QNAP

QTS 4.3.4

Getting Started Guide

Contents

1. 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: • NAS name (Example: http://example123/) or IP address • Logon credentials of a valid user account For details, see Accessing the NAS Using a Browser.	• Computer that is connected to the same network as the NAS • Web browser
Qfinder Pro	Qfinder Pro is a desktop utility that supports Windows, macOS, Linux, and Chrome OS. For details, see Accessing the NAS Using Qfinder Pro.	• Computer that is connected to the same network as the NAS • Web browser • Qfinder Pro
Qmanager	Qmanager is a mobile application that enables administrators to manage and monitor NAS devices on the same network. You can download Qmanager from the Apple App Store and the Google Play Store. For details, see Accessing the NAS Using Qmanager.	• Mobile device that is connected to the same network as the NAS • Qmanager
Explorer (Windows)	You can map a NAS shared folder as a network drive to easily access files using Explorer. For details on mapping shared folders, see Mapping a Shared Folder on a Windows Computer.	• Windows computer that is connected to the same network as the NAS • Qfinder Pro (during mapping)
Finder (macOS)	You can map a NAS shared folder as a network drive to easily access files using Finder. For details on mounting shared folders, see Mounting a Shared Folder on a Mac Computer.	• Mac computer that is connected to the same network as the NAS • Qfinder Pro (during mapping)

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.

> **Note**
> 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.

1. Verify that your computer is connected to the same network as the NAS.

2. Open a web browser on your computer.

3. Type the IP address of the NAS in the address bar.
   The QTS login screen appears.

4. Specify your user name and password.
   The default user name and password is `admin`.

5. Click **Login**.
   The QTS desktop appears.

Accessing the NAS Using Qfinder Pro

Qfinder Pro is a desktop utility that enables you locate and access QNAP NAS devices on a specific network. The utility supports Windows, macOS, Linux, and Chrome OS.

1. Install Qfinder Pro on a computer that is connected to the same network as the NAS.
   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 QTS login screen opens in the default web browser.

4. Specify your user name and password.
   The default user name and password is `admin`.

5. Click **Login**.
   The QTS desktop appears.

Accessing the NAS Using Qmanager

Qmanager is a mobile application that enables administrators to manage and monitor NAS devices on the same network.

Administrators can perform the following actions with Qmanager.

- View system information such as CPU usage, memory usage, connection status, and system events

- Manage download and backup tasks

- Enable and disable application services

- Restart or shut down the NAS

1. Install Qmanager on an Android or iOS device.
   To download Qmanager, go to the Apple App Store or the Google Play Store.

2. Open Qmanager.

3. Tap **Add NAS**.
   Qmanager automatically searches for all QNAP NAS devices on the network.

4. Locate the NAS in the list, and then tap the name or IP address.

5. Specify your user name and password.

The default user name and password is `admin`.

6. Optional: If your mobile device and NAS are not connected to the same subnet, perform one of the following actions.

Action	Steps
Tap **Add NAS manually**.	**a.** Specify the following information. • Host name or IP address of the NAS • Password of the admin account **b.** Tap **Save**.
Tap **Sign in QID**.	**a.** Specify the following information. • Email address that you used to create your QNAP account • Password of your QNAP account **b.** Tap **Sign in**. **c.** Locate the NAS in the list, and then tap the name or IP address.

2-step Verification

2-step verification enhances the security of user accounts. When the feature is enabled, users are required to specify a six-digit security code in addition to the account credentials during the login process.

To use 2-step verification, you must install an authenticator application on your mobile device. The application must implement verification services using the Time-based One-time Password Algorithm (TOTP). QTS supports Google Authenticator (for Android, iOS, and BlackBerry) and Authenticator (for Windows Phone).

Enabling 2-step Verification

1. Install an authenticator application on your mobile device.
   QTS supports the following applications:

   • Google Authenticator: Android, iOS, and BlackBerry

   • Authenticator: Windows Phone

2. Verify that the system times of the NAS and mobile device are synchronized.

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

3. In QTS, go to **Options** > **2-step Verification** .

4. Click **Get Started**.
   The **2-step Verification** window opens.

5. Open the authenticator application on your mobile phone.

6. Configure the application by scanning the QR code or specifying the security key displayed in the **2-step Verification** window.

7. In the **2-step Verification** window, click **Next**.
The **Confirm your 2-step verification settings** screen appears.

8. Specify the security code generated by the authenticator application.

9. Select an alternative verification method that will be used whenever your mobile device is inaccessible.

   • Answer a security question: Select one of the options or provide your own security question.

   • Email a security code: To use this method, go to **Control Panel** > **Notification** > **Email** and then verify that the SMTP server is correctly configured.

10. Click **Finish**.

Logging into QTS with 2-step Verification

1. Specify your user name and password.

2. Specify the security code generated by the authenticator application installed on your mobile device.

3. Optional: If your mobile device is inaccessible, click **Verify another way**.

4. Specify the answer to the security question.

5. Click **Login**.

Disabling 2-step Verification

Situation	User Action	Steps
Users are locked out of their accounts.	Administrators can disable 2-step verification from the Control Panel.	Go to **Control Panel** > **Users** > **Edit Account Profile** .
An administrator is locked out and no other administrators can access the account.	An administrator must restore the factory settings.	Press the RESET button at the back of the NAS for three seconds. The NAS restores the default administrator password and network settings. ⚠️ **Warning** Pressing the RESET button for 10 seconds resets all settings and deletes all data on the NAS.

About QTS

QTS is a Linux-based operating system that runs applications for file management, virtualization, surveillance, multimedia, and other purposes. The optimized kernel and various services efficiently manage system resources, support the applications, and protect your data. QTS also has built-in utilities that extend the functionality and improve the performance of the NAS.

The multi-window, multitasking user interface enables you to manage the NAS, user accounts, data, and applications. Out of the box, QTS provides built-in features that allow you to easily store and share files. QTS also links to the App Center, which offers plenty of options for customizing the NAS and improving user workflows.

QTS Navigation

Task Bar
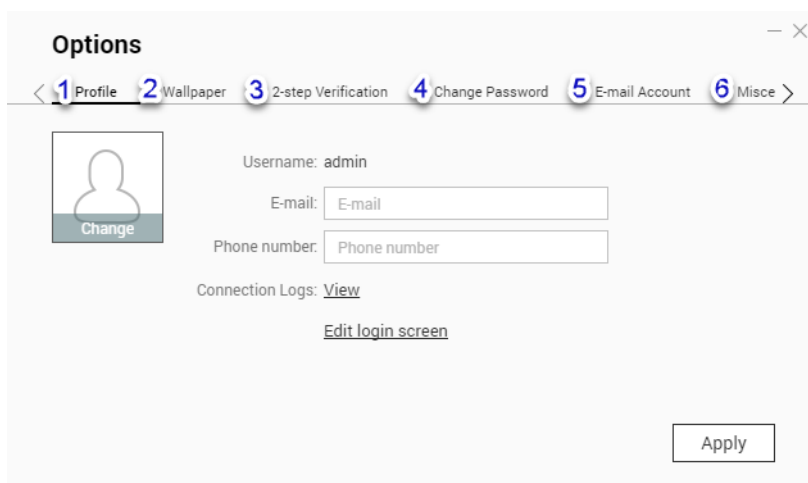
#	Element	Possible User Actions
1	**Show Desktop**	Click the button to minimize or restore all open windows.
2	**Main Menu**	Click the button to open the Main Menu panel on the left side of the desktop.
3	**Search**	• Type key words to locate settings, applications, and help content. • Click an entry in the search results to open the application, system utility, or **Help Center** window. If the application is not yet installed, QTS opens the corresponding download screen in the **App Center** window.
4	**Volume Control** ⊘ **Important** The feature is available only in models with certain hardware specifications.	Click the button to view the following: • Media Volume: Click and drag the slider thumb to adjust the volume of audio from applications that use the built-in speaker or line out port. • HD Station • Music Station • OceanKTV • Audio Alert Volume: Click and drag the slider thumb to adjust the volume of system audio alerts.
5	**Background Tasks**	• 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. • Click the button to see the following details for each background task: • Task type • Affected settings • Progress (percentage of completion) • Click ◉ to stop a task.

#	Element	Possible User Actions
6	**External Devices**	• 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 of the NAS. • Click the button to view the following details for each connected device. • Click a listed device to open File Station and view the contents of the device.
7	**Event Notifications**	• Position the mouse pointer over the button to see the number of recent errors, warnings, and notices. • Click the button to view the following details for each event: • Event type • Description • Timestamp • Number of instances • Click a list entry to view the related utility or application screen. Clicking a warning or error log entry opens the **System Logs** window. • Click **More>>** to open the **System Logs** window. • Click **Clear All** to delete all list entries.
8	**Options**	Click your profile picture to open the **Options** screen. For details, see Options.

#	Element	Possible User Actions
9	**[USER_NAME]**	Click the button to view the last login time and the following menu items: • **Options**: Opens the Options window. For details, see Options. • **Sleep**: Keeps the NAS powered on but significantly reduces power consumption. This feature is available only in models with certain specifications. • **Restart**: Restarts the NAS • **Shutdown**: Shuts down QTS and then powers off the NAS **Note** You can also power off the NAS using one of the following methods: • Press and hold the power button for 1.5 seconds. • Run Qfinder Pro and go to **Tools** > **Shut down Server** . • Open Qmanager and go to **Menu** > **System Tools** > **System** . Tap **Shutdown**. • **Logout**: Logs the user off the current session

#	Element	Possible User Actions
10	**More**	Click the button to view the following menu items: • **What's New**: Opens the **What's New** window, which displays information on the new features and enhancements avaiilable in the installed QTS version • **Help**: Displays links to the Quick Start Guide, Virtualization Guide, Help Center, and online tutorials page • **Language**: Opens a list of supported languages and allows you to change the language of the operating system • **Desktop Preferences**: Opens a list of display modes and allows you to select your preferred mode of displaying the QTS desktop based on your device type • **Help Request**: Opens the Helpdesk window • **About**: Displays the following information: • Operating system • Hardware model • Operating system version • Number of installed drives • Number of empty drive bays • System volume name • Used disk space • Available disk space
11	**Dashboard**	Click the button to display the dashboard. For details, see Dashboard.

Options

#	Tab	Possible User Actions
1	**Profile**	• Specify the following optional information: • Profile picture • Email address • Phone number • Click **View** to open the **System Connection Logs** screen. • Click **Edit login screen** to open the **Login Screen** configuration screen in the **Control Panel** window. • Click **Apply** to save all changes.
2	**Wallpaper**	• Select a wallpaper from the built-in options or upload a photo. • Click **Apply** to save all changes.
3	**2-step Verification**	Click **Get Started** to open the configuration wizard. For details, see Enabling 2-step Verification.
4	**Change Password**	• Specify the following information: • **Old password** • **New password**: Specify a password with a maximum of 64 characters. QNAP recommends using passwords with at least 6 characters. • Click **Apply** to save all changes.
5	**E-mail Account**	• Add, edit, and delete email accounts that you intend to use to share files. • Click **Apply** to save all changes.

#	Tab	Possible User Actions
6	**Miscellaneous**	• Enable the following settings as necessary. • **Auto logout after an idle period**: Specify the duration of inactivity after which the user is automatically logged out. • **Warn me when leaving QTS**: When enabled, QTS 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. • **Reopen windows when logging back into NAS**: When enabled, the current desktop settings (including all open windows) are retained until the next session. • **Show the desktop switching button**: When enabled, QTS displays the desktop switching buttons **< >** on the left and right sides of the desktop. • **Show the link bar on the desktop**: When enabled, QTS displays the link bar on the bottom of the desktop. • **Keep Main Menu open after selection**: When enabled, QTS keeps the main menu pinned to the desktop after you open it. • **Show a list of actions when external storage devices are detected**: When enabled, QTS displays an **Autoplay** dialog box whenever an external storage device is inserted into a USB or SATA port. • Click **Apply** to save all changes.

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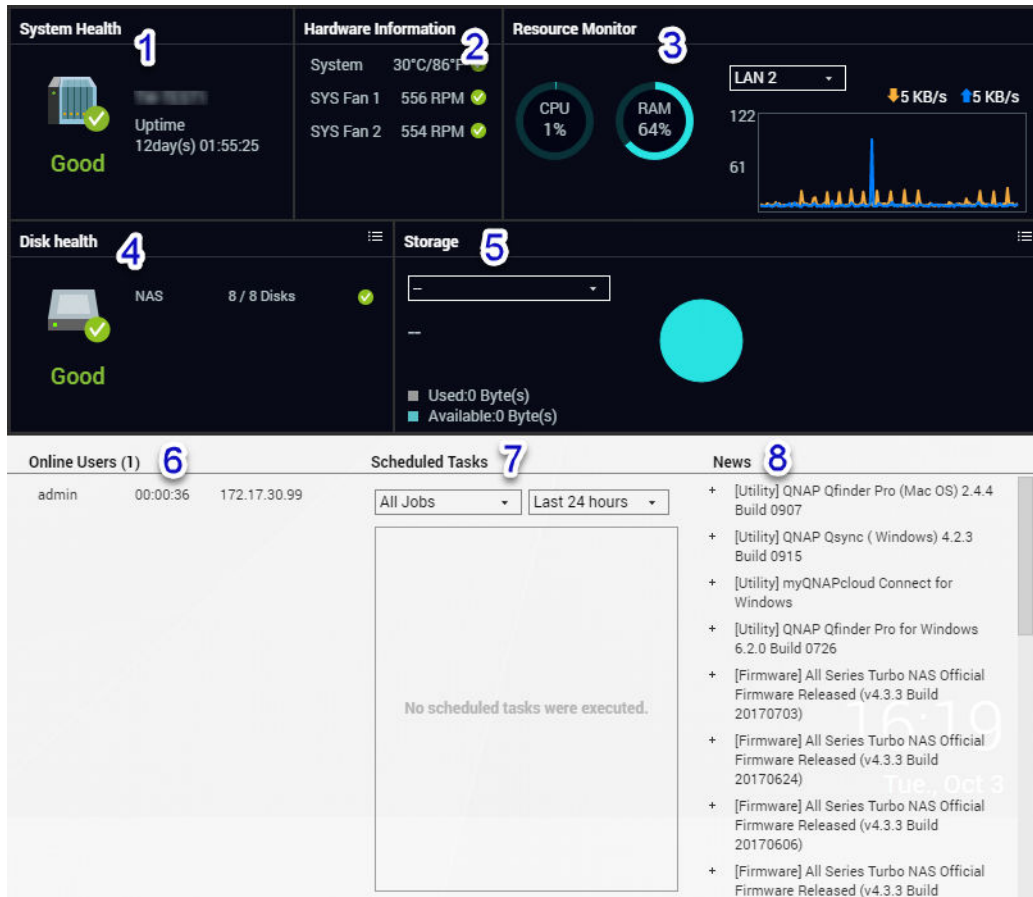
The dashboard opens in the lower right corner of the desktop.

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

#	Section	Displayed Information	User Actions
1	System Health	• NAS name • Uptime (number of days, hours, minutes and seconds) • Health status	Click the heading to open the **System Information** screen in the **System Status** window. If disk-related issues occur, clicking the heading opens the **Storage & Snapshots** window.
2	Hardware Information	• System temperature • CPU fan speed • System fan speed • System fan speed	Click the heading to open the **Hardware Information** screen in the **System Status** window.

#	Section	Displayed Information	User Actions
3	Resource Monitor	• CPU usage in % • Memory usage in % • Network upload and download speeds/rates	Click the heading to open the **Overview** screen in the **Resource Monitor** window.
4	Disk Health	• Number of installed disks • Health status of installed disks	• Click the heading to open the **Disk Health** screen in the **Storage & Snapshots** window. • Click ▤ to view the following information for each installed disk: • Capacity/size • Temperature • Health status • Click **Details** to open the **Overview** screen in the **Storage & Snapshots** window.
5	Storage	For each volume: • Status • Used space • Available space • Folder size For each storage pool: • Status • Used space • Available space • Volume size	• Click the heading to open the **Storage Resource** screen in the **Resource Monitor** window. • Click ▤ to switch between volume and storage pool information.
6	Online Users	• User name • Session duration • IP address	Click the heading to open the **Online Users** screen in the **System Logs** window.
7	Scheduled Tasks	• Task type • Task summary • Task name • Timestamp • Status	Use the filters to view tasks that were executed within a specific period.

#	Section	Displayed Information	User Actions
8	News	Links to QNAP announcements	Click the heading to open the relevant pages in the QNAP website.

Main Menu

#	Section	Description	Possible User Actions
1	NAS Information	NAS name and model number	N/A

2	Systems	System utilities and other programs that enable you to manage the NAS
		The following are the default system utilities:
		
		• Control Panel
		
		• Storage & Snapshots
		
		• Users
		
		• Network & Virtual Switch
		
		• myQNAPcloud
		
		• Resource Monitor
		
		• App Center
		
		• Help Center
			• Open a system utility or application in the QTS desktop
			
			  • Click a menu item.
			
			  • Right-click a menu item and then select **Open**.
			
			• Open an application in a new browser tab (only for certain apps)
			
			  • Right-click a menu item and then select **Open in new browser tab**.
			
			• Create a shortcut on the desktop
			
			  • Right-click a menu item and then select **Create shortcut**.
			
			  • Click and drag a menu item to the desktop.

3	Applications	Applications developed by QNAP or third-party developers When an app is installed, it is automatically added to the applications list. The following are the default applications: • Backup Station • File Station • Helpdesk • HybridDesk Station This application is only available in models with certain specifications. • QTS SSL Certificate	

Desktop

#	Element	Description	Possible User Actions
1	Wallpaper	This is a digital image that is used as a background for the QTS desktop. Users can either select from one of the provided wallpapers or upload an image	Change the wallpaper in the **Options** window.
2	Shortcut icons	This opens an app or a utility. When you install an application, QTS automatically creates a shortcut on the desktop. The following are the default shortcuts: • Control Panel • File Station • Storage & Snapshots • App Center • Help Center	• Click an icon to open the application window. • Right-click an icon and then select one of the following: • **Open**: Opens the application window • **Remove**: Deletes the icon from the desktop • Click and drag an icon to another desktop.
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	Qboost	This enables you to manage and monitor memory consumption.	• Click 🔲 or 🔲 to display the memory status and open the Qboost panel. • Click 🔲 or 🔲 to hide the memory status and close the Qboost panel.

#	Element	Description	Possible User Actions
5	Recycle Bin	This displays the list of files that the currently active user moved to the Recycle Bin. The following applications provide users a choice between permanently deleting files and moving files to the Recycle Bin. • File Station • Music Station • Photo Station • Video Station	• Click ▯ to open the **Recycle Bin** screen in the **File Station** window. • Right-click ▯ and then select one of the following: • **Open**: Opens the **Recycle Bin** screen in the **File Station** window • **Empty All**: Permanently deletes files in the Recycle Bin • Settings: Opens the **Network Recycle Bin** screen in the **Control Panel** window
6	Date and time	This displays the date and time that the user configured during installation of the operating system.	N/A
7	Link bar	This displays shortcut links to myQNAPcloud, utility and app download pages, feedback channels, and the Helpdesk.	Click any of the following buttons: • 🔘: Opens the myQNAPcloud website in another browser tab • 🔘: Opens the download page for mobile applications and utilities • 🔘: Provides links to theQNAP Wiki, QNAP Forum, and Customer Service portal • 🔘: Opens the Helpdesk utility
8	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.

Qboost
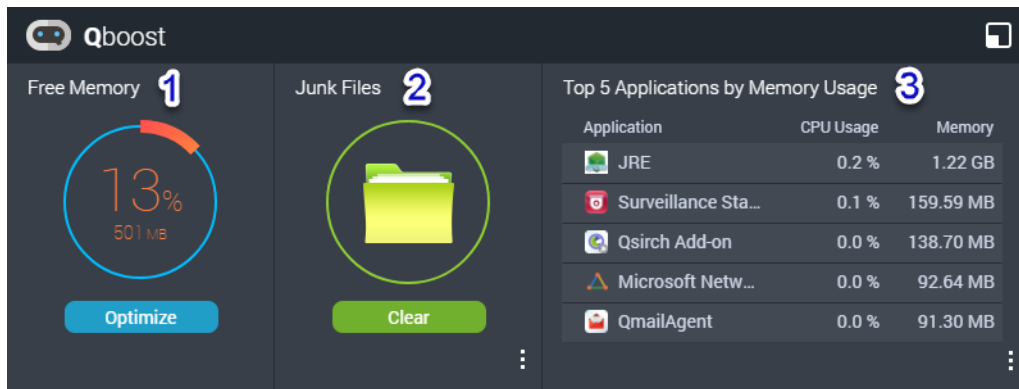
Qboost is a system utility that monitors and enables you to manage memory consumption. It provides the following information:

#	Section	Description	User Actions
1	Free Memory	• Memory that has not been allocated, is currently unused, and does not contain useful information • Expressed as a percentage of the total memory and the number of bytes	Click **Optimize** to clear the buffer memory (block level) and cache memory (file level).
2	Junk Files	• Unnecessary system files and files in the Recycle Bin • Consume disk space and memory because they are not automatically deleted when no longer needed	• Click **Clear** to permanently delete the specified files. By default, clicking **Clear** only deletes unnecessary system files, such as files that the operating system and applications create while performing certain tasks • Click ⋮ to select other types of files to delete. Select **Empty Recycle Bin** to include files that were moved to the Recycle Bin by the currently active user.
3	Top 5 Applications by Memory Usage	Top five applications and services that consume the most memory	Click ⋮ to display all applications and services that can be enabled and disabled from either the Control Panel or the App Center. For details, see Application Management.

Application Management

Application Management displays the following information.

Item	Description
Application	Displays the application name
CPU Usage	Displays the percentage of consumed processing power
Memory	Displays the amount of memory consumed
CPU Time	Displays the amount of time the CPU requires to process an application request
Status	Displays one of the following statuses: • Always Enabled • Always Disabled • Scheduled
Action	Displays icons for the possible actions

You can perform the following actions.

Objective	Action
Enable or disable an application or service.	• Click to change the status to Always Enabled. • Click to change the status to Always Disabled.
Create a schedule for enabling and disabling an application or service. ⚠ **Warning** Setting a schedule may force an application to stop in the middle of a task.	1. Click to open the scheduling screen. 2. Select **Enable Schedule**. Step result: The calendar is activated. All days and hours are enabled by default. 3. Select the hours during which the application or service should be enabled or disabled. Hours are filled with one of the following colors or patterrns. • Blue: The application or service is enabled. • Gray: The application or service is disabled. • Striped: The NAS is scheduled to sleep or shut down. 4. Optional: If you want to enable the app at a certain time, specify the number of minutes after the hour when the application is enabled or disabled. Example: To enable an application only after half an hour, type 30. 5. Perform one of the following actions. • Click **Apply**: Applies the schedule to the selected application or service • Select **Auto-apply**: Applies the schedule to all applications and services
Delete a schedule.	Click to delete the schedule and disable an application or service.
Remove an application.	Click . This function applies only to applications that are available on the App Center.

Getting Started

1. Plan how you want to combine or divide the available storage space.
   For details, see Volume Configuration.

2. Optional: Create one or more storage pools.
   Creating multiple volumes requires a storage pool. For details, see Storage Pools.

3. Create one or more volumes.
   The NAS can store files only if at least one volume is created. For details, see Volumes.

4. Create user accounts.
   QNAP recommends creating a user account for each person that requires access to the NAS. For details, see Users.

5. Optional: Create user groups.
   User groups enable you easily manage user accounts. For details, see User Groups.

6. Optional: Create shared folders.
   QTS creates four default shared folders. For details, see Shared Folders.

7. Edit the shared folders permissions.
   Permissions enable you to control who can view and modify files in a shared folder. For details, see Editing Shared Folder Properties.

8. Map the shared folders as network drives on your computer.
   For details, see Drive Mapping.

9. Store and manage files.
   For details, see File Station.

2. Storage & Snapshots

Storage & Snapshots is a system utility that enables you to manage storage space. You can perform the following tasks with Storage & Snapshots.

- Create and configure storage pools, volumes, LUNs, and shared folders.

- View the amount of free storage space.

- Check the health of installed disks.

- Back up data using snapshots.

- Manage external storage devices connected to the NAS, such as USB drives and expansion units.

Storage

QTS provides a flexible volume architecture that enables you to easily manage, store, and share files.
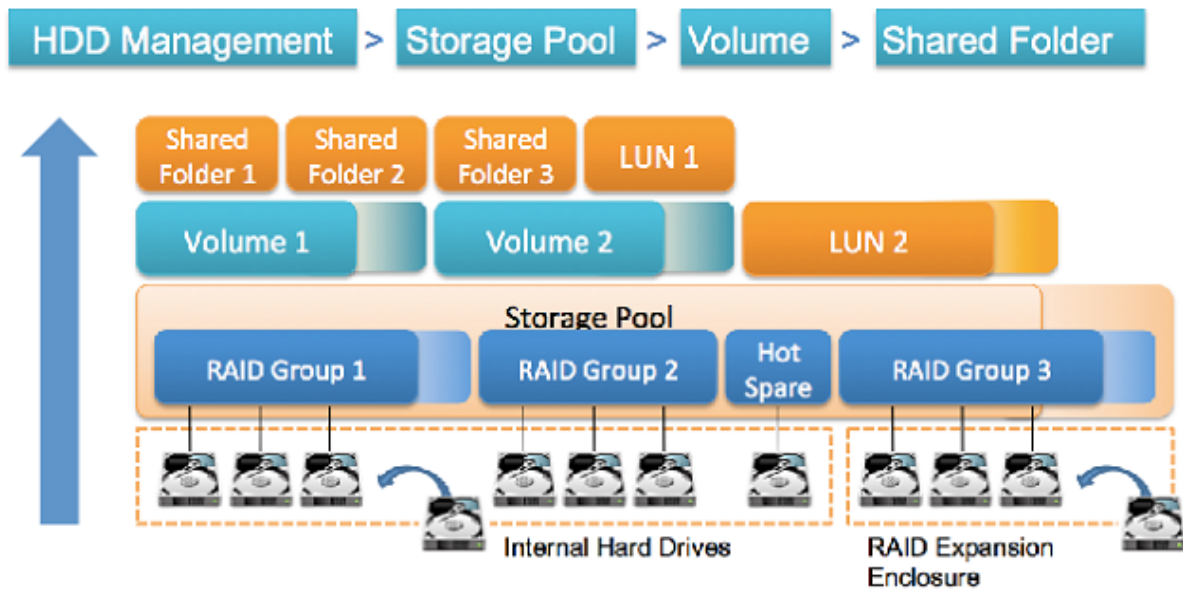
QTS Flexible Volume Architecture

Object	Description	Details
Disk	Physical device that stores and retrieves data	QNAP NAS devices support the following disk sizes and types: Size. • 3.5-inch, 2.5-inch • Specific models: M.2 Type: • SATA, SSD • Specific models: SAS, NL-SAS, NVMe PCIe SSD, NVMe M.2 PCIe SSD **Note** All of the above disk types can be used to create storage pools and static volumes. Only SSDs, NVMe PCIe SSDs, and NVMe M.2 SSDs can be used in the SSD cache.
RAID group	Logical disk that consists of one or more disks. RAID groups usually contain disks that are of the same type and capacity.	Data is distributed across the disks in a RAID group. Each RAID type offers a different combination of reliability, performance, and capacity. For details, see RAID.
Storage pool	Pool of storage space that consists of RAID groups	Storage pools can aggregate RAID groups that consist of disks of different types and capacities. Storage pools enable easier storage space management and features such as snapshots.
Volume	Portion of storage space that is used to divide and manage storage capacity	You can create volumes by dividing storage pool space, or using the space of a RAID group. QTS offers three different volume types, with different combinations of performance and flexibility. At least one volume must be created before the NAS can start storing data.
iSCSI LUN (logical unit number)	Portion of storage space that can be used by other NAS devices through the iSCSI protocol	QTS offers two LUN types. • Block-based LUN: Created from a storage pool. It is similar to a volume, except that it has no file system and must be linked to an iSCSI host. • File-based LUN: Created on a volume. It is similar to an ISO image file.
Shared folder	Folder that is used for storing and sharing files	Shared folders are created on volumes. QTS automatically creates default shared folders for multimedia, public documents, and downloads. You can create more shared folders and configure permissions for each.

Storage Creation

Volumes

A volume is a portion of storage space within the NAS. Each volume is created from the storage space of a storage pool, or of a RAID group. Volumes are used to divide and manage your storage space. QNAP NAS devices support three different types of volume.

	Volume Type		
	Single Static	**Thick Multiple**	**Thin Multiple**
Summary	Best overall read/write performance, but does not support most advanced features	Good balance between performance and flexibility	Enables you to allocate storage space more efficiently
Read/write speed	Fastest for random writes	Good	Good
Flexibility	Inflexible A volume can only be expanded by adding extra drives to the NAS.	Flexible A volume can easily grow in size.	Very flexible A volume can easily grow in size, and unused space can be reclaimed and added back to the parent storage pool.
Parent storage space	RAID group	Storage pool	Storage pool
Number of volumes that can be created in the parent storage space	One	One or more	One or more
Initial size	Size of the parent RAID group	User-specified	Zero Storage pool space is allocated on-demand, data is written to the volume. This is called thin provisioning.
Maximum size	Size of the parent RAID group	Size of the parent storage pool	Twenty times the amount of free space in the parent storage pool The size of a thin volume can be greater than that of its parent storage pool. This is called over-allocation.
Effect of data deletion	Space is freed in the volume	Space is freed in the volume	QTS can reclaim the space and add it back into the parent storage pool.
Method of adding storage space	• Add disks to the NAS • Replace existing disks with higher capacity disks	Allocate more space from the parent storage pool	Allocate more space from the parent storage pool
Snapshot support (fast backup and recovery)	No	Yes	Yes
Qtier (automatic data tiering) support	No	Yes	Yes

Volume Configuration

Volumes divide your storage space into separate areas. You can have one large volume or several smaller volumes. Shared folders are then created on the volumes to store and share files.

Configuration	Advantage	Description

Single Volume
Example:
 	
• Volume 1
 	
  • Shared Folder 1
 	
  • Shared Folder 2
 	
  • Shared Folder 3
 	
  • Shared Folder 4
	Simplicity	Creating one volume is quick and easy. You do not have to worry about changing volume sizes or creating new volumes after the initial NAS setup.

	Speed	Single static volumes are faster because they do not require a storage pool.

Multiple Volumes
Example:
 	
• Volume 1
 	
  • Shared Folder 1
 	
• Volume 2
 	
  • Shared Folder 2
 	
• Volume 3
 	
  • Shared Folder 3
 	
  • Shared Folder 4
	Limiting of storage space usage	Each volume functions like a separate container. If a user or an app writes a large amount of files to a volume, only the specified volume is filled. Other volumes remain unaffected.

	Multiple snapshot schedules	Snapshots protect files from accidental deletion or modification. Snapshot creation requires time, memory resources, and storage space. QTS takes snapshots of individual volumes. QNAP recommends storing important files on dedicated volumes, so that QTS only creates snapshots of important files to save system resources.
	Faster file system repair	QTS occasionally encounters errors in the file system of a volume. While QTS can scan the volume and automatically repair errors, this process can take a long time. The required time depends on the volume size. Files on the volume cannot be accessed during the scanning process.

Volume Configuration Examples

Users often purchase NAS devices to store a combination of documents, media, and backups.

The following table compares the advantages and disadvantages of creating one large volume or multiple smaller volumes.

Requirement	User Goal	Single Volume	Multiple Volumes
Simplicity	Store files	Users create one large thin volume if they want to use snapshots, or one large static volume if they do not. They then create three shared folders on the volume, for documents, movies, and backups.	Users create three separate volumes for documents, movies, and backups. Users must decide how much space to initially allocate to each volume.

Requirement	User Goal	Single Volume	Multiple Volumes
Speed	Edit video and audio files	Users create one large single static volume on the NAS. The files are backed up daily to another NAS, or to an external disk.	Users create a thick volume to store the movies files. Random-write performance is sightly lower than a single static volume.
Containerizing storage space	Copy a large number of movie files to the NAS	Users copy the movie files to the movies shared folder. However, they must pay attention to how large the movies folder is. If they copy too many files, the NAS becomes full and unable save any more files.	Users copy the movie files to the movies volume. When the volume becomes full, they can increase the volume size.
Multiple snapshot schedules	Protect document files using snapshots	Users create a daily snapshot schedule for a single volume. The snapshots record all changes made to document files. However, the snapshots also record changes to movie and backup files which wastes resources and storage space.	Users create a daily snapshot schedule for the document volume only.
File system repair	Fix file system errors	QTS must scan the entire single volume, which takes a long time. The volume is not readable while the scan is in progress, making the entire NAS unusable.	QTS only needs to scan the volume that has an error. Each volume is small, so scanning is relatively quick. Users can still access files on other volumes while the scan is in progress.

Creating a Single Static Volume

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Perform one of the following actions.

NAS State	Action
No volumes or storage pools	Click **New Volume**.
One or more volumes or storage pools	Click **Create** > **New Volume** .

 The **Volume Creation Wizard** window opens.

3. Select **Static Single Volume**.

4. Click **Next**.

5. Optional: If you want to use disks in a connected expansion unit, select the expansion unit from the **Enclosure Unit** list.
 You cannot select disks from multiple expansion units.

6. Select one or more disks.

7. Select a RAID type.

Storage & Snapshots displays all RAID types that match the number of selected disks and automatically selects the most optimized RAID type.

Number of disks	Supported RAID Types	Default RAID Type
One	Single	Single
Two	JBOD, RAID 0, RAID 1	RAID 1
Three	JBOD, RAID 0, RAID 5	RAID 5
Four	JBOD, RAID 0, RAID 5, RAID 6, RAID 10 **Important** RAID 10 requires an even number of disks.	RAID 5
Five	JBOD, RAID 0, RAID 5, RAID 6	RAID 6
Six or more	JBOD, RAID 0, RAID 5, RAID 6, RAID 10, RAID 50	RAID 6
Eight or more	JBOD, RAID 0, RAID 5, RAID 6, RAID 10, RAID 50, RAID 60	RAID 6

> **Tip**
> Use the default RAID type if you are unfamiliar with the technology.
> For details, see RAID Types.

8. Optional: Select the disk that will be used as a hot spare for this RAID group.
   The designated hot spare automatically replaces any disk in the RAID group that fails.
   For details, see RAID Spare Disks.

9. Optional: Select the number of RAID 50 or RAID 60 sub-groups.
   The selected disks are divided evenly into the specified number of RAID 5 or 6 groups.

   - A higher number of sub-groups results in faster RAID rebuilding, increased disk failure tolerance, and better performance if all the disks are SSDs.

   - A lower number of sub-groups results in more storage capacity, and better performance if all the disks are HDDs.

> **Warning**
> If a RAID group is divided unevenly, the excess space becomes unavailable. For example, 10 disks divided into 3 sub-groups of 3 disks, 3 disks, and 4 disks will provide only 9 disks of storage capacity.

10. Click **Next**.

11. Optional: Specify an alias for the volume.
    The alias must consist of 1 to 64 characters from any of the following groups:

    - Letters: A to Z, a to z

    - Numbers: 0 to 9

    - Special characters: Hyphen "-" and underscore "_"

12. Specify the number of bytes per inode.
    The number of bytes per inode determines the maximum volume size, and the number of files and folders that the volume can store. Increasing the number of bytes per inode results in a larger maximum volume size, but a lower maximum number of files and folders.

13. Configure advanced settings.

Setting	Description
Alert threshold	QTS issues a warning notification when the percentage of used disk space on the volume reaches the specified value.
Encryption	QTS encrypts all data on the volume with 256-bit AES encryption. • Specify an encryption password containing 8 to 32 characters, with any combination of letters, numbers and special characters. Spaces are not allowed. • Select **Save encryption key** to save a local copy of the encryption key on the NAS. This enables QTS to automatically unlock and mount the encrypted volume when the NAS starts up. If the encryption key is not saved, you must specify the encryption password each time the NAS restarts. ⚠️ **Warning** • Saving the encryption key on the NAS can result in unauthorized access to data if the entire NAS is stolen. • If you forget the encryption password, the volume will become inaccessible and all data will be lost. ⚠️ **Warning** • Saving the encryption key on the NAS can result in unauthorized access to data if the entire NAS is stolen. • If you forget the encryption password, the volume will become inaccessible and all data will be lost.
Create a shared folder on the volume	QTS automatically creates the shared folder when the volume is ready. Only the NAS admin account can access the new folder.

14. Click **Next**.

15. Click **Finish**.
A confirmation message appears.

⚠️ **Warning**
Clicking **OK** deletes all data on the selected disks.

QTS creates and initializes the volume, and then creates the optional shared folder.

Creating a Thick or Thin Multiple Volume

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Perform one of the following actions.

NAS State	Action
No volumes or storage pools	Click **New Volume**.
One or more volumes or storage pools	Click **Create** > **New Volume** .

The **Volume Creation Wizard** window opens.

3. Select the volume type.

- Thick Multiple Volume

- Thin Multiple Volume

For details, see Volumes.

4. Select the storage pool that will be used to create the volume.
You can select an existing storage pool or create a new storage pool immediately.

5. Optional: Create a new storage pool.

   a. Click the **Create Storage Pool** icon ⊕.
The **Create Storage Pool Wizard** opens.

   b. Click **Next**.

   c. Optional: If you want to use disks in a connected expansion unit, select the expansion unit from the **Enclosure Unit** list.
You cannot select disks from multiple expansion units.

   d. Select one or more disks.

> ⚠ **Warning**
> All data on the selected disks will be deleted.

   e. Select a RAID type.
Storage & Snapshots displays all RAID types that match the number of selected disks and automatically selects the most optimized RAID type.

Number of disks	Supported RAID Types	Default RAID Type
One	Single	Single
Two	JBOD, RAID 0, RAID 1	RAID 1
Three	JBOD, RAID 0, RAID 5	RAID 5
Four	JBOD, RAID 0, RAID 5, RAID 6, RAID 10	RAID 5
Five	JBOD, RAID 0, RAID 5, RAID 6	RAID 6
Six or more	JBOD, RAID 0, RAID 5, RAID 6, RAID 10, RAID 50 💬 **Note** RAID 10 requires an even number of disks.	RAID 6

> 💡 **Tip**
> Use the default RAID type if you are unfamiliar with the technology.
> For details, see RAID Types.

   f. Optional: Select the disk that will be used as a hot spare for this RAID group.
The designated hot spare automatically replaces any disk in the RAID group that fails.

   g. Click **Next**.
The **Pool Creation Summary** window opens.

   h. Click **Create**.
A confirmation message appears.

> ⚠️ **Warning**
> Clicking **OK** deletes all data on the selected disks.

   i. Click **OK**.

6. Click **Next**.

7. Optional: Specify an alias for the volume.
   The alias must consist of 1 to 64 characters from any of the following groups:

   • Letters: A to Z, a to z

   • Numbers: 0 to 9

   • Special characters: Hyphen "-" and underscore "_"

8. Specify the capacity of the volume.
   The volume type determines the maximum volume capacity.

Volume Type	Maximum Size
Thick	Amount of free space in the parent storage pool.
Thin	Twenty times the amount of free space in the parent storage pool

   Setting the maximum size of a thin volume to a value that is greater than the amount of free space in the storage pool is called over-allocation.

9. Specify the number of bytes per inode.
   The number of bytes per inode determines the maximum volume size, and the number of files and folders that the volume can store. Increasing the number of bytes per inode results in a larger maximum volume size, but a lower maximum number of files and folders.

10. Configure advanced settings.

Setting	Description
Alert threshold	QTS issues a warning notification when the percentage of used disk space on the volume reaches the specified value.

Setting	Description
Encryption	QTS encrypts all data on the volume with 256-bit AES encryption. • Specify an encryption password containing 8 to 32 characters, with any combination of letters, numbers and special characters. Spaces are not allowed. • Select **Save encryption key** to save a local copy of the encryption key on the NAS. This enables QTS to automatically unlock and mount the encrypted volume when the NAS starts up. If the encryption key is not saved, you must specify the encryption password each time the NAS restarts. ⚠ **Warning** • Saving the encryption key on the NAS can result in unauthorized access to data if the entire NAS is stolen. • If you forget the encryption password, the volume will become inaccessible and all data will be lost. ⚠ **Warning** • Saving the encryption key on the NAS can result in unauthorized access to data if the entire NAS is stolen. • If you forget the encryption password, the volume will become inaccessible and all data will be lost.
Create a shared folder on the volume .	QTS automatically creates the shared folder when the volume is ready. Only the NAS admin account can access the new folder.

11. Click **Next**.

12. Click **Finish**.
    A confirmation message appears.

    ⚠ **Warning**
    Clicking **OK** deletes all data on the selected disks.

QTS creates and initializes the volume, and then creates the optional shared folder.

Storage Pools

A storage pool aggregates many physical 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. Using a storage pool provides the following benefits:

• Multiple volumes can be created on a storage pool, enabling you to divide the storage space among different users and applications.

• Disks of different sizes and types can be mixed into one large storage space.

• Disks from connected expansion units can be mixed with disks in the NAS to form a storage pool.

• Extra disks can be added while the storage pool is in use, increasing storage capacity without interrupting services.

- Qtier provides auto-tiering when a storage pool contains a mix of SATA, SAS, and SSD disks. Qtier automatically moves frequently accessed hot data to the faster SSDs, and infrequently accessed cold data to the slower disks.

- Snapshots can only be used with storage pools. Snapshots record the state of the data on a volume or LUN at a specific point in time. Data can then be restored to that time if it is accidentally modified or deleted.

- Multiple RAID 5 or RAID 6 can be striped together to form a RAID 50 or RAID 60 pool.

Creating a Storage Pool

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Perform one of the following actions.

NAS State	Action
No volumes or storage pools	Click **New Storage Pool**
One or more volumes or storage pools	Click **Create** > **New Storage Pool**

   The **Create Storage Pool Wizard** opens.

3. Click **Next**.

4. Optional: If you want to use disks in a connected expansion unit, select the expansion unit from the **Enclosure Unit** list.
   You cannot select disks from multiple expansion units.

5. Select one or more disks.

   ⚠️ **Warning**
   All data on the selected disks will be deleted.

6. Select a RAID type.
   Storage & Snapshots displays all RAID types that match the number of selected disks and automatically selects the most optimized RAID type.

Number of disks	Supported RAID Types	Default RAID Type
One	Single	Single
Two	JBOD, RAID 0, RAID 1	RAID 1
Three	JBOD, RAID 0, RAID 5	RAID 5
Four	JBOD, RAID 0, RAID 5, RAID 6, RAID 10	RAID 5
Five	JBOD, RAID 0, RAID 5, RAID 6	RAID 6
Six or more	JBOD, RAID 0, RAID 5, RAID 6, RAID 10, RAID 50 📝 **Note** RAID 10 requires an even number of disks.	RAID 6

   💡 **Tip**
   Use the default RAID type if you are unfamiliar with the technology.
   For details, see RAID Types.

7. Optional: Select the disk that will be used as a hot spare for this RAID group.

The designated hot spare automatically replaces any disk in the RAID group that fails.
For RAID 50 or RAID 60, a spare disk must be configured later. You should configure a global spare disk so that all sub-groups share the same spare disk. For details, see Configuring a Global Hot Spare.

8. Optional: Select the number of RAID 50 or RAID 60 sub-groups.
    The selected disks are divided evenly into the specified number of RAID 5 or 6 groups.

    • A higher number of sub-groups results in faster RAID rebuilding, increased disk failure tolerance, and better performance if all the disks are SSDs.

    • A lower number of sub-groups results in more storage capacity, and better performance if all the disks are HDDs.

> **Warning**
> If a RAID group is divided unevenly, the excess space becomes unavailable. For example, 10 disks divided into 3 sub-groups of 3 disks, 3 disks, and 4 disks will provide only 9 disks of storage capacity.

9. Click **Next**.
    The **Pool Creation Summary** window opens.

10. Click **Create**.
    A confirmation message appears.

> **Warning**
> All data on the selected disks will be deleted.

11. Click **OK**.

QTS creates the storage pool and then displays the information on the **Storage/Snapshot** screen.

RAID

Redundant array of independent disks (RAID) combines multiple physical disks into a single storage unit, and then distributes data across the disks in one of several predefined methods.

The following features make RAID ideal for use with data storage and NAS applications.

RAID Feature	Description	Advantages	Disadvantages
Grouping	Disks that are combined using RAID form a RAID group, which QTS considers one large logical disk.	Managing the storage space of one large disk is simpler and more efficient than multiple small disks.	Initial configuration can be more complicated.
Striping	Data is split into smaller pieces. Each piece is stored on a different disk in the RAID group. QTS can then access that data by reading from or writing to multiple disks simultaneously, increasing read and write speeds.	• Greater read/write speeds, compared to a single disk • Speeds can be increased further by adding disks	If one disk in the RAID group fails, and the RAID group has no redundancy, all data will be lost.

RAID Feature	Description	Advantages	Disadvantages
Redundancy	Each disk in the RAID group can store the following: • Complete copy of the stored data • Metadata that allows reconstruction of lost data	• Disks can fail or be removed from the RAID group without any loss of data • Users can access data while failed disks are being replaced	Total storage capacity of the RAID group is reduced.

RAID Types

QNAP NAS devices support several RAID types. Each type provides a different combination of striping and redundancy.

> **Important**
>
> • If disks with different capacities are combined in one RAID group, all disks function according to the capacity of the smallest disk. For example, if a RAID group contains five 2 TB disks and one 1 TB disk, QTS detects six 1 TB disks.
> QNAP recommends the following.
>
>   • Create a RAID group for each capacity.
>
>   • Combine the RAID groups using storage pools.
>
> • Using only one disk type (HDD, SSD, SAS) in a RAID group is recommended. If different types of disk are combined in one RAID group, the RAID group will function according to the speed of the slowest disk.

RAID Type	Count	Disk Failure Tolerance	Capacity	Overview
Single	1	0	Size of the one disk	• A single disk is used for storage. • It does not provide any disk failure protection and performance benefits. • It should be selected if only one disk is available and if a data backup plan is in place.

RAID Type	Count	Disk Failure Tolerance	Capacity	Overview
JBOD (just a bunch of disks)	1 or more	0	Combined disk capacity	• JBOD appends disks together in a linear fashion. QTS writes data to a disk until it is full, and then writes to the next disk. • JBOD allows all of the disks capacity to be used. • JBOD Single is not real RAID. It does not provide any disk failure protection or performance benefits. • JBOD is generally not recommended. RAID 0 should be used instead.
RAID 0	2 or more	0	Combined disk capacity	• Disks are combined together using striping. • RAID 0 offers the fastest read/ write speeds and allows all disk capacity to be used • No disk failure protection. This type should be paired with a data backup plan.
RAID 1	2	1	Disk size divided by 2	• An identical copy of data is stored on two disks. • If either disk fails, data can still be read from the other disk. • Half of the total disk capacity is lost, in return for a high level of data protection. • Recommended for NAS devices with two disks.
RAID 5	3 or more	1	Total number of disks minus 1 disk	• Data and parity information are striped across all disks. • The capacity of one disk is lost for parity. This means that if any one disk fails, it can be replaced and the data on it can be restored. • Striping means read speeds are increased with each additional disk. • Recommended for a good balance between data protection and speed.

RAID Type	Count	Disk Failure Tolerance	Capacity	Overview
RAID 6	4 or more	2	Total number of disks minus 2 disks	• Data and parity information are striped across all disks. • Same as RAID 5, but two disks are used for parity. This means that it protects against two disk failures, but the capacity of two disks are lost. • Recommended for business and general storage use. It provides high disk failure protection and read performance.
RAID 10	4 or more (even number required)	1 per pair of disks	Total number of disks divided by 2	• Every two disks are paired using RAID 1 for failure protection. Then all pairs are striped together using RAID 0. • Excellent read/write speeds and high failure protection, but half the disk capacity is lost. • Recommended for application or database storage.
RAID 50	6 or more	1 per disk sub-group	Total number of disks minus 1 disk per sub-group	• Multiple small RAID 5 groups are striped to form one RAID 50 group. • Better failure protection and faster rebuild times than RAID 5. More storage capacity than RAID 10. • Better random access performance than RAID 5 if all of the disks are SSDs. • Recommended for enterprise backup with ten or more disks.
RAID 60	8 or more	2 per disk sub-group	Total number of disks minus 2 disks per sub-group	• Multiple small RAID 6 groups are striped to form one RAID 60 group. • Better failure protection and faster rebuild time than RAID 6. More storage capacity than RAID 10. • Better random access performance than RAID 6 if all of the disks are SSDs. • Recommended for business storage and online video editing with twelve or more disks.

Storage Management

Storage Pool Management

Expanding a Storage Pool by Adding Disks to a RAID Group

You can add one or more disks to a RAID group in the storage pool.

> ⊘ **Important**
>
> - Adding disks to a RAID 1 group changes the RAID type of the group to RAID 5.
>
> - To expand a RAID 50 or RAID 60 pool, every sub-group must be expanded with the same number of disks.

1. Go to **Main Menu** > **Storage & Snapshots** > **Disks/VJBOD** .

2. Verify that the NAS contains one or more free disks.

3. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

4. Verify the following:

   - The storage pool contains at least one RAID 1, RAID 5, or RAID 6 group.

   - The status of the RAID group that you want to expand is `Ready`.

5. Select the storage pool that you want to expand.

6. Click **Manage**.
   The **Storage Pool Management** window opens.

7. Click **Expand Pool**.
   The **Expanding Storage Pool** window opens.

8. Select **Add new disk(s) to an existing RAID group**.

9. Select a RAID 1, RAID 5, or RAID 6 group.

10. Click **Next**.

11. Select the disks that will be used to expand the storage pool.

12. Click **Expand**.
    A confirmation message appears.

> ⚠ **Warning**
> Clicking **OK** deletes all data on the selected disks.

13. Click **OK**.

14. Optional: For a RAID 50 or RAID 60 pool, repeat these steps for each sub-group.

QTS starts rebuilding the RAID groups. The capacity of the new disks appears as free space after RAID rebuilding is completed.

Expanding a Storage Pool By Adding a New RAID Group

You can create a new RAID group and then add it to the storage pool. The total capacity of the new RAID group appears as additional free space.

QTS writes data to a storage pool that contains multiple RAID groups in a linear manner. This means that QTS writes data to a RAID group until is it full before writing data to the next RAID group.

> ⚠️ **Warning**
>
> - If a storage pool contains multiple RAID groups and one RAID group fails, all data in the storage pool will be lost. Ensure that you have a complete data backup plan.
>
> - To expand a RAID 50 or RAID 60 pool, you must create a new RAID 50 or 60 group with the same number of disks and sub-groups as the original pool. It is not possible to just add additional sub-groups.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Select the storage pool that you want to expand.

3. Click **Manage**.
   The **Storage Pool Management** window opens.

4. Click **Expand Pool**.
   The **Expanding Storage Pool** window opens.

5. Select **Create and add a new RAID group**.

6. Click **Next**.

7. Optional: If you want to use disks in a connected expansion unit, select the expansion unit from the **Enclosure Unit** list.

> ⚠️ **Warning**
> If the selected expansion unit is disconnected from the NAS, all data in the storage pool will become inaccessible.

8. Select one or more disks.

> ❗ **Important**
> For RAID 50 or RAID 60 pools, the number of selected disks must be equal to or greater than the number of disks initially used to create the pool.

9. Select a RAID type.

> ❗ **Important**
>
> - If the storage pool contains a RAID 1, RAID 5, RAID 6 or RAID 10 group, the new RAID group must also have one of the mentioned RAID types.
>
> - For RAID 50 or RAID 60 you cannot select a different RAID type.

10. Optional: Select the disk that will be used as a hot spare for this RAID group.
    For details, see Configuring a RAID Group Hot Spare.

11. Click **Next**.

12. Click **Expand**.

A confirmation message appears.

⚠ **Warning**
Clicking **OK** deletes all data on the selected disks.

13. Click **OK**.

QTS creates the new RAID group and then the RAID group starts rebuilding. The capacity of the new RAID group appears as free space in the storage pool after RAID rebuilding is completed.

Volume Management

Expanding a volume increases its maximum size, also known as its capacity, enabling it to store more data. Expansion should be performed when free space is low, to prevent users suddenly discovering that they are unable to save files to the volume.

Expanding a Thick or Thin Volume

Thick and thin volumes can be expanded online, meaning that space can be added to the volume while it is still being accessed. The extra space is allocated from the volumes parent storage pool.

Volume Type	Maximum Allowed Expansion
Thick	Amount of free space in the parent storage pool.
Thin	Twenty times the amount of free space in the parent storage pool ⓘ **Important** Setting the maximum size of a thin volume to a value that is greater than the amount of free space in the storage pool is called over-allocation.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Select a thick or thin volume.

3. Click **Manage**.

4. Click **Expand Volume**.
The **Volume Resizing Wizard** opens.

5. Specify a new capacity for the volume.
Capacity can be specified in megabytes (MB), gigabytes (GB) or terabytes (TB). The new capacity must be greater than the current volume capacity.

6. Optional: Click **Set to Max**.
Sets the new volume capacity to the maximum available size. This option is only available for thick volumes.

7. Click **Apply**.
The **Volume Resizing Wizard** closes. The volume status changes to `Resizing....`

After expansion is complete, the volume status changes back to `Ready`.

Expanding a Single Static Volume by Adding Disks to a RAID Group

The total storage capacity of a single static volume can be expanded by adding one or more additional disks to a RAID group in the static volume. This extra capacity can be added online, without any interruption to data access.

> **!** **Important**
>
> - Adding disks to a RAID 1 group changes the RAID type of the group to RAID 5.
>
> - To expand a RAID 50 or RAID 60 pool, every sub-group must be expanded with the same number of disks.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Verify the following:

   - The NAS contains one or more free disks.

   - The storage pool contains at least one RAID 1, RAID 5, or RAID 6 group.

   - The status of the RAID group that will be expanded is `Ready`.

3. Select the single static volume that you want to expand.

4. Click **Manage**.
   The **Volume Management** window opens.

5. Click **Expand Volume**.
   The **Volume Resizing Wizard** window opens.

6. Select **Add new disk(s) to an existing RAID group**.

7. Select a RAID 1, RAID 5 or RAID 6 group.

8. Click **Next**.

9. Select one or more disks.

10. Click **Next**.

11. Click **Expand**.

> **⚠** **Warning**
> All data on the selected disks will be deleted.

   A confirmation message appears.

12. Click **OK**.

13. Optional: For a RAID 50 or RAID 60 volume, repeat these steps for each sub-group.

QTS starts rebuilding the RAID groups. The capacity of the new disks appears as free space after RAID rebuilding is completed.

Expanding a Single Static Volume By Adding a New RAID Group

A new RAID group is created and appended to the single static volume. The total capacity of this new RAID group is then appears as additional storage pool free space.

> ⚠️ **Warning**
>
> - If a storage pool contains multiple RAID groups and one RAID group fails, all data in the storage pool will be lost. Ensure that you have a complete data backup plan.
>
> - To expand a RAID 50 or RAID 60 pool, you must create a new RAID 50 or 60 group with the same number of disks and sub-groups as the original pool. It is not possible to just add additional sub-groups.

QTS writes data to a single static volume that contains multiple RAID groups in a linear manner. This means that QTS writes data to a RAID group until is it full before it writes data to the next RAID group.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Select the single static volume that you want to expand.

3. Click **Manage**.
   The **Volume Management** window opens.

4. Click **Expand Volume**.
   The **Expanding Volume Wizard** window opens.

5. Select **Create and add a new RAID group**.

6. Click **Next**.

7. Optional: If you want to use disks in a connected expansion unit, select the expansion unit from the **Enclosure Unit** list.

> ⚠️ **Warning**
> If the selected expansion unit is disconnected from the NAS, all data on the volume will become inaccessible.

8. Select one or more disks.

> ❗ **Important**
> For RAID 50 or RAID 60 volumes, the number of selected disks must be equal to or greater than the number of disks initially used to create the volume.

9. Select a RAID type.

> ❗ **Important**
> For RAID 50 or RAID 60 you cannot select a different RAID type.

10. Optional: Select the disk that will be used as the hot spare for this RAID group.

> 💬 **Note**
> For details, see Configuring a RAID Group Hot Spare

11. Click **Next**.

12. Click **Expand**.

> ⚠️ **Warning**
> All data on the selected disks will be deleted.

A confirmation message appears.

13. Click **OK**.
    QTS creates the new RAID group, and the RAID group starts rebuilding. The volumes status changes
    to `Rebuilding...`

After expansion is complete, the volume status changes back to `Ready`.

RAID Management

RAID Spare Disks

Configuring a RAID Group Hot Spare

Assigning a hot spare gives extra protection against data loss. In normal conditions, a hot spare disk is
unused and does not store any data. When a disk in the RAID group fails, the hot spare disk automatically
replaces the faulty disk. QTS copies the data to the spare disk in a process called RAID rebuilding.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Verify that the NAS contains one or more available disks.

3. Select a storage pool or single static volume.

4. Click **Manage**.

5. Select a RAID 1, RAID, 5, RAID 6, or RAID 10 group.

6. Select **Manage** > **Configure Spare Drive** .

7. Select one or more disks that will be used as spare disks.

8. Click **Apply**.

> ⚠️ **Warning**
> All data on the selected disks will be deleted.

    A confirmation message appears.

9. Click **OK**.

The spare disks are added to the RAID group. The disk appears as a green `Spare` in the disks summary at
Disks/VJBOD.

Configuring a Global Hot Spare

A global spare disk acts as a hot spare for all RAID groups in a storage device such as a NAS or a
connected expansion unit. In normal conditions, the disk is unused and does not store any data. When a disk
in any RAID group fails, the hot spare disk automatically replaces the faulty disk. QTS copies the data to the
spare disk in a process called RAID rebuilding.

> ❗ **Important**
> Storage enclosures (the NAS and connected expansion units) cannot share global spare
> disks. A unique global hot spare disk must be assigned to each storage enclosure.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Verify that the NAS contains one or more available disks.

3. Optional: Select a connected expansion unit.

4. Select a free disk.

5. Select **Action** > **Set as Enclosure Spare** .

> ⚠️ **Warning**
> All data on the selected disk will be deleted.

   A confirmation message appears.

6. Click **OK**.

The disk appears as a green `Spare` on the **Disks/VJBOD** screen.

Expanding a RAID Group by Replacing all Disks

You can increase the maximum storage capacity of a RAID group by replacing all member disks with higher-capacity disks. This can be done online, without losing access to data or any interruption to NAS services.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Verify that all hot spares and global hot spares assigned to this RAID group are disabled.

3. Select a storage pool or single static volume.

4. Click **Manage**.

5. Select a RAID 1, RAID 5, RAID 6, or RAID 10 group.

6. Select **Manage** > **Replace Disks One by One** .

7. Select a disk to replace.
   Ensure that the capacity of the new disk is greater than the capacity of the disk that it is replacing.

8. Click **Change**.
   The disk description changes to `Please remove this drive`.

9. Remove the disk from the bay.
   The NAS beeps twice. Then the disk description changes to `Please insert the new disk`.

10. Insert a new disk into the same bay.
    The NAS beeps twice. Then the status of the disk and RAID group change to `Rebuilding`.

11. Wait for rebuilding to finish.

> ⚠️ **Warning**
> Do not remove any disks while the RAID group is rebuilding.

   The disks status changes back to `Good`.

12. Repeat the previous steps until all disks in the RAID group have been replaced.
    The **Expand Capacity** button is enabled after all disks have been replaced and rebuilding has completed.

13. Click **Expand Capacity**.
    A confirmation message appears.

14. Click **OK**.

The NAS beeps and then the RAID group status changes to `Synchronizing`.

> ⚠️ **Warning**
> Do not power off the NAS or remove any disks while hard drive synchronization is in progress.

The RAID group status changes to `Ready`.

Changing the RAID Type of a RAID Group

You can change the RAID type of an existing RAID group online, without losing access to data or any interruption to NAS services. Changing the RAID type of a RAID group is called RAID migration. QTS allows the following migrations:

Original RAID Type	New RAID Type	Extra Disks Required
Single	RAID 1	One
RAID 1	RAID 5	One or more
RAID 5	RAID 6	One or more

> 💡 **Tip**
> Migration from a single disk to RAID 6 is performed in stages. First migrate the group to RAID 1, then to RAID 5, and then finally to RAID 6.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Verify the following:

    - The NAS contains one or more available disks.

    - The capacity of each available disk is equal to or greater than the smallest disk in the RAID group.

3. Select a storage pool or single static volume.

4. Click **Manage**.

5. Select a RAID group.

6. Select **Manage** > **Migrate** .

7. Select one or more disks.

8. Click **Apply**.

> ⚠️ **Warning**
> All data on the selected disks will be deleted.

    A confirmation message appears.

9. Click **OK**.
    The RAID group status changes to `Migrating`.

The RAID type changes and then the RAID group status changes back to `Ready` when migration is completed.

Creating a RAID Bitmap

If a disk is temporarily disconnected from its RAID group and then reconnected, the RAID group must resynchronize all of its data. This process may take a long time. If the RAID group has a bitmap, only

changes that were made after the disk was removed need to be synchronized, greatly speeding up the process.

A disk can become temporarily disconnected in the following situations.

- A disk is accidentally removed from the NAS while the NAS is powered on.

- The NAS unexpectedly shuts down because of a hardware or software error.

- A user presses the power button for 10 seconds or disconnects the power cable while the NAS is powered on.

> **Important**
>
> - You can only create bitmaps for RAID 1, RAID 5, RAID 6, and RAID 10 groups.
>
> - Enabling a RAID bitmap causes the RAID groups performance to decrease slightly.
>
> - A bitmap improves resynchronization time only if the same disk is added back to the RAID group. If a new disk is added to a RAID group, the bitmap makes no difference.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Select a storage pool or single static volume.

3. Click **Manage**.

4. Select a RAID 1, RAID 5, RAID 6, or RAID 10 group.

5. Click **Manage** and then select **Enable Bitmap**.
   A confirmation message appears.

QTS creates a bitmap for the RAID group.

Recovering a RAID Group

RAID recovery enables you to recover a RAID group in the event of accidental disk removal or SATA connector failure. When several disks are removed or disconnected from a RAID group:

- The status of the group changes to `Error`.

- The statuses of all volumes and storage pools using the RAID group change to `Inactive`.

- All data on the affected volumes and LUNs becomes inaccessible.

> **Important**
> RAID recovery only helps when disks are temporarily disconnected and then reconnected. It does not help in the event of disk failure.

1. Reconnect all disconnected disks.

> **Important**
> Ensure that each disk is reinserted into its original drive bay.

2. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

3. Select a storage pool or single static volume with the status `Inactive`.

4. Click **Manage**.

5. Select a RAID group with the status `Error`.

6. Click **Manage** and then select **Recover**.
   The RAID group starts to rebuild.

RAID Scrubbing

RAID scrubbing helps maintain the consistency of data on the NAS. QTS scans the sectors of a RAID 5 or RAID 6 group and automatically attempts to repair any detected errors. You can run RAID scrubbing manually, or on a schedule.

> **Tip**
> QNAP recommends performing RAID scrubbing at least once a month to maintain system health and prevent data loss.

Running RAID Scrubbing Manually

> **Warning**
> The read/write speeds of the RAID group may decrease while RAID scrubbing is in progress.

1. Go to **Main Menu** > **Storage & Snapshots** .

2. Select a storage pool or single static volume.
   Verify that the RAID status is `Ready`.

3. Click **Manage**.

4. Select a RAID 5 or RAID 6 group.

5. Click **Manage** and then select **RAID Scrubbing**.

The RAID group status changes to `Scrubbing`.

Running RAID Scrubbing on a Schedule

You can schedule periodic RAID scrubbing of all RAID 5 and RAID 6 groups.

> **Warning**
> The read/write speeds of the RAID group may decrease while RAID scrubbing is in progress.

1. Go to **Main Menu** > **Storage & Snapshots** .

2. Click the **Global Settings** icon ⚙.
   The **Global Settings** menu opens.

3. Enable **RAID Scrubbing Schedule**.

4. Specify how often data scrubbing will run.

   - Daily

   - Weekly

   - Monthly

5. Specify when data scrubbing will run.

> 💡 **Tip**
> QNAP recommends specifying a time when the NAS is not in use, such as after business hours or on weekends.

6. Click **Apply**.

Data scrubbing will run according to the specified schedule. When data scrubbing is running on a RAID groups, the status of the group changes to `Scrubbing`.

Snapshots

Snapshots help protect stored data by recording the state of thick volumes, thin volumes, and LUNs at a specific time. You can restore data to a previous state if the data is unintentionally modified or deleted. Single static volumes and legacy volumes do not support snapshots.

To use snapshots, your NAS model must support snapshots and must contain at least 1 GB of memory. For details on compatible models, see www.qnap.com/solution/snapshots.

Snapshot Creation

Taking a Snapshot

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Select a thick volume, thin volume, or block-based LUN.
   To take a snapshot of a file-based LUN, select the volume that it is stored on.

3. Click **Snapshot** and then select **Take a Snapshot**.
   A confirmation message appears.

4. Click **OK**.
   The **Take a Snapshot** window opens.

5. Specify a name.

6. Specify a retention time.

Option	Description
Keep For	Specify the number of days, weeks, or months that QTS retains the snapshot before it is automatically deleted.
Keep this snapshot permanently	When selected, QTS retains the snapshot indefinitely, even when storage space is low.

7. Optional: Specify a description that will help you identify the snapshot.

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

9. Click **OK**.

QTS takes the snapshot, then the snapshot appears in **Snapshot Manager**.

Configuring a Snapshot Schedule

Configure a snapshot schedule to ensure that snapshots are taken at regular intervals. You can configure a separate schedule for each volume and LUN.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Select a thick volume, thin volume, or LUN.

3. Click **Snapshot** and then select **Snapshot Manager**. The **Snapshot Manager** window opens.

4. Click **Snapshot Settings**.
   The **Snapshot Settings** window opens.

5. Enable scheduling.

6. Specify the snapshot frequency.

7. Optional: Specify a retention time.

   a. Select **Keep for**.

   b. Specify the number of days, weeks, or months that QTS keeps the snapshot before it is deleted.

   If this option is not selected, QTS retains the snapshot indefinitely.

8. Optional: Select **Enable smart snapshots**.
   When selected, QTS takes a snapshot only if the data was modified after the last snapshot was taken. This reduces the number of snapshots and saves storage space.

9. Optional: Specify a description that will help you identify the snapshot.

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

11. Click **OK**.

QTS takes snapshots according to the specified schedule.

Configuring Guaranteed Snapshot Space

Guaranteed snapshot space is storage pool space that is reserved for storing snapshots. Enabling this feature ensures that QTS always has sufficient space for taking new snapshots.

Setting	Space Available for Storing Snapshots
Disabled	Free space in the storage pool
Enabled	Guaranteed snapshot space until full, then free space in the storage pool

When all space available for snapshots is full, QTS deletes the oldest snapshots to create free space for new snapshots. If creating free space is not possible, new snapshots are not created.

1. Go to **Main Menu** > **Storage & Snapshots** > **Snapshot** .

2. Select a storage pool.

3. Click **Guaranteed Snapshot Space** and then select **Configure**.

4. Select **Actions** > **Set Snapshot Reserved** .

5. Enable **Guaranteed Snapshot Space**

6. Select a method for specifying the amount of space that will be reserved for snapshots.

Option	Description
Recommended	Select a percentage of the total storage pool space. The default value is 20%.
Custom	Specify a fixed amount of storage pool space in gigabytes (GB).

7. Click **OK**.

Guaranteed Snapshot Space appears in the Space Allocation section of the **Snapshot** screen.

Snapshot Storage Limitations

The maximum number of snapshots a NAS can store is determined by the NAS series, CPU type, and installed memory.

QNAP NAS Processor Type

You can determine your CPU type by looking for a sticker on the NAS or on the retail packing, or by searching for the NAS specifications at https://www.qnap.com.

CPU Type	CPU Manufacturer
x86	Intel, AMD
ARM	Annapurna Labs, Realtek

Maximum Number of Snapshots

Installed Memory	NAS	Maximum Snapshots per NAS	Maximum Snapshots per Volume/LUN
< 1GB	Unsupported	Unsupported	Unsupported
≥ 1 GB	All	32	16
≥ 2 GB	All	64	32
≥ 4 GB	x86 CPU	1024	256
	X51/X51+ series	256	64
	ARM CPU	256	64

Snapshot Management

Restoring Files and Folders from a Snapshot

You can restore individual files or entire folders to a previous state using snapshots. The number of files and the total file size affect the duration of the restoration process.

> **Tip**
>
> - Use snapshot revert to quickly restore all files and folders on a volume. For details, see Reverting to a Volume or LUN Snapshot.
>
> - You can restore files and folders from a snapshots in File Station by enabling **Enable File Station Snapshot Directory for administrators**. For details, see Snapshot Settings.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Select a thick volume, thin volume, or LUN.
   The volume or LUN must contain at least one snapshot.

3. Click **Snapshot** and then select **Snapshot Manager**.
   The **Snapshot Manager** window opens.

4. Select a snapshot.

5. Select the files and folders that you want to restore.

6. Click **Restore** and then select one of the following.

Option	Description
Restore File	When selected, QTS restores the files and folders to their original locations. ⚠ **Warning** Restoring files to their original locations overwrites all changes that were made to the files after the snapshot was taken.
Restore File to	When selected, you must specify a storage location for the restored files and folders. You can restore the files to a local or remote folder. If you are restoring a folder, you can restore it as a new NAS shared folder.

7. Click **OK**.

QTS restores the files and folders to the specified location and then displays a message.

Reverting to a Volume or LUN Snapshot

You can restore all the data on a volume or LUN to a previous state using snapshot revert. Reverting a volume or LUN takes significantly less time than restoring individual files and folders.

💡 **Tip**
Create a snapshot shared folder to take a snapshot of a single folder. Snapshot shared folders have their own dedicated volume and can be restored faster than a larger volume containing multiple folders.

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage/Snapshot** .

2. Select a thick volume, thin volume, or LUN.
   The volume or LUN must contain at least one snapshot.

3. Click **Snapshot** and then select **Snapshot Manager**.
   The **Snapshot Manager** window opens.

4. Select a snapshot.

5. Click **Revert Volume Snapshot**.

⚠ **Warning**
Reverting a snapshot overwrites all changes made to files and folders on the selected volume or LUN after the snapshot was taken.

A confirmation message appears.

6. Optional: Select **Take a new snapshot before reverting**

7. Click **Local Revert**.

The volume or LUNs status changes to `Reverting`.QTS disables access to the volume or LUN until the process is completed.

Restoring Files and Folders using Windows Previous Versions

- You must be using Windows 7, Windows 8 or Windows 10.

- The files to be restored must be stored on a NAS shared folder that can be accessed in Windows.

- The files must be stored on a thick volume, thin volume or LUN that supports snapshots. The volume or LUN must have at least one snapshot.

QTS snapshots integrate with the Previous Versions feature, which enables Windows users to restore files and folders from a snapshot in Windows File Explorer.

1. Open a NAS shared folder in Windows File Explorer.
For details on mapping a shared folder, see Mapping a Shared Folder on a Windows Computer.

2. Right-click the file or folder, and then select **Properties** > **Previous Versions**
A list of available versions appears. Each version corresponds to a snapshot of this NAS shared folder.

3. Optional: Preview the file or folder to be restored.

   a. Click **Open**.
   The file or folder opens.

   b. Verify that the version of the file or folder is correct.

4. Click **Restore**.

QTS restores the file or folder to the specified previous version.

Global Settings

You can access global settings by clicking at the top-right of the **Storage & Snapshots** window.

Storage Settings

Setting	Description
RAID Resync Priority	Specify the priority level for the following RAID operations when the NAS is in use: • Rebuild • Scrubbing • Sync You can select one of the following priorities. • **Service**: When selected, QTS performs RAID operations at lower speeds to maintain NAS performance. • **Default**: When selected, QTS performs RAID operations at medium speeds. • **Resync First**: When selected, QTS performs RAID operations at higher speeds. Users may notice a decrease in NAS performance. ⚠ **Important** When the NAS is idle, all RAID operations are performed at the highest possible speeds.
RAID Scrubbing Schedule	Enable this feature to periodically scan for and automatically fix bad sectors on RAID 5 and RAID 6 groups. For details, see Running RAID Scrubbing on a Schedule.
Auto Reclaim and SSD Trim Schedule	Enable this feature to periodically run the following tasks on all thin volumes and SSDs: • Auto Reclaim: QTS returns unused storage space to the parent storage pool. The unused storage space is derived from files deleted from thin volumes. • SSD Trim: QTS cleans deleted data blocks to maintain SSD read and write performance. By default, the operations are scheduled to run daily at 2:00 AM. SSD Trim is only performed on solid state drives if they are in a RAID 0, RAID 1 or RAID 10 group.

Disk Health Settings

Setting	Description
Activate Predictive S.M.A.R.T. Migration:	Enable this feature to regularly monitor disk health. If S.M.A.R.T. errors are detected on a disk, QTS displays a warning and then begins migrating data from the faulty disk to a healthy spare disk. After migration is completed, the healthy disk is used in place of the faulty disk. This process is faster and safer than waiting for a disk to fail, and then initiating a full RAID rebuild.
Disk S.M.A.R.T. polling time (minutes)	QTS will check periodically for S.M.A.R.T. errors. You can specify the frequency in minutes or hours.

Setting	Description
Disk Temperature Alarm	Enable this feature to monitor the disk temperatures. QTS displays a warning when the disk temperature reaches the specified value. You can set separate alerts for hard disk drives and solid state drives.
TLER/ERC timer (seconds):	Enable this feature to specify how long before QTS flags a disk as unresponsive. A disk temporarily becomes unresponsive when it encounters a read or write error, which it tries to fix. QTS might interpret this unresponsiveness as disk failure, and automatically initiate a rebuild of the disks in the RAID group. Enabling this feature ensures that a disk has sufficient time to recover from a read or write error. **Tip** This setting is usually known as Error recovery control (ERC), Time-limited error recovery (TLER) or Command completion time limit (CCTL), depending on the manufacturer.

Snapshot Settings

Setting	Description
Smart snapshot space management	Enable this feature to delete the oldest snapshots when the space available for storing snapshots (guaranteed snapshot space plus free storage pool space) is less than 32GB. QTS excludes the last snapshot taken, or snapshots that are set to be kept permanently. If QTS is unable to create 32GB of free snapshot space, then it does not take any new snapshots.
Enable File Station Snapshot Directory for administrators	Enable this feature to consolidate the available snapshots into one folder on File Station. You can restore files and folders from the snapshot directory by copying and then pasting into a NAS shared folder.
Make snapshot directory (@Recently-Snapshot) visible in shared folder root	Enable this feature to show a special read-only folder at the root level of each shared folder. Making the folder visible allows users to browse its contents and restore previous versions of files using copy and paste.
When the number of snapshots reaches maximum	Specify the default QTS behavior after the maximum number of snapshots for any volume, LUN or NAS is reached. You can choose to overwrite the oldest available snapshots or to stop taking snapshots. The maximum number of snapshots depends on your NAS model. For details, see Snapshot Storage Limitations.
Use timezone GMT+0 for all new snapshots	Enable this feature to use the GMT+0 time zone in the file names of new snapshots. This file naming convention can simplify snapshot management especially when working with snapshots from NAS devices on different time zones. This setting only applies to new snapshots. Existing snapshots are not renamed.
Show hidden files in Snapshot Manager	Enable this feature to display hidden files in Snapshot Manager. The setting does not affect files inside the File Station Snapshot Directory.

3. Privilege

Users

The following user types are supported:

User Type	Description
Local user	• User accounts created in QTS are synced to Storage & Snapshots. • User accounts created in Storage & Snapshots are synced to QTS. • Both QTS and Storage & Snapshots store the account data. • Storage & Snapshots authenticates users and assigns the surveillance privileges.
Domain user	• User accounts created on a domain controller are synced to Storage & Snapshots. • Storage & Snapshots authenticates users and assigns the surveillance privileges.

Creating a Local User

1. Go to **Control Panel** > **Privilege** > **Users** .
The **Users** screen appears.

2. Click **Create**, and then select **Create a User**.
The **Create a User** window opens.

3. Specify the following information:

Field	Description
Username	Specify a username that contains 1 to 32 characters from any of the following groups: • Letters: A to Z, a to z • Numbers: 0 to 9 • Special characters: ~ ! @ # $ ^ & ( ) - _ . { }
Password	Specify a password that contains 1 to 64 ASCII characters.
Phone number (optional)	The information is for your reference and is not used by QTS.
Email (optional)	QTS sends a notfication to this email address when the account password is about to expire. **Note** • **SMTP Server**: Go to **Control Panel** > **System** > **Notification** > **E-mail** . • **Change Password**: Go to **Control Panel** > **System** > **Security** .

	• If the **SMTP Server** and **Change Password** are not configured, QTS does not use the information. • For details, see the QTS User Guide.
Send a notification mail to the newly created user (optional)	When selected, QTS sends a message that contains the following information to the specified email address. • Username and password • URLs for connecting to the NAS

4. Optional: Add the user to one or more user groups.

    a. Under **User Groups**, click **Edit**.

    b. Select one or more user groups.
       QTS provides two default user groups.

User Group	Description
Administrators	Users in this group can configure settings, create users, and install applications.
Everyone	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.

    c. Optional: Select **Create a User Group**.
       For details, see Creating a User Group.

5. Optional: Specify shared folder permissions for the user.

    a. Under **Shared Folder Permission**, click **Edit**.

    b. Specify the actions the user can perform in shared folders.
       For details, see Editing Shared Folder Properties.

Permission	Description
RO (read-only)	The user can read but not write files in the shared folder.
RW (read/write)	The user can read and write files in the shared folder.
Deny	The user cannot read or write files in the shared folder.

6. Optional: Specify the applications the user can access.

    a. Under **Edit Application Privilege**, click **Edit**.

    b. Select the applications the user can use.

Tip
QNAP recommends denying access to applications and network services that the user does not require.

7. Click **Create**.

QTS creates the user account and then adds it to the **Users** screen.

User Account Settings

Administrators can configure user account settings.
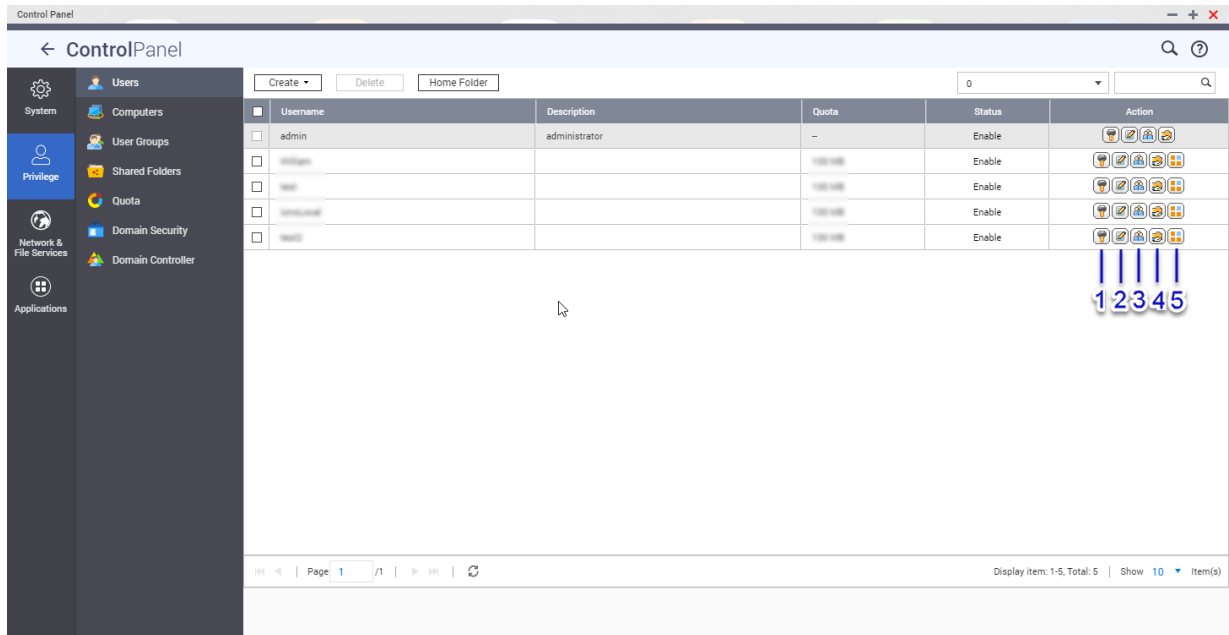
#	Action	Field/Option	Description
1	**Change password**	**Old Password**	This field is only available to admin accounts.
		Password	The password must contain 1 to 64 ASCII characters.
		Verify Password	The password must match the previously specified password.
		Show Password	When selected, QTS displays the specified password.

#	Action	Field/Option	Description
2	**Edit Account Profile**	**Email (optional)**	QTS sends a notfication to this email address when the account password is about to expire. You must configure the following settings: • **SMTP Server**: Go to **Control Panel** > **System** > **Notification** > **E-mail** . • **Change Password**: Go to **Control Panel** > **System** > **Security** . If the **SMTP Server** and **Change Password** are not configured, QTS does not use the information. For details, see the QTS User Guide.
		Phone number (optional)	The information is for your reference and is not used by QTS.
		Description (optional):	The information is for your reference and is not used by QTS.
		Disallow the user to change password	When selected, QTS prevents the user from changing the password.
		Disable this account	When selected, the account can be disabled immediately or on a specified date.
		Quota	When selected, QTS limits the amount of data that each user can store on the NAS. To enable this feature, go to **Main Menu** > **Control Panel** > **Privilege** > **Quota** .
3	**Edit User Group**	N/A	User groups, along with user-level shared folder permissions, determine which shared folders the user will have access to. QTS provides two default user groups. • Administrators: Users in this group can configure settings, create users, and install applications. • Everyone: Users in this group can only view or modify files.
4	**Edit Shared Folder Permission**	N/A	A shared folder can have any of the following access permissions. • **RO** (read-only): The user can read but not write files in the shared folder. • **RW** (read/write): The user can read and write files in the shared folder. • **Deny**: The user cannot read or write files in the shared folder. **Important** Group-level permissions may override user-level permissions. For details, go to Conflicts in Shared Folder Permissions.

#	Action	Field/Option	Description
5	**Edit Application Privilege**	N/A	This button is not available to admin accounts because they have access to all applications.
			Tip QNAP recommends denying access to applications and network services that the user does not require.

User Groups

Administrators can create user groups to manage permissions for multiple users.

Creating a User Group

1. Go to **Control Panel** > **Privilege** > **User Groups** .
   The **User Groups** screen appears.

2. Click **Create**.
   The **Create a User Group** window opens.

3. Specify the following information:

   - **User group name**: The name must contain 1 to 128 characters, and cannot include the following characters: ` * @ = + [ ] \ | ; : " , < > / ? % ' SPACE.

   - **Description**: The description must contain 1 to 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. Optional: Edit Shared Folder Permissions
   A shared folder can have any of the following access permissions.

   - **RO** (read-only): The group can read but not write files in the shared folder.

   - **RW** (read/write): The group can read and write files in the shared folder.

   - **Deny**: The group cannot read or write files in the shared folder.

   Important
   Group-level permissions may override user-level permissions. For details, go to Conflicts in Shared Folder Permissions.

6. Click **Create**.

Storage & Snapshots creates the user group and then adds it to the **User Groups** screen.

Shared Folders

Creating a Shared Folder

1. Go to **Control Panel** > **Privilege** > **Shared Folders** > **Shared Folder** .

The **Shared Folder** screen appears.

2. Click **Create**, and then select **Shared Folder**.
   The **Create A Shared Folder** window opens.

3. Specify the following information:

Field	Description
Folder Name	Specify a folder name that contains 1 to 64 characters and that does not: • Begin with a space or "_sn_" • Contain consecutive spaces • Contain the following characters: " + = / \ : | * ? < > ; [ ] % ` '.
Comment (optional)	Specify a comment that contains 1 to 128 ASCII characters.
Disk Volume	Specify the volume on which the shared folder will be created.
Path	You can specify a path or allow the operating system to automatically create one.

4. Optional: Configure user access permissions.

   a. Under **Configure access privileges for users**, click **Edit**.

   b. Specify the access permissions for users.

User Group	Description
Administrators	Users in this group can configure settings, create users, and install applications.
Everyone	Users in this group can only access files. This group contains all local user accounts and can be used to grant shared folder permissions to all local user accounts.

5. Optional: Enable folder encryption.

   a. Under **Folder Encryption**, click **Edit**.

   b. Select **Encryption**.
      Folder encryption protects folder content against unauthorized data access when the drives are physically stolen.

   c. Specify the following information:

Field/Option	Description
Input Password	Specify a password that contains 8 to 32 characters except the following: " $: = \
Verify Password	The password must match the previously specified password.

Field/Option	Description
Save encryption key	When enabled, QTS automatically unlocks the shared folder after the NAS restarts. When disabled, the admin must perform the following steps: a. Restart the NAS. b. Go to **Control Panel** > **Privilege** > **Shared Folders** > **Shared Folder** . c. Click the unlock icon. ⚠️ **Warning** The data will be inaccessible if the encryption password is lost.

6. Optional: Configure advanced settings.

Option	Description
Guest Access Right	Select the permission level that is assigned to users without a NAS account.
Media Folder	Selecting this option allows media applications to scan this folder for media files.
Hide Network Drives	Selecting this option hides the folder in Windows networks. Users that know the specific path can still access the folder.
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.
SMB Encryption	This option is available only when SMB3 is enabled. Selecting this option encrypts all Microsoft network communication on the SMB3 protocol.
Enable Network Recycle Bin	Selecting this option creates a Recycle Bin for this shared folder.
Restrict the access of Recycle Bin to administrators only for now	This option is available only when **Enable Network Recycle Bin** is selected. Selecting this option prevents non-administrator users from recovering and deleting files in the Recycle Bin.
Enable sync on this shared folder	Selecting this option allows this shared folder to be used with Qsync.

7. Click **Create**.

QTS creates the shared folder and then adds it to the **Shared Folders** screen.

Editing Shared Folder Properties

1. Go to **Main Menu** > **Control Panel** > **Privilege** > **Shared Folders** > **Shared Folder** .

2. Select **Action** > **Edit Properties** .
    The **Edit Properties** window appears.

3. Configure the following settings.

Option	Description
Comment	Specify a comment that contains 1 to 128 ASCII characters. The information is for your reference and is not used by QTS.
Hide Network Drives	Selecting this option hides the folder in Windows networks. Users that know the specific path can still access the folder.
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.
SMB Encryption	This option is available only when SMB3 is enabled. Selecting this option encrypts all Microsoft network communication on the SMB3 protocol.
Enable Network Recycling Bin	Selecting this option creates a Recycle Bin for this shared folder.
Restrict the access of Recycle Bin to administrators only for now	This option is available only when **Enable Network Recycle Bin** is selected. Selecting this option prevents non-administrator users from recovering and deleting files in the Recycle Bin.
Enable write-only access on FTP connection	Selecting this option prevents non-administrator users from viewing and downloading the content of this folder with an FTP connection.
Encrypt this folder	Selecting this option enables folder encryption, which protects folder content against unauthorized data access when the drives are physically stolen.
Enable sync on this shared folder	Selecting this option allows this shared folder to be used with Qsync.

4. Click **OK**.

Conflicts in Shared Folder Permissions

When a user is assigned different permissions for a shared folder, QTS 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
Read Only	Read/Write	Read/Write
Read/Write	Read Only	Read/Write
Read Only	User group 1: No Access User group 2: Read/Write User group 3: Read Only	No Access

Drive Mapping

Mapping a Shared Folder on a Windows Computer

Mapping a NAS shared folder as a network drive lets you easily access and manage files from your Windows computer.

1. Power on the NAS.

2. Connect the NAS to your local area network.

3. Install Qfinder Pro on a Windows computer that is connected to the same local area network.
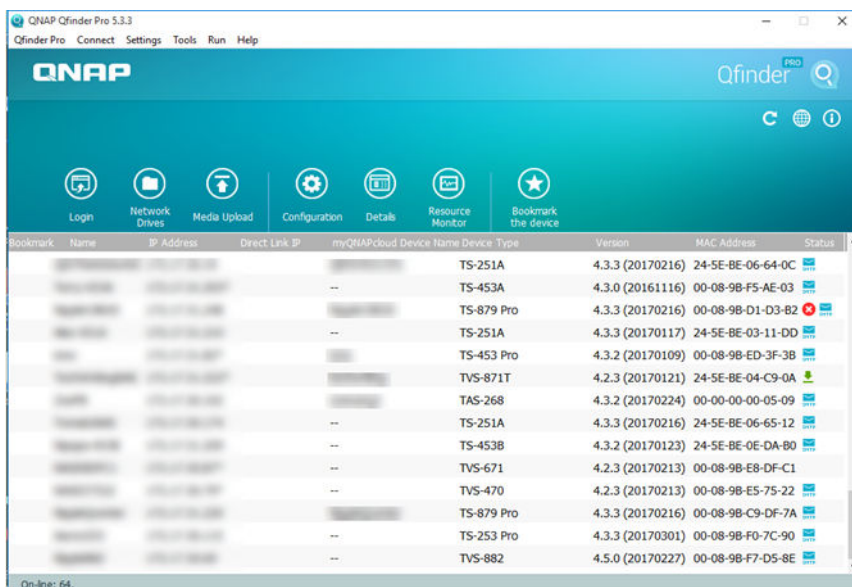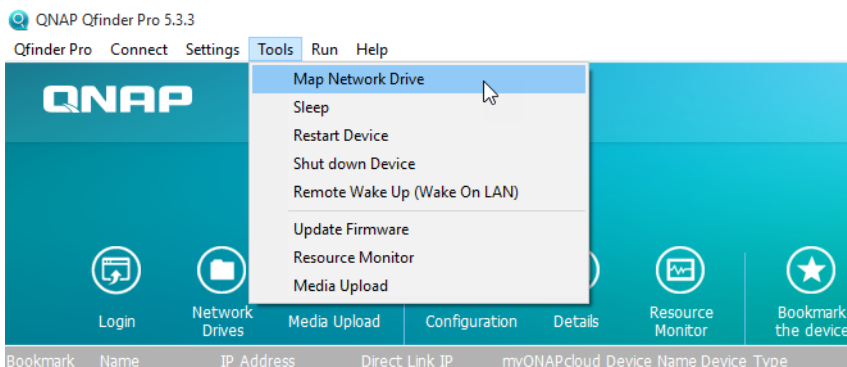
    Tip
    Qfinder Pro is a desktop utility that enables you to locate and access the QNAP NAS devices in your local area network.
    To download Qfinder Pro, go to https://www.qnap.com/utilities.

4. Open **Qfinder Pro**.
    Qfinder Pro displays all QNAP NAS devices in your local area network.

5. Select the NAS, and then go to **Tools** > **Map Network Drive** .

6. Select a shared folder, and then click **Map Network Drive**.
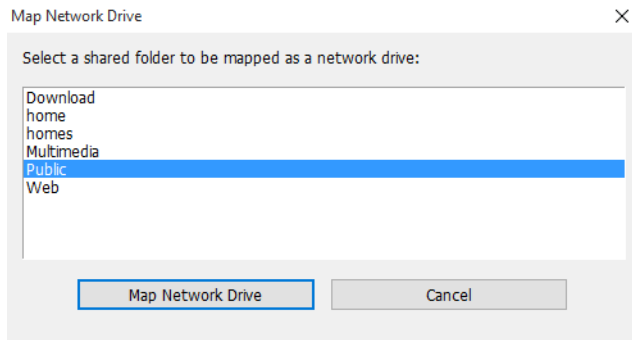
7. Specify your QTS username and password.
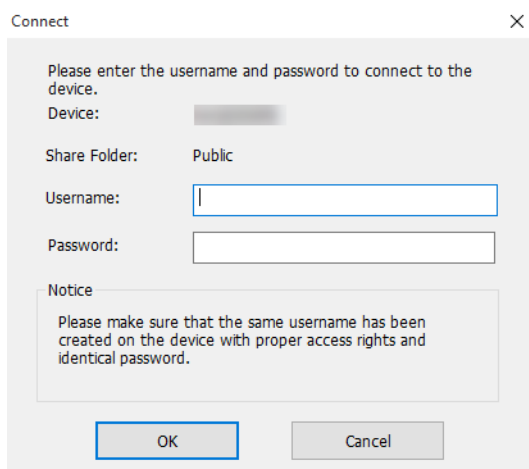
8. Specify a drive letter.
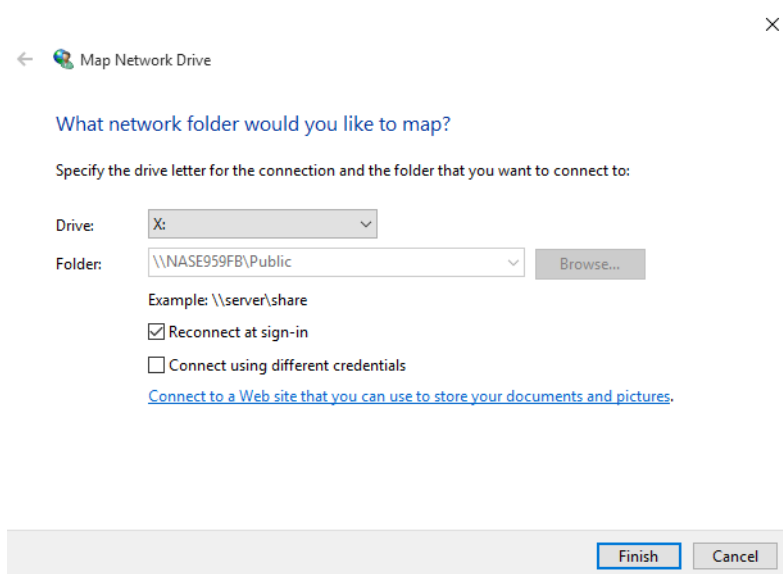
9. Click **Finish**.

The shared folder is mapped as a network drive and can be accessed using Windows Explorer.

Mounting a Shared Folder on a Mac Computer

With Qfinder Pro, you can find all the available QNAP NAS devices on your network. Mapping a NAS shared folder as a network drive lets you quickly access and manage files from your Mac device.

1. Power on the NAS.

2. Connect the NAS to your local area network.

3. Install Qfinder Pro on a Mac computer that is connected to the same local area network.

> **Tip**
> Qfinder Pro is a desktop utility that enables you to locate and access the QNAP NAS devices in your local area network.
> To download Qfinder Pro, go to https://www.qnap.com/utilities.

4. Open **Qfinder Pro**.
   Qfinder Pro displays all QNAP NAS devices in your local area network.

5. Select the NAS, and then click **Network Drives**.
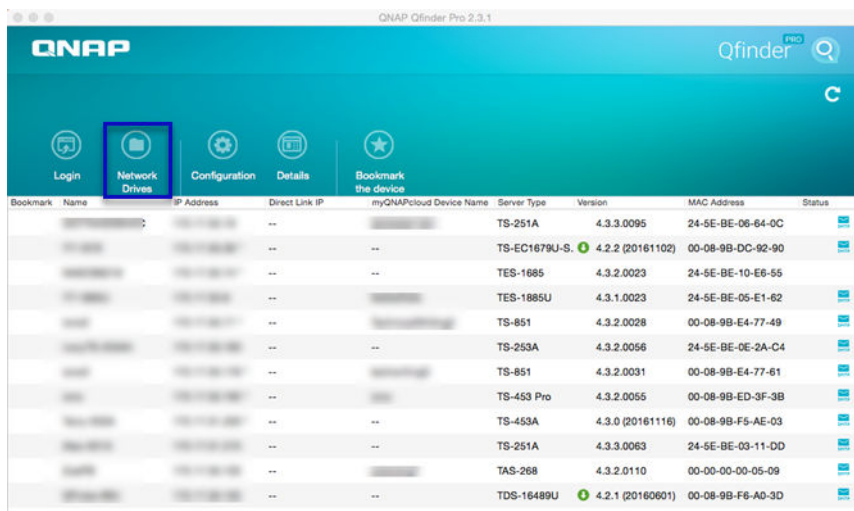
6. Specify your QTS user name and password, and then click **OK**.

The **Mount Network Drives** window opens.

7. Select **Add mounted folders to "Favorites" in Finder**, and then click **OK**.
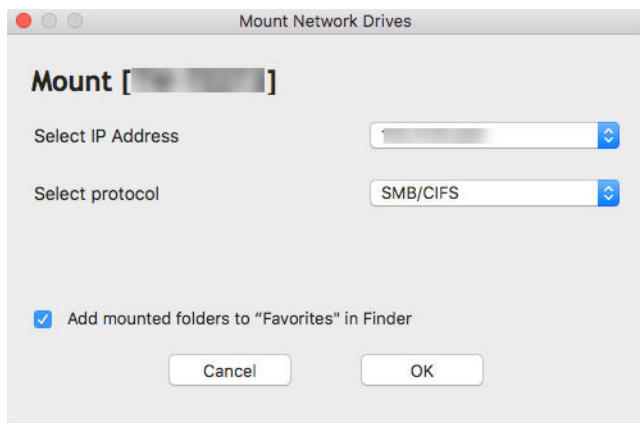
A confirmation message appears.

8. Click **Yes**.
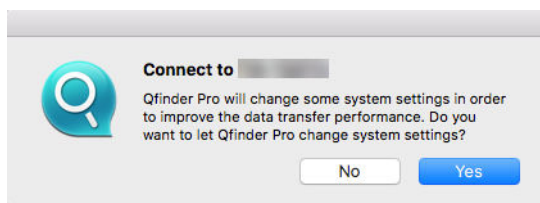
9. Specify your Mac user name and password, and then click **OK**.

10. Select the shared folder, and then click **OK**.
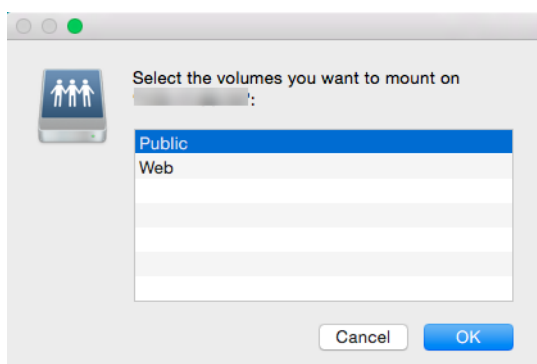
The shared folder is mapped as a network drive and can be accessed using Qfinder.

4. File Station

Overview

About File Station

File Station is a QTS file management application that allows you to access your NAS files. You can quickly find files, manage file and folder permissions, play media files, and share files and folders.

Supported File Formats

Category	File Extension
Image	• BMP
	• JPG
	• JPE
	• PNG
	• TGA
	• GIF
Music	• MP3
	• FLAC
	• OGG
	• WAV
	• AIF
	• AIFF
Video	• AVI
	• MP4

System Requirements

Category	Detail
Web browser	• Microsoft Internet Explorer 9 or later
	• Mozilla Firefox 3.6 or later
	• Apple Safari 5 or later
	• Google Chrome
Java program	Java Runtime Environment (JRE) 7 or later
Flash player	Adobe Flash Player 9 or later

Parts of the User Interface

Left Panel
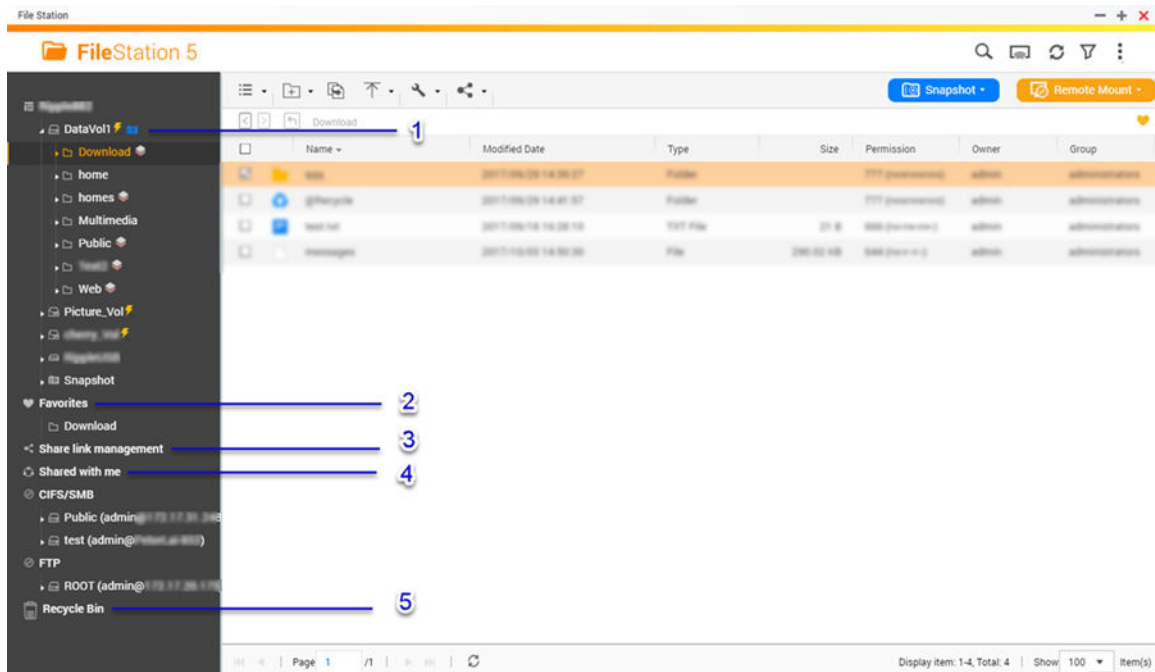
Label	UI Element	Description
1	Volume	Displays all the folders in the volume, including shared folders. The default shared folders vary depending on the NAS model.
2	Favorites	Displays bookmarked folders.
3	Share link management	Displays links of NAS files shared by the logged on user. Administrators see links shared by all NAS users.
4	Share with me	Displays files and folders shared by other NAS users with the logged on user.
5	Recycle Bin	Displays deleted files and folders.

Depending on your setup, the following folders may also appear on the list.

Folder	Description
Snapshot	Displays the saved snapshots from enabled volumes.
Local folders	Displays the local folders on a Windows computer. **Important** To view local folders from File Station, you must first install Java Runtime Environment.
Qsync	Displays files, folders, and team folders from Qsync.

Menu Bar

Label	Item	Description
1	Search	Search files by their name or file type, or using advanced search.
2	Network Media Player	Stream videos, photos, and music to compatible devices in different rooms over your home network.
3	Refresh	Refresh the current page.
4	Smart File Filter	Filter files based on the specified conditions.
5	More Settings	Modify the settings, or view the Help or app information.
6	Browsing Mode	Select a browsing mode.
7	Create folder	Create a folder, shared folder, snapshot shared folder, or share a space with another NAS user.
8	Copy	Copy the selected files and folders. **Note** This button only appears when a file or folder is selected.
9	Upload	Upload files or folders to the selected shared folder.
10	More Action	Perform different tasks. The list of available actions changes after selecting a file or folder.
11	Share	Share the selected files and folders. **Note** This button only appears when a file or folder is selected.
12	Snapshot	Open the Snapshot Manager or view the Snapshot Manager quick tutorial.
13	Remote Mount	Manage files across local devices, external devices, cloud services, and remote devices from a single interface
14	Add to Favorites	Add the current folder to your list of favorite folders

Settings

Modifying the General Settings

1. Go to **More settings** > **Settings** .
   The **Options** window appears.

2. Under **General**, modify the following as needed.

Option	Description
Show files and folders of my PC	When enabled, File Station displays the local files and folders on the computer. This feature only supports Windows computers and requires the installation of Java Runtime Environment.
Show hidden files on NAS	When enabled, File Station displays files and folders with the hidden attribute.
Allow all users to create shared links	When enabled, File Station allows all users to share NAS files using shared links.
Support multimedia playback and thumbnail display	When enabled, File Station allows on-the-fly transcoding and displays thumbnail previews of multimedia files.
Always display the 360º panoramic view button on the viewer	When enabled, File Station permanently displays the 360º panoramic view button and allows users to manually switch between the panorama and general modes.
Show Network Recycle Bin(s)	When enabled, File Station displays the `@Recycle` folder in all user folders.
Only allow the admin and administrators group to use "Share to NAS user"	When enabled, File Station prevents non-administrators from sharing files with other NAS users.
Only allow the admin and administrators group to permanently delete files	When enabled, File Station prevents non-administrators from permanently deleting files.
Only allow the admin and administrators group to use on-the-fly transcoding	When enabled, File Station prevents non-administrators from using on-the-fly transcoding.
Always play videos using VLC media player	Videos opened in File Station will be played in VLC media player rather than Video Station. To use this feature, you must install QVHelper and VLC Player on your computer.

3. Click **Close**.

Modifying the Remote Mount Settings

1. Go to **More settings** > **Settings** .
   The **Options** window appears.

2. Under **Remote Mount**, select one of the following.

   - admin only

   - administrators group only

   - specific users

3. Click **Apply**.

File Operations

File Station enables you to perform the following basic tasks.

Operation	Task
Store	• Uploading a File
Access	• Downloading a File
	• Opening a File
	• Playing a Media File
Share	• Sharing a File By Email
	• Sharing a File on a Social Network
	• Sharing a File Using Share Links
	• Sharing a File with a NAS User

Uploading a File

1. Open File Station.

2. Perform one of the following methods.

Method	Steps
Use the menu bar	**a.** Click **Upload** and then select **File**. The **File Upload** window opens.
	b. Select the file and then click **Open**.
Use drag and drop	**a.** Locate the file on your computer.
	b. Drag and drop the file to the File Station window.

A confirmation message appears.

3. Select one of the following.

Option	Description
Skip the files	Do not upload a file if another file with the same file name and extension already exists on File Station.
Overwrite the files	Upload the file and then overwrite an existing file with the same name and extension.
Rename if a file exists with the same name	Upload and rename a file if another file with the same name and extension already exists on File Station.

4. Click **OK**.
   File Station uploads the file.

Downloading a File

1. Open File Station.

2. Locate the file.

3. Perform one of the following methods.

Method	Steps

Use the menu bar	**a.** Select the file.
	b. Click **More Action**.
	c. Select **Download**.
	d. Click **OK**.
Use the context menu	Right-click the file and then click **Download**.

Depending on your browser, a confirmation message appears before the file is downloaded to your computer.

Opening a File

1. Open File Station.

2. Locate the file.

3. Perform one of the following methods.

Method	Steps
Use the menu bar	**a.** Select the file.
	b. Click **More Action**.
	c. Select **Open**.
Use the context menu	Right-click and then select **Open**.

File Station opens the selected file.

Playing a Media File

1. Open File Station.

2. Locate the file.

3. Perform one of the following methods.

Method	Steps
Use the menu bar	**a.** Select the file.
	b. Click **More Action**.
	c. Select **Play**.
	d. Under **Online streaming**, select the resolution.
Use the context menu	**a.** Right-click the file.
	b. Select **Play**.
	c. Under **Online streaming**, select the resolution.

File Station plays the selected file using Media Viewer.

Sharing a File By Email

1. Open File Station.

2. Locate the file.

3. Perform one of the following methods.

Method	Steps
Use the menu bar	a. Select the file. b. Click **Share**. c. Select **Via Email**.
Use the context menu	a. Right-click the file. b. Select **Share** and **Via Email**.

The **Share** window appears.

4. Specify the following.

Field	Description
Send from	Select one of the following. • Use NAS to mail the link(s). • Use local computer to mail the link(s).
Sender	Select an email account or click **Add email account**.
To	Specify the email address of the recipient.
Subject	Specify the email subject.
Message	Use the default message or type a new one.

5. Optional: Click **More settings** and then specify the following.

Field	Task
Link Name	Type a name for the link or use the current file name.
Domain name/IP	Select the domain name or IP address.
Show SSL in URL	Select to use HTTPS.
Expire in	Specify the expiration date.
Password	Move the switch to the right and then type a password.

6. Click **Share Now**.
   File Station sends an email to the recipient.

Sharing a File on a Social Network

1. Open File Station.

2. Locate the file.

3. Perform one of the following methods.

Method	Steps

Use the menu bar	**a.** Select the file.
	b. Click **Share**.
	c. Select **To Social Network**.
Use the context menu	**a.** Right-click the file.
	b. Select **Share** and then select **To Social Network**.

The **Share** window appears.

4. Specify the following.

Field	Description
Social Network	Select the social media website.
Message	Use the default message or type a new one.

5. Optional: Click **More settings** and then specify the following.

Field	Task
Link Name	Type a name for the link or use the current file name.
Domain name/IP	Select the domain name or IP address.
Show SSL in URL	Select to use HTTPS.
Expire in	Specify the expiration date.
Password	Move the switch to the right and then type a password.

6. Click **Share Now**.
File Station connects to the specified social media website.

Sharing a File Using Share Links

1. Open File Station.

2. Locate the file.

3. Perform one of the following methods.

Method	Steps
Use the menu bar	**a.** Select the file.
	b. Click **Share**.
	c. Select **Create share link only**.
Use the context menu	**a.** Right-click the file.
	b. Select **Share** and then select **Create share link only**.

The **Share** window appears.

4. Specify the following.

Field	Task

Link Name	Type a name for the link or use the current file name.
Domain name/IP	Select the domain name or IP address.
Show SSL in URL	Select to use HTTPS.
Expire in	Specify the expiration date.
Password	Move the switch to the right and then type a password.

5. Click **Create Now**.
   File Station generates a link.

Sharing a File with a NAS User

1. Open File Station.

2. Locate the file.

3. Perform one of the following methods.

Method	Steps
Use the menu bar	a. Select the file. b. Click **Share**. c. Select **To NAS user**.
Use the context menu	a. Right-click the file. b. Select **Share** and then select **To NAS user**.

   The **Share** window appears.

4. Select one of the following options.

Option	Description
Existing user	Select a user from the list. Optional: Select **Send a notification email to the user** and then specify the email subject and message.
New user	Specify the following information. • User name • Password • Phone number (Optional) • Email (Optional)

5. Optional: Click **More settings** and then specify the following.

Field	Task
Link Name	Type a name for the link or use the current file name.
Domain name/IP	Select the domain name or IP address.
Show SSL in URL	Select to use HTTPS.
Expire in	Specify the expiration date.
Password	Move the switch to the right and then type a password.

6. Click **Share Now**.
File Station shares the file with the specified user.

Folder Operations

File Station enables you to perform the following basic tasks.

Operation	Task
Store	• Uploading a Folder • Uploading a Folder Using Drag and Drop
Organize	• Creating a Folder • Creating a Desktop Shortcut
Share	• Creating a Shared Folder

Uploading a Folder

> **Note**
> This feature is only available on Google Chrome browsers.

1. Open File Station.

2. Click **Upload** and then select **Folder**.
The **Browse for Folder** window opens.

3. Perfom one of the following tasks.

Task	Steps
Upload an existing folder	Select the folder.
Upload a new folder	Click **Make New Folder** and then specify a folder name.

A confirmation message appears.

4. Select one of the following.

Option	Description
Skip the files	Do not upload a folder if the folder name already exists on Storage & Snapshots.
Overwrite the files	Upload the folder and then overwrite an existing folder with the same name.
Rename if a file exists with the same name	Upload and rename the folder if another folder with the same name already exists on Storage & Snapshots.

5. Click **OK**.
File Station uploads the selected folder.

Uploading a Folder Using Drag and Drop

> **Note**
> This feature is only available on Google Chrome browsers.

1. Open File Station.

2. Drag and drop the local folder to Storage & Snapshots.

3. Select one of the following.

Option	Description
Skip the files	Do not upload a folder with a folder name that already exists on Storage & Snapshots.
Overwrite the files	Upload the folder and then overwrite a folder with the same name already exists on Storage & Snapshots.
Rename if a file exists with the same name	Upload and rename a folder if another folder with the same name already exists on Storage & Snapshots.

4. Click **OK**.
   File Station uploads the selected folder.

Creating a Folder

1. Open File Station.

2. Perfom one of the following tasks.

Task	Steps
Use the menu bar	a. Click **More Action**. b. Click **Create folder** and then select **Folder**. The **Create folder** window opens. c. Specify the folder name. d. Click **OK**.
Use the context menu	a. Right-click inside the folder and then select **Create folder**. b. Specify the folder name. c. Click **OK**.

   File Station creates a new folder.

Creating a Desktop Shortcut

1. Open File Station.

2. Locate the folder.

3. Perform one of the following methods.

Method	Steps
Use the menu bar	a. Select the folder. b. Click **More Action**. c. Select **Create Shortcut to Desktop**.

Use the context menu	**a.** Right-click the folder.
	b. Select **Create Shortcut to Desktop**.

File Station creates a desktop shortcut for the selected folder.

Creating a Shared Folder

1. Open File Station.

2. On the menu bar, click **Create folder** and then select **Shared Folder**.
   The **Create A Shared Folder** window opens.

3. Specify the following information.

Field	Description
Folder Name	Specify a folder name that contains 1 to 64 characters and that does not: • Begin with a space or "_sn_" • Contain consecutive spaces • Contain the following characters: " + = / \ : | * ? < > ; [ ] % ` '.
Comment (optional)	Specify a comment that contains 1 to 128 ASCII characters.
Disk Volume	Specify the volume on which the shared folder will be created.
Path	You can specify a path or allow the operating system to automatically create one.

4. Click **OK**.
   File Station creates a new folder.