Hybrid Backup Sync 3.0
QuDedup
combats data loss, ensuring file backup & instant data restoration

NEW
Will be released in QTS 4.4.1 coming soon
Discover the all-new Hybrid Backup Sync

- Data deduplication technology QuDedup greatly reduces backup and restore time
- Backup time spent is the key factor for multi-version backup
- QuDedup Extract Tool makes your backup data visible and portable
- Support TCP BBR to accelerate the cloud backup speed
- Complete Support to Cloud Object Storage
- Make the 3-2-1 backup strategy
- Voice from enterprise users:
  30 sets schedule settings and rate control per job
Affirmation from millions of users, and continuous evolution

<table>
<thead>
<tr>
<th>Feature</th>
<th>Hybrid Backup Sync 2.1</th>
<th>Hybrid Backup Sync 3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud synchronization</td>
<td>Support 8 cloud providers</td>
<td>Support 22 cloud providers (continue increasing...), full support for synchronous, multi-version backup</td>
</tr>
<tr>
<td>Cloud backup</td>
<td>Support 13 cloud providers</td>
<td></td>
</tr>
<tr>
<td>QuDedup technology</td>
<td>N/A</td>
<td>Support source-side deduplication</td>
</tr>
<tr>
<td>TCP BBR technology</td>
<td>N/A</td>
<td>Support</td>
</tr>
<tr>
<td>Scheduler</td>
<td>Single schedule setting</td>
<td>Up to 30 schedule settings</td>
</tr>
</tbody>
</table>
Rapid data growth, data preservation would be a challenge

Issues you might encounter while backing up data...

• Transmission time is too long and bandwidth resources are consumed for a long time.
• Backup takes too long to achieve intensive backup cause data loss risk raising.
• Slow internet transmission speed cause remote backup hardly to achieve.
• Without data reduction pre-processing will cause increased storage costs
Why we want to develop Hybrid Backup Sync 3.0?

Key: Backup files must be small, backup speed must be fast

- Smaller backup data size
- Faster backup speed
- More backup versions
- Smaller data loss risk

- Smaller backup data size
- Faster remote recovery speed
- Smaller data loss risk

- Faster internet speed
- Faster cloud backup speed
- Smaller data loss risk
Data deduplication technology QuDedup greatly reduces backup and restore time
Gatner: Deduplication will be the transformational technology in near future

**Technical Point**
- Block level analysis and comparison, removing redundant data from finer levels.
- Cross-file comparison instead of single file compression.

**3 Major Scenarios**
- Backup Application
- Virtual Tape Library (VTL)
- Storage Server
QuDedup Technology: Data reduction, small is fast!

Future highlights
• Block level analysis and comparison
• Source-side data deduplication framework
• 3 Advantages
  • Bandwidth reduction,
  • Space saving
  • Support multiple cloud providers

<table>
<thead>
<tr>
<th>VM Image Size</th>
<th>Deduped File Size</th>
<th>Compression Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.48 GB</td>
<td>7.59 GB</td>
<td>2.04:1</td>
</tr>
</tbody>
</table>

Note: The compression ratio of one VM image file.

QuDedup support model: x86 / ARM 64 bit / ARM AL
Source-side data deduplication technology is in line with modern enterprise needs.

81% of enterprises have adopted the cloud solution, therefore source-side data deduplicated is more suitable for their needs.

Highly compatible with different backup destinations
Reduce backup storage space and data transmission bandwidth

Source-side Data Deduplication Technology

QTS 4.4.1
High compression ratio, surpassing traditional data reduction technology

<table>
<thead>
<tr>
<th>Category</th>
<th>File Compression</th>
<th>Single Instance Storage</th>
<th>Data Deduplication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Comparison Level and Scope</strong></td>
<td>Byte / Single file</td>
<td>File / Specified disk area</td>
<td>Block / Specified disk area</td>
</tr>
<tr>
<td><strong>Suiteable Scenario</strong></td>
<td>Single file</td>
<td>Cross-files</td>
<td>Both single file and cross-files</td>
</tr>
<tr>
<td><strong>Typical Data Compression Rate</strong></td>
<td>2:1 ~ 5:1</td>
<td>3:1 ~ 5:1</td>
<td>5:1 ~ 20:1</td>
</tr>
</tbody>
</table>
Use SSD to Speed up QuDedup

QuDedup requires a lot of file parsing and decomposition. If only the HDDs are used, the lower file access speed will make the network bandwidth use idle.

Notice: Data deduplication will consume more computing and memory resources. Please confirm that the NAS model has sufficient processing resources.
Backup time spent is the key factor for multi-version backup.
Multi-version backup can greatly increase the file availability from disaster recovery

- Free of damage caused by accidental alteration, damage or loss of files
- Intensive backup versions reduce the risk of missing business and personal data for enterprise and personal users

Don't ignore the hidden risk
When the data amount of the backup task is too large to be completed in time, the next scheduled task will be canceled.

The key is to speed up the execution of backup task.
How to optimize the two indicators RPO and RTO?

**Tip 1:**
Complete 10/25/40 GbE solution
Utilize high-speed interfaces to speed up data transmission

**Tip 2:**
Enable QuDedup technology for backup task
Turn on data reduction to reduce transferred data amount

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Data Backup Time
Disaster
System online

- Recover Point Objective
- Recover Time Objective
Backup needs data reduction, multi-version backup needs more.

- **Notice:** Enable multi-version backup will enable the QuDedup option at the same time.

- **Tip:** Use QuDedup for cross-files and cross-versions data deduplication, saving substantial time and space!

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Multi-version backups consume lots of storage space after long term execution.

<table>
<thead>
<tr>
<th>QuDedup</th>
<th>Source Size</th>
<th>Destination Size</th>
<th>Number of Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Backup</td>
<td>15.48 GB</td>
<td>7.59 GB</td>
<td>1</td>
</tr>
<tr>
<td>2nd Backup</td>
<td>15.49 GB</td>
<td>7.82 GB</td>
<td>1.03x</td>
</tr>
</tbody>
</table>

Note: Multi-version backup of the virtual machine image.
Live Demo Part 1

Data deduplication and multi-version backup demonstration
QuDedup Extract Tool makes your backup data visible and portable.
What is .qdff?

Backup Knowledge of .qdff (QNAP Dedup File Format)

- Storage format for deduplicated data
- Backup data is deduplicated in block level
- Unable to see the file directory structure and file contents
- File needs to be extracted before it can be accessed.
QuDedup Extract Tool makes .qdf file restore without constraints

The after effect of data deduplication
- Backup files cannot be viewed after deduplication.
- Backup files need to be restored to the source before access.

All new QuDedup Extract Tool allows you to take TB-level file with you.
- File Restore Anywhere
- Backup files can be restored directly on multiple platforms (Windows / Mac / Linux (Ubuntu))
- File Preview
- The backup file can be previewed before restoration to view the content differences in each version.
- Fine Recovery
- Single folder/file restoration
Bring your backup data by a single USB drive

QNAP QTS 4.4.1
Backup data can be restored in different places and taken anywhere.

Access from local NAS (via HBS):
- Taipei

Access from remote NAS (via File Station):
- Taipei
- File Station with QuDedup, coming soon...

Access from Cloud:
- File Station with QuDedup, coming soon...

Carry and Use:
- Taipei
- Windows Tokyo
- MacOS New York
- ubuntu Beijing

Network Protocols:
- TCP BBR
- CIFS / NFS / FTP
QuDedup Extract Tool User Manual
Import .qdff file by double click the .qdff file, you can also click "Open" button in QuDedup Extract Tool to import.
View multi-version and file content

- Multi-version data will be displayed directly in the left window ordered by backup time.
- Double click the file to preview.
Arbitrarily select the file to be restored

- Support to extract the whole .qdff
- Support fine recovery, users can select some files/folders to restore according to their needs.

Intimate reminder:
Estimated restore size
Support TCP BBR to accelerate the cloud backup speed
What is BBR
(Bottleneck Bandwidth and Round-Trip Time)

BBR is a congestion control technology suitable for modern network environment

• BBR is Google's new congestion control algorithm designed for TCP
• Supported by Linux kernel 4.9 and above
• Fully improve bandwidth utilization in a network environment where the packet loss rate is too high

TCP before BBR
Today's Internet is not moving data as well as it should. TCP sends data at lower bandwidth because the 1980s-era algorithm assumes that packet loss means network congestion.

TCP BBR
BBR models the network to send as fast as the available bandwidth and is 270x faster than previous TCP's on a 10Gb, 100ms link with 1% loss. BBR powers google.com, youtube.com, and apps using Google Cloud Platform services.
Network Speed Measurement of TCP BBR

Source: QNAP NAS in Taiwan
Destination: AWS S3 EU(London) Zone

Connect to the cloud service through the Heterogeneous network. Enable TCP BBR to improve the transmission efficiency!

4 ~ 5 times increase

Notice: TCP BBR is suitable for WAN, it will not have effect in network env. without packet loss(e.g. LAN).
TCP BBR makes enterprise hybrid cloud architecture robust

Robust and easy to deploy

Compared with traditional framework, which need to overcome complex network environments, enterprises simplify device deployment problems through public cloud services while maintaining stable transmission quality and speed.
Complete Support to Cloud Object Storage
Use QNAP NAS as the file storage gateway
Convert the local file to a cloud object, and the file directory structure is also saved in the cloud space.

Create a tight hybrid cloud storage architecture
- Flexibly use cloud space to complete the backup strategy
- Instantly synchronize multiple files with cloud architecture
Completely Integrate File and Object Type Cloud Services

- Already supports 22 public cloud service provider and continue increasing
- Support both cloud synchronization and backup
- Support multi-version backup
Quickly get backup files in the cloud

Step 1: Deploy AWS WorkSpace
Step 2: Download and install QuDedup Extract Tool from QNAP Download Center (Coming Soon)
Step 3: Install third-party S3 client tools (e.g. CloudBerry) to access backup data located on AWS S3

Tip: The commonly used application can store in the AWS S3 backup space, and copy to the AWS WorkSpace for installation and use when accessing the backup data (e.g., Unzip tool, PDF Reader, Video Player...).
Live Demo Part 2
Cloud multi-version backup and restore with QuDedup Extract Tool
Make the 3-2-1 backup strategy
Best practice of hybrid cloud architecture

• Adapt the backup strategy depending on the infrastructure and cloud services that the user already holds.

• Easy to build offsite backup via private and public cloud.

• Adjust the backup location according to the confidentiality of the backup data.

• Adopt data deduplication technology to reduce bandwidth and storage space consumption for backup task.
QNAP's Complete Data Protection Plan
Complies with the 3-2-1 Principle

Local
- Mac Time Machine
- Netbak Replicator
- External Device / TR-004
- VJBOD

Remote
- RTRR
- TCP BBR

Cloud
- Backup / Sync
  - TCP BBR
- File Storage
- Object Storage
- • Rsync Server
- • CIFS / SMB Server
- • FTP Server

QTS 4.4.1
Voice from enterprise users: 30 sets schedule settings and rate control per job
Advanced management to ensure the quality of enterprise network

- Set the rate control for each task.
- Plan backup task schedule according to enterprise demand elasticity
Flexible setting of task schedule can reduce disaster recovery RPO

• Supports schedule types
  • One-time
  • Periodically (Monthly/Weekly/Daily/Hourly ...)
  • Linked one-time backup
  • Manually

• Supports 30 sets schedule settings per-job
• Supports schedule valid interval setting
Enterprise Backup Data should more secure for Complying with GDPR

Backup data cannot be accessed by unauthorized personnel

• Transmission encryption
  • HTTPS
  • SSL
  • SSH
• Data encryption
  • Client-side encryption
  • Server-side encryption
New Look of Hybrid Backup Sync 3.0
Intuitive operation design improve backup management efficiency
Task overview page Manage multiple tasks at once
See all storage space status at a glance

Notice: Some of the cloud services do not support to show storage information.
Task setup by wizard

Select Source

Select Destination

Complete the backup path setting
Version viewer helps you to select folder to restore by 3 steps

1. Select the date from timeline
2. Select version
3. Select folder to restore
Hybrid Backup Sync 3.0 Beta Program
QNAP Hybrid Backup Sync 3
The best help for your hybrid cloud data protection