

**QNAP**

# Qtier SSD

tier redefine:

**Upgrade SSD capacity  
or types instantly**

Coming soon! Will be released with QTS 4.4.1



# Easily Recreate the Qtier SSD Tier

**1** **SSDs Need To Be Upgraded**

**2** **Re-create Qtier SSD Tier**

Demo

**3** **Remove Qtier SSD Tier**

**4** **More Scenarios and Recap**

# QNAP

## SSDs Need To Be Upgraded

- SSD Evolution Trend
- Change Qtier SSD Tier

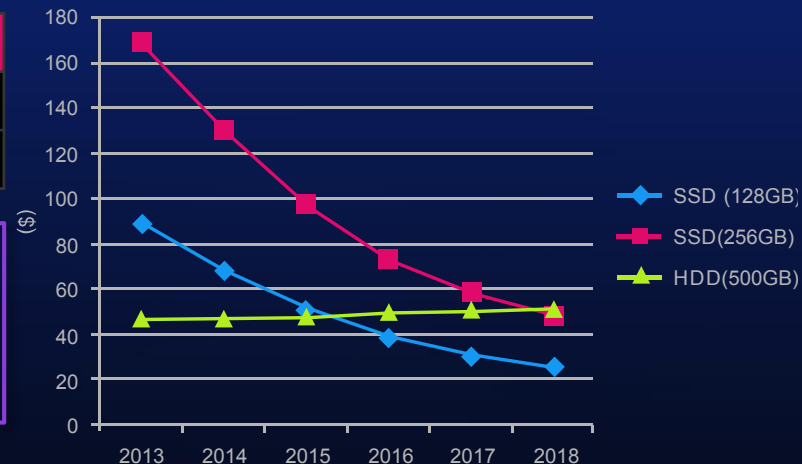
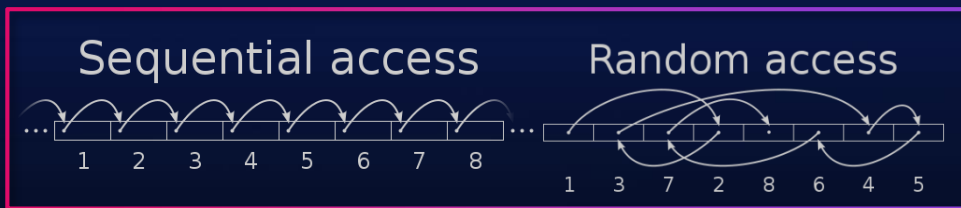


# SSD EVOLUTION TREND

➤ With modern applications it is required higher storage performance, SSD is becoming more popular and is being widely used.

➤ As the SSD price keeps falling, smaller SSDs that have been purchased in the past can be replaced with larger SSD.

Disk Type	SW (MB/s)	RW (IOPS)
HDD	100	350
SSD	300	60000



<https://www.sandisk.com/business/datacenter/resources/white-papers/the-ssd-enabled-pc-total-cost-of-ownership>

# SSD EVOLUTION TREND



Since the SSD already has high performance, the SATA Port and AHCI Interface still post a limitation to the SSD.



The NVMe Interface, PCIe, M.2, U.2 SSD, and latest technologies such as SSD Over-provisioning and Intel® Optane™ are all continuously contributing to the SSD evolution.

Bus Type	SATA 3	M.2	U.2	PCIe
Speed	6Gbps	10/32Gbps	32Gbps	20/32Gbps
IOPS	60,000	100,000	300,000	1,000,000
Interface Standard	AHCI	NVMe	NVMe	NVMe



2.5 inch

SATA

NVMe (U.2)



M.2

SATA

NVMe



PCIe card

NVMe

IOPS performance is evaluated based on products spec existed on the market.

<http://www.2cm.com.tw/2cm/zh-tw/magazine/-MarketTrend/F26FE52365E548DFB150B39173AED7D3>

<https://www.xfastest.com/thread-167519-1-1.html>

# Change Qtier SSD Tier



QNAP allows the combination of SSD and HDD RAID into the same pool and migrate data automatically based on accessing pattern.



Support SATA, SAS, M.2, QM2 and U.2 SSD.



Provide higher capacity as SSD can be used to store data

- Hot Data
- Warm Data
- Cold Data

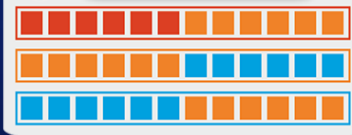
1

Before Tiering



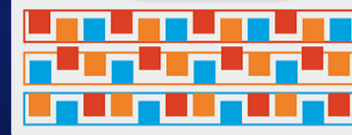
4

Data Access  
Pattern Changed



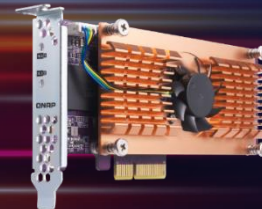
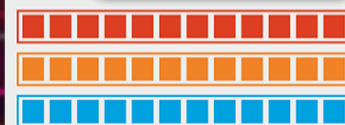
2

Start Tiering



3

After Tiering



# Change Qtier SSD Tier

## Challenges

As SSD price continues to fall, larger SSDs can be purchased, but how to replace the SSD quickly?



### Replace Disks One by One

Cancel

Please select at least one disk.

Disk	Manufacturer	Model	Type	Bus Type	Capacity	Stat...	Description
Disk 5	ADATA	SP920SS	SSD	SATA	238.47 GB	Good	Please remove this drive.
Disk 6	ADATA	SP920SS	SSD	SATA	238.47 GB	Good	No operation can be execut...

Source Disk RAID Group: Group 1 (RAID 1 Disk Group)

Disks <NAS Host: Disk 5 Disk 6>

You can expand the RAID group capacity to approximately: **206.07 GB**

Expand Capacity

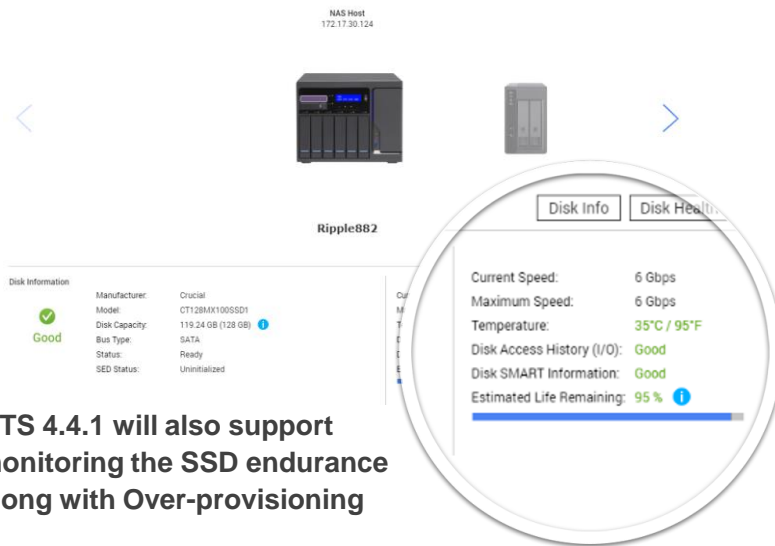
Cancel

**QTS system has "Replace disk one by one" but such operation requires multiple resync to be completed.**

# CHANGE QTIER SSD TIER

## Challenges

After upgrading the QTS to 4.3.6, the new feature of SSD Over-provisioning cannot be applied on the existed Qtier SSD Tier?

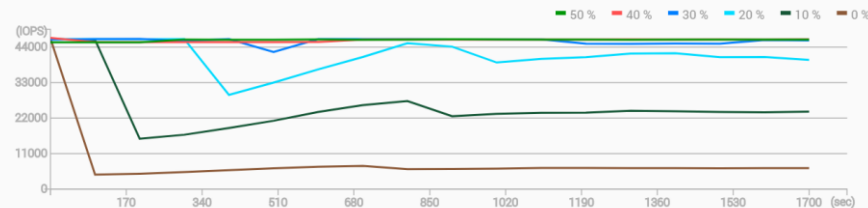


## Test Information

NAS : --  
Disk Model: Samsung 850 pro  
RAID Type: Single

Test Status: Completed  
Test range: 0 % ~ 50 %  
Test interval: 10 %  
Test pattern: Random Write

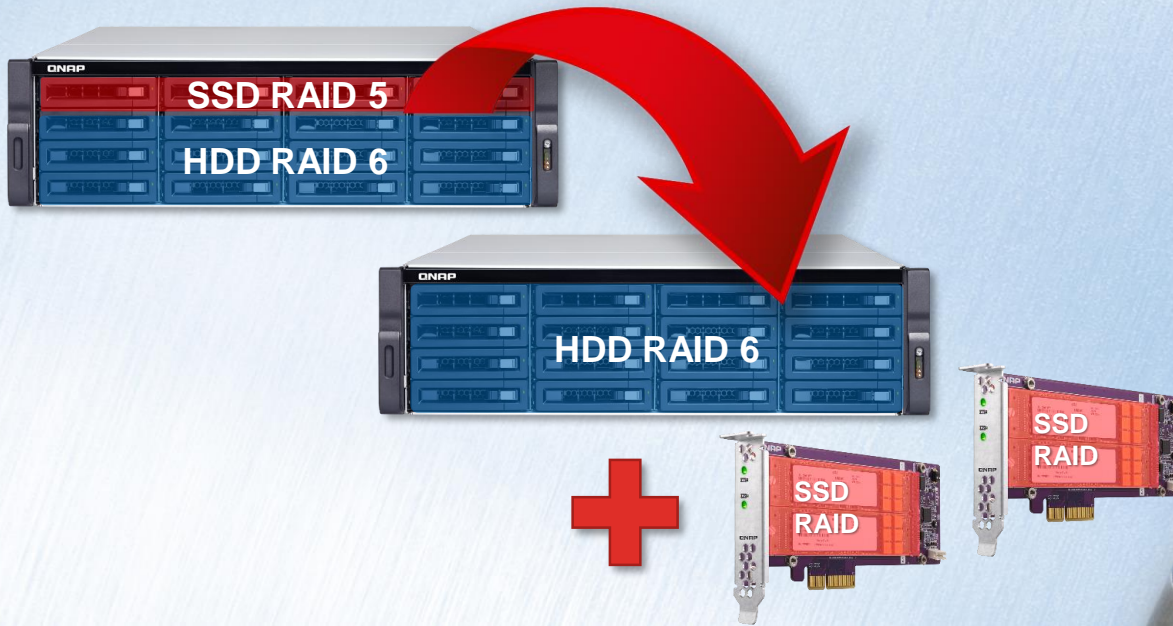
## Test Result



# Change Qtier SSD Tier

## Challenges

While SSD Tier is already created with SATA Disk, how can I replace it with QM2 to expand the NAS while improving the SSD Tier performance?



# QNAP

## Re-create Qtier SSD Tier

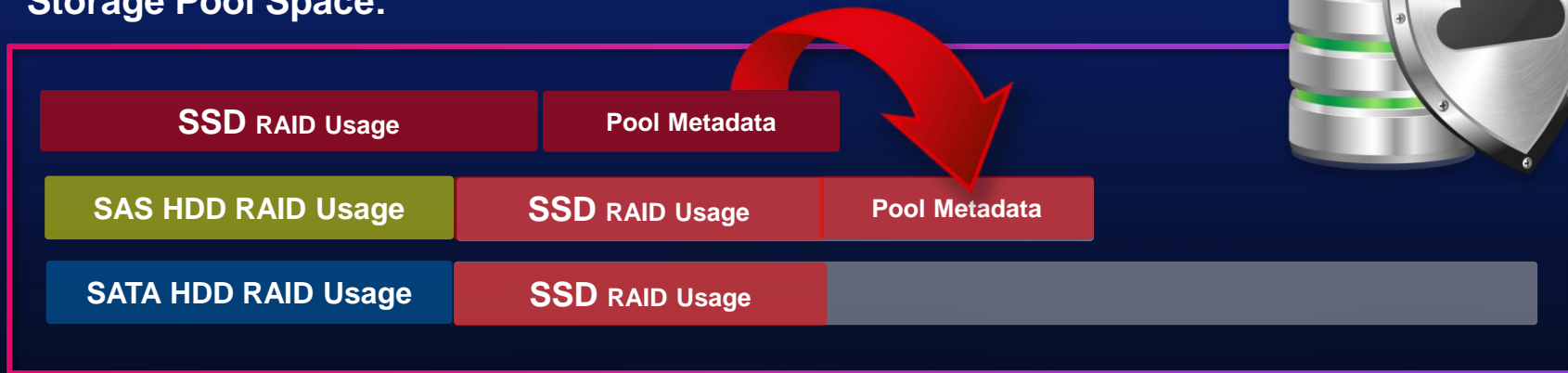
- Remove Qtier SSD Tier
- Recreate Qtier SSD Tier



# Remove Qtier SSD Tier

- QNAP QTS 4.4.1 supports remove Qtier SSD Tier, the users can remove then re-create SSD tier as required.
- When removing the SSD tier, all the storage pool data will be retained as data on SSD only to be moved to HDD.

## Storage Pool Space:



# Remove Qtier SSD Tier

> Remove SSD Tier in 3 steps.

> It is required that all RAID groups in Qtier Pool are normal and HDD tiers have enough capacity to store all data.

Ultra-High Speed Tier Removal Wizard

Check **Configure** Summary

Storage pool name: Storage Pool 1

This wizard will remove the ultra-high speed (SSD) tier by migrating all of its data to other tiers. The system will then remove the following SSD RAID groups:

	RAID Group	Enclosure Unit	Capacity	Disk member	Tier	Status
<input checked="" type="checkbox"/>	RAID Group 1	NAS Host	206.07 GB	Disk 5, Disk 6	Ultra-High Speed	Ready
<input type="checkbox"/>	RAID Group 2	NAS Host	865.79 GB	Disk 1, Disk 2, Dis...	Capacity	Ready

Available space: 869.13 GB

■ Allocated: 16.6 % (178.78 GB) ■ Ultra-High Speed Tier: 19.2 % (206.07 GB)

Cancel Next

1

Storage Pool Management >  
Remove > Remove SSD Tier

2

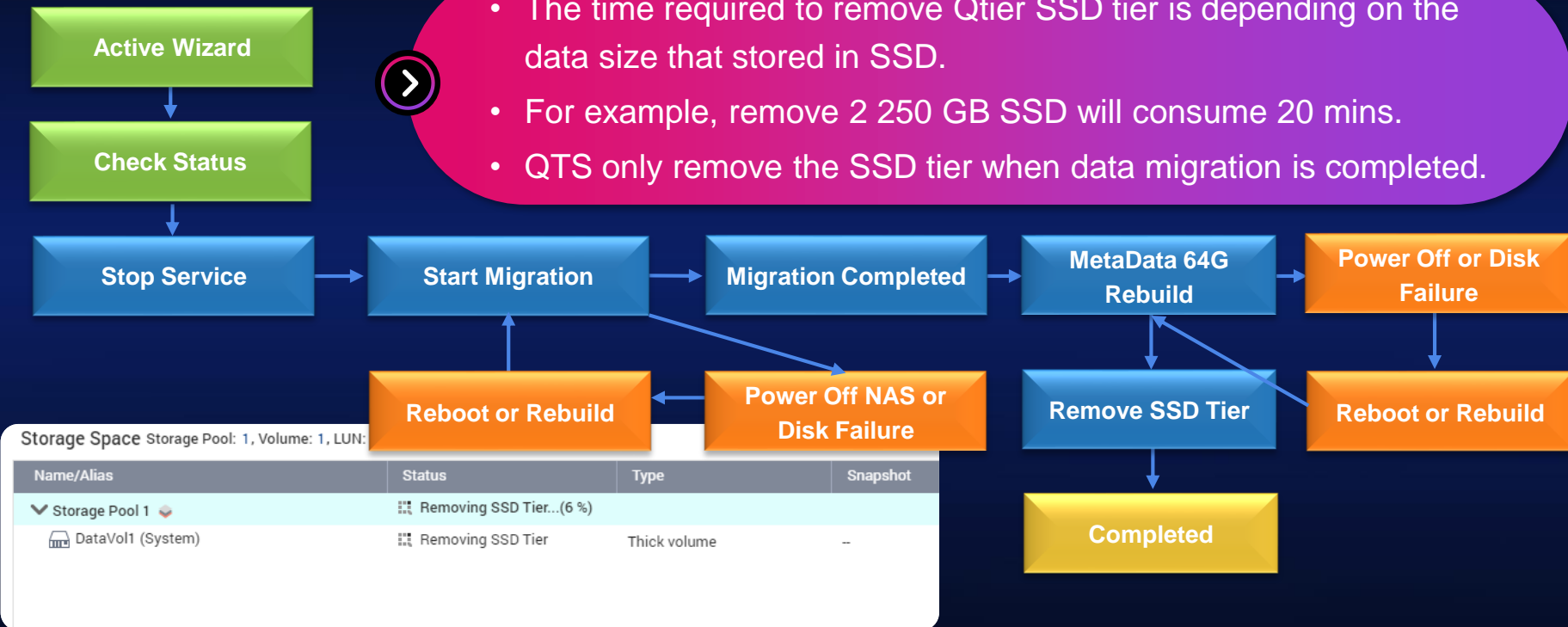
Check if all the RAID Groups are  
ready and have enough space.

3

User confirm to stop the pool's  
service to start the operation.

# Remove Qtier SSD Tier

- The time required to remove Qtier SSD tier is depending on the data size that stored in SSD.
- For example, remove 2 250 GB SSD will consume 20 mins.
- QTS only remove the SSD tier when data migration is completed.



**QNAP**

**DEMO**



# Re-create Qtier SSD Tier



Once Qtier SSD Tier is removed, the Storage Pool will become Normal Pool or remain to be Qtier Pool based on if second tier existed. User then can upgrade or expand the pool accordingly to add SSD.

## Step 1

Insert new SSD and Open Storage & Snapshot.

## Step 2

Choose “Upgrade” or “Expand” the Storage Pool.

## Step 3

Following the wizard to add new SSD back into the Storage Pool.

**Upgrade To Qtier Wizard**

Summary

Select Disk and Configuration:

Tier: Ultra-high Speed (SSD)

Storage Pool: SSD SAS SATA

Enclosure Unit: NAS Host [available disk(s): 2/10]

<input checked="" type="checkbox"/>	Disk	Model	Type	Bus Type	Capacity	Status
<input checked="" type="checkbox"/>	SSD 1	KINGSTON SE50S3480G (S...)	SSD	SATA	447.13 GB	Good
<input checked="" type="checkbox"/>	SSD 2	KINGSTON SE50S3480G (S...)	SSD	SATA	447.13 GB	Good

RAID Type: RAID 1

Hot Spare Disk: None

Selected Disk: 2

Estimated Capacity: 437.63 GB

Cancel Back Next

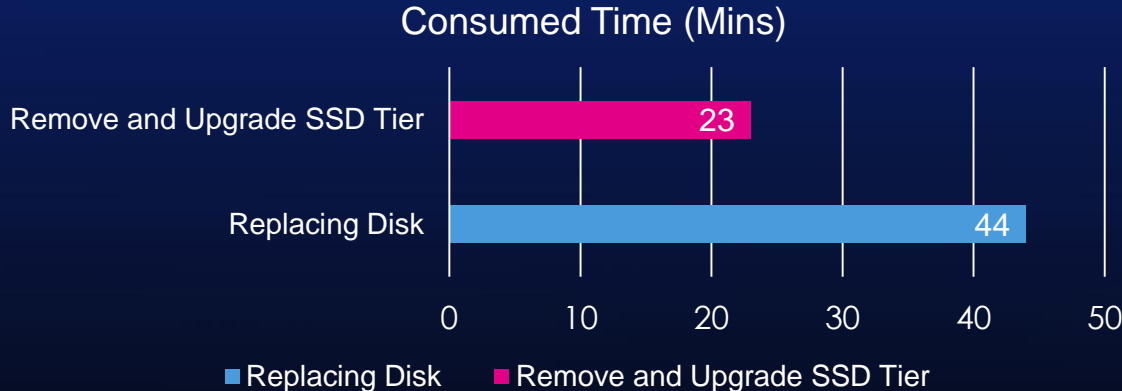
# Re-create Qtier SSD Tier



In QNAP Lab, 4 250 GB SSD need to be replaced with 500 GB SSD. The operation is conducted with both Replacing Disk & Remove SSD Tier



The time for removing and re-creating the SSD tier is almost 2 times faster than replacing disk.



Using TVS-1282T with 4 enterprise HDD for testing.

# QNAP

## SUMMARY

- More Scenarios
- Function Summary

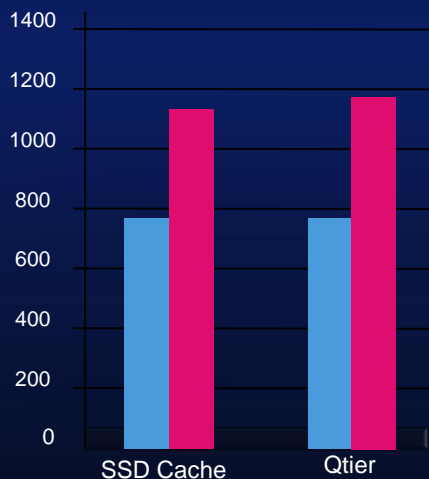


# MORE SCENARIOS



The best SSD configuration may only be measurable once it is configured. The SSD Cache and Qtier have different advantages.

Sequential R/W (MB/s)



Random R/W (IOPS)



## SSD Cache

Real Time Performance Boost

1. For accessing with burst IO such as file syncing and video editing.
2. Can be changed to Read or Write only with bypass block size.

## Qtier 2.0

Fully use SSD Capacity

1. For boosting IO with fixed pattern such as mail server.
2. With IO Aware Qtier can also support database operations.

# MORE SCENARIO



With Qtier remove SSD tier functions, the IT manager can freely switch between the SSD Cache and Qtier to adapt to the best configuration.

Scenarios	File Server	Web Server	Video Editing	Virtualization Storage	Backup	Database
SSD Usage	Read-write Cache	Qtier	Read-write Cache	Qtier	Write-only Cache	Qtier
RAID Type	RAID 10	RAID 10	RAID 5	RAID 10	RAID 5	RAID 10
SSD OP	10%	20%	20%	20%	10%	30%

# SUMMARY



## Upgrade SSD capacity or types in an instant

- SSD price is continuously falling, but performance is still increased with the new interface such as PCIe, M.2 and U.2.
- QNAP Qtier Pool support remove SSD tier, can replace SSD or change RAID type instantly.
- Data can be migrated to HDD tier automatically to prevent data loss.
- Afterward SSD can be re-added through using upgrading or migrating wizard.

# QNAP

# QNAP NAS

is your best choose in  
creating hybrid storage



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