select an option.

Option	Description
Delete	Delete the selected snapshot.
Delete all	Delete all snapshots for this shared folder or LUN.

A confirmation message appears.

7. Click **OK**.

## Configuring Snapshot Global Settings

1. Go to **Storage Manager > Storage > Storage Space**.
2. Select a shared folder or LUN.
3. Click **Snapshot**, and then select **Snapshot Manager**.  
The **Snapshot Manager** window opens.
4. Click .  
The **Snapshot Global Settings** window opens.
5. Select **Make snapshot directory (@Snapshot) visible**.  
QES mounts all snapshots in a folder called @Snapshot in the top-level shared folder. All users have read-only access to this snapshot folder.



### Important

This setting only applies to the current shared folder.

6. Click **OK**.

## Snapshot Data Recovery

### Restoring Files and Folders from a Snapshot




### Important

You cannot restore files and folders from a LUN snapshot.

1. Go to **Main Menu > Storage Manager > Storage > Storage Space**.
2. Select a shared folder.
3. Select **Snapshot > Snapshot Manager**.  
The **Snapshot Manager** window opens.
4. Select a snapshot.
5. Select a file or folder.




### Tip

If the file preview window is not visible, click .

6. Select a restore action.

Restore	QES restores the file or folder to its original storage location. If the file or folder still exists on the NAS, then it will be overwritten with the older version.
---------	--

	 <b>Warning</b> All changes made after the snapshot was created will be lost.
Restore to	QES restores the file or folder to a different location on the NAS.
Download	You can download the file or folder to your computer. QES packages folders in a ZIP file for downloading.

## Reverting a Shared Folder or LUN

Reverting restores a shared folder or LUN to the state at which the snapshot was taken. Restoring data using snapshot revert is faster than restoring individual files and folders.



### Important

- QES automatically unmaps an iSCSI LUN before reverting it.
- If Snapshot agent is installed and the snapshot is application consistent, QES will automatically re-map it to its original target.

1. Go to **Main Menu > Storage Manager > Storage > Storage Space** .
2. Select a shared folder or LUN.
3. Select **Snapshot > Snapshot Manager** .  
The **Snapshot Manager** window opens.
4. Select a snapshot.
5. Click **Revert**.  
A confirmation message appears.



### Warning

All changes made after the snapshot was taken will be deleted.

6. Click **OK**.

## QNAP Snapshot Agent

QNAP Snapshot Agent enables QES to take application-consistent snapshots of iSCSI LUNs on VMware or Microsoft servers. Application-consistent snapshots record the state of running applications, virtual machines, and data. When QES takes a LUN snapshot, QNAP Snapshot Agent triggers the following actions:

- Windows: The server flushes data in memory, logs, and pending I/O transactions to the LUN before the snapshot is created.
- VMware: The server takes a virtual machine snapshot.

For more information on using Snapshot Agent, see the following QNAP application note: [https://files.qnap.com/news/pressresource/datasheet/Create\\_Microsoft\\_Hyper-V\\_Backups\\_Using\\_QNAP\\_Snapshot\\_Agent\\_and\\_VSS\\_Hardware\\_Provider\(English\).pdf](https://files.qnap.com/news/pressresource/datasheet/Create_Microsoft_Hyper-V_Backups_Using_QNAP_Snapshot_Agent_and_VSS_Hardware_Provider(English).pdf).

## Viewing Registered Snapshot Agent Servers

1. Go to **Main Menu > Storage Manager > iSCSI > iSCSI Storage** .
2. Select **Snapshot > Snapshot Agent** .

The **Snapshot Agent** window opens.

3. Optional: Deregister a server.
  - a. Select a server.
  - b. Click **Remove**.

## Snapshot Clone

Cloning creates a copy of a shared folder or LUN from a snapshot. The copy is stored in the same storage pool as the original shared folder or LUN.

### Cloning a Shared Folder

1. Go to **Storage Manager > Storage > Storage Space** .
2. Select a shared folder.



#### Important

The shared folder must have at least one snapshot.

3. Click **Snapshot**, and then select **Snapshot Manager**.  
The **Snapshot Manager** window opens.
4. Select a snapshot.
5. Click **Clone**.  
The **Clone Snapshot** window opens.
6. Specify a name.
7. Click **OK**.

QES clones the shared folder and then displays a confirmation message.

### Cloning a LUN

1. Go to **Storage Manager > Storage > Storage Space** .
2. Select a block-based LUN.



#### Important

The LUN must have at least one snapshot.

3. Click **Snapshot**, and then select **Snapshot Manager**.  
The **Snapshot Manager** window opens.
4. Select a snapshot.
5. Click **Clone**.  
The **Clone Snapshot** window opens.
6. Specify a name.
7. Optional: Select an iSCSI target.  
QES will map the LUN copy to the target.

8. Click **OK**.

QES clones the LUN and then displays a confirmation message.

## Cache Acceleration

Cache Acceleration enables you to create an SSD cache for improving the read performance of the NAS.



### Important

- QES only uses the SSD cache for read-cache.
  - On ES series NAS models, QES performs write caching using hardware NVRAM.
  - TES and TDS series NAS models offer RAM write cache protection (write log) when you add an SSD to the SSD cache. The write log ensures data integrity and also helps increase write performance, but it is not technically a write cache.
- Shared folders and LUNs created in an all-SSD storage pool cannot use the SSD cache, as it would provide no additional performance benefits.

## Configuring the SSD Cache

For details on compatible SSDs, see [www.qnap.com/compatibility](http://www.qnap.com/compatibility).

1. Go to **Storage Manager > Storage > Cache Acceleration**.
2. Click **Set SSD**.  
The **Set SSD** window opens.
3. Select the SSDs to be included in the cache.
4. Optional: Enable RAM write cache protection (Write Log).  
When enabled, QES copies data from the RAM write cache to the SSD cache for additional data protection.



**Important**

- This feature is only available on TES and TDS series NAS models.
- Enabling this feature requires an even number of SSDs.
- If an SSD fails, QES automatically disables the write log.

5. Click **OK**.  
A confirmation message appears.


**Warning**

All data except for system partition data will be deleted.


6. Click **OK**.  
The **Set SSD** window closes.

QES uses the selected drives as an SSD cache. If no SSDs are selected, QES disables the SSD cache.

**Enabling the SSD Cache**

1. Ensure the SSD cache contains at least one disk.  
For details on adding disks to the SSD cache, see [Configuring the SSD Cache](#).
2. Go to **Main Menu > Storage Manager > Storage > Cache Acceleration**.
3. Set the **Cache Acceleration** toggle switch to .

**Disabling the SSD Cache**

1. Go to **Main Menu > Storage Manager > Storage > Cache Acceleration**.
2. Set the **Cache Acceleration** toggle switch to .

**Configuring Cached Shared Folders and LUNs**

1. Go to **Storage Manager > Storage > Cache Acceleration**.
2. Click **Set Caching Storage**.
3. Select the shared folders and LUNs that are allowed to use the SSD cache.

**Important**

Shared folders and LUNs created in an all-SSD storage pool cannot use the SSD cache.

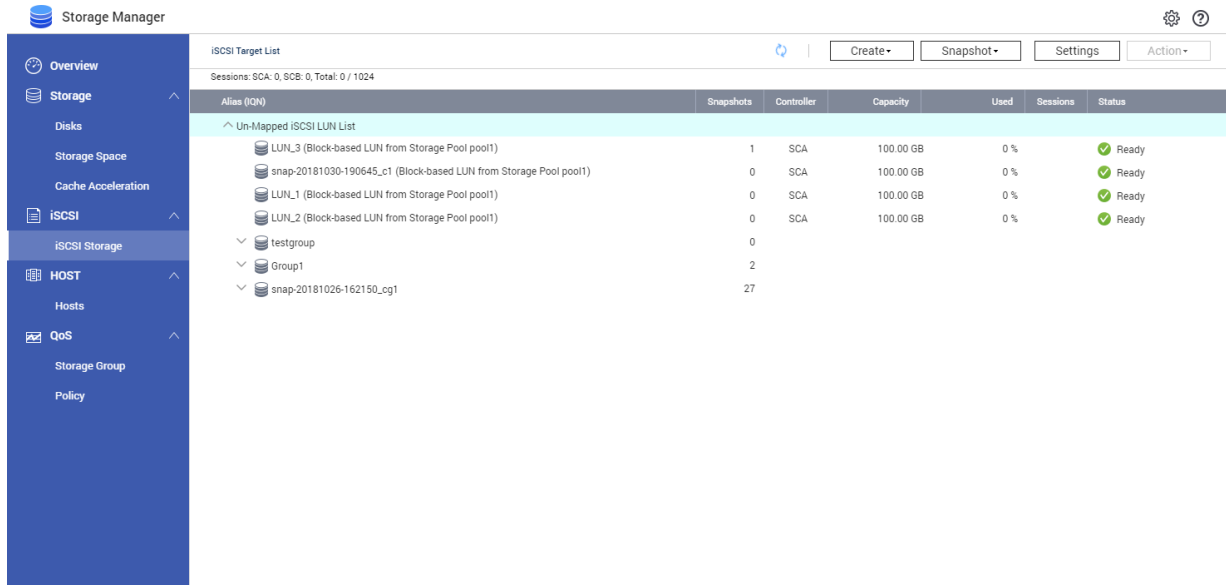
4. Optional: Enable **Bypass Prefetch Data**.

Setting	Setting
Setting	QES does not copy data from large-block sequential I/O operations such as video streaming to the SSD cache. This is the default SSD cache behavior.
Disabled	QES copies data from large block sequential I/O operations to the SSD cache. This requires more cache space and CPU resources.

5. Click **Finish**.

## iSCSI Storage

QES supports iSCSI (Internet Small Computer System Interface) for server clustering and virtualized environments.



### Tip

To view tutorials on configuring and optimizing iSCSI with your ES NAS, go to <https://www.qnap.com/en/how-to/tutorial/enterprise-zfs-nas>.

## iSCSI Overview

QES supports blocked-based iSCSI LUNs with the following features:

- VAAI full copy
- VAAI block zeroing
- VAAI hardware assisted locking
- Thin provisioning
- Space reclamation (with VAAI or from Windows 2012 or Windows 8)
- Microsoft ODX
- LUN snapshot
- LUN SnapSync

## iSCSI Storage Limits

iSCSI Storage Limit	Maximum
iSCSI targets per NAS	255
iSCSI LUNs per NAS	1024

iSCSI Storage Limit	Maximum
iSCSI sessions per target	256
iSCSI sessions per storage controller	512
iSCSI sessions per NAS	<ul style="list-style-type: none"> <li>• Single controller NAS: 512</li> <li>• Dual controller NAS: 1024</li> </ul>

## Getting Started with iSCSI

1. Create an iSCSI target on the NAS.  
For details, see [Creating an iSCSI Target](#).
2. Create a LUN on the NAS.  
creates LUNs using storage pool space. For details, see [Creating an iSCSI LUN](#).
3. Map the LUN to the iSCSI target.  
Multiple LUNs can be mapped to one target.  
For details, see [Creating an iSCSI Target With a Mapped LUN](#) and [Managing an iSCSI LUN](#).
4. Install an iSCSI initiator application or driver on the host.  
The host is the service, computer, or NAS device that will access the LUN.
5. Connect the iSCSI initiator to the iSCSI target on the NAS.



### Warning

To prevent data corruption, multiple iSCSI initiators should not connect to the same LUN simultaneously.

The LUNs mapped to the iSCSI target appear as disks on the host.  
For details, see [iSCSI Target Access](#).

6. In the host OS, format the disks.

## iSCSI Creation

### Creating an iSCSI Target With a Mapped LUN

1. Go to **Storage Manager > iSCSI > iSCSI Storage**.
2. Click **Create**, and then select **iSCSI Target / LUN**.
3. Select **iSCSI Target with a mapped LUN** and then click **Next**.
4. Click **Next**.
5. Specify a target name.  
QES appends the specified name to the iSCSI qualified name (IQN). IQNs are unique names used to identify targets and initiators.
  - Valid characters: 0 to 9, a to z, A to Z
  - Length: 1 to 16 characters
6. Specify a target alias.  
An alias enables you to identify the target more easily on the initiator.
  - Valid characters: 0 to 9, a to z, A to Z, underscore (\_), hyphen (-)

- Length: 1 to 32 characters

**7. Optional: Enable CRC checksums.**

Initiators and targets communicate over TCP connections using iSCSI protocol data units (PDU). The sending device can send a checksum with each PDU. The receiving device uses this checksum to verify the integrity of the PDU, which is useful in unreliable network environments. There are two checksum types, which can be enabled separately.

Checksum Type	Description
Data Digest	The checksum can be used to verify the data portion of the PDU.
Header Digest	The checksum can be used to verify the header portion of the PDU.

The following options are available for each checksum type.

Option	Description
None	The target reports that it does not support checksums. CRC32C checksums must be disabled on connecting initiators.
crc32c	The target reports that checksums are required. CRC32C checksums must be enabled on connecting initiators.
none/crc32c	The target reports that checksums can be disabled or enabled. Connecting initiators can choose whether to use CRC32C or not.

**8. Click **Next**.**

**9. Optional: Enable CHAP authentication.**

An initiator must authenticate with the target using the specified username and password. This provides security, as iSCSI initiators do not require a NAS username or password.


- Username
  - Length: 1 to 128 characters
  - Valid Characters: 0 to 9, a to z, A to Z
- Password
  - Length: 12 to 16 characters
  - Valid characters: 0 to 9, a to z, A to Z




**10. Optional: Enable mutual CHAP authentication.**


Both the initiator and the target must authenticate with each other for additional security. First, the initiator authenticates with the target using the CHAP authentication username and password. Next, the target authenticates with the initiator using the mutual CHAP username and password.

- Username
  - Length: 1 to 128 characters
  - Valid characters: 0 to 9, a to z, A to Z, colon (:), period (.), hyphen (-)
- Password
  - Length: 1 to 128 characters
  - Valid characters: 0 to 9, a to z, A to Z, colon (:), dot (.), dash (-)

11. Click **Next**.
12. Select the network interfaces that this target will use for data transmission.
13. Click **Next**.
14. Select the hosts that are allowed to access this target.  
Click the field in the **Access** column to change a host's access rights. You must select `All Access` for at least one host.
15. Click **Next**.
16. Configure the following LUN settings.

Setting	Description
LUN name	<ul style="list-style-type: none"> <li>• Valid characters: 0-9, a-z, A-Z, dash -, underscore ( _ )</li> <li>• Length: 1 to 32 characters</li> </ul>
LUN Allocation	<ul style="list-style-type: none"> <li>• Thin Provisioning: QES allocates storage pool space to a LUN only when necessary. However, QES cannot save data to the LUN if the storage pool runs out of space.</li> <li>• Instant Allocation: QES allocates storage pool space when creating the LUN. This option is also known as Thick provisioning.</li> </ul>
LUN Location	Select the storage pool that this LUN will be created in.
Capacity	Specify the maximum capacity of the LUN. The maximum capacity depends on the LUN allocation method:
Alert threshold	QES issues a warning notification when the percentage of used LUN space is equal to or above the specified threshold.
Performance profile	<p>Specify how the LUN will be used. Each option results in a different record size, optimizing performance for the specified application.</p> <ul style="list-style-type: none"> <li>• Generic</li> <li>• Hyper-V</li> <li>• VMware</li> <li>• Database</li> <li>• Custom (Choose from: 8k, 16k, 32k, 64k, 128k)</li> </ul> <div style="border-left: 2px solid #ccc; padding-left: 10px; margin-top: 10px;">  <p><b>Tip</b> Select <code>Generic</code> if you are unsure of which option to select.</p> </div>

Setting	Description
Synchronous I/O	<p>Select the ZFS Intent Log (ZIL) sync setting to improve either data consistency or performance. There are three options:</p> <ul style="list-style-type: none"> <li>• <b>Always:</b> (Default). All I/O transactions are treated as synchronous and are always written and flushed to a non-volatile storage (such as a SSD or HDD). This option gives the best data consistency, but might have a slight impact on performance.</li> <li>• <b>Standard:</b> QES uses synchronous I/O or asynchronous I/O based on the application and the type of I/O request.</li> <li>• <b>Disabled:</b> All I/O transactions are treated as asynchronous. This option gives the highest performance, but has a higher risk of data loss in the event of a power outage. Ensure that a UPS (uninterrupted power supply) is installed when using this option.</li> </ul>
SSD Cache	<p>The SSD cache will be used to improve LUN access performance.</p> <p> <b>Important</b> Shared folders and LUNs created in an all-SSD storage pool cannot use the SSD cache.</p>
Deduplication	<p>QES eliminates duplicate copies of data to reduce the required amount of storage space.</p> <p> <b>Warning</b></p> <ul style="list-style-type: none"> <li>• Before QES 1.1.3, the default deduplication algorithm was <code>SHA256</code>. If you update a pre-QES 1.1.3 NAS to QES 1.1.3 or later and then change the deduplication algorithm to <code>SHA512</code> or <code>Skein</code>, data might become inaccessible .</li> <li>• Deduplication is only available if <b>Performance profile</b> is set to <b>VDI</b> or <b>Custom</b>, and <b>Thin provisioning</b> is selected.</li> </ul>
Compression	<p>QES compresses the data in the LUN to reduce the size of stored data. Enabling compression also reduces the total number of blocks that QES needs to read and write, increasing read and write speeds.</p> <p> <b>Tip</b> New shared folders and LUNs have compression enabled by default. Compression does not impact read/write and processor performance on ZFS filesystems. Only disable this setting when necessary.</p>

Setting	Description
Enable Fast Clone	<p>Fast Clone enables QES to create copies of files faster. It also saves storage space by modifying file metadata, allowing original and copied files to share the same data blocks.</p> <p> <b>Important</b></p> <ul style="list-style-type: none"> <li>• To enable this setting, <b>Thin provisioning</b> must be selected.</li> <li>• Fast Clone only works when the copied file is created in the LUN containing the original file.</li> <li>• Fast Clone does not improve the speed of snapshot restoration operations such as restoring files from a snapshot, snapshot revert, and snapshot clone.</li> </ul>
Encryption	<p>QES encrypts the LUN using 256-bit AES encryption. You must specify an encryption password.</p> <ul style="list-style-type: none"> <li>• Valid characters: All alphanumeric and special characters except spaces</li> <li>• Length: 8 to 16 characters</li> </ul> <p>You can also save a copy of the encryption key on the NAS.</p>

17. Click **Next**, and then **Next** again.

18. Click **Finish**.

QES creates the LUN and the target.

### Creating an iSCSI Target

1. Go to **Storage Manager > iSCSI > iSCSI Storage** .
2. Click **Create**, and then select **iSCSI Target / LUN**.
3. Select **iSCSI LUN only**.
4. Click **Next**.
5. Specify a target name.  
QES appends the specified name to the iSCSI qualified name (IQN). IQNs are unique names used to identify targets and initiators.
  - Valid characters: 0 to 9, a to z, A to Z
  - Length: 1 to 16 characters
6. Specify a target alias.  
An alias enables you to identify the target more easily on the initiator.
  - Valid characters: 0 to 9, a to z, A to Z, underscore (\_), hyphen (-)
  - Length: 1 to 32 characters
7. Optional: Enable CRC checksums.

Initiators and targets communicate over TCP connections using iSCSI protocol data units (PDU). The sending device can send a checksum with each PDU. The receiving device uses this checksum to verify the integrity of the PDU, which is useful in unreliable network environments. There are two checksum types, which can be enabled separately.

Checksum Type	Description
Data Digest	The checksum can be used to verify the data portion of the PDU.
Header Digest	The checksum can be used to verify the header portion of the PDU.

The following options are available for each checksum type.

Option	Description
None	The target reports that it does not support checksums. CRC32C checksums must be disabled on connecting initiators.
crc32c	The target reports that checksums are required. CRC32C checksums must be enabled on connecting initiators.
none/crc32c	

8. Click **Next**.

9. Optional: Enable CHAP authentication.

An initiator must authenticate with the target using the specified username and password. This provides security, as iSCSI initiators do not require a NAS username or password.

- Username
  - Length: 1 to 128 characters
  - Valid Characters: 0 to 9, a to z, A to Z
- Password
  - Length: 12 to 16 characters
  - Valid characters: 0 to 9, a to z, A to Z

10. Optional: Enable mutual CHAP authentication.

Both the initiator and the target must authenticate with each other for additional security. First, the initiator authenticates with the target using the CHAP authentication username and password. Next, the target authenticates with the initiator using the mutual CHAP username and password.

- Username
  - Length: 1 to 128 characters
  - Valid characters: 0 to 9, a to z, A to Z, colon (:), period (.), hyphen (-)
- Password
  - Length: 12 to 16 characters
  - Valid characters: 0 to 9, a to z, A to Z, colon (:), dot (.), dash (-)

11. Click **Next**.

12. Select the network interfaces that this target will use for data transmission.






13. Click **Next**.
14. Select the hosts that are allowed to access this target.  
Click the field in the **Access** column to change a host's access rights. You must select **All Access** for at least one host.
15. Click **Next**, and then **Next** again.
16. Click **Finish**.



QES creates the iSCSI target.

## Creating an iSCSI LUN

1. Go to **Storage Manager > iSCSI > iSCSI Storage**.
2. Click **Create**, and then select **iSCSI Target / LUN**.
3. Select **iSCSI LUN only**.
4. Click **Next**.
5. Configure the following LUN settings.

Setting	Description
LUN name	<ul style="list-style-type: none"> <li>• Valid characters: 0-9, a-z, A-Z, dash -, underscore (_)</li> <li>• Length: 1 to 32 characters</li> </ul>
LUN Allocation	<ul style="list-style-type: none"> <li>• Thin Provisioning: QES allocates storage pool space to a LUN only when necessary. However, QES cannot save data to the LUN if the storage pool runs out of space.</li> <li>• Instant Allocation: QES allocates storage pool space when creating the LUN. This option is also known as Thick provisioning.</li> </ul>
LUN Location	Select the storage pool that this LUN will be created in.
Capacity	<p>Specify the maximum capacity of the LUN. The maximum capacity depends on the LUN allocation method:</p> <ul style="list-style-type: none"> <li>• Thick provisioning: Equal to the amount of free space in the parent storage pool. Equal to the amount of free space in the parent storage pool.</li> <li>• Thin provisioning: Twenty times the amount of free space in the parent storage pool.</li> </ul>
Alert threshold	QES issues a warning notification when the percentage of used LUN space is equal to or above the specified threshold.

Setting	Description
Performance profile	<p>Specify how the LUN will be used. Each option results in a different record size, optimizing performance for the specified application.</p> <ul style="list-style-type: none"> <li>• Generic</li> <li>• Hyper-V</li> <li>• VMware</li> <li>• Database</li> <li>• Custom (Choose from: 8k, 16k, 32k, 64k, 128k)</li> </ul> <p> <b>Tip</b> Select <code>Generic</code> if you are unsure of which option to select.</p>
Synchronous I/O	<p>Select the ZFS Intent Log (ZIL) sync setting to improve either data consistency or performance. There are three options:</p> <ul style="list-style-type: none"> <li>• <b>Always:</b> (Default). All I/O transactions are treated as synchronous and are always written and flushed to a non-volatile storage (such as a SSD or HDD). This option gives the best data consistency, but might have a slight impact on performance.</li> <li>• <b>Standard:</b> QES uses synchronous I/O or asynchronous I/O based on the application and the type of I/O request.</li> <li>• <b>Disabled:</b> All I/O transactions are treated as asynchronous. This option gives the highest performance, but has a higher risk of data loss in the event of a power outage. Ensure that a UPS (uninterrupted power supply) is installed when using this option.</li> </ul>
SSD Cache	<p>The SSD cache will be used to improve LUN access performance.</p> <p> <b>Important</b> Shared folders and LUNs created in an all-SSD storage pool cannot use the SSD cache.</p>
Deduplication	<p>QES eliminates duplicate copies of data to reduce the required amount of storage space.</p> <p> <b>Warning</b></p> <ul style="list-style-type: none"> <li>• Before QES 1.1.3, the default deduplication algorithm was <code>SHA256</code>. If you update a pre-QES 1.1.3 NAS to QES 1.1.3 or later and then change the deduplication algorithm to <code>SHA512</code> or <code>Skein</code>, data might become inaccessible .</li> <li>• Deduplication is only available if <b>Performance profile</b> is set to <b>VDI</b> or <b>Custom</b>, and <b>Thin provisioning</b> is selected.</li> </ul>

Setting	Description
Compression	<p>QES compresses the data in the LUN to reduce the size of stored data. Enabling compression also reduces the total number of blocks that QES needs to read and write, increasing read and write speeds.</p> <p> <b>Tip</b> New shared folders and LUNs have compression enabled by default. Compression does not impact read/write and processor performance on ZFS filesystems. Only disable this setting when necessary.</p>
Enable Fast Clone	<p>Fast Clone enables QES to create copies of files faster. It also saves storage space by modifying file metadata, allowing original and copied files to share the same data blocks.</p> <p> <b>Important</b></p> <ul style="list-style-type: none"> <li>• To enable this setting, <b>Thin provisioning</b> must be selected.</li> <li>• Fast Clone only works when the copied file is created in the LUN containing the original file.</li> <li>• Fast Clone does not improve the speed of snapshot restoration operations such as restoring files from a snapshot, snapshot revert, and snapshot clone.</li> </ul>
Encryption	<p>QES encrypts the LUN using 256-bit AES encryption. You must specify an encryption password.</p> <ul style="list-style-type: none"> <li>• Valid characters: All alphanumeric and special characters except spaces</li> <li>• Length: 8 to 16 characters</li> </ul> <p>You can also save a copy of the encryption key on the NAS.</p>

6. Click **Next**.
7. Optional: Map the LUN to an existing target.
  - a. Deselect **Do not map it to a target for now**.
  - b. Select a target.
8. Click **Next**, and then **Next** again.
9. Click **Finish**.

QES creates the LUN.

## iSCSI Management

## iSCSI Targets and LUNs

To view the list of targets and LUNs, go to **Storage Manager > iSCSI > iSCSI Storage** .

### iSCSI Target Status

Status	Description
Ready	The target is accepting connections but no initiators are currently connected.
Connected	An initiator is connected to the target.
Offline	The target is not accepting connections.

### iSCSI LUN Status

Status	Description
Enabled	The LUN is active and visible to connected initiators.
Disabled	The LUN is inactive and invisible to connected initiators.

## Managing an iSCSI Target

1. Go to **Main Menu > Storage Manager > iSCSI > iSCSI Storage** .
2. Select a target.
3. Click **Action**.
4. Select an action.

Target Action	Description
Deactivate	Disable an active target and disconnect all connected iSCSI initiators. For details on target statuses, see <a href="#">iSCSI Targets and LUNs</a> .
Activate	Enable an inactive target.
Modify	Modify the target's settings.
View Connections	View the IP addresses and IQN information of iSCSI initiators connected to this target.
Delete	Disconnect all connected iSCSI initiators and delete the target.
Hosts	Select which hosts can connect to the target.

## Managing an iSCSI LUN



### Important

Most of these actions will be unavailable if the LUN is part of a LUN group. For details, see [LUN Groups](#).

1. Go to **Main Menu > Storage Manager > iSCSI > iSCSI Storage** .
2. Select a LUN.

**Tip**

Double-click a target to see all mapped LUNs.

3. Click **Action**.
4. Select an action.

LUN Action	LUN Location	Description
Disable	iSCSI Target List	Disable the LUN and disconnect all connected initiators.
Enable	iSCSI Target List	Enable a disabled LUN.
Un-map	iSCSI Target List	Unmap a disabled LUN from its target. QES moves the LUN to the <b>Un-Mapped iSCSI LUN</b> list.
Modify	iSCSI Target List Un-Mapped iSCSI LUN List	Open the <b>Modify an iSCSI LUN</b> window.
Map	Un-Mapped iSCSI LUN List	Map the LUN to a target.
Delete	Un-Mapped iSCSI LUN List	Delete the LUN and all data stored on it.

### Changing the Target of an iSCSI LUN

1. Go to **Storage Manager > iSCSI > iSCSI Storage** .
2. Select a mapped iSCSI LUN.

**Tip**

Double-click an iSCSI target to view all of its mapped LUNs.

3. Click **Action**, and then select **Disable** .  
A confirmation message appears.
4. Click **OK**.  
QES disables the LUN.
5. Click **Action**, and then select **Un-map**.  
QES unmaps the LUN from its target and then moves it to the **Un-Mapped iSCSI LUN List**.
6. Select the unmapped LUN.
7. Click **Action**, and then select **Map**.  
The **Map LUN to Target** window opens.
8. Select a target.
9. Click **Apply**.

QES maps the LUN to the new target.

### Expanding an iSCSI LUN

1. Go to **Main Menu > Storage Manager > iSCSI > iSCSI Storage** .
2. Select a LUN.
3. Click **Action** and then select **Modify**.

The **Modify an iSCSI LUN** window opens.

- Specify the new LUN capacity.




#### Important

The new capacity must be higher than the current capacity of the LUN.

- Click **Apply**.

## Configuring iSCSI Portal Settings

- Go to **Storage Manager > iSCSI > iSCSI Storage**.
- Click **Settings**.  
The **iSCSI Portal Management** window opens.
- Configure any of the following settings.

Setting	Description
Enable iSCSI target service	This service allows iSCSI initiators to connect to iSCSI targets on the NAS.
iSCSI service port	View the port that iSCSI initiators connect to.   <b>Important</b> This is for reference only and cannot be modified.
Enable iSNS	SNS enables the automatic discovery and management of iSCSI initiators and targets within a TCP/IP network. <b>iSNS server IP:</b> Specify the IP address of the iSNS server.

- Click **Apply**.

## iSCSI ACL

The iSCSI access control list (ACL) allows you to configure a LUN masking policy for each connected iSCSI initiator. A LUN masking policy determines which LUNs the initiator is able to see and access. If no policy is specified for an iSCSI initiator, then QES applies the default policy to it.



#### Tip

- The default policy gives all iSCSI initiators full read/write access to all LUNs.
- You can edit the default policy so that all LUNs are either read-only or not visible to all iSCSI initiators, except for initiators with specific permissions from a policy.

## Adding an iSCSI LUN Masking Policy

- Go to **Storage Manager > iSCSI > iSCSI Storage**.
- Click **iSCSI ACL**.  
The **iSCSI ACL** window opens.
- Click **Add a Policy**.  
The **Add a Policy** window opens.

4. Specify the policy name.  
The name must consist of 1 to 32 characters from any of the following groups:
  - Letters: a-z, A-Z
  - Numbers: 0-9
  - Special characters: Hyphen (-), space ( ), underscore ( \_ )
5. Specify the initiator IQN.
6. Configure the access permissions for each LUN.

Permission	Description
Read Only	The iSCSI initiator can read data on the LUN, but cannot write, modify, or delete data.
Read/Write	The iSCSI initiator can read, write, modify, and delete data on the LUN.
Deny Access	The LUN is invisible to the iSCSI initiator.

**Tip**

Click the values in the columns to change the permissions.

7. Click **Apply**.

### Editing an iSCSI LUN Masking Policy

1. Go to **Storage Manager > iSCSI > iSCSI Storage** .
2. Click **iSCSI ACL**.  
The **iSCSI ACL** window opens.
3. Select a policy.
4. Click **Edit**.  
The **Modify a Policy** window opens.
5. Optional: Edit the policy name.  
The name must consist of 1 to 32 characters from any of the following groups:
  - Letters: a-z, A-Z
  - Numbers: 0-9
  - Special characters: Hyphen (-), space ( ), underscore ( \_ )
6. Optional: Configure the access permissions for each LUN.

Permission	Description
Read Only	The iSCSI initiator can read data on the LUN, but cannot write, modify, or delete data.
Read/Write	The iSCSI initiator can read, write, modify, and delete data on the LUN.
Deny Access	The LUN is invisible to the iSCSI initiator.

**Tip**

Click the values in the columns to change the permissions.

7. Click **Apply**.

## Deleting an iSCSI LUN Masking Policy

1. Go to **Storage Manager > iSCSI > iSCSI Storage** .
2. Click **iSCSI ACL**.  
The **iSCSI ACL** window opens.
3. Select a policy.
4. Click **Delete**.  
A confirmation message appears.
5. Click **OK**.

## iSCSI Target Access

For information on connecting to QES iSCSI targets from different operating systems, go to <https://www.qnap.com/en/how-to/tutorial/storage-management>.

## LUN Groups

LUN groups help you to organize, manage, and back up LUNs more easily. When you perform an action on a LUN group, the action is performed on every LUN in the group. LUN groups support the following actions:

- Map
- Unmap
- Take a snapshot
- Revert
- Clone
- Back up with SnapSync

## LUN Group Features and Limitations

### General

- A LUN group must contain at least one LUN.
- The member LUNs must all be in the same storage pool.
- Only unmapped LUNs can be added to a LUN group.
- Encrypted LUNs cannot be added to a LUN group.
- A LUN can only be in one LUN group.

### iSCSI

- Mapping a LUN group to a target maps all member LUNs to the target.



- Unmapping a LUN group from a target unmaps all member LUNs from the target.
- Adding a LUN to a mapped LUN group maps it to the group's target.
- LUNs in a LUN group cannot be mapped or unmapped individually.

## Snapshots

- Taking a LUN group snapshot takes a snapshot of every member LUN.
- You cannot revert, clone, or take snapshots of individual LUNs in a LUN group.
- Existing snapshots of a LUN become inaccessible after adding the LUN to a LUN group. They become accessible again after removing the LUN from the LUN group.
- If a LUN group is deleted, all snapshots taken of the group are deleted.
- When reverting or cloning a LUN group using a LUN group snapshot, the current group members must be the same as when the snapshot was taken. If the group members are different, the action will fail.
- Cloning a LUN group clones the group and all members. The cloned group will be unmapped.

## Creating a LUN Group

1. Go to **Main Menu > Storage Manager > iSCSI > iSCSI Storage** .
2. Select **Create > LUN Group** .
3. Specify a LUN group name.  
The name must contain 1 to 31 characters from any of the following groups:
  - Letters: A to Z, a to z
  - Numbers: 0 to 9
4. Select a storage pool.
5. Add LUNs to the group.



### Important

You must add at least one LUN.

6. Click **Apply**.

QES creates the group and then adds it to the **iSCSI Target List**.

## LUN Group Actions

Go to **Main Menu > Storage Manager > iSCSI > iSCSI Storage** and then select a LUN group to perform one of the following actions.


Action	Description
Map	Map a LUN group and all member LUNs to an iSCSI target.
Unmap	Unmap a LUN group and all member LUNs from its iSCSI target.
Modify	Add or remove LUN group members.

Action	Description
Delete	Delete an unmapped LUN group. Member LUNs are not deleted.

## LUN Group Snapshots


### Taking a LUN Group Snapshot

1. Go to **Storage Manager > iSCSI > iSCSI Storage** .
2. Select a LUN group.
3. Click **Snapshot** and then select **Take a Snapshot**.  
The **Take a Snapshot** window opens.
4. Specify a name.  
The name must consist of 1 to 24 characters from the following groups:
  - Letters: A-Z, a-z
  - Numbers: 0-9
  - Special Characters: Dash (-), period (.), underscore (\_)
5. Specify a retention time.

Option	Description
Keep For	QES retains the snapshot for the specified time period.
Keep this snapshot permanently	<p>QES retains the snapshot indefinitely.</p> <div style="border-left: 2px solid red; padding-left: 10px; margin-left: 10px;">  <p><b>Important</b> QES will still delete the snapshot when the following two conditions are met:</p> <ul style="list-style-type: none"> <li>• <b>Delete the oldest snapshots when a storage pool is full</b> is enabled at <b>Storage Manager &gt; Global Settings</b> .</li> <li>• Storage space is low.</li> </ul> </div>

6. Select the LUN snapshot type.

Type	Description
Crash consistent	The snapshot records the state of the data on the LUN.

Type	Description
Application consistent	<p>The snapshot records the state of data and applications on the LUN. The iSCSI host flushes data in memory to the LUN before QES takes a snapshot. If VMware vCenter is using the LUN, vCenter takes a virtual machine snapshot.</p> <p> <b>Important</b> This option is only available for VMware vCenter, or for Volume Shadow Copy Service (VSS) aware applications running on a Windows server. You must install QNAP Snapshot Agent on the iSCSI initiator.</p>

7. Click **OK**.

QES takes the snapshot. The snapshot appears in **Snapshot Manager**.

### Configuring a LUN Group Snapshot Schedule




#### Tip

- All LUNs in the LUN group share the same snapshot schedule.
- You can configure a separate snapshot schedule for each LUN group.

1. Go to **Storage Manager > iSCSI > iSCSI Storage** .
2. Select a LUN group.
3. Click **Snapshot**, and then select **Snapshot Manager**.  
The **Snapshot Manager** window opens.
4. Click **Schedule**.  
The **Schedule Snapshot** window opens.
5. Select **Enable schedule**.
6. Specify how often QES will take a snapshot.
7. Select the LUN snapshot type.

Type	Description
Crash consistent	The snapshot records the state of the data on the LUN.

Type	Description
Application consistent	<p>The snapshot records the state of data and applications on the LUN. The iSCSI host flushes data in memory to the LUN before QES takes a snapshot. If VMware vCenter is using the LUN, vCenter takes a virtual machine snapshot.</p> <p> <b>Important</b> This option is only available for VMware vCenter, or for Volume Shadow Copy Service (VSS) aware applications running on a Windows server. You must install QNAP Snapshot Agent on the iSCSI initiator. For details, see <a href="#">QNAP Snapshot Agent</a>.</p>

8. Specify a retention time.  
QES retains the snapshot for the specified time period. If you deselect **Keep for**, QES retains the snapshot indefinitely.
9. Click **OK**.

QES takes snapshots according to the specified schedule.

### Reverting a LUN Group

Reverting a LUN group restores each LUN in the group to the state at which the snapshot was taken. Restoring data using snapshot revert is faster than restoring individual files and folders.



#### Important

QES automatically unmaps an iSCSI LUN before reverting it.

1. Go to **Main Menu > Storage Manager > iSCSI > iSCSI Storage** .
2. Select a LUN group.
3. Select **Snapshot > Snapshot Manager** .  
The **Snapshot Manager** window opens.
4. Select a snapshot.
5. Click **Revert**.  
A confirmation message appears.



#### Warning

All changes made after the snapshot was taken will be deleted.

6. Click **OK**.

QES unmaps the LUN group from its iSCSI target and then reverts all member LUNs.

### Cloning a LUN Group

1. Go to **Main Menu > Storage Manager > iSCSI > iSCSI Storage** .
2. Select a LUN group.



### Important

The LUN group must have at least one snapshot.

3. Click **Snapshot**, and then select **Snapshot Manager**.  
The **Snapshot Manager** window opens.
4. Select a snapshot.
5. Click **Clone**.  
The **Clone Snapshot** window opens.
6. Specify a LUN group name.
7. Click **OK**.

QES clones the LUN group and all member LUNs, and then displays a confirmation message. The cloned LUN group and LUNs appear in **Main Menu > Storage Manager > iSCSI > iSCSI Storage**.

## Hosts

Hosts are computers that are authorized to connect to the NAS. You can configure access permissions for shared folders and iSCSI LUNs on this screen.

## Adding a Host

1. Go to **Main Menu > Storage Manager > HOST > Hosts**.
2. Click **Create Host**.  
The **Create Host** window opens.
3. Specify an alias.  
The alias must consist of one or more characters from the following groups:
  - Letters: A to Z, a to z
  - Numbers: 0 to 9

- Special characters: space " ", underscore "\_", period ".", hyphen "-"



### Important

The alias cannot be "all".

4. Specify a description.
5. Specify one or more of the following identifiers.
  - IPv4 address
  - IPv4 subnet
  - IPv6 address
  - IPv6 subnet
  - Network name
  - iSCSI IQN



### Tip

To obtain the iSCSI IQN of a host, perform the following actions.

- Microsoft Windows: Start Microsoft iSCSI Initiator, and then click **General**.
  - VMware ESXi: Log into the vSphere client and select an ESXi host. Go to **Configuration > Hardware > Storage Adapters**, select a vmhba, and then click **Properties**.
6. Click **Apply**.

QES adds the host to the list.

## QoS

By default, all storage services running on the NAS share the same storage I/O resources. QoS (quality of service) can guarantee a minimum and maximum level of I/O resources for each LUN and shared folder, preventing resource-heavy services from negatively affecting the performance of other services.



### Important

QoS does not support SnapSync.

## Storage Group

On the Storage Group screen you can create and manage QoS storage groups. A storage group is a group of shared folders and LUNs with a policy applied to it. QES applies the policy to each storage group member individually.

- The maximum number of storage groups is 16.
- A storage group may contain 0 to 64 LUNs and shared folders from the same storage pool.
- A LUN or shared folder can only belong to one storage group.
- Removing a storage pool deletes all storage groups associated with the pool.

Storage Manager

QoS Storage Group Management

Enable QoS

Create Setting

Group Name	Pool Name	I/O Capacity	Policy	Priority	I/O Type	Minimum	Maximum	Action
demo (1/64)	pool1	0 MB/s	QoS_Demo	Highest	IOPS	500	1000	
QES demo								
TestGroup (2/64)	pool1	0 MB/s	default_policy	Medium	IOPS	0	Unlimited	
share1								
share2								

## Enabling QoS

1. Go to **Main Menu > Storage Manager > QoS > Storage Group** .
2. Set **Enable QoS** to  .

## Creating a QoS Storage Group

1. Go to **Main Menu > Storage Manager > QoS > Storage Group** .
2. Click **Create**.  
The **QoS Configuration Wizard** window opens.
3. Specify a group name.  
The name must consist of 1 to 32 characters from the following groups:
  - Letters: A-Z, a-z
  - Numbers: 0-9
4. Specify a description.
5. Select a storage pool.



### Important

You cannot mix shared folders or LUNs from different storage pools in one storage group.

6. Select a storage type.  
Choose from the following options:
  - LUN
  - Shared Folder

**Important**

You cannot add shared folders and LUNs to the same storage group.

7. Select one or more shared folders or LUNs.
8. Click **Next**.
9. Select a QoS policy to apply to the storage group.  
QES applies the policy to each storage member individually.

**Tip**

To create a new policy, click **Create Policy**. For details, see [Creating a QoS Policy](#).

10. Click **Next**.
11. Review the storage group and policy information.
12. Click **Finish**.

## Policy

On the Policy screen you can create and manage QoS policies. A policy is a set of I/O limits and a priority which is applied to a storage group.

- The maximum number of policies is 16.
- Each policy can be applied to a maximum of 16 storage groups.
- A policy is applied to each member of a storage group individually.
- Policies only affect shared folders and LUNs in the same storage pool.

Policy	Pool Name	Priority	I/O Type	Minimum	Maximum	Action
QoS_Demo (1/16)		Highest	IOPS	500	1000	
default_policy (1/16)		Medium	IOPS	0	Unlimited	

## Creating a QoS Policy

1. Go to **Main Menu > Storage Manager > QoS > Policy**



**2. Click **Create**.**

The **Create Policy** window opens.

**3. Specify a name.**

The name must consist of 1 to 32 characters from the following groups:

- Letters: A-Z, a-z
- Numbers: 0-9

**4. Specify a description.**

**5. Select a priority.**

When a storage pool does not have enough I/O resources to fulfill the Maximum I/O requirements for all storage group members in the pool, QES uses the priority value to divide up I/O resources between members. Choose one of the following options:


Priority	Weight
Highest	100
High	80
Medium	60
Low	40
Lowest	20





**6. Select an I/O type.**

Choose one of the following options:

- IOPS (Input/output operations per second)
- MB/s (Megabytes per second)

**7. Optional: Specify throughput limits.**

Setting	Description	Unit	Allowed Values
Maximum	The maximum amount of I/O that a storage group member is allowed to perform over an extended period of time.	IOPS or MB/s, depending on the selected I/O type	0–500,000  <b>Tip</b> Setting Maximum to 0 means I/O is unrestricted.

Setting	Description	Unit	Allowed Values
Minimum	<p>The minimum amount of I/O required by this storage group member.</p> <p>QES tries to maintain the minimum I/O value for all storage group members that have a Minimum value set. When all members meet their minimum requirement, QES scales up the I/O for each member towards its Maximum value based on its priority.</p> <p> <b>Important</b></p> <ul style="list-style-type: none"> <li>• Ensure that network bandwidth available to the pool is greater than or equal to than Minimum I/O capacity.</li> <li>• There should only be one storage pool per controller when using the Minimum setting. Having more than one storage pool may result in storage group members failing to meet the QoS minimum I/O requirements.</li> </ul>	IOPS or MB/s, depending on the selected I/O type	<p>0–500,000</p> <p> <b>Important</b></p> <ul style="list-style-type: none"> <li>• The value must be less than or equal to the maximum value.</li> <li>• Setting Minimum to 0 means there is no minimum I/O requirement.</li> </ul>
Burst	<p>The maximum amount of I/O that a storage group member is allowed to process over a short period of time. Burst requests are only processed when both of the following conditions are met:</p> <ul style="list-style-type: none"> <li>• The storage pool has sufficient spare I/O capacity.</li> <li>• The storage group member has had no I/O requests for a certain amount of time (see Burst Time).</li> </ul>	IOPS or MB/s, depending on the selected I/O type	<p>0–500,000</p> <p> <b>Important</b></p> <ul style="list-style-type: none"> <li>• The value must be greater than or equal to the maximum value.</li> <li>• If Maximum is set to 0, then I/O is unrestricted and burst is not used.</li> </ul>
Burst Time	<p>If a storage group member has no I/O requests for the specified amount of time, then when it starts I/O again it can perform burst I/O for an equal amount of time.</p>	Seconds	<p>0–60</p> <p> <b>Important</b></p> <p>Setting Burst Time to 0 disables the burst feature.</p>

8. Click **Apply**.

## Reserved Pool I/O Capacity

You can reserve a percentage of storage pool I/O capacity for shared folders and LUNs without a QoS minimum value applied to them. This ensures that all shared folders and LUNs in the pool always have sufficient I/O for normal operations.

Example: Six out of ten shared folders in a storage pool have throughput limits set to "Minimum". If the reserved ratio is set to 20%, then 20% of the pool's total I/O capacity is reserved for the remaining four shared folders. This reserved I/O capacity is then allocated equally to the four shared folders when they request I/O. If only two folders request I/O, they will get 10% of the reserved I/O capacity each. If all four folders request I/O, they will get 5% of the reserved capacity each.

## Reserving Pool I/O Capacity

1. Go to **Main Menu > Storage Manager > QoS > Storage Group** .
2. Click **Setting**.  
The **Reserve Pool I/O Capacity** window opens.
3. Under **Reserved Ratio**, select the percentage of I/O capacity to reserve for each storage pool.
4. Click **Apply**.

## 4. System Settings



Go to **Control Panel > System** to configure the basic settings of the NAS.

### General Settings

Settings	Description
System Administration	This screen allows you to specify the server name and ports, and configure secure connection settings.
Time	Time settings affect event logs and scheduled tasks. This screen allows you to specify the time zone and format, and configure the system date and time.
Daylight Saving Time (DST)	Daylight saving time (DST) settings apply only to regions that use DST. This screen allows you to either automatically adjust the system clock or to manually configure the settings.
Codepage	This screen allows you to select the language that the NAS uses to display file and directory information.
Login Screen	This screen allows you to customize the NAS login screen.

### Configuring the System Administration Settings

- Go to **Control Panel > System > General Settings > System Administration**.
- Specify the following information:

Field	User Action
<b>Server name</b>	<p>Specify a NAS name that contains up to 14 characters from any of the following groups:</p> <ul style="list-style-type: none"> <li>Letters: A to Z, a to z</li> <li>Numbers: 0 to 9</li> </ul> <p> <b>Important</b> The server name cannot consist of numbers only.</p> <ul style="list-style-type: none"> <li>Dashes (-)</li> </ul> <p> <b>Important</b> Ensure that dashes are not preceded or followed by a space.</p>
<b>System port</b>	Specify the port that you will use to access the web interface. The default port is 8080.
<b>Service port</b>	Specify a port that client services and utilities can use to access the NAS.
<b>Enable secure connection (SSL)</b>	Select this option and specify a port number to allow users to connect to the NAS using HTTPS.
<b>Force secure connection (SSL) only</b>	Select this option to require all users to connect to the NAS using only HTTPS.

- Click **Apply**.

## Configuring the Time Settings




### Important

You must configure the system time correctly to avoid the following issues.

- When using a web browser to connect to the NAS or save a file, the displayed time of the action will be incorrect.
- Event logs do not reflect the exact time that events occurred.
- Scheduled tasks run at the wrong time.

1. Go to **Control Panel > System > General Settings > Time** .
2. Select the time zone.
3. Specify the date and time format.
4. Select the time setting.

Option	User Action
<b>Manual setting</b>	Specify the date and time.
<b>Synchronize with an Internet time server automatically</b>	<p>Ensure that your NAS is connected to the Internet, and then specify the following information:</p> <ul style="list-style-type: none"> <li>• <b>Server:</b> Name of the Network Time Protocol (NTP) server Examples: time.nist.gov, time.windows.com</li> <li>• <b>Time interval:</b> Number of hours or days in between each time synchronization task</li> </ul> <p> <b>Tip</b> To manually synchronize your NAS time with the NTP server, click <b>Update</b>.</p>

5. Click **Apply**.

## Configuring the Daylight Saving Time (DST) Settings

These settings are available for NAS users in regions that use Daylight Saving Time (DST). Users outside these regions can ignore these settings.


1. Go to **Control Panel > System > General Settings > Daylight Saving Time** .



### Tip

If you do not want to manually configure the DST settings, select **Adjust system clock automatically for daylight saving time**, then click **Apply**. Otherwise, perform steps 2 to 5.

2. Select **Enable customized daylight saving time table**.
3. Perform any of the following actions:

Action	Steps
Add DST data	<ol style="list-style-type: none"> <li>Click <b>Add Daylight Saving Time Data</b>.</li> <li>Specify a time period and the number of minutes to offset.</li> <li>Click <b>Apply</b>.</li> </ol>
Edit DST data	<ol style="list-style-type: none"> <li>Select a DST schedule from the table.</li> <li>Click  .</li> <li>Specify a time period and the number of minutes to offset.</li> <li>Click <b>Apply</b>.</li> </ol>
Delete DST data	<ol style="list-style-type: none"> <li>Select a DST schedule from the table.</li> <li>Click <b>Delete</b>.</li> <li>Click <b>OK</b>.</li> </ol>

4. Select a DST schedule from the table.

5. Click **Apply**.

## Configuring the Codepage Settings

All files and directories on the NAS use Unicode encoding. If your operating system or FTP client does not support Unicode, you must configure the following settings to properly view files and directories on the NAS.

For details on modifying FTP settings, see [Configuring FTP Service Settings](#).

1. Go to **Control Panel > System > General Settings > Codepage** .

2. Select the language of your operating system.

3. Click **Apply**.

## Configuring the Login Screen

1. Go to **Control Panel > System > General Settings > Login Screen** .

2. Specify the following information:

Field	User Action
<b>Show firmware version</b>	Select this option to display the QES firmware version.
<b>Show the link bar</b>	Select this option to display links to myQNAPCloud, QNAP Utility, and Feedback.
<b>Background</b>	Select a background image or fill color.
<b>Logo</b>	Select a logo.
<b>Message</b>	Specify a message that will appear on the login screen. You can use a maximum of 120 ASCII characters.

- Optional: Click **Preview** to view the changes.
- Click **Apply All**.

## Network

### IPv4

You can configure the following settings on this screen:

- IP address
- Default gateway
- DNS
- Port trunking
- VLAN

### IP Address

ES series NAS devices have one management interface and two Ethernet interfaces on each controller. The management interface allows users to access and manage the NAS, but is also used by certain network protocols such as AD, NTP, and SNMP. The Ethernet interfaces are dedicated to data transfer for iSCSI and shared folders.




#### Tip

You can configure services to use the management interface or Ethernet interfaces by enabling service binding. For more information, see [Service Binding](#).

You can connect the Ethernet interfaces to different switches and configure the TCP/IP settings separately. The NAS acquires two IP addresses, which allow access from two different subnets. When using Qfinder Pro, the IP address of Ethernet 1 is displayed only in LAN 1 and the IP address of Ethernet 2 is displayed only in LAN 2.

### Configuring IPv4 Settings

- Go to **Control Panel > System > Network > IPv4**.
- Identify the interface that you want to configure and then click . The **TCP/IP - Property** window opens.
- Select the network transfer speed of the interface. The default setting is **Auto-negotiation**, which means QES automatically detects and sets the transfer rate.
- Configure the DHCP settings.

Setting	Description
Obtain the IP address settings automatically via DHCP	QES automatically obtains the IP address and network settings.
Use static IP address	You must specify the IP address, subnet mask, and default gateway.

**Tip**

In QES 1.1.3 and later, you can specify a default gateway for an interface that is part of a VLAN.

**5. Enable jumbo frames.**

Jumbo Frames are Ethernet frames that are larger than 1500 bytes. They are designed to enhance Ethernet networking throughput, and to reduce CPU usage when transferring large files.

QES uses standard Ethernet frames (1500 bytes) by default and supports the following jumbo frame sizes:

- 4074
- 7418
- 9000

**Important**

- Using jumbo frames requires a network speed of 1000 Mbps or higher.
- All connected network devices must enable jumbo frames and use the same MTU size.
- In QES, the selected jumbo frame size applies to the size of the data payload only. It does not include overhead data, such as the Ethernet, VLAN, and IP headers. This means that actual packet size will be larger than the selected value. Ensure that the MTU size on all connected network devices is higher than the selected jumbo frame size.

**6. Click **Apply**.**

A confirmation message appears.

**7. Click **OK**.****Configuring Port Trunking**

Port trunking enables you to combine two or more Ethernet interfaces for increased bandwidth, load balancing and fault tolerance.

1. Go to **Control Panel > System > Network > IPv4 > IP Address** .
2. Click **Port Trunking**.  
The **TCP/IP - Port Trunking** window appears.
3. Select two or more network interfaces that you want to add to the trunking group.

**Important**

Ensure that the ports are connected to the same switch.

**4. Select a port trunking mode.**

The default option is **Loadbalance**.

**Important**


Some port trunking modes must be supported by your network switches. Selecting an unsupported mode may affect network performance or cause the network interface to freeze.



Mode	Description	Benefits	Requires Switch Support
Failover	QES sends and receives traffic using only the master port, which is the interface that was added first to the trunking group. If the master port becomes unavailable, QES uses the next active port.	<ul style="list-style-type: none"> <li>• Redundancy</li> <li>• Fault tolerance</li> </ul>	No
Lacp (IEEE® 802.3ad Link Aggregation Control Protocol)	QES negotiates a set of aggregable links with the peer in to one or more Link Aggregated Groups (LAGs). Each LAG is composed of ports of the same speed, which are set to full-duplex operation. Traffic is balanced across the ports in the LAG with the greatest total speed. In the event of changes in physical connectivity, QES will quickly reconfigure the LAG. Incoming traffic is accepted by any active port.	<ul style="list-style-type: none"> <li>• Redundancy</li> <li>• Fault tolerance</li> <li>• Greater bandwidth</li> </ul>	Yes
Loadbalance	QES distributes outgoing traffic based on the current load on each interface, which is computed relative to the interface's speed. The current interface receives incoming traffic. If that interface fails, another interface takes over its MAC address.	<ul style="list-style-type: none"> <li>• Redundancy</li> <li>• Fault tolerance</li> <li>• Increased throughput</li> </ul>	No
Roundrobin	QES sends packets in sequential order from the first active port to the last.	<ul style="list-style-type: none"> <li>• General purpose load balancing</li> <li>• Fault tolerance</li> </ul>	Supports static trunking. Ensure static trunking is enabled on the switch.

5.



Optional: Click  to specify a hashing method.

Hashing Method	Description
L2/Mac	MAC address
L3/IP	IP address
L4/Port	Port number

6. Click **Apply**.

### Virtual LANs (VLANs)

A Virtual LAN (VLAN) enables a group of network devices to communicate as if they were attached to the same network switch, even if they are located in different physical locations. You can use VLANs to increase security and flexibility, and to decrease network latency and load.

QES supports a maximum of 512 VLANs.

### Adding an Interface to a VLAN



#### Important

To use both VLANs and port trunking, you must configure port trunking first.

1. Go to **Control Panel > System > Network > IPv4 > IP Address** .

2. Click **VLAN**.  
The **VLAN** window opens.
3. Click **Add**.  
The **Add a VLAN** window opens.
4. Specify a VLAN ID.  
You must specify a VLAN ID between 1 and 4094.
5. Select an interface.  
You can select a management or data interface.
6. Click **Apply**.


The VLAN appears in the VLAN list.

## DNS Server

You can configure the NAS to obtain a DNS server address automatically, or manually specify the IP address of a DNS server.

### Configuring IPv4 DNS Settings

1. Go to **Control Panel > System > Network > IPv4 > DNS Server** .
2. Select one of the following options.

Option	User Action
Automatically obtain the IP address using DHCP.	Select <b>Obtain DNS server address automatically</b> .
Manually specify the IP address.	<ol style="list-style-type: none"> <li>a. Select <b>Use the following DNS server address</b>.</li> <li>b. Obtain the IP addresses of the primary and the secondary DNS servers from your network administrator or ISP.</li> <li>c. Specify the following information:               <ol style="list-style-type: none"> <li>1. Primary DNS server</li> <li>2. Secondary DNS server</li> </ol> </li> </ol> <div style="display: flex; align-items: center;">  <p><b>Important</b> QNAP recommends specifying at least one DNS server to allow URL lookups.</p> </div>

3. Click **Apply**.

## Default Gateway

You must specify a network interface for the default gateway. All outgoing network traffic passes through this interface by default.

### Configuring the IPv4 Default Gateway

1. Go to **Control Panel > System > Network > IPv4 > Default Gateway** .
2. Under **Use the settings from**, select an interface that QES will use as the default route.



### Important

To use an interface as the default gateway:

- The interface must have a gateway IP address configured. If the interface obtains its IP address using DHCP, ensure that the DHCP server assigns a gateway address.
- The interface's link status must be `Connected`.


3. Add a static route.
  - a. Click **Static Route**.  
The **Static Route** window opens.
  - b. Specify an IP or subnet address.
  - c. Select an interface.
  - d. Click **Apply**.  
QES adds the IP address and interface to the routing table.
  - e. Close the **Static Route** window.
4. Click **Apply**.


## IPv6

You can configure IPv6 settings on this screen. These settings allow hosts on the same subnet to automatically acquire IPv6 addresses from the NAS. The following NAS services support IPv6:

- CIFS/SMB
- NFS
- FTP
- iSCSI
- SNMP
- SSH

### Configuring IPv6 Settings


1. Go to **Control Panel > System > Network > IPv6 > IP Address** .
2. Select **Enable IPv6**.
3. Click **Apply**.
4. Go to **Control Panel > System > Network > IPv6 > IP Address** .
5. Identify the interface you want to configure, and then click  .  
The **IPv6 - Property** window appears.
6. Specify an IPv6 configuration.

Option	User Action
<b>IPv6 Auto-Configuration</b>	Select this option to automatically obtain the IPv6 settings if an IPv6-enabled router is available on the network.
<b>Use static IP address</b>	<p>Select this option to use a static IP address. You must specify the following information:</p> <ul style="list-style-type: none"> <li>• IPv6 address</li> <li>• Prefix length</li> </ul> <div style="border-left: 2px solid orange; padding-left: 10px; margin-top: 10px;">  <b>Tip</b>                      Obtain the prefix and the prefix length information from your ISP.                 </div> <ul style="list-style-type: none"> <li>• Default gateway IPv6 address</li> </ul>

7. Click **Apply**.

### Configuring IPv6 DNS Settings

1. Go to **Control Panel > System > Network > IPv6 > DNS Server** .
2. Select one of the following options.

Option	User Action
Automatically obtain the IP address using DHCP.	Select <b>Obtain DNS server address automatically</b> .
Manually specify the IP address.	<p><b>a.</b> Select <b>Use the following DNS server address</b>.</p> <p><b>b.</b> Obtain the IP addresses of the primary and the secondary DNS servers from your network administrator or ISP.</p> <p><b>c.</b> Specify the following information:</p> <ol style="list-style-type: none"> <li>1. Primary DNS server</li> <li>2. Secondary DNS server</li> </ol> <div style="border-left: 2px solid red; padding-left: 10px; margin-top: 10px;">  <b>Important</b>                      QNAP recommends specifying at least one DNS server to allow URL lookups.                 </div>

3. Click **Apply**.

### Service Binding

NAS services run on all available network interfaces by default. Service binding enables you to allow or block services from specific network interfaces to increase security. You can bind services to one or more specific wired or wireless network interfaces.

Applying changes to service binding settings does not affect the ongoing connections of online users. On their next session, these users will only be able to connect to services using the specified network interfaces.

### Configuring Service Binding

1. Go to **Control Panel > System > Network > Service Binding** .

2. Select **Enable Service Binding**.  
QES displays the available network interfaces.
3. Select the network interfaces that you want each service to use.
4. Click **Apply**.

**Tip**

If QES is unable to save the settings, click **Refresh** to list the current network interfaces on the NAS and then configure the settings again.

## Configuring Proxy Server Settings

1. Go to **Control Panel > System > Network > Proxy** .
2. Select **Use a proxy server**.
3. Specify a proxy server and port number.  
All internet requests will pass through this proxy server.
4. Optional: Select **Authentication**.
5. Optional: Specify a username and password.
6. Click **Apply**.

## Security

### Allow/Deny List

Go to **Control Panel > System > Security > Allow/Deny List** to select the security level for all your NAS connections.

**Important**

After modifying security level settings, the new settings do not take effect until a client has created a new connection session (disconnected then reconnected)

Security Level	Option	Description
No Security	<b>Allow all connections</b>	The NAS can connect to all IP addresses and network domains.
Low	<b>Deny connections from the list</b>	The NAS cannot connect to all IP addresses or network domains on the IP block list.
High	<b>Allow connections from the list only</b>	The NAS can only connect to the IP addresses or network domains specified on the IP allow list.

### Creating an IP Block List

1. Go to **Control Panel > System > Security > Allow/Deny List** .
2. Select **Deny connections from the list**.
3. Click **Add**.  
The IP configuration window appears.
4. Select **IPv4** or **IPv6**.

5. Specify an IP address, netmask, or IP range.
6. Click **Create**.

**Tip**

To remove an IP address, netmask, or IP range, select an entry from the table, then click **Remove**.

7. Click **Apply**.

## Creating an IP Allow List

1. Go to **Control Panel > System > Security > Allow/Deny List** .
2. Select **Allow connections from the list only**.
3. Click **Add**.  
The IP configuration window appears.
4. Select **IPv4** or **IPv6**.
5. Specify an IP address, netmask, or IP range.
6. Click **Create**.

**Tip**

To remove an IP address, netmask, or IP range, select an entry from the table, then click **Remove**.

7. Click **Apply**.

## Network Access Protection

Network access protection enhances system security. You can block an IP for a specific period or indefinitely after a specified number of unsuccessful connection attempts.

### Configuring Network Access Protection

1. Go to **Control Panel > System > Security > Network Access Protection** .
2. Select **Enable Network Access Protection**.
3. Select the connection methods that you want to protect.
4. Specify the following information:
  - Time period
  - Maximum number of unsuccessful login attempts
  - Amount of time the IP will be blocked
5. Click **Apply**.

## Certificate & Private Key

Secure Socket Layer (SSL) is a protocol used for secure data transfers and encrypted communication between web servers and browsers. To prevent receiving alert or error messages when accessing the web interface, upload an SSL certificate from a trusted provider.

### Uploading an SSL Certificate and Private Key



#### Warning

The NAS supports only X.509 PEM certificates and private keys. Uploading an invalid security certificate may prevent you from logging onto the NAS through SSL. To resolve the issue, you must restore the default security certificate and private key. For details, see [Restoring the Default SSL Certificate and Private Key](#).

1. Go to **Control Panel > System > Security > Certificate & Private Key** .
2. Specify an SSL certificate.



#### Tip

Click **View Sample** to view a valid SSL certificate sample.

3. Specify a private key.



#### Tip

Click **View Sample** to view a valid private key sample.

4. Click **Apply**.

### Downloading the SSL Certificate and Private Key

1. Go to **Control Panel > System > Security > Certificate & Private Key** .
2. Click **Download Certificate**.  
The SSL certificate is downloaded.
3. Click **Download Private Key**.  
The private key is downloaded.

### Restoring the Default SSL Certificate and Private Key

1. Go to **Control Panel > System > Security > Certificate & Private Key** .
2. Click **Restore Default Certificate & Private Key**.  
A confirmation message appears.
3. Click **OK**.
4. Click **Apply**.

## Password Policy

Enabling password policy rules will force NAS users to set stronger, more secure passwords.

### Configuring the Password Policy

1. Go to **Control Panel > System > Security > Password Policy > Password Strength** .

## 2. Select the password strength criteria.

- A new password has to contain characters from at least three of the following classes: lowercase letters, uppercase letters, digits, and special characters.
- No character in the new password may be repeated three (or more) times consecutively.  
Example: AAA.
- The password must not be the same as the username, or username reversed.  
Example: Username: user1, password: 1resu.

## 3. Click **Apply**.

## Hardware

### Reset Button

You must enable the configuration reset switch to perform a basic or advanced system reset using the NAS reset button. You can enable the configuration reset switch on the **General** screen ( **Control Panel** > **System** > **Hardware** > **General** ).

For details on reset options, see [System Reset and Restore to Factory Default](#).

### Buzzer

The buzzer inform you of any ongoing NAS operations or errors. You can enable this option on the **Buzzer** screen ( **Control Panel** > **System** > **Hardware** > **Buzzer** ).

Option	Description
<b>System operations</b>	The buzzer sounds when the NAS starts, shuts down, or updates the firmware.
<b>System events</b>	The buzzer sounds when errors or critical events occur.



#### Tip

You can find the full list of NAS events and their corresponding buzzer sounds in your NAS hardware user guide.

## Smart Fan

### Enabling the Smart Fan

1. Go to **Control Panel** > **System** > **Hardware** > **Smart Fan** .
2. Select **Enable smart fan (recommended)**.
3. Specify a smart fan setting.



Option	Description
Pre-set temperature	<ul style="list-style-type: none"> <li>• The smart fan rotates at low speed when the system temperature is lower than 50°C (122°F).</li> <li>• The smart fan rotates at high speed when any of the following conditions occur. <ul style="list-style-type: none"> <li>• The system temperature is higher than or equal to 60°C (140°F).</li> <li>• The CPU temperature is higher than or equal to 75°C (167°F).</li> <li>• The hard drive temperature is higher than or equal to 52°C (125°F).</li> </ul> </li> </ul>
User-specified temperature	The smart fan rotates at low and high speed according to the temperature you specify.

4. Click **Apply All**.

### Configuring the Fan Speed Manually

1. Go to **Control Panel > System > Hardware > Smart Fan**.
2. Select **Set fan rotation speed manually**.
3. Select a fan speed.
4. Click **Apply All**.

### Backup Battery Unit (BBU)

You can schedule a learning cycle for the backup battery units (BBUs). A learning cycle is when a controller performs a battery calibration operation to determine the battery's condition. During this cycle, the system switches to write-through mode to protect data integrity.

In write-through mode, the NAS writes data directly to HDDs/SSDs instead of writing to the RAM first. This prevents data loss if a power outage occurs before the NAS finishes writing data. Because this process takes up memory, QNAP strongly recommends scheduling the learning cycle during off-peak hours.

### Configuring the Backup Battery Unit (BBU) Settings

QNAP strongly recommends scheduling the learning cycle during off-peak hours.

1. Go to **Control Panel > System > Hardware > BBU**.
2. Select **Enable BBU learning schedule**.
3. Specify a learning cycle schedule.
4. Click **Apply All**.

### Power

You can configure Wake-on-LAN (WOL) and specify the NAS behavior after a power outage.

## Wake-on-LAN (WOL)

You can power on the NAS remotely using the Wake-on-LAN (WOL) protocol in Qfinder. This feature is enabled by default.



### Important

If the power cable is disconnected when the NAS is powered off, WOL will not work until the NAS has been manually powered on.

## Enabling or Disabling Wake-on-Lan (WOL)

1. Go to **Control Panel > System > Power > Wake-on-LAN (WOL)** .
2. Select **Enable** or **Disable**.
3. Click **Apply**.

## Power Recovery

This feature allows you to configure the power on and off status of the NAS after a power outage.

## Configuring the Power Recovery Settings

1. Go to **Control Panel > System > Power > Power Recovery** .
2. Select a power recovery setting.
  - Resume the server to the previous power-on or power-off status.
  - Turn on the server automatically.
  - The server should remain off.
3. Click **Apply**.

## Notification

You can configure the NAS to send you alert messages when system events, such as warnings or errors, occur.

## Email Alerts

You can configure an SMTP server so you can receive alert notifications through email.

## Configuring an Email Server

1. Go to **Control Panel > System > Notification > Email > SMTP Server** .
2. Specify the following information.


Field	User Actions
Select an e-mail account	Select an email service. To use a custom SMTP server, see <a href="#">Configuring a Custom SMTP Server</a> .

Field	User Actions
<b>E-mail</b>	Specify an email address that contains a maximum of 128 characters. This is for testing purposes.
<b>Password</b>	Specify the password of the email account. The password must contain a maximum of 128 characters.

3. Click **Apply**.

## Configuring a Custom SMTP Server

1. Go to **Control Panel > System > Notification > Email > SMTP Server**.
2. Under **Select an e-mail account**, select **Custom**.
3. Specify the following information.

Field	User Actions
<b>SMTP Server</b>	Specify an SMTP server name such as <code>smtp.gmail.com</code> .
<b>Port Number</b>	Specify the port number for the SMTP server.
<b>E-mail</b>	Specify the email address that will receive QES notifications.
<b>Username</b>	Specify a username that contains a maximum of 128 characters. This field is optional.
<b>Password</b>	Specify a password that contains a maximum of 128 characters. This field is optional.
<b>Secure connection</b>	<p>Select one of the following options.</p> <ul style="list-style-type: none"> <li>• <b>SSL</b>: Use SSL to secure the connection.</li> <li>• <b>TLS</b>: Use TSL to secure the connection.</li> <li>• <b>None</b>: Do not use a secure connection.</li> </ul> <p> <b>Tip</b> QNAP recommends enabling a secure connection if the SMTP server supports it.</p>
<b>Authentication</b>	<p>Select one of the following SMTP authentication options.</p> <ul style="list-style-type: none"> <li>• None</li> <li>• LOGIN</li> <li>• PLAIN</li> <li>• CRAM-MD5</li> </ul>

4. Click **Apply**.

## SMS Alerts

Configuring the SMSC server settings allows QES to send SMS messages to specified phone numbers from the NAS. You can use the default SMS service or specify a custom service provider.

## Configuring SMS Alerts from Clickatell Communicator/Central



### Important

Clickatell Communicator/Central is for Clickatell accounts created before November 2016.

1. Go to **Control Panel > System > Notification > SMS > SMSC Server** .
2. Under **SMS Service Provider**, select **Clickatell -Communicator/Central**.
3. Specify the following information.

Field	User Action
<b>SMS server login name</b>	Specify your Clickatell username. The username must contain a maximum of 32 characters.
<b>SMS server login password</b>	Specify your Clickatell password. The password must contain a maximum of 32 characters.
<b>API ID</b>	Specify your Clickatell API ID.

4. Click **Apply**.

## Configuring SMS Alerts from Clickatell SMS Platform



### Important

Clickatell SMS Platform is for Clickatell accounts created from November 2016 onwards.

1. Go to **Control Panel > System > Notification > SMS > SMSC Server** .
2. Specify the following information.


Field	User Action
Alias	Specify your Clickatell alias.
API Key	Specify your Clickatell API key.

3. Click **Apply**.

## Configuring SMS Alerts from a Custom Service Provider

1. Go to **Control Panel > System > Notification > SMS > SMSC Server** .
2. Under **SMS Service Provider**, select **Add SMS service provider**.
3. Specify the following information.

Field	Description
<b>SMS service provider</b>	Specify the name of the service provider. The name must contain a maximum of 32 characters.

Field	Description
URL template text	<p>Specify the URL template text according to the format of your SMS service provider. Use the following replaceable URL template parameters:</p> <ul style="list-style-type: none"> <li>• @@UserName@@: Specify the username for this connection.</li> <li>• @@Password@@: Specify the password for this connection.</li> <li>• @@PhoneNumber@@: Specify the phone number where the SMS messages are sent. This parameter is required.</li> <li>• @@Text@@: Specify the text content of the SMS message. This parameter is required.</li> </ul> <p> <b>Important</b> You will not be able to receive SMS messages if the template text does not match the format used by your SMS service provider.</p>

4. Click **Apply**.

## Configuring Notification Settings

1. Go to **Control Panel > System > Notification > Alert Notification**.
2. Configure the alert notification settings.

Alert Notification	Description
System error alert	QES sends an alert notification through email or SMS when a system error occurs. System errors include failures in updating applications or enabling NAS features.
System warning alert	<p>QES sends an alert notification through email when the following occur.</p> <ul style="list-style-type: none"> <li>• NAS resources, such as storage space and memory, are critically low.</li> <li>• The hardware behaves abnormally.</li> </ul>

3. Configure the email notification settings.
  - a. Verify that an SMTP server is configured.  
For details, see [Email Alerts](#).
  - b. Specify one to two email addresses that will receive notifications.
  - c. Click **Send a test E-mail**.
4. Configure the SMS notification settings.
  - a. Verify that an SMSC server is configured.  
For details, see [SMS Alerts](#).
  - b. Select a country code.
  - c. Specify one to two mobile phone numbers that will receive notifications.

d. Click **Send a test SMS message**.

5. Click **Apply**.

## Firmware Update

### Checking for Live Updates

QNAP recommends backing up all data before updating the firmware.



#### Important

You cannot perform a QES firmware update if the High Availability status is **Takeover**. This prevents firmware inconsistencies between storage controllers.

1. Go to **Control Panel > System > Firmware Update > Live Update** .
2. Perform one of the following actions:

Action	Description
Click <b>Check for Live Update</b> .	QES immediately checks for firmware updates.
Select <b>Automatically check if a newer version is available when logging into the NAS web administration interface</b> .	QES periodically checks for firmware updates. When an update is available, QES notifies you after you log in as an administrator.

3. Click **Apply**.

### Updating the Firmware Manually

QNAP recommends backing up all data before updating the firmware.



#### Important

You cannot perform a QES firmware update if the High Availability status is **Takeover**. This prevents firmware inconsistencies between storage controllers.

1. Download the NAS firmware.
  - a. Go to <http://www.qnap.com/download>.
  - b. Read the release notes and confirm that your NAS mode supports the new firmware.
  - c. Download the firmware package.
  - d. Extract the firmware image file.
2. Go to **Control Panel > System > Firmware Update > Firmware Update** .
3. Click **Browse** and then select the extracted firmware image file.
4. Click **Update System**.
5. Select a restart option.

Option	Description
<b>Automatically apply new firmware and restart the system after update</b>	The NAS automatically installs the new firmware and restarts the system once the update is complete.

Option	Description
<b>Restart the system without interrupting services</b>	This option is only available on dual-controller ES NAS models. The NAS passes control from the primary controller to the secondary controller, and then restarts. After restarting, the NAS passes control back to the primary controller. This process takes more time but ensures that all services stay running.

6. Click **OK**.

The firmware update may require a few minutes or longer to complete, depending on system load and storage pool utilization.

## Updating the Firmware Using Qfinder Pro

QNAP recommends backing up all data before updating the firmware.



### Important

You cannot perform a QES firmware update if the High Availability status is **Takeover**. This prevents firmware inconsistencies between storage controllers.

1. Download the NAS firmware.
  - a. Go to <http://www.qnap.com/download>.
  - b. Read the release notes and confirm the following:
    - The NAS model and firmware version match.
    - Updating the firmware is necessary.
  - c. Ensure that the product model and firmware version are correct.
  - d. Download the firmware package.
  - e. Extract the firmware image file.
2. In Qfinder Pro, select a NAS model.
3. Go to **Tools > Update Firmware**.



### Tip

You can also right-click the NAS model in the list, and then click **Update Firmware**.

The **Firmware Update** window appears.

4. Log on to the NAS as an administrator.
5. Click **Browse**, and then select a firmware image file.
6. Perform one of the following actions:

Action	Steps
Update a single NAS device	Select a NAS model from the list.

Action	Steps
Update multiple NAS devices with the same model number	<ol style="list-style-type: none"> <li>a. Select a NAS model from the list.</li> <li>b. Select <b>Update all the devices with the same model number within the network.</b></li> </ol>

7. Click **Start**.

## Backup/Restore

### Backing Up the System Settings

1. Go to **Control Panel > System > Backup/Restore > Backup/Restore Settings** .
2. Click **Backup**.  
QES exports the system settings as a BIN file.

### Restoring the System Settings



#### Warning

If the backup files contain users or groups that already exist on the NAS, QES overwrites the duplicate information on the NAS.

1. Go to **Control Panel > Sytem > Backup/Restore > Backup/Restore Settings** .
2. Select a system settings BIN file.
3. Click **Restore**.

### System Reset and Restore to Factory Default

QES provides different options for resetting or restoring the NAS to its default state.



System Reset	Description	User Action
Basic system reset	<p>This resets the following settings to the default values without deleting user data.</p> <ul style="list-style-type: none"> <li>• System administrator password: admin</li> <li>• TCP/IP configuration: <ul style="list-style-type: none"> <li>• Obtain IP address settings automatically via DHCP</li> <li>• Disable jumbo frames</li> </ul> </li> <li>• System port: 8080 (system service port)</li> <li>• Security level: Low (Allow all connections)</li> <li>• LCD panel password: (blank)</li> <li>• VLAN: Disabled</li> <li>• Service binding: All NAS services can run on all available network interfaces.</li> </ul>	<p>Use one of the following methods:</p> <ul style="list-style-type: none"> <li>• Basic system reset using QES <ol style="list-style-type: none"> <li>a. Go to <b>Control Panel &gt; System &gt; Hardware &gt; Backup/Restore &gt; Restore to Factory Default</b> .</li> <li>b. Click <b>Reset Settings</b>.</li> </ol> </li> <li>• Basic system reset using the reset button <ol style="list-style-type: none"> <li>a. Power on the NAS.</li> <li>b. Press and hold the reset button for 3 seconds.</li> </ol> </li> </ul>
Advanced system reset	<p>This performs a basic system reset and deletes all user and user group settings. It does not delete user data.</p>	<p>Use one of the following methods:</p> <ul style="list-style-type: none"> <li>• Advanced system reset using QES <ol style="list-style-type: none"> <li>a. Go to <b>Control Panel &gt; System &gt; Hardware &gt; Backup/Restore &gt; Restore to Factory Default</b> .</li> <li>b. Click <b>Reset System Pool</b>.</li> </ol> </li> <li>• Advanced system reset using the reset button <ol style="list-style-type: none"> <li>a. Power on the NAS.</li> <li>b. Press and hold the reset button for 10 seconds.</li> </ol> </li> </ul>



### Important

Back up all data before reinitializing the NAS.

Reinitialize	Description	User Action
Reinitialize NAS	<p>This deletes the operating system and all stored data.</p>	<ol style="list-style-type: none"> <li>1. Go to <b>Control Panel &gt; System &gt; Backup/Restore &gt; Restore to Factory Default</b> .</li> <li>2. Click <b>Reinitialize NAS</b>.</li> </ol>

Reinitialize	Description	User Action
Reinitialize QTS	This deletes all system settings and stored data, and then installs QTS. Only TES and TDS NAS models support this feature.	<ol style="list-style-type: none"> <li>1. Go to <b>Control Panel &gt; System &gt; Backup/Restore &gt; Restore to Factory Default</b> .</li> <li>2. Click <b>Reinitialize QTS</b>. A confirmation message appears.</li> <li>3. Click <b>OK</b>.</li> </ol>
Reinitialize QES	This deletes all system settings and stored data, and then installs QES. Only TES and TDS NAS models support this feature.	<ol style="list-style-type: none"> <li>1. Go to <b>Control Panel &gt; System &gt; Backup/Restore &gt; Restore to Factory Default</b> .</li> <li>2. Click <b>Reinitialize QES</b>. A confirmation message appears.</li> <li>3. Click <b>OK</b>.</li> </ol>

## External Device

### Uninterruptible Power Supply (UPS)

The NAS connects to uninterruptible power supply (UPS) devices that can protect your NAS from abnormal system shutdowns resulting from power disruptions.

#### Configuring an SNMP UPS

1. Ensure that the NAS is connected to the same network as the UPS.
2. Go to **Control Panel > System > External Device > UPS** .
3. Select **Enable UPS Support**.
4. Specify the IP address of the network UPS server.
5. Select a power failure option for the NAS.

Option	Description
<b>Turn off the server after the AC power fails</b>	The NAS shuts down after a specified time and then remains powered off.
<b>Enter auto-protection mode after the AC power fails</b>	The NAS stops all running services after a specified time and then resumes the stopped services after power is restored.

6. Specify the number of minutes the NAS should wait before performing the action that you selected.



#### Important

If the remaining UPS power during an outage is less than 15%, the NAS performs the selected action after 30 seconds regardless of the specified waiting time.

7. Click **Apply All**.

## NAS Behavior During a Power Outage

The following table describes the possible scenarios during a power outage and the corresponding NAS behavior.

Phase	Scenario	NAS Behavior
Phase 1: From the start of the power outage until the end of the specified waiting time	The power outage starts.	The NAS detects the remaining UPS power.
	The UPS power is more than 15%.	Depending on your UPS settings, the NAS powers off or switches to auto-protection mode after the specified waiting time lapses.
	The UPS power is less than 15%.	After 30 seconds, the NAS automatically powers off or switches to auto-protection mode regardless of the specified waiting time.
	The power resumes.	The NAS remains operational.
Phase 2: From the end of your specified waiting time to when the UPS runs out of power	The power does not resume and the NAS is in auto-protection mode.	The NAS stops all running services. All shared folders and iSCSI LUNs become inaccessible.
	The power does not resume and the NAS is powered off.	The NAS remains powered off.
	The power resumes and the NAS is in auto-protection mode.	The NAS reboots and resumes its previous state.
	The power resumes and the NAS is powered off.	The NAS remains powered off.
Phase 3: From when the UPS device runs out power to when the power is restored	The power does not resume and the NAS is in auto-protection mode.	The NAS powers off.
	The power does not resume and the NAS is powered off.	The NAS remains powered off.
	The power resumes.	The NAS applies the specified power recovery settings. For details, see <a href="#">Configuring the Power Recovery Settings</a> .

## System Status

You can check the status of your NAS on the System Status screen ( **Control Panel** > **System** > **System Status** ).

Section	Description
<b>Controller Information</b>	This section displays the information (such as CPU and memory usage, storage pool usage, shared folders and LUNs) for each controller.
<b>System Information</b>	This section displays the system information (such as the server name, memory, firmware and system up time) for each controller.
<b>Network Status</b>	This section displays the current network settings and statistics for each network interface.

Section	Description
<b>System Service</b>	This section displays the current status of system services, such as Microsoft networking, NFS, FTP, and File Station.
<b>Hardware Information</b>	This section displays the basic NAS hardware information, such as CPU usage, memory, cache, and system fan speed.
<b>Resource Monitor</b>	This section displays the CPU usage, disk usage, and bandwidth transfer statistics of the NAS.

## System Logs

You can view logs on the system logs screen at **Control Panel > System > System Logs** .

System Event Logs							
Type	Date	Time	Users	Source IP	Controller Name	Event ID	Content
	2020/05/16	16:00:04	System	127.0.0.1	SCB	0x040500fb	[Snapshot Schedule] Scheduled Snapshot auto-20200516-160003 created for CYSnapsyncDST
	2020/05/16	16:00:03	System	127.0.0.1	SCB	0x040500fb	[Snapshot Schedule] Scheduled Snapshot auto-20200516-160003 created for CYSnapsyncDST2
	2020/05/16	16:00:02	System	127.0.0.1	SCB	0x0405017b	[Snapshot] Deleted snapshot "auto-20200509-150003". The snapshot expired and was automatically deleted by the system.
	2020/05/16	16:00:02	System	127.0.0.1	SCB	0x0405017b	[Snapshot] Deleted snapshot "auto-20200509-150003". The snapshot expired and was automatically deleted by the system.
	2020/05/16	15:00:03	System	127.0.0.1	SCB	0x040500fb	[Snapshot Schedule] Scheduled Snapshot auto-20200516-150002 created for CYSnapsyncDST
	2020/05/16	15:00:02	System	127.0.0.1	SCB	0x0405017b	[Snapshot] Deleted snapshot "auto-20200509-140005". The snapshot expired and was automatically deleted by the system.

## System Event Logs

QES stores a maximum of 10,000 event logs, including warnings, errors, and information messages. You can perform the following actions:


- Delete a single entry: Right-click on the log message.
- Delete all logs: Click **Clear All**.

## System Connection Logs

QES can log the following events:

Protocol	Events
FTP, HTTP, HTTPS, iSCSI, and SMB	<ul style="list-style-type: none"> <li>• Logging on and off</li> <li>• Accessing, creating, deleting, moving, and renaming files and folders</li> </ul>
SSH	Logging on and off

You can perform the following actions:

Action	Steps
Record connection logs	Click <b>Start Logging</b> .   <b>Note</b> Logging connections may affect file transfer speeds.
Select protocols to log	<ol style="list-style-type: none"> <li>1. Click <b>Options</b>.</li> <li>2. Select one or more protocols.</li> </ol>
Archive connection logs when the number of logs reaches 10,000.	<ol style="list-style-type: none"> <li>1. Click <b>Options</b>.</li> <li>2. Select <b>When the number of log entries reaches 10,000, archive the connection logs</b>.</li> <li>3. Select a folder for storing log files.</li> </ol>

## Online Users

This screen shows the users that are currently connected to the NAS, ordered by network service. You can right-click on a log to disconnect the IP connection and block the IP.

## Syslog Client Management

Syslog is a standard for forwarding log messages on an IP network. You must enable this service to store event and connection logs on a remote syslog server.

You can also export logs to a CSV file. The following tables contain the supported connection types and actions with their respective codes.

### Connection Type Codes

Code	Connection Type
0	UNKNOWN
1	SAMBA
2	FTP
3	HTTP
4	NFS
5	AFP
6	TELNET
7	SSH
8	ISCSI

### Action Codes

Code	Action
0	UNKNOWN
1	DEL
2	READ
3	WRITE
4	OPEN


Code	Action
5	MKDIR
6	NFSMOUNT_SUCC
7	NFSMOUNT_FAIL
8	RENAME
9	LOGIN_FAIL
10	LOGIN_SUCC
11	LOGOUT
12	NFSUMOUNT
13	COPY
14	MOVE
15	ADD

## 5. Privilege

Go to **Control Panel > Privilege** to configure the privilege settings, disk quotas, and domain security on the NAS.

### Users


#### Default User Accounts

User Account	Description
admin	This account can configure settings, create users, and install applications. You cannot delete this account.
guest	Users without dedicated accounts can use this account to view and modify files. You cannot delete this account.   <b>Note</b> For security reasons, the guest account is disabled by default.

### User Creation

#### Creating a Local User

1. Go to **Control Panel > Privilege > Users** .
2. Click **Create > Create a User** .  
The **Create a User** window appears.
3. Specify the following information:


Field	Actions
<b>Profile photo</b>	Upload a profile photo for the user.
<b>User Description (optional)</b>	Specify a user description that contains a maximum of 50 characters.
<b>Username</b>	Specify a username between 1 and 32 characters that contains any of the following: <ul style="list-style-type: none"> <li>• Letters: A to Z</li> <li>• Numbers: 0 to 9</li> <li>• Multi-byte characters: Chinese, Japanese, Korean, and Russian</li> <li>• Special characters: . - _ ~ ! @ # \$ % ^ &amp; ( ) { }</li> </ul>  <b>Note</b> Usernames are not case-sensitive.
<b>Password</b>	Specify a password that contains 5 to 64 ASCII characters.
<b>Phone number</b>	Specify the user's phone number. The information is for your reference and is not used by QES.
<b>Email (optional)</b>	Specify an email address that will receive notifications from QES.

Field	Actions
<b>Send a notification mail to the newly created user</b>	When selected, QES sends a message that contains the following information to the specified email address: <ul style="list-style-type: none"> <li>• Username and password</li> <li>• URLs for connecting to the NAS</li> </ul>

4. Optional: Specify the user groups the user belongs to.  
For details, see [Editing a User's Groups](#).
5. Optional: Specify the user's shared folder permissions.  
For details, see [Editing a User's Shared Folder Permissions](#).
6. Optional: Specify the user's application privileges.  
For details, see [Editing Application Privileges](#).
7. Optional: Specify a custom UID.  
Typically, QES assigns UIDs automatically. However, sometimes you might need to set the UID manually, such as when some NFS clients require that local and NAS users with the same name also use the same UID.
  - a. Under **Advanced Options**, click **Edit**.
  - b. Specify a UID for the user.
    - The UID must be between 2,001 and 65,000.
    - QES warns you if the specified UID is already in use.
8. Click **Create**.  
QES creates the local user account and adds it to the displayed list of users.

## Creating Multiple Users

1. Go to **Control Panel > Privilege > Users** .
2. Click **Create > Create Multiple Users** .  
The **Multiple Users Creation Wizard** appears.
3. Click **Next**.
4. Specify the following information:

Field	Description
<b>User Name Prefix</b>	Specify a user name that will be used as a prefix for all users. Example: <code>test</code>
<b>User Name Start Number</b>	Specify a start number. Example: 1   <b>Note</b> QES removes leading zeros in starting numbers. For example, 001 becomes 1.
<b>Number of Users</b>	Specify the number of users. Example: 5



**Note**

The username format is [username prefix][user number]. The specified start number and number of users determine the user number.

Using the examples, the users created will have the following usernames: test1, test2, test3, test4, and test5.

5. Specify a password for all users that will be created in this batch.
6. Click **Next**.  
QES creates the user accounts and adds them to the displayed user list.
7. Click **Finish**.  
The **Multiple Users Creation Wizard** closes.

## User Account Lists

The NAS supports importing user accounts from TXT, CSV, and BIN files. The files contain user account information including usernames, passwords, user groups, and quota settings.

File Format	Description
TXT	Create user account lists using a text editor. For details, see <a href="#">Creating a TXT User Account List</a> .
CSV	Create user account lists using Microsoft Excel. For details, see <a href="#">Creating a CSV User Account List</a> .
BIN	QNAP NAS devices can export user account information, including quota settings, to BIN files. For details, see <a href="#">Exporting Users</a> and <a href="#">Quota</a> .

### Creating a TXT User Account List

1. Create a new file in a text editor.
2. Specify user information in the following format:  
Username,Password,Quota (MB),Group Name

**Important**

- Separate values using commas.
- Specify information for only one user in each line.

Example:

```
John,s8fk4b,30,Sales
Jane,9fjwbx,40,Marketing
Mary,f9xn3ns,10,RD
```

3. Save the file.

**Important**

If the list contains multi-byte characters, save the file with UTF-8 encoding.

### Creating a CSV User Account List

1. Create a new workbook in Microsoft Excel.
2. Specify user information in the following format:

- column A: Username
- column B: Password
- column C: Quota (MB)
- column D: Group name



### Important

Specify information for only one user in each row.  
Example:

	A	B	C	D
1	John	s8fk4b	30	Sales
2	Jane	9fjwbx	40	Marketing
3	Mary	f9xn3ns	10	RD

3. Save the workbook as a CSV file.



### Important

If the list contains multi-byte characters, open the file using a text editor and then save with UTF-8 encoding.

## Importing Users

1. Go to **Control Panel > Privilege > Users** .
2. Click **Create > Import/Export Users** .  
The **Import/Export Users** window appears.
3. Select **Import user and user group settings**.
4. Click **Browse**, and then select the file that contains the user account list.



### Important

Ensure that you are importing a valid QES user account list file to avoid parsing errors.

For details, see [User Account Lists](#).

5. Click **Next**.  
QES imports the user account list.
6. Click **Finish**.  
QES displays the imported user account information.

## Exporting Users

1. Go to **Control Panel > Privilege > Users** .
2. Click **Create > Import/Export Users** .  
The **Import/Export Users** window appears.
3. Select **Export user and user group settings**.
4. Click **Next**.

QES exports the user account list to a BIN file on your computer.




#### Tip


You can use this file to import users to another NAS running QES.


## User Management


### Changing User Passwords

1. Go to **Control Panel > Privilege > Users** .
2. Identify a user.
3. Under **Action**, click  .  
The **Change Password** window appears.
4. Specify a password that contains 5 to 64 ASCII characters.
5. Specify the password again.
6. Click **Apply**.  
QES saves the new password.

### Editing a User Account


1. Go to **Control Panel > Privilege > Users** .
2. Identify a user.
3. Under **Action**, click  .  
The **Edit Account Profile** window appears.
4. Modify any of the following information.

Field	Actions
<b>Email (optional)</b>	Specify the user's email address.
<b>Phone number</b>	Specify the user's phone number. The information is for your reference and is not used by QES.
<b>Description (optional)</b>	Specify a user description that contains a maximum of 50 characters.
Custom UID	<p>Specify a custom UID. Typically, QES assigns UIDs automatically. However, sometimes you might need to set the UID manually, such as when some NFS clients require that local and NAS users with the same name also use the same UID.</p> <div style="border-left: 2px solid #0070C0; padding-left: 10px;"> <p> <b>Note</b></p> <ul style="list-style-type: none"> <li>• The UID must be between 2,001 and 65,000.</li> <li>• QES warns you if the specified UID is already in use.</li> </ul> </div>


Field	Actions
<b>Disable this account</b>	Select this option to disable the user account. You can either select to disable the account <b>Now</b> or specify an <b>Expiry Date</b> .
<b>Quota</b>	Specify a quota limit for the user.  <div style="display: flex; align-items: flex-start;">  <div> <p><b>Note</b></p> <p>This option is only available when user quotas are enabled. For more details, see <a href="#">Configuring Quota Settings</a>.</p> </div> </div>

5. Click **OK**.  
QES saves the changes.

### Editing a User's Groups

1. Go to **Control Panel > Privilege > Users** .
2. Identify a user.
3. Under **Action**, click  .  
The **Edit User's Groups** window appears.
4. Select or deselect user groups.  
For details, see [User Groups](#).
5. Click **Apply**.  
QES saves the changes.

### Editing Application Privileges

1. Go to **Control Panel > Privilege > Users**
2. Identify a user.
3. Under **Action**, click  .  
The **Edit Application Privileges** window appears.
4. Select the applications that the user is allowed to access.
5. Click **Apply**.  
QES saves the changes.

### Deleting Users

1. Go to **Control Panel > Privilege > Users**
2. Select the user accounts that you want to delete.
3. Click **Delete**.  
A warning message appears.
4. Click **OK**.  
QES deletes the selected user accounts.

## Home Folders

Enabling home folders creates a personal folder for each local and domain user on the NAS. Users can access their home folder through Microsoft networking, FTP, and File Station.

All the home folders are located in the homes shared folder. By default, only the administrator can access this folder.

### Enabling Home Folders

1. Go to **Control Panel > Privilege > Users** .
2. Click **Home Folder**.  
The **Home Folder** window appears.
3. Select **Enable home folder for all users**.
4. Select a storage pool where the home folder will be created.
5. Click **Apply**.

## User Groups

A user group is a collection of users with the same access rights to files or folders. Administrators can create user groups to manage folder permissions for multiple users.

### Default User Groups

User Group	Description
administrators	Users in this group can configure settings, create users, and install applications. You cannot delete this group.
users	Users in this group can only view and modify files. This group contains all local user accounts and can be used to grant shared folder permissions to all local user accounts. You cannot delete this group.


### Creating a User Group

1. Go to **Control Panel > Privilege > User Groups** .
2. Click **Create**.  
The **Create a User Group** window appears.
3. Specify the following information:


Field	Actions
<b>User group name</b>	Specify a user group name between 1 and 32 characters that contains any of the following: <ul style="list-style-type: none"> <li>• Letters: A to Z, a to z</li> <li>• Numbers: 0 to 9</li> <li>• Multi-byte characters: Chinese, Japanese, Korean, and Russian</li> <li>• Dashes (-)</li> </ul>
<b>Description</b>	Specify a description that contains a maximum of 128 ASCII characters.

4. Optional: Add users to the user group.
  - a. Under **Assign users to this group**, click **Edit**.
  - b. Select one or more users.
5. Specify shared folder permissions for the user group.
  - a. Under **Edit shared folder permissions**, click **Edit**.
  - b. Select the permissions for each shared folder.  
For details, see [Conflicts in Shared Folder Permissions](#).
6. Optional: Specify a custom GID.  
Typically, QES assigns GIDs automatically. However, sometimes you might need to set the GID manually, such as when some NFS clients require that local and NAS groups with the same name also use the same GID.
  - a. Under **Advanced Options**, click **Edit**.
  - b. Specify a GID for the group.
    - The GID must be between 2,001 and 65,000.
    - QES warns you if the specified GID is already in use.
7. Click **Create**.  
QES creates the user group and then adds it to the **User Groups** screen.

## Editing a User Group's Description

1. Go to **Control Panel > Privilege > User Groups**
2. Identify a user group.
3. Under **Action**, click .  
The **View Group Details** window appears.
4. Modify the description.
5. Click **OK**.  
QES saves the changes.

## Editing User Groups

1. Go to **Control Panel > Privilege > User Groups**
2. Identify a user group.
3. Under **Action**, click .  
The **Edit User Group** window appears.
4. Select the users you want to include or remove from the group.
5. Click **Apply**.  
QES saves the changes.

## Deleting User Groups

1. Go to **Control Panel > Privilege > User Groups**
2. Select the user groups that you want to delete.
3. Click **Delete**.  
A warning message appears.
4. Click **OK**.  
QES deletes the selected user groups.

## Shared Folder Permissions

### Conflicts in Shared Folder Permissions


When a user is assigned different permissions for a shared folder, QES uses the following hierarchy to resolve conflicts.

1. No Access (Deny)
2. Read/Write (RW)
3. Read Only (RO)

User Permission	User Group Permission	Actual Permission
No Access	No Access	No Access
Read Only		No Access
Read/Write		No Access
Not Specified		No Access
No Access	Read Only	No Access
Read Only		Read Only
Read/Write		Read/Write
Not Specified		Read Only
No Access	Read/Write	No Access
Read Only		Read/Write
Read/Write		Read/Write
Not Specified		Read/Write

User Permission	User Group Permission	Actual Permission
No Access	Not Specified	No Access
Read Only		Read Only
Read/Write		Read/Write
Not Specified		No Access

## Editing a User's Shared Folder Permissions


1. Go to **Control Panel > Privilege > Users**
2. Identify a user.
3. Under **Action**, click .  
The **Edit Shared Folder Permissions** window appears.
4. Select the permissions the user will have for each shared folder.

Option	Description
Read Only (RO)	The user group can read but not write files in the shared folder.
Read/Write (RW)	The user group can read and write files in the shared folder.
Deny	The user group cannot read or write files in the shared folder.

For details, see [Conflicts in Shared Folder Permissions](#).

5. Click **Apply**.  
QES saves the changes.

## Editing a User Group's Shared Folder Permissions

1. Go to **Control Panel > Privilege > User Groups**
2. Identify a user group.
3. Under **Action**, click .  
The **Edit Shared Folder Permissions** window appears.
4. Select the permissions the user group will have for each shared folder.

Option	Description
Read Only (RO)	The user group can read but not write files in the shared folder.
Read/Write (RW)	The user group can read and write files in the shared folder.
Deny	The user group cannot read or write files in the shared folder.

For details, see [Conflicts in Shared Folder Permissions](#).

5. Click **Apply**.  
QES saves the changes.



## Quota

To efficiently allocate storage space, you can specify a quota value (in megabytes or gigabytes) that applies to all users. When the feature is enabled, QES prevents users from uploading data to the NAS once the quota is reached. By default, no quotas are set for the users.

### Configuring Quota Settings

1. Go to **Control Panel > Privilege > Quota** .
2. Select **Enable a quota for all users**.
3. Specify the **Quota size on the disk**.
4. Click **Apply**.



#### Tip

You can specify a quota size for each user. For details, see [Editing a User Account](#).

### Exporting Quota Settings

You can export quota settings to a CSV file after you have configured them. For details, see [Configuring Quota Settings](#).

You can use the exported settings to review the quota allocated for each user or as a reference when configuring user accounts on other devices.

1. Go to **Control Panel > Privilege > Quota** .
2. Click **Generate**.
3. Click **Download**.

## Domain Security

The NAS supports user authentication by local access right management, Microsoft Active Directory (AD), and Lightweight Directory Access Protocol (LDAP) directory.

By joining the NAS to an Active Directory domain or an LDAP directory, AD or LDAP users can access the NAS using their own accounts without extra user account configuration on the NAS.



#### Note

QES supports AD running on Windows Server 2003, 2008, 2008 R2, 2012, 2012 R2, and 2016.

The following options are available on the **Domain Security** screen.

Option	Description
No domain security	Only the local users can access the NAS.
<a href="#">Active Directory Authentication</a>	Local and AD users can access the NAS using Samba, FTP, and File Station.
<a href="#">LDAP Authentication</a>	Local and LDAP users can access the NAS using Samba, FTP, and File Station.

## Active Directory (AD) Authentication

Active Directory (AD) is a hierarchical data center that centrally holds information for users, user groups, and computers for secure access management. Windows environments use AD to store, share, and manage a network's information and resources.

When you join a NAS to an AD domain, the NAS automatically imports all of the AD server's user accounts. AD users will be able to use the same login details to access the NAS.

When joining a domain controller using a dual-controller ES NAS, you must connect both management ports of each controller to the network switch.

### Configuring Active Directory (AD) Authentication Using the Quick Configuration Wizard

1. Go to **Control Panel > Privilege > Domain Security** .
2. Select **Active Directory authentication (Domain member)**.
3. Click **Quick Configuration Wizard**.  
The **Active Directory Wizard** appears.
4. Read the introduction, and then click **Next**.
5. Specify the fully qualified domain name (FQDN) of the AD DNS server, and then type ENTER.  
QES automatically generates the **NetBIOS domain name**.
6. Specify the IP address of the AD DNS server.
7. Click **Next**.
8. Select a domain controller.
9. Specify the domain administrator username and password.
10. Click **Join**.  
The NAS joins the domain.
11. Click **Finish**.  
The **Active Directory Wizard** closes.

### Configuring Active Directory (AD) Authentication Manually

1. Verify the following:
  - The time settings of the NAS and the AD server are identical. The maximum time disparity tolerated is 5 minutes. For details, see [Configuring the Time Settings](#).
  - The AD server is configured as the primary DNS server. If you use an external DNS server, you will not be able to join the domain. For details, see [Network](#).
  - You have specified the IP address of the WINS server that you use for name resolution. For details, see [Configuring Microsoft Networking Settings](#).
2. Log in to the NAS as an administrator.
3. Go to **Control Panel > Privilege > Domain Security** .
4. Select **Active Directory authentication (Domain member)**.

- Click **Manual Configuration**.  
The **Active Directory** box appears.

- Specify the following AD information:

Field	Description
<b>Domain NetBIOS Name</b>	Example: qnap
<b>AD Server Name</b>	Example: dc1
<b>Domain</b>	Example: qnap.com
<b>Domain Administrator User Name</b>	The specified user must have administrator access rights to the AD domain. Example: admin
<b>Domain Administrator Password</b>	Example: password123
<b>Organizational Unit (Optional)</b>	You can specify the organizational unit the NAS belongs to. Example: computers
<b>Server Description (Optional)</b>	The NAS Samba service replicates this in the server's <b>Comment</b> field. You will see this description when connecting to a NAS Samba share using the command line interface. Example: QNAP ES1652DC NAS


- Click **Join**.

## Active Directory (AD) Server and Domain Names

After joining the NAS to the AD domain, you can use the following username formats to log into the NAS and access shared folders:

- Local users: `NASname\NASusername`
- Active Directory users: `Domain\DomainUsername`

The location of your Active Directory server and domain names varies depending on your Windows Server version.

Windows Server Version	Location
2003	Go to <b>System Properties</b> in Windows. Example: If the computer name is "node1.qnap-test.com", the AD server name is "node1", and the domain name is "qnap-test.com".
2008	Go to <b>Control Panel &gt; System</b> in Windows. The AD server name will appear as the computer name, and the domain name can be found in the domain field.
2012, 2016	Right-click  , and then click <b>System</b> . The AD server name will appear as the computer name, and the domain name can be found in the domain field.

## Trusted Domains

A trusted domain is a domain that Active Directory (AD) trusts to authenticate users. If you join the NAS to an AD domain, all users from trusted domains can log on and access shared folders.

Trusted domains are configured in AD. You can only enable trusted domains on the NAS. By default, this feature is disabled in QES.

### Enabling Trusted Domain Authentication

1. Log on to the NAS as an administrator.
2. Go to **Control Panel > Network & File Services > Win/NFS > Microsoft Networking** .
3. Click **Advanced Options**.  
The **Advanced Options** window appears.
4. Select **Enable trusted domains**.
5. Click **Apply**.  
The **Advanced Options** window closes.
6. Click **Apply**.

### LDAP Authentication

An LDAP (Lightweight Directory Access Protocol) server stores user and user group information. Administrators can use LDAP to manage users in the LDAP server and to connect to multiple NAS devices with the same logon details. This feature requires a running LDAP server and knowledge of FreeBSD servers, LDAP servers, and Samba.

### Configuring LDAP Authentication

1. Log on to the NAS as an administrator.
2. Go to **Control Panel > Privilege > Domain Security** .
3. Select **LDAP authentication**.
4. Specify the following information:

Field	Description
<b>LDAP Server Host</b>	Host name or IP address of the LDAP server
<b>LDAP Security</b>	Method the NAS uses to communicate with the LDAP server <ul style="list-style-type: none"> <li>• <b>ldap://</b> = Use a standard LDAP connection. The default port is 389.</li> <li>• <b>ldap:// (ldap + SSL)</b> = Use an encrypted connection with SSL. The default port is 686. Older versions of LDAP servers normally use this port.</li> <li>• <b>ldap:// (ldap + TLS)</b> = Use an encrypted connection with TLS. The default port is 389. Newer versions of LDAP servers normally use this port.</li> </ul>
<b>Base DN</b>	LDAP domain Example: <code>dc=mydomain,dc=local</code>
<b>Root DN</b>	LDAP root user Example: <code>cn=admin, dc=mydomain,dc=local</code>
<b>Password</b>	Root user password

Field	Description
<b>Users Base DN</b>	Organizational unit (OU) where users are stored Example: ou=people,dc=mydomain,dc=local
<b>Groups Base DN</b>	OU where groups are stored Example: ou=group,dc=mydomain,dc=local

5. Click **Apply**.  
The **LDAP authentication options** window appears.
6. Select which users are allowed to access the NAS.  
For details, see [LDAP Authentication Options](#).
7. Click **Finish**.

### LDAP Authentication Options

The **LDAP authentication options** vary depending on when Microsoft Networking is enabled.

To enable Microsoft Networking, see [Configuring Microsoft Networking Settings](#).

Condition	Options
Microsoft Networking is enabled while LDAP settings are applied.	<ul style="list-style-type: none"> <li>• <b>Local users only:</b> Only local users can access the NAS using Microsoft Networking.</li> <li>• <b>LDAP users only:</b> Only LDAP users can access the NAS using Microsoft Networking.</li> </ul>
Microsoft Networking is enabled after the NAS is connected to the LDAP server.	<ul style="list-style-type: none"> <li>• <b>Standalone Server:</b> Only local users can access the NAS using Microsoft Networking.</li> <li>• <b>LDAP Domain Authentication:</b> Only LDAP users can access the NAS using Microsoft Networking.</li> </ul>

### LDAP Authentication via Server Message Block (SMB)

Authenticating LDAP users requires third-party software and a Samba schema.

#### Third-party Software

Software applications such as the following allow management of LDAP users and Samba passwords.

Application	Description
LDAP Account Manager (LAM)	Web-based front end interface available at <a href="http://www.ldap-account-manager.org/">http://www.ldap-account-manager.org/</a>
smbldap-tools	Command line tool
webmin/ldap-useradmin	Web-based LDAP user administration module

### Samba Schema

Importing the Samba schema to the LDAP server requires a samba.schema file. You can find this file in the directory `examples/LDAP` in the Samba source distribution. For details, refer to the documentation or FAQ of the LDAP server.

Below is a Samba schema example for openldap in the FreeBSD server where the LDAP server is running. The schema varies depending on the FreeBSD distribution.

```
zcat /usr/share/doc/samba-doc/examples/LDAP/samba.schema.gz >
/etc/ldap/schema/samba.schema
```

When editing openldap server configuration files like `/etc/ldap/slapd.conf`, the following lines should be present:

```
include /etc/ldap/schema/samba.schemainclude
/etc/ldap/schema/cosine.schemainclude
/etc/ldap/schema/inetorgperson.schema
include /etc/ldap/schema/nis.schema
```

## Configuration Examples

The following are some domain name examples you can use as guides when configuring LDAP authentication.

- FreeBSD OpenLDAP Server

Field	Example
<b>Base DN</b>	dc=qnap,dc=com
<b>Root DN</b>	cn=admin,dc=qnap,dc=com
<b>Users Base DN</b>	ou=people,dc=qnap,dc=com
<b>Groups Base DN</b>	ou=group,dc=qnap,dc=com

- Mac Open Directory Server

Field	Example
<b>Base DN</b>	dc=macserver,dc=qnap,dc=com
<b>Root DN</b>	uid=root,cn=users,dc=macserver,dc=qnap,dc=com
<b>Users Base DN</b>	cn=users,dc=macserver,dc=qnap,dc=com
<b>Groups Base DN</b>	cn=groups,dc=macserver,dc=qnap,dc=com

## Active Directory (AD) and LDAP Management


The administrator can perform the following tasks when the NAS joins an AD domain or connects to an LDAP server.

Task	Steps
View and modify users	<ol style="list-style-type: none"> <li>1. Go to <b>Privilege &gt; Users</b></li> <li>2. Select <b>Domain Users</b> . QES displays the list of domain users. To modify a user's privileges, see <a href="#">User Management</a>.</li> </ol>
View and modify user groups	<ol style="list-style-type: none"> <li>1. Go to <b>Privilege &gt; User Groups</b></li> <li>2. Select <b>Domain Groups</b> . QES displays a list of domain user groups. To modify a user group, see <a href="#">User Groups</a>.</li> </ol>



### Tip



Click  to display newly created users or user groups in the AD or LDAP server. User permission settings are automatically synchronized with the domain controller.

## UIDs and GIDs

Each NAS user has a unique identifier, called a UID, which QES assigns when it creates the user. When a user is deleted:

- QES adds the deleted user's UID to a list of deleted UIDs. QES does not assign these deleted UIDs to new users.
- The file and folder permissions associated with the deleted user's UID are left on the NAS, as removing them would be too resource intensive

If the number of usable UIDs becomes low, you can reclaim these deleted UIDs. Reclaiming UIDs does the following:

1. QES cycles through each file and folder on the NAS, and removes all permissions associated with UIDs from the deleted UID list. This process is resource intensive, and may reduce system performance while it is running.
2. QES removes all UIDs from the deleted UID list, and adds them back onto the pool of usable UIDs.



### Note

All the above information also applies to NAS groups and GIDs.

## Reclaiming UIDs



### Warning

The reclaim process might take a long time. System performance will be reduced while the reclaim process is running. You should run this process during off-peak hours.

1. Go to **Control Panel > Privilege > Users** .
2. Click **Reclaim UIDs**.
3. Confirm **OK**.

## Reclaiming GIDs



### Warning

The reclaim process might take a long time. System performance will be reduced while the reclaim process is running. You should run this process during off-peak hours.

1. Go to **Control Panel > Privilege > User Groups** .
2. Click **Reclaim GIDs**.
3. Confirm **OK**.

## 6. Network and File Services Settings

### Win/NFS

#### Microsoft Networking

##### Configuring Microsoft Networking Settings

1. Go to **Control Panel > Network & File Services > Win/NFS > Microsoft Networking** .
2. Select **Enable file service for Microsoft Networking**.
3. Specify the following:

Setting	User Action
<b>Server description (Optional)</b>	Specify a description that contains a maximum of 256 characters. The description must enable users to easily identify the NAS on a Microsoft network.
<b>Workgroup</b>	Specify a name between 1 and 32 characters that contains any of the following: <ul style="list-style-type: none"> <li>• Letters: A to Z, a to z</li> <li>• Numbers: 0 to 9</li> <li>• Multi-byte characters: Chinese, Japanese, Korean, and Russian</li> <li>• Special characters: ~ ! @ # \$ ^ &amp; ( ) - _ { } . ' .</li> </ul>



4. Select an authentication method.

Option	Description
<b>Standalone server</b>	QES uses the local user account information for authentication. For details, see <a href="#">User Creation</a> .
<b>AD Domain Member</b>	QES uses Microsoft Active Directory (AD) for authentication. For details, see <a href="#">Active Directory (AD) Authentication</a> .
<b>LDAP domain authentication</b>	QES uses an LDAP directory for authentication. For details, see <a href="#">LDAP Authentication</a> .

5. Configure the advanced settings.
  - a. Click **Advanced Options**.  
The **Advanced Options** window opens.
  - b. Specify the following information:

Option	User Action
<b>Use the specified WINS server</b>	Select this option to specify a WINS server IP address that the NAS will use for name resolution. Do not select this option if you are unsure about the settings.



Option	User Action
<b>Local master browser</b>	<p>Select this option to use the NAS as a local master browser. A local master browser is responsible for maintaining the list of devices in a specific workgroup on a Microsoft network. When deselected, another device on the network maintains the device list.</p> <p> <b>Important</b> To use the NAS as local master browser, you must specify the name of the workgroup that your NAS belongs to. The default workgroup in Windows is "workgroup".</p>
<b>Allow only NTLMv2 authentication</b>	<p>Select this option to authenticate clients using only NT LAN Manager version 2 (NTLMv2). When this option is deselected, the NAS uses NT LAN Manager (NTLM).</p>
<b>Name resolve priority</b>	<p>Select the name service that you want to use for name resolution. The default service is <b>DNS only</b>. If you specified a WINS server, <b>Try WINS then DNS</b> is selected by default.</p>
<b>Automatically register in DNS</b>	<p>Select this option to register the NAS on the DNS server. If the NAS IP address changes, the NAS automatically updates the IP address on the DNS server. This option is only available if Active Directory (AD) authentication is enabled. For details, see <a href="#">Active Directory (AD) Authentication</a>.</p>
<b>Enable trusted domains</b>	<p>Select this option to join users from trusted AD domains. For details, see <a href="#">Trusted Domains</a>. This option is only available if Active Directory (AD) authentication is enabled. For details, see <a href="#">Active Directory (AD) Authentication</a>.</p>
<b>Enable Asynchronous I/O</b>	<p>Select this option to improve the Samba performance using asynchronous I/O. Asynchronous I/O refers to the I/O behavior on the CIFS protocol layer. This is different from the synchronous I/O feature found in the shared folder settings, which only applies to specific shared folders on the file system level.</p> <p> <b>Tip</b> To prevent power interruption, use a UPS when asynchronous I/O is enabled.</p>
<b>Force Encryption Transport</b>	<p>Select this option to encrypt all data using Microsoft Networking. When selected, only SMB 3 clients can connect to the NAS.</p>
<b>Highest SMB version</b>	<p>Select the highest SMB protocol version supported for Microsoft Networking operations.</p>
<b>Lowest SMB version</b>	<p>Select the lowest SMB protocol version supported for Microsoft Networking operations. For example, if you set <b>Highest SMB version</b> to SMB 3 and <b>Lowest SMB version</b> to SMB 2, QES supports SMB 2, SMB 2.1, and SMB 3 for Microsoft Networking.</p>

c. Click **Apply**.

6. Click **Apply All**.

## NFS Service

Enabling the NFS service allows Linux and FreeBSD users to connect to the NAS.

- To configure NFS permissions, see [Configuring NFS Host Access Permissions](#).
- To connect to the NAS from Linux using NFS, see [Mounting a Shared Folder on a Linux Computer](#).

### Enabling the NFS Service


1. Go to **Control Panel > Network & File Services > Win/NFS > NFS Service**.
2. Select **Enable NFS Service**.
3. Click **Apply**.

## FTP

The NAS FTP service helps optimize FTP data transfer. To use the service, you must configure the settings and then connect the NAS to an FTP client such as FileZilla.

### Configuring FTP Service Settings

1. Go to **Control Panel > Network & File Services > FTP > FTP Service**.
2. Select **Enable FTP Service**.
3. Configure the following settings:



Setting	User Action
Protocol type	Select the protocols to use. At least one protocol must be selected. <ul style="list-style-type: none"> <li>• <b>FTP</b>: Standard file transfer protocol</li> <li>• <b>FTP with TLS (Explicit)</b>: File transfer protocol with channel encryption</li> </ul>
TLS version	Select which TLS version to use for FTP with TLS.
Port number	Specify the port number that the FTP service will use.
Enforce Unicode-only filenames	Select one of the following options. <b>Yes</b> : Your FTP client supports Unicode encoding. <b>No</b> : Your FTP client does not support Unicode encoding.  <b>Tip</b> To correctly display the file and folder names, specify a filename encoding language. For details, see <a href="#">Configuring the Codepage Settings</a> .
Maximum number of all FTP connections	Specify the maximum number of allowed FTP connections for the NAS. The maximum possible number that you can specify is 1024.

Setting	User Action
Maximum number of connections for a single account	Specify the maximum number of allowed FTP connections for single user accounts. The maximum possible number that you can specify is 1024.
Enable FTP transfer limitation	Select this option, and then specify the maximum upload and download rates.

4. Click **Apply All**.

## Configuring the FTP Service Advanced Settings

1. Go to **Control Panel > Network & File Services > FTP > Advanced**.
2. Configure the following settings:

Setting	User Action
Passive FTP port range	<p>Select one of the following options.</p> <ul style="list-style-type: none"> <li>• <b>Use the default port range:</b> Use ports 55536 to 56559.</li> <li>• <b>Define port range:</b> Specify a port range larger than 1023.</li> </ul> <p> <b>Important</b> When specifying a custom port range, ensure that your router and firewall ports are open.</p>
Respond with external IP address for passive FTP connection requests	<p>Enable this option and then specify an external IP address. Remote devices can use this IP address to connect to the NAS FTP server.</p> <p> <b>Important</b> Use this feature when the following conditions are true:</p> <ul style="list-style-type: none"> <li>• The NAS is using a passive FTP connection.</li> <li>• The NAS FTP server is behind a router.</li> <li>• Remote devices cannot connect to the FTP server over the WAN.</li> </ul>
Enable Site-to-Site Transfer (FXP)	Enable File eXchange Protocol (FXP). FXP enables an FTP client to transfer data directly from one FTP server to another, without routing the data through the client's connection.

3. Click **Apply All**.

## SSH

Enabling the Secure Shell (SSH) service on the NAS allows administrators to connect to the NAS using an SSH-encrypted connection or SSH clients such as PuTTY.



### Tip

By default, SSH connections use the NAS management interface, which usually supports 1 Gbps. To use a different interface (for example, one that supports 10 Gbps), enable service binding and then configure **SSH Service**. For details, see [Service Binding](#).

## Configuring SSH

1. Go to **Control Panel > Network & File Services > SSH** .
2. Select **Allow SSH connection**.
3. Specify a port number from 1 to 65535.



### Tip

The default SSH port is 22.

4. Click **Apply**.

## SNMP

Enabling the Simple Network Management Protocol (SNMP) service on the NAS allows the immediate reporting of NAS events, such as warnings or errors, to an SNMP management station (SNMP manager).

### Configuring the SNMP Settings

1. Go to **Control Panel > Network & File Services > SNMP** .
2. Select **Enable SNMP Service**.
3. Specify the following information:

Setting	User Action
<b>Port number</b>	Specify the port that the SNMP manager will use to connect to the NAS.
<b>SNMP Trap Level</b>	Select the type of alert messages that the NAS will send to the SNMP manager. <ul style="list-style-type: none"> <li>• <b>Information:</b> QES sends information regarding ongoing or scheduled NAS operations.</li> <li>• <b>Warning:</b> QES alerts you when the NAS resources are critically low or the hardware behaves abnormally.</li> <li>• <b>Error:</b> QES alerts you when enabling NAS features or updating applications fail.</li> </ul>
<b>Trap Address</b>	Specify the IP addresses of the SNMP manager. You can specify a maximum of 3 trap addresses.

4. Select the SNMP version that the SNMP manager uses.

Option	User Action
<b>SNMP V1/V2</b>	Specify an SNMP community name that contains 1 to 64 characters from any of the following groups: <ul style="list-style-type: none"> <li>• Letters: A to Z, a to z</li> <li>• Numbers: 0 to 9</li> <li>• Special characters: _ -</li> </ul> The SNMP community string functions as a password that is used to authenticate messages sent between the SNMP manager and the NAS. Every packet that is transmitted between the SNMP manager and the SNMP agent includes the community string.
<b>SNMP V3</b>	Specify the user name, authentication protocol and password, and privacy protocol and password. For details, see <a href="#">Configuring SNMP V3 Settings</a> .

5. Click **Apply**.

## Configuring SNMP V3 Settings

1. Specify a user name.

The user name must contain 1 to 32 characters from any of the following groups:

- Letters: A to Z, a to z
- Numbers: 0 to 9
- Special characters: \_ -

2. Optional: Select **Use Authentication**.

a. Specify the authentication protocol.



### Tip

You can select either **HMAC-MD5** or **HMAC-SHA**. If you are unsure about this setting, QNAP recommends selecting **HMAC-SHA**.

b. Specify an authentication password.

The password must contain 8 to 64 characters from any of the following groups:

- Letters: A to Z, a to z
- Numbers: 0 to 9
- Special characters: \_ -

3. Optional: Select **Use Privacy**.

a. Specify the privacy protocol.



### Tip

You can select either **DES** or **AES**. If you are unsure about this setting, QNAP recommends selecting **AES**.

b. Specify a privacy password.

The password must contain 8 to 64 characters from any of the following groups:

- Letters: A to Z, a to z
- Numbers: 0 to 9
- Special characters: \_ -

## SNMP Management Information Base (MIB)

The Management Information Base (MIB) is a type of database in ASCII text format that is used to manage the NAS in the SNMP network. The SNMP manager uses the MIB to determine the NAS status or understand the messages that the NAS sends within the network. You can download the MIB and then view the contents using any word processor or text editor.



### Important

MIBs describe the structure of the management data of a device subsystem. They use a hierarchical namespace containing object identifiers (OID). Each OID identifies a variable that you can read or set using SNMP. You must assign the correct OID to retrieve the NAS information. The default OID for QNAP ES NAS devices is 1.3.6.1.4.1.24861.2.

## Downloading the SNMP MIB

1. Go to **Control Panel > Network & File Services > SNMP** .
2. Under **SNMP MIB**, click **Download**.  
QES downloads the NAS.mib file on your computer.

## Service Discovery

### Bonjour

Bonjour is a networking technology developed by Apple that enables usage of devices and services on a network. Enabling Bonjour allows Mac computers to automatically discover network services that are running on the NAS without requiring you to specify IP addresses or configure DNS servers.

### Configuring the Bonjour Settings

You must enable all relevant services before configuring the Bonjour settings.

1. Go to **Control Panel > Network & File Services > Service Discovery > Bonjour** .
2. Select the services that you want Bonjour to broadcast.
3. Click **Apply**.

## Network Recycle Bin

The Network Recycle Bin contains files and folders that users have deleted from the NAS through File Station, FTP, and Samba. You can specify file types to exclude from the bin.



### Important

Each file or folder in the Network Recycle Bin must have a unique name. If the Network Recycle Bin contains two files or folders with the same name, QES adds a unique number to the end of the newest file or folder's name.

## Configuring the Network Recycle Bin

1. Go to **Control Panel > Network & File Services > Network Recycle Bin** .
2. Select **Enable Network Recycle Bin**.
3. Optional: Specify a file retention time.
  - a. Select **File retention time (days)**.
  - b. Specify a file retention time.  
QES deletes files from the recycle bin after the specified number of days. This field supports a maximum of 9999 days. The default is 180 days.
  - c. Specify what time QES should check the recycle bin for expired files every day.  
This check might affect system performance, and therefore should be set outside of working hours.
4. Optional: Specify the file extensions to exclude.
5. Click **Apply**.

## Deleting All Files in the Network Recycle Bin

1. Go to **Control Panel > Network & File Services > Network Recycle Bin** .
2. Click **Empty All Network Recycle Bin**.  
A warning message appears.
3. Click **OK**.  
QES deletes all files in the Network Recycle Bin.

## Permanently Deleting a File or Folder



### Warning

After a file or folder is permanently deleted, it can no longer be recovered.

1. Open **File Station**.
2. Click **Recycle Bin**.
3. Right-click on a file or folder.
4. Select **Delete**.  
A confirmation message appears.
5. Click **OK**.

QES creates a background task which deletes the file or folder from the Network Recycle Bin.

## Recovering a Deleted File or Folder

1. Open **File Station**.
2. Click **Recycle Bin**.
3. Right-click on a file or folder.

4. Select **Recover**.  
The **Recover** window opens.
5. Choose whether to overwrite an existing file or folder.

Option	Description
Yes	QES restores the file or folder to its original location. If a file or folder exists in the same location with the same name, QES overwrites it with the file or folder from the Network Recycle Bin.
No	QES restores the file or folder to its original location. If a file or folder exists in the same location with the same name, QES does not restore the file.

QES restores the file or folder to its original location.

### Restricting Access to the Network Recycle Bin

1. Go to **Control Panel > Storage Manager > Storage Space** .
2. Click a shared folder.
3. Click **Actions > Edit Properties** .  
The **Shared Folder Properties** window appears.
4. Under **Advanced Settings**, click **Edit**.
5. Under **Recycle Bin**, select **Enabled**.
6. Select **Restrict the access to Recycle Bin to administrators only for now**.
7. Click **Apply**.



## 7. High Availability

### About High Availability

High availability enables you to manage the storage controllers of your NAS. QNAP ES Series NAS devices are designed with a dual active-active controller architecture. If one controller fails, the other one immediately takes over to eliminate downtime.



#### Important

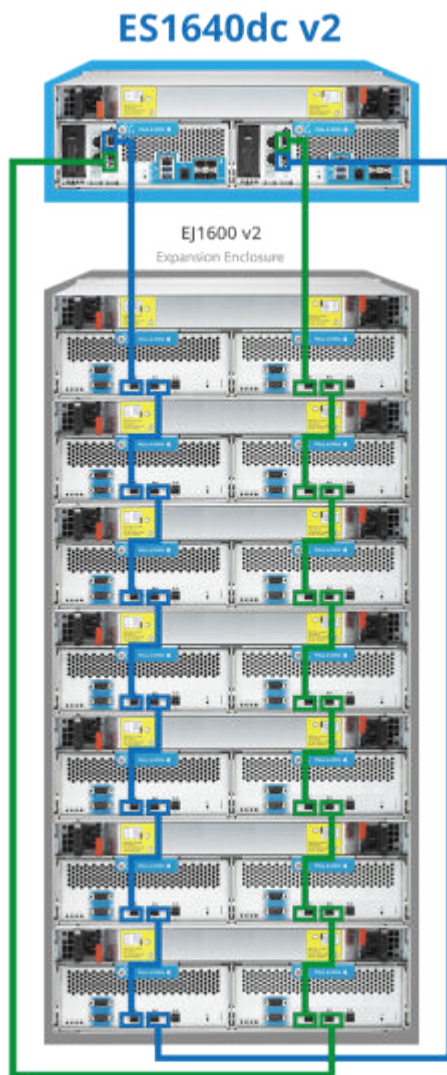
Only ES series NAS models support high availability.

The screenshot displays the QNAP management interface for a NAS Host ES1640dc. On the left, the 'System Component' tree shows the NAS Host and its sub-components: PSU1, PSU2, SCA, SCB, and Expansion Unit 1. The main area is titled 'Chassis View' and shows a physical representation of the NAS host. At the top right, the 'High Availability Status' is 'Active-Active' (green checkmark) and the 'Dual path' is 'Dual-Path' (green checkmark). Below the chassis view, there are buttons for 'SCA Action', 'SCB Action', 'Cluster Options', and 'Force Takeover'. The 'High Availability Information' section shows a 'Warning' icon and the following details:

Summary	Details
Warning	Model Name: ES1640dc
	Server Name:
	Firmware Version: ES-DUAL_20200424-2.1.1.0343
	Write Mode: write-back w/ 1 BBU(s)

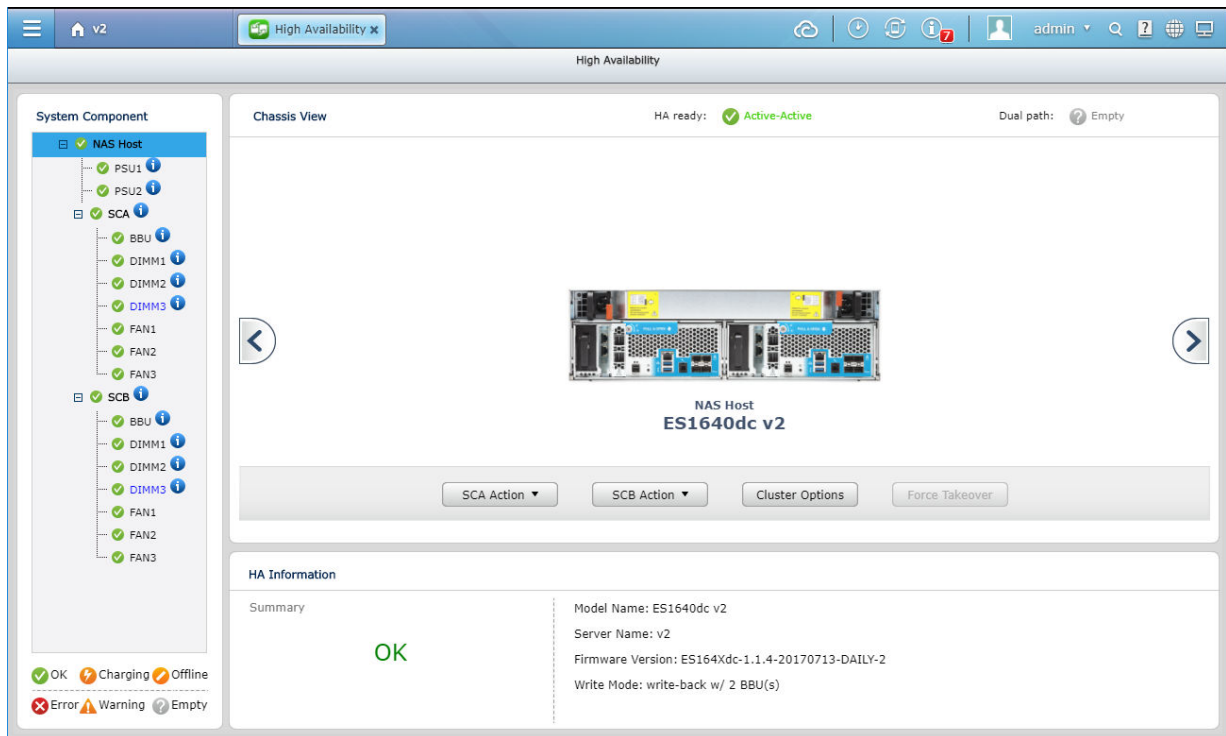
### Dual Path Overview

ES series NAS models use a redundant cross loop cabling configuration to connect the storage controllers and the SAS expansion units (also known as JBODs). This ensures continuous operation even if one cable is disconnected or damaged. The following image provides an example of dual-path cabling.



## System Components

Select a system component in the left panel to see its location within the main NAS chassis and to view additional hardware information.



Component	Description	HA Information	Additional Information
NAS host	The ES NAS	Model name, server name, firmware version, write mode	<p>Write mode:</p> <ul style="list-style-type: none"> <li>• Write-back: QES writes incoming data to NVRAM first, notifies the host that the write command was completed, and then writes the data to disk storage later.</li> <li>• Write-through: QES writes incoming data to both NVRAM and disk, and then notifies the host that the write command was completed. This mode is enabled when a BBU is not working.</li> </ul>
REXP	Expansion enclosure	Model name	

Component	Description	HA Information	Additional Information
SCA, SCB	Storage controller	Host name, machine status, initialized	Machine status: <ul style="list-style-type: none"> <li>power_on: The controller is working normally.</li> <li>power_off: The controller is powered off.</li> <li>empty: There is no controller installed in the bay.</li> <li>connecting: The communication channel between SCA and SCB is not established.</li> <li>boot: The communication channel between SCA and SCB is established. The controller is starting up.</li> </ul>
ECA, ECB	Expansion enclosure controller	Machine status	
PSU	Power supply unit	Temperature, fan speed Nas host only: Model, power	
BBU	Backup battery unit	Capacity, temperature, voltage, serial number, manufacturing date, initialization date	
DIMM	Memory module	Manufacturer, type, serial number, size, speed	
FAN	Internal fan	Fan speed Nas host only: Mode	

## System Component Status


Status	Description
OK	The component is functioning properly.
Charging	The battery is charging.
Offline	The component is disabled. QES cannot communicate with it.
Error	The component is not functioning properly. You should replace it immediately.
Warning	The component might fail soon.
Empty	The component is missing or not installed.

## System Availability Status

The **High Availability** window contains the following status indicators.

Status Indicator	Description
High Availability Status	This shows the current high availability status of the NAS.
Dual Path	This shows the status of the connections between the storage controllers and the SAS expansion units.

## High Availability Status

Status	Description
Active-Active	Both controllers are active and working as expected.
Taking over	Only one controller is active and it is taking control from the other controller.
Takeover	Only one controller is active.   <b>Important</b> You cannot perform a QES firmware update if the High Availability status is <code>Takeover</code> . This prevents firmware inconsistencies between storage controllers.
Giving back	Only one controller is active and it is returning control to the inactive controller.

## Dual Path Status



### Note

QES issues a system notification every time the dual path status changes.

Status	Description
Dual Path	The storage controllers and SAS expansion units are connected using two independent paths. This ensures continuous operation of the NAS even if one cable is damaged or disconnected.
Single Path	The storage controllers and SAS expansion units are connected using one path.
Empty	No SAS expansion units are connected to the NAS.

## Storage Controller Actions

Action	Description
Takeover	The controller takes over all services while the other controller transitions into standby mode. HA status changes to <code>Takeover</code> .
Giveback	The controller gives back services to the other inactive controller. HA status changes to <code>Active-Active</code> .
Restart	The controller restarts.
Shutdown	The controller powers off.
Power On	The controller powers on.

Action	Description
Force Takeover	A recovered controller is forced to take over if it does not regain control automatically. This button becomes available only if a takeover or giveback attempt is unsuccessful.

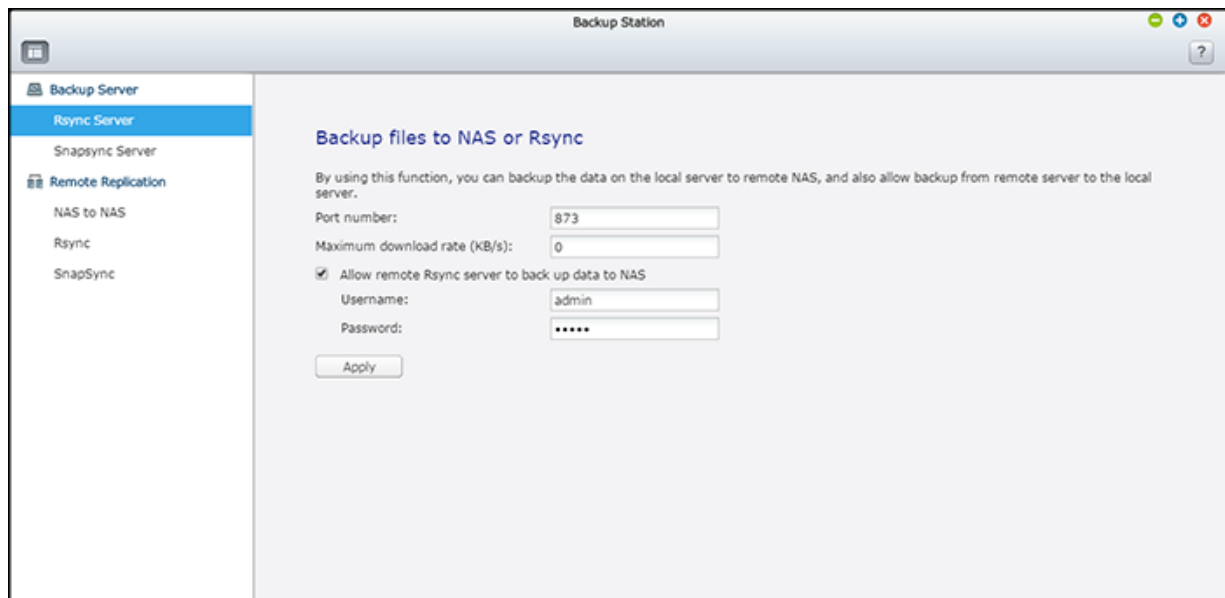
## Cluster Options

Setting	Description
System failover protection	When a controller fails, the other controller automatically takes over. A controller failure may result from one of the following situations: <ul style="list-style-type: none"> <li>• The controller is powered off.</li> <li>• The controller is unresponsive.</li> <li>• The controller encounters an unrecoverable hardware failure.</li> <li>• The amount of memory installed in the controller is inconsistent with the other controller.</li> <li>• The CPU model of the controller is inconsistent with the other controller.</li> </ul>
Failover when network fails	When a controller becomes inaccessible as a result of network connection failure, the other controller automatically takes over.
Failover when JBOD fails	When a SAS expansion unit that is connected to a controller becomes inaccessible, the other controller automatically takes over.
Automatically failback when system recovers	When a controller functions again after an automatic failover, it initiates a giveback and then regains control.
Prevent failback repeatedly	When automatic failback is unsuccessful, the recovered controller might repeatedly try to initiate failback. When enabled, a recovered controller can only attempt two failbacks with a 30-second interval between them. QES then disables automatic failback for 24 hours and changes the High Availability status to <code>Locked</code> . During this 24-hour period, you can manually initiate a failback by clicking <b>Giveback</b> on the working controller. If this succeeds, QES enables automatic failback again.
Management port failover	When the management interface of one controller fails, the other controller automatically takes over. This feature is disabled if static IP addresses are not assigned to the management interfaces of both controllers.

## 8. Applications

### Backup Station

Backup Station enables you to back up files and folders to other remote NAS devices. You can also configure QES as a backup destination for other NAS.



### Comparison of Backup Methods

Source	Destination	Backup Method
QES	QES	Real-time SnapSync (Recommended), Scheduled SnapSync, NAS to NAS
QES	QTS	NAS to NAS
QES	Linux	Rsync
QTS	QES	NAS to NAS
Linux	QES	Rsync (with SSH)

### Rsync

Rsync is file transfer utility that enables you to synchronize files between QNAP NAS devices and Unix clients.

#### Configuring the Rsync Server

1. Go to **Backup Station > Backup Server > Rsync Server** .
2. Configure the following settings.

Setting	Description
Port number	The port used for incoming and outgoing Rsync connections. The default port is 873.
Enable maximum download rate	Limit the amount of bandwidth used by clients backing up this NAS using Rsync. 0 is unrestricted.
Allow remote Rsync server to back up data to the NAS	UNIX clients can back up to this NAS using Rsync.

3. Click **Apply**.

### Creating an Rsync Backup Job



1. Go to **Backup Station > Remote Replication > Rsync**.
2. Click **Create a Replication Job**.
3. Specify a job name.
4. Configure the remote server.
  - a. Click **Settings**.
  - b. Configure the following remote site settings.

Setting	Description
Name or IP address of the remote server	The remote server DNS name or IP address.
User name	The username of the remote user. The user must have full read/write access and a sufficient quota limit on the remote server.
Password	The password of the remote user.
Port Number	The Rsync port of the remote server. The default is 873.
Server Mode	By default, this setting is enabled and Rsync runs on server mode. When disabled, Rsync runs in daemon mode.
Skip Group ID	When enabled, Rsync does not replicate the group ownership of files and folders to the remote server.
Enable encryption	Rsync transfers are encrypted for additional security. SSH connections must be enabled on the remote server and the remote user must have permission to perform SSH encrypted backup jobs. Port number: Set the SSH port of the remote server. The default is port 22.

- c. Optional: Test the remote server connection.
  - d. Click **Apply**.
5. Select the source folder.  
The source folder is a local shared folder or subfolder.
6. Select the destination folder.  
The destination folder is a shared folder or subfolder on the remote server.
7. Click **Add**.
8. Optional: Configure job options.



- a. Click **Options**.
- b. Configure the following settings.

Setting	Description
Activate file compression	QES compresses the data before sending it to the destination. The destination NAS decompresses the data before saving it to disk. Enabling this setting can reduce transfer times if your NAS or the remote NAS has a slow network connection, or the NAS devices are connecting via a WAN.
Perform incremental replication	On the first run of a job, Rsync replicates all files to the remote server. On subsequent runs, Rsync only replicates files that have been modified since the last run.   <b>Tip</b> QNAP recommends enabling this setting as it can greatly reduce backup times.
Delete extra files on remote destination	By default, Rsync only adds new files and updates modified files at the destination. When enabled, Rsync deletes files from the destination folder if they no longer exist in the source folder.
Handle sparse files efficiently	A sparse file is a type of computer file that contains large blocks of zero-byte data. When enabled, Rsync replicates sparse files more quickly.
Replicate ACL and extended attributes	Rsync replicates ACLs for Windows files and extended attributes for Mac and UNIX files.   <b>Important</b> QES and the remote server must have the same ACL features enabled and must join the same domain.
Maximum transfer rate (KB/s)	Configuring this setting limits the bandwidth consumption of Rsync and prevents it from affecting the NAS storage performance. The default value is 0, which means unrestricted access.
Check file contents	By default, Rsync determines if two files in the source and destination are identical by comparing their filenames, last modified dates, and file sizes. When this setting is enabled, Rsync also compares content of both files using checksums.
Send alert emails when the following events occur	When enabled, QES sends out an email alert each time a job succeeds or fails. To use this feature, you must first configure the SMTP server on QES. Go to <b>Control Panel &gt; System &gt; Notification &gt; E-mail &gt; SMTP Server</b> .

## 9. Configure a job schedule.

- a. Click **Backup frequency**.
- b. Select **Enable schedule**.
- c. Specify the schedule.  
The job can be scheduled to run daily, weekly, monthly, or to repeat after a certain number of hours.
- d. Click **Apply**.

10. Optional: Select **Execute backup immediately**.  
The job runs immediately after you finish creating it. Subsequent runs follows the backup schedule.
11. Click **Apply**.







QES creates the job and runs it based on the specified settings.

## Rsync Job Settings

To configure the following settings, go to **Backup Station > Remote Replication > Rsync** and click **Options**.

Setting	Description
Timeout (seconds)	If no data is received from the remote server during an Rsync job, QES waits for the specified number of seconds and then stops the job.
Number of retries	After an Rsync job fails, QES runs the job again until the specified number of retries is reached.
Retry intervals (second)	QES waits for the specified number of seconds between each retry.

## Rsync Job Buttons

Icon	Action	Description
	Start	Run the job immediately.
	Stop	Stop a running job.
	Rsync Log	View the job's logs.
	Edit	Edit the job's settings.
	Disable schedule	Disable the job's schedule.
	Enable schedule	Enable the job's schedule. This button is only active if a schedule is configured for the job.



## NAS to NAS Backups

### Creating a NAS to NAS Backup Job

1. Go to **Backup Station > Remote Replication > NAS to NAS**.
2. Click **Create a Replication Job**.
3. Specify a job name.
4. Configure the remote server.
  - a. Click **Settings**.
  - b. Configure the following remote site settings.

Setting	Description
Name or IP address of the remote server	The remote server DNS name or IP address.
User name	The username of the remote user. The user must have full read/write access and a sufficient quota limit on the remote server.
Password	The password of the remote user.
Port Number	The Rsync port of the remote server. The default is 873.
Enable encryption	Transfers are encrypted for additional security. SSH connections must be enabled on the remote server and the remote user must have permission to perform SSH encrypted backup jobs. Port number: The SSH port of the remote server .

- c. Optional: Test the remote server connection.
  - d. Click **Apply**.
5. Select the source folder.  
The source folder is a local shared folder or subfolder.
  6. Select the destination folder.  
The destination folder is a shared folder or subfolder on the remote server.
  7. Click **Add**.
  8. Configure the following settings.

Setting	Description
Activate file compression:	QES compresses the data before sending it to the destination. The destination NAS decompresses the data before saving it to disk. Enabling this setting can reduce transfer times if your NAS or the remote NAS have slow network connections, or are connecting via a WAN.
Perform incremental replication:	On the first run of a job, Rsync replicates all files to the remote server. On subsequent runs, Rsync only replicates files that have been modified since the last run.   <b>Tip</b> QNAS recommends enabling this setting, as it can greatly reduce backup times.
Delete extra files on remote destination	By default, Rsync only adds new files and updates modified files at the destination. Enabling this setting causes Rsync to delete files from the destination folder if they no longer exist in the source folder.
Handle sparse files efficiently	A sparse file is a type of computer file that contains large blocks of zero-byte data. Enabling this setting allows Rsync to replicate sparse files more quickly.
Replicate ACL and extended attributes	Rsync replicates ACLs for Windows files and extended attributes for Mac and UNIX files.   <b>Important</b> QES and the remote server must have the same ACL features enabled and be joined to the same domain.

Setting	Description
Maximum transfer rate (KB/s)	Limit the amount of bandwidth used by Rsync. By configuring this setting, you can prevent Rsync from consuming all bandwidth and affecting NAS storage performance. 0 is unrestricted.
Check file contents	By default, Rsync determines if two files in the source and destination are identical by comparing their filenames, last modified dates and file sizes. When this setting is enabled, Rsync also compares content of both files using checksums.
Send alert emails when the following events occur	You can receive an email alert each time a job fails or finishes successfully. The SMTP server must be configured in QES at <b>Control Panel &gt; System &gt; Notification &gt; E-mail &gt; SMTP Server</b> .

9. Configure a job schedule.

a. Click **Backup frequency**.

b. Select **Enable schedule**.

c. Specify the schedule.

The job can be scheduled to run daily, weekly, monthly, or to repeat after a certain number of hours.

d. Click **Apply**.

10. Optional: Select **Execute backup immediately**.

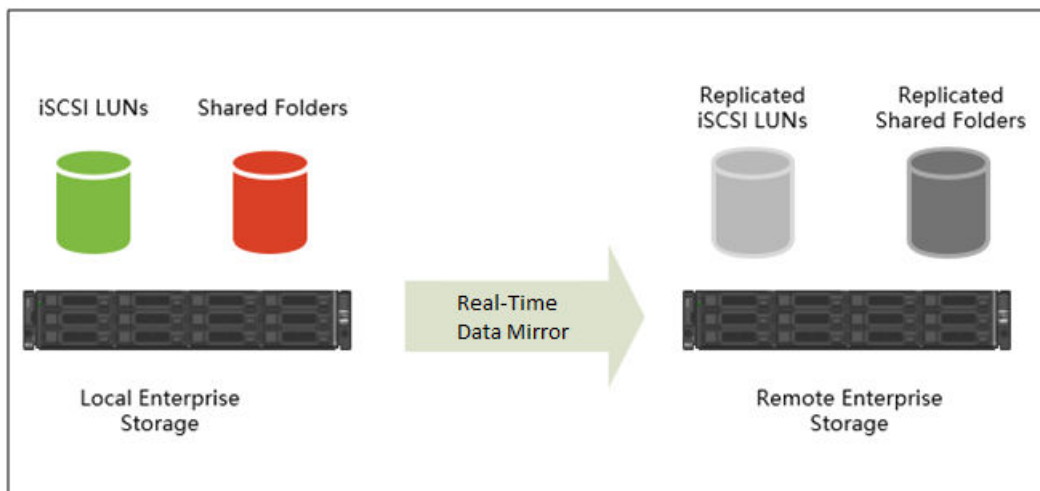
The job will run immediately after you finish creating the job. Subsequent runs will follow the backup schedule.

11. Click **Apply**.

QES creates the job, and then runs it if you selected **Execute backup immediately**.

## Real-Time SnapSync

SnapSync is a disaster recovery solution that enables you to back up data from the local NAS to another QNAP NAS using block-level replication in real time. Real time means each time data is written to the source NAS, it is also immediately written to the destination NAS, reducing backup time and the risk of data loss.



#### Note

You can also configure SnapSync to run periodically on a schedule (Scheduled SnapSync), in order to save system resources.

### SnapSync Requirements

- Both the source and destination NAS must be running QES version 2.0.0 or later.
- Both the source and destination NAS should run the same version of QES to ensure data consistency.
- When using real-time SnapSync, the round trip latency between the local and remote NAS devices must be 5ms or less. Higher latency might cause local storage write delays.

### SnapSync Restrictions

The following restrictions apply after creating a SnapSync job.

- If the destination is a shared folder, the folder becomes read-only.
- If the destination is a LUN, the LUN becomes read-only and is no longer accessible to iSCSI initiators.

Deleting the SnapSync job removes these restrictions.

### SnapSync Server Screen

Use this screen to enable SnapSync and edit settings for SnapSync backup jobs. You can also allow other NAS devices to back up data to this NAS using SnapSync, and edit SnapSync hosts. A SnapSync host is destination server in a SnapSync job.

**The SnapSync Server Screen.**

UI Element	Action
Enable SnapSync Server	You must enable the SnapSync server to create and run SnapSync jobs, and to allow other NAS devices to back up data to this NAS using SnapSync.
Port number	Set the port used for incoming and outgoing SnapSync connections. The default port is 874.
Enable maximum download rate	Limit the amount of download bandwidth used by SnapSync. 0 is unrestricted.
Maximum upload rate	Limit the amount of upload bandwidth used by SnapSync. 0 is unrestricted.
Create Host	Create a SnapSync host. The host can then be used as a destination server in SnapSync jobs.
Edit	Edit the settings of the selected SnapSync host.
Delete	Delete the selected SnapSync host.
Test	Test whether the selected SnapSync host is reachable, and whether the stored admin username and password are correct.
Apply	Save modified settings on this screen.

### Enabling the SnapSync Server

1. Go to **Backup Station > SnapSync Server** .
2. Select **Enable SnapSync Server**.
3. Configure the following settings.

Setting	Description
Port number	The port used for incoming and outgoing SnapSync connections. The default port is 874.

Setting	Description
Enable maximum download rate	Limit the amount of bandwidth used by SnapSync. 0 is unrestricted.

- Click **Apply**.

### Adding a SnapSync Host

- Go to **Backup Station > SnapSync Server**.
- Click **Create Host**.  
The **Create Host** window opens.
- Specify the following information.

Field	Description
Remote IPv6/IPv4 IP Address	The IP address of a QNAP ES NAS running QES 2.0.0 or later.
Remote Port	SnapSync port on the remote NAS. The default port for SnapSync is 874.
User Name	Username of a remote user. The user must have full read/write access and a sufficient quota limit on the remote server.
Remote Port	Password of the remote user.

- Click **Apply**.

### Real-Time SnapSync Jobs

#### Creating a Real-Time SnapSync Backup Job

- Go to **Backup Station > Remote Replication > SnapSync**.
- Click **Create a Replication Job**.
- Specify a job name.  
The name cannot contain any of the following special characters: ` \* = + [ ] \ | ; : ' " , < > / ? %
- Select **Real-Time**.
- Select the remote backup destination.
- Select the source storage pool.
- Select the source shared folder or LUN.
- Select the destination storage pool.
- Optional: Click **New** to create a new destination shared folder.
- Select the destination shared folder or LUN.





#### Warning

All data in the shared folder will be deleted.

- Select the source IP address.

QES will use this IP address to send data when running this job. This setting is only available if the destination is another NAS.


12. Select the destination IP address.  
QES on the remote NAS will use this IP address to receive data when running this job. This setting is only available if the destination is another NAS.
13. Optional: Test the connection between the source and destination NAS devices.
14. Optional: Configure job options.
  - a. Click **Options**.
  - b. Configure the following settings.

Setting	Description
Compression	SnapSync compresses the data before sending it to the destination. The destination NAS decompresses the data before saving it to disk. Enabling this setting can reduce transfer times if your NAS or the remote NAS have slow network connections, or are connecting via a WAN.
Deduplication	SnapSync reduces the amount of storage and bandwidth needed by eliminating duplicate copies of repeated data.
Support application consistent snapshots	<p>SnapSync creates application consistent snapshots.</p> <div style="border-left: 2px solid #0070C0; padding-left: 10px; margin-top: 10px;">  <p><b>Note</b> This option is only available for VMware vCenter and Volume Shadow Copy Service (VSS) aware applications running on a Windows server. You must install QNAP Snapshot Agent on the iSCSI initiator. For details, see <a href="#">QNAP Snapshot Agent</a>.</p> </div>
Send alert emails when the following events occur	<p>You can receive an email alert each time a job fails or finishes successfully.</p> <div style="border-left: 2px solid #D9534F; padding-left: 10px; margin-top: 10px;">  <p><b>Important</b> An SMTP server must be configured at <b>Control Panel &gt; System &gt; Notification &gt; E-mail &gt; SMTP Server</b> .</p> </div>




15. Click **OK**.

QES begins synchronizing the source folder to the destination folder.



### Editing a Real-Time SnapSync Job

1. Go to **Backup Station > Remote Replication > SnapSync** .
2. Locate the job you want to edit.
3. Optional: Click  if the job is running. The job's state changes to *Consistent*.







4. Click . The job's state changes to `Split`.
5. Click . The **Remote Replication** window opens.
6. Configure the job settings.
7. Click **OK**.
8. Optional: Click  to start the job.

### Deleting a SnapSync Backup Job

1. Go to **Backup Station > Remote Replication > SnapSync** .
2. Select a job.
3. If the job is running, click . The job's state changes to `Consistent`.
4. Click . The job's state changes to `Split`.
5. Click **Delete**. A confirmation message appears.
6. Click **OK**.

### Real-Time SnapSync Job Buttons

Icon	Action	Description
	Start	Start a stopped or suspended job. QES immediately synchronizes the source and destination folders.
	Stop	Stop a running job.
	Edit	Edit the job settings. For details, see <a href="#">Editing a Real-Time SnapSync Job</a> .
	Suspend job	The source and destination folders no longer connected.

### Real-Time SnapSync Status

Status	Description
Inactive	The job has been created but has not started synchronizing yet.
Synchronizing	The job has run started running. QES is synchronizing the source and destination folders.
Synchronized	The source and destination folders are synchronized.

Status	Description
Inconsistent	The job has stopped running. The files in the source and destination folders are not identical. The destination folder is read-only.
Consistent	The job has stopped running. The files in the source and destination folders are identical. The destination folder is read-only.
Split	The source and destination folders are no longer paired. The destination folder has full read/write permissions.
Connection failed	The two NAS devices are disconnected.

## Scheduled SnapSync



### Creating a Scheduled SnapSync Job

1. Go to **Backup Station > Remote Replication > SnapSync** .
2. Click **Create a Replication Job**.
3. Specify a job name.  
The name cannot contain any of the following special characters: ` \* = + [ ] \ | ; : ' " , < > / ? %
4. Select **Scheduled**.
5. Select the backup destination.  
Choose from one of the following settings.

Setting	Description
Local Interface	Back up from one shared folder to another shared folder on the same NAS.
Remote Host	Back up to another ES NAS. If the NAS does not appear in the list of SnapSync hosts then click <b>Add</b> to add it.

6. Select the source storage pool.
7. Select the source shared folder or LUN.
8. Select the destination storage pool.
9. Optional: Click **New** to create a new destination shared folder.
10. Select the destination shared folder or LUN.
11. Select the source IP address.  
SnapSync uses this IP address to send data when the job is running. This setting is only available if the destination is a different NAS.
12. Select the destination IP address.  
SnapSync on the remote NAS uses this IP address to receive data when the job is running. This setting is only available if the destination is a different NAS.
13. Optional: Test the connection between the source and destination NAS devices.
14. Optional: Configure job options.

- a. Click **Options**.
- b. Configure the following settings.



Setting	Description
Compression	SnapSync compresses the data before sending it to the destination. The destination NAS decompresses the data before saving it to disk. Enabling this setting can reduce transfer times if your NAS or the remote NAS have slow network connections, or are connecting via a WAN.
Deduplication	SnapSync reduces the amount of storage and bandwidth needed by eliminating duplicate copies of repeated data.
Support application consistent snapshots	<p>SnapSync creates application consistent snapshots.</p> <div style="border-left: 2px solid #0070C0; padding-left: 10px;"> <p> <b>Note</b> This option is only available for VMware vCenter and Volume Shadow Copy Service (VSS) aware applications running on a Windows server. You must install QNAP Snapshot Agent on the iSCSI initiator. For details, see <a href="#">QNAP Snapshot Agent</a>.</p> </div>
Send alert emails when the following events occur	<p>You can receive an email alert each time a job fails or finishes successfully.</p> <div style="border-left: 2px solid #D9534F; padding-left: 10px;"> <p> <b>Important</b> An SMTP server must be configured at <b>Control Panel &gt; System &gt; Notification &gt; E-mail &gt; SMTP Server</b> .</p> </div>

15. Configure a job schedule.
  - a. Click **Backup frequency**.
  - b. Select **Enable schedule**.
  - c. Specify the schedule.  
The job can be scheduled to run daily, weekly, monthly, or to repeat after a certain number of hours.
  - d. Click **Apply**.
16. Optional: Select **Execute backup immediately**.  
The job will run immediately after you finish creating the job. Subsequent runs will follow the backup schedule.
17. Click **OK**.


QES creates the job, and then runs it if you selected **Execute backup immediately**.

### Editing a Scheduled SnapSync Job






1. Go to **Backup Station > Remote Replication > SnapSync** .

2. Locate the job you want to edit.
3. Optional: Click  if the job is running. The job stops.
4. Click . The **Remote Replication** window opens.
5. Configure the job settings.
6. Click **OK**.

### Deleting a Scheduled SnapSync Job

1. Go to **Backup Station > Remote Replication > SnapSync** .
2. Select a job.
3. Click . The job's state changes to *Suspended*.
4. Click **Delete**. A confirmation message appears.
5. Click **OK**.

### Scheduled SnapSync Job Buttons

Icon	Action	Description
	Start	Run the job immediately.
	Stop	Stop a running job.
	Edit	Edit the job settings. For details, see <a href="#">Editing a Scheduled SnapSync Job</a>
	Suspend job	The job no longer runs according to its schedule.
	Resume job	The job runs according to its schedule. If QES detects that the source and destination folders are different, then it immediately runs the job and synchronizes them.

### Scheduled SnapSync Status

Status	Description
Idle	The job is not currently running.
Starting	SnapSync is preparing to run the job.
Ready	The job is not currently running. This status appears after deleting a SnapSync job, and then creating a new job with the same name and the same source and destination. Delete and then recreate an existing job.

Status	Description
Updated	The job has finished running. The source was synchronized to a destination on a remote NAS.
Local Updated	The job has finished running. The source was synchronized to a destination on the local NAS.
Suspended	The job was suspended by a user clicking <b>Suspend job</b> on the source or destination NAS.
Not run yet	The job was created but has not been run.
Updating	The job is running. SnapSync is synchronizing data from the source folder to the destination folder.
Disconnected	The two NAS devices are disconnected.

## Accessing a SnapSync Destination Folder

The destination shared folder has separate permissions from the source folder. To access a destination folder, you must configure its access permissions on the destination NAS.



### Important

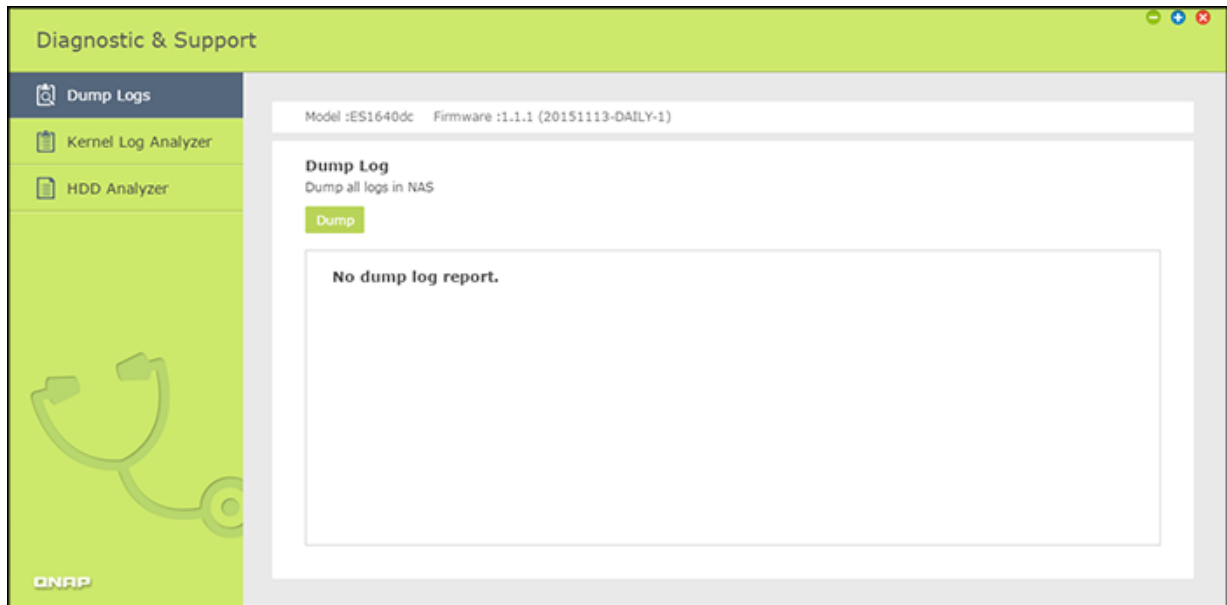
The destination folder of a SnapSync job is configured as read-only. To restore full read/write permissions you must suspend the SnapSync job.

1. Log onto the destination NAS using an account with administrator permissions.
2. Go to **Storage Manager > Storage > Storage Space** .
3. Select the destination storage pool.
4. Select the destination folder.  
The **Shared Folder Manager** window opens.
5. Select **Actions > Edit Properties** .  
The **Shared Folder Properties** window opens.
6. Under **Storage Settings and Services**, click **Edit**.
7. Select one or more storage services.
8. Click **Apply**.
9. Click **Permissions**.  
The **Shared Folder** window opens  
.
10. Select **Users and groups permission**.
11. Configure user and group access permission, then click **Apply**.  
You can only select RO (read-only) permissions. For details, see [Configuring User and Group Permissions](#).
12. Configure NFS host access.  
For details, see [Configuring NFS Host Access Permissions](#).
13. Configure SMB host access.  
For details, see [Configuring SMB Host Access Control](#).

You can now access the destination folder.

## Diagnostic Tool

The Diagnostic Tool provides several features for checking the stability of the NAS. Users can export system kernel records to quickly check whether abnormal operations have recently occurred. In addition, users can send the records to QNAP technical support for further investigation. The Diagnostic tool also provides features for checking the file system, hard drives, and RAM.



### Tip

QNAP strongly recommends using the Diagnostic Tool to efficiently troubleshoot NAS issues.

## Downloading System Logs

1. Go to **Control Panel > Applications > Diagnostic Tool > Dump Log** .
2. Click **Dump**. The system will produce a .zip file.
3. Download the .zip file.
4. Optional: Send the file to QNAP technical support for further investigation.




## Analyzing Kernel Logs

1. Go to **Control Panel > Applications > Diagnostic Tool > Kernel Log Analyzer** .
2. Click **Start**.

QES will show the results of the kernel log analysis.

## Analyzing Hard Disk Drives

1. Go to **Control Panel > Applications > Diagnostic Tool > HDD Analyzer** .
2. Perform one of the following actions.

Action	Steps
Dump SMART test logs	<ol style="list-style-type: none"> <li>a. Select <b>Dump SMART value</b>.</li> <li>b. Select the enclosure you wish to analyze.</li> <li>c. Click <b>Dump</b>.</li> </ol> <p> <b>Note</b> You can download the SMART test logs after they have been dumped.</p>
Test system performance	<ol style="list-style-type: none"> <li>a. Select <b>Test performance</b>.</li> <li>b. Select the enclosure you wish to analyze.</li> <li>c. Click <b>Start</b>.</li> </ol> <p> <b>Note</b> QES will show the results of the system performance test.</p>
Dump RAID logs	<ol style="list-style-type: none"> <li>a. Select <b>Dump RAID information</b>.</li> <li>b. Select the pool you wish to analyze.</li> <li>c. Click <b>Update</b>.</li> </ol> <p> <b>Note</b> QES will show the results of the RAID information dump.</p>

**Tip**

QNAP recommends sending these logs to technical support when you open a technical support request.

## Station Manager

Station Manager is an integrated control panel for enabling and disabling QNAP stations. File Station is currently the only station on QES.

**File Station**

Enable File Station

After enabling this service, click the following link to enter to Web File Station.

[Regular login \(http://172.17.22.161:8080/cgi-bin/filemanager.html\)](http://172.17.22.161:8080/cgi-bin/filemanager.html)

[Secure login \(https://172.17.22.161:443/cgi-bin/filemanager.html\)](https://172.17.22.161:443/cgi-bin/filemanager.html)

Apply

Apply All

## TFTP Server

Trivial File Transfer Protocol (TFTP) is a basic form of FTP. You can configure the NAS as a TFTP server for network device management and remote network booting. TFTP does not provide user authentication and you cannot connect to it using a standard FTP client.

Enable TFTP Server

UDP port:

You need to specify a root directory for the TFTP server.

Root directory:  Controller: SCB

Access right:

Allow TFTP access from:

Anywhere

Certain IP range only

Start IP address:  .  .  .

End IP address:  .  .  .

Apply

## Enabling the TFTP Server

1. Go to **Control Panel > Applications > TFTP Server**.
2. Select **Enable TFTP Server**.



3. Specify the UDP port.  
The default UDP port is 69.
4. Specify the TFTP root directory.  
The TFTP root directory stores all files and folders uploaded to the NAS using TFTP.
5. Select access rights.

Option	Description
Read only	TFTP clients can view and download files.
Full access	TFTP clients can view, modify, upload, and download files.

6. Configure TFTP client access.

Option	Description
Anywhere	
Certain IP range only	

7. Click **Apply**.

QES enables the TFTP server.

## Virtualization

The QNAP ES NAS is a virtualization-ready storage solution that includes VMware vSphere, Microsoft Hyper-V, and Citrix XenServer, as well as VAAI for iSCSI, VAAI for NAS, and Offloaded Data Transfer (ODX). The NAS supports thin provisioning and storage reclamation, and QNAP offers network accessories that support 10GbE and SSD cache. In addition, you can use vSphere Client and SMI-S Provider to increase productivity and efficiency.

For more information, go to <https://www.qnap.com/en/how-to/tutorial/zfs-virtualization>.

## VAAI for iSCSI and VAAI for NAS

For details, go to [https://files.qnap.com/news/pressresource/datasheet/QNAP\\_Plugin\\_for\\_VMWare\\_vStorage\\_API\\_for\\_Array\\_Integration\\_\(VAAI\)\(English\).pdf](https://files.qnap.com/news/pressresource/datasheet/QNAP_Plugin_for_VMWare_vStorage_API_for_Array_Integration_(VAAI)(English).pdf)

## Offloaded Data Transfer (ODX)

The ES NAS supports Offloaded Data Transfer (ODX) in Microsoft Windows Server 2016, making it a high-performance iSCSI storage solution for Hyper-V virtualized environments. By supporting ODX, the NAS can be offloaded with all the copying processes from Windows servers. ODX significantly reduces the load on Windows servers and improves the efficiency of copying and moving operations for Windows 2016 hosts that use QNAP iSCSI storage.

## 10GbE Support

A 10GbE network is essential for businesses that require high bandwidth for virtualization and quick, efficient backup and data restoration. The QNAP ES NAS series is a reliable storage solution for deploying a 10GbE environment. For details, go to <https://www.qnap.com/solution/10gbe-ready/en/>.

## vSphere Client

The vSphere Client for the ES NAS is an interface between ESXi and the NAS. This tool enables system administrators to manage VMware datastores and verify the status of NAS units directly from the vSphere

Client. For details, go to <https://www.qnap.com/en/how-to/tutorial/article/using-qnap-vsphere-web-client-plugin-with-qnap-es-nas>.

## QNAP SMI-S Provider

The QNAP SMI-S Provider is required for System Center Virtual Machine Manager (SCVMM 2012). With the SMI-S Provider, the NAS can directly communicate with SCVMM 2012, and server management tasks can be facilitated for administrators. For details, see [https://files.qnap.com/news/pressresource/datasheet/QNAP\\_Enterprise-class\\_ES\\_NAS\\_SMI-S\\_Provider\\_for\\_System\\_Center\\_Virtual\\_Machine\\_Manager\(English\).pdf](https://files.qnap.com/news/pressresource/datasheet/QNAP_Enterprise-class_ES_NAS_SMI-S_Provider_for_System_Center_Virtual_Machine_Manager(English).pdf).

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- c. Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.
- d. Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

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