

QNAP

QM2

Expansion Card

feat. **Qtier**



SSD caching & auto-tiering
volume to boost NAS
performance



QNAP

QM2 *series*

feat. **Qtier**

01

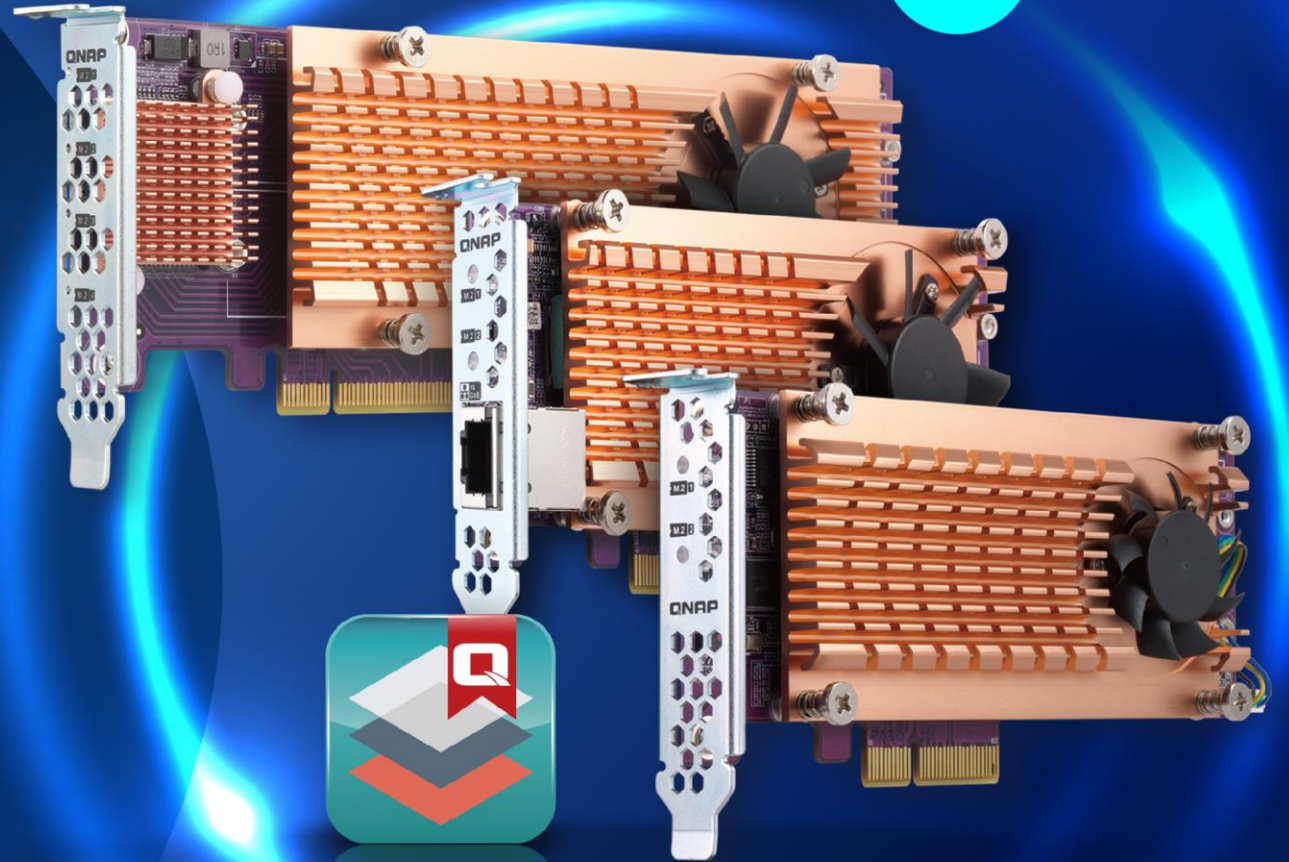
M.2 SSD + 10GbE
revealed

02

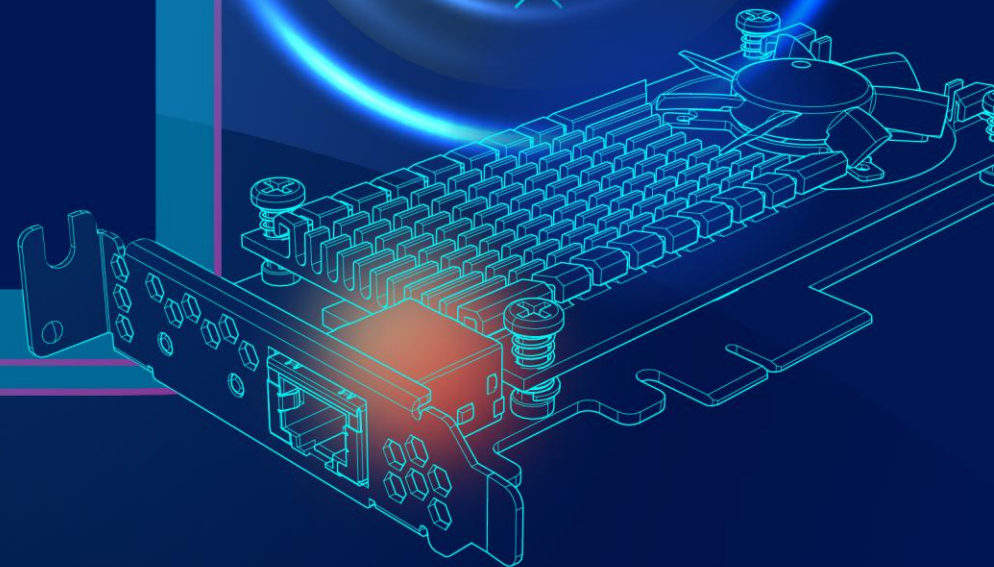
NAS/PC supported,
experience super speed
NVMe SSD

03

QTS 4.4.1 fully utilize
SSD's performance



M.2 SSD + 10GbE cache card **Revealed**



Select the QM2 card you need



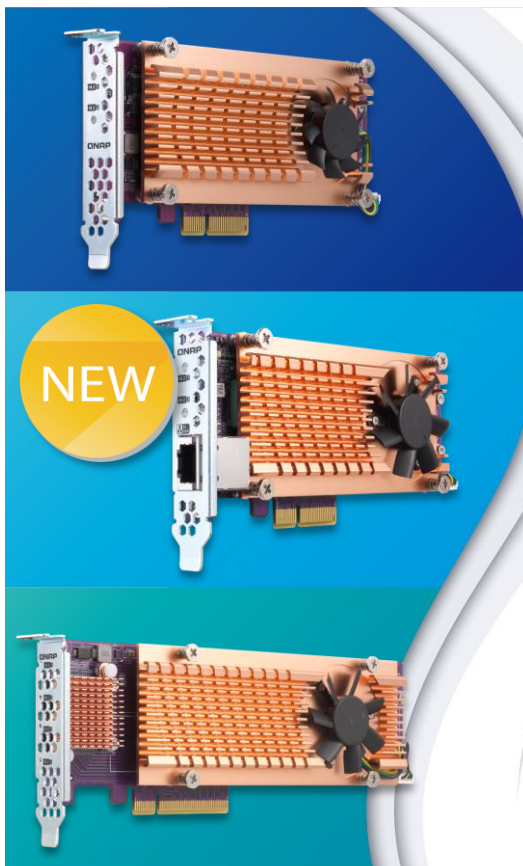
M.2 SATA

M.2 PCIe Gen 2

M.2 PCIe Gen 3

Support
10GBASE-T
port

Expand four
M.2 ports



QM2-2S-220A

QM2-2P-244A

QM2-2P-344
QM2-2P-384

QM2-2S10G1TA

QM2-2P10G1TA

QM2-4S-240

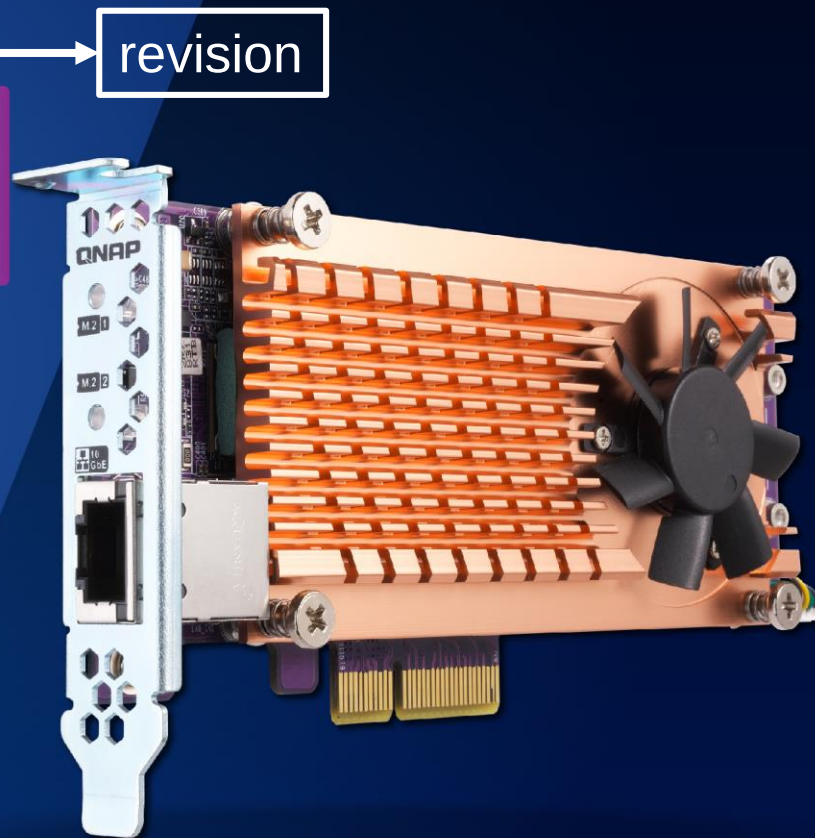
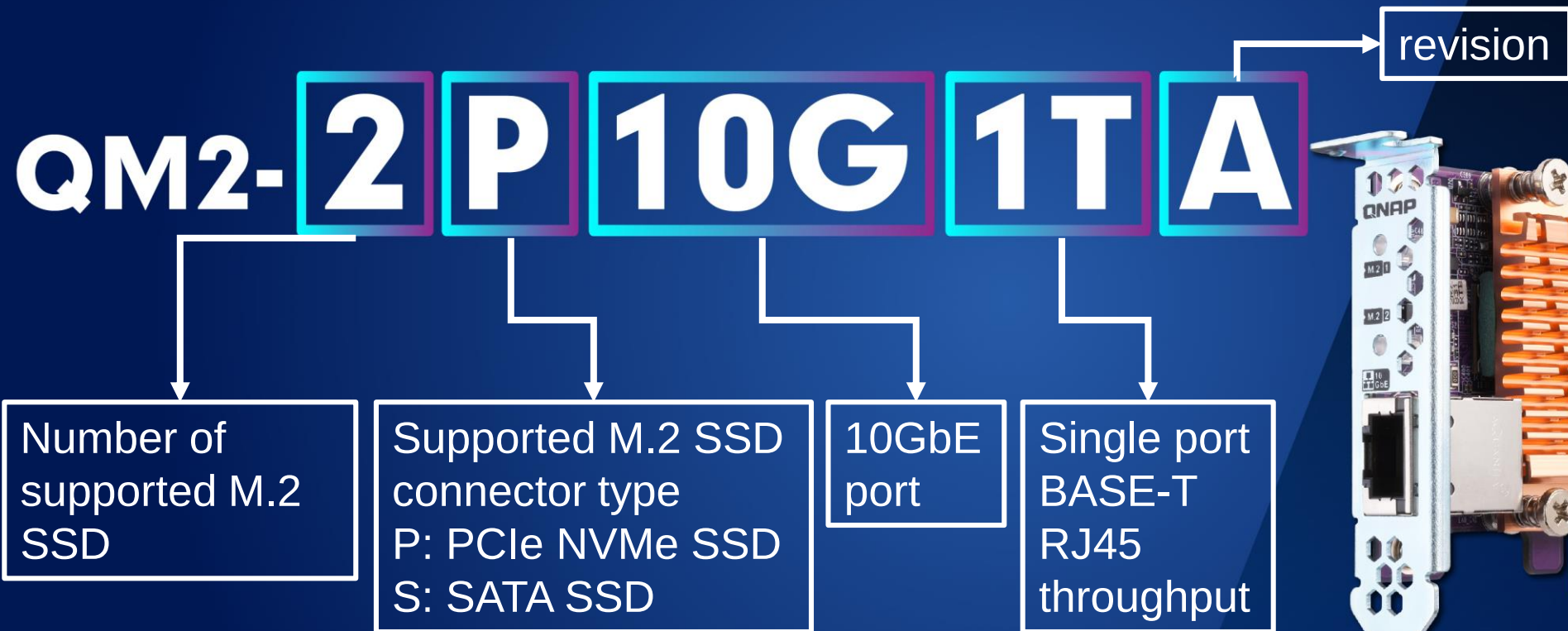
QM2-4P-284

QM2-4P-342
QM2-4P-384

Clear naming rule – featured 10GbE

QNAP M.2 PCIe cache/10GbE card

M.2 SSD + 10GbE



Clear naming rule - M.2 cache only

QNAP M.2 PCIe cache card

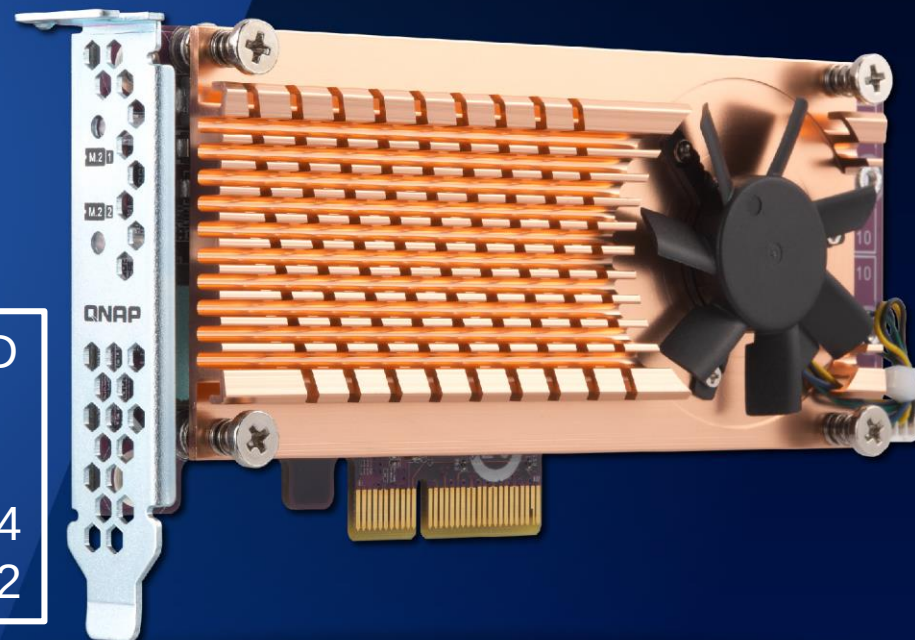
QM2-**2****P****34****4**

Number of supported M.2 SSD
2: 2 x SSD
4: 4 x SSD

Supported M.2 SSD connector type
P: PCIe NVMe SSD
S: SATA SSD

PCIe interface
34= Gen3 x4
28= Gen2 x8

NVMe SSD slot bandwidth
4= Gen3 x4
2= Gen3 x2

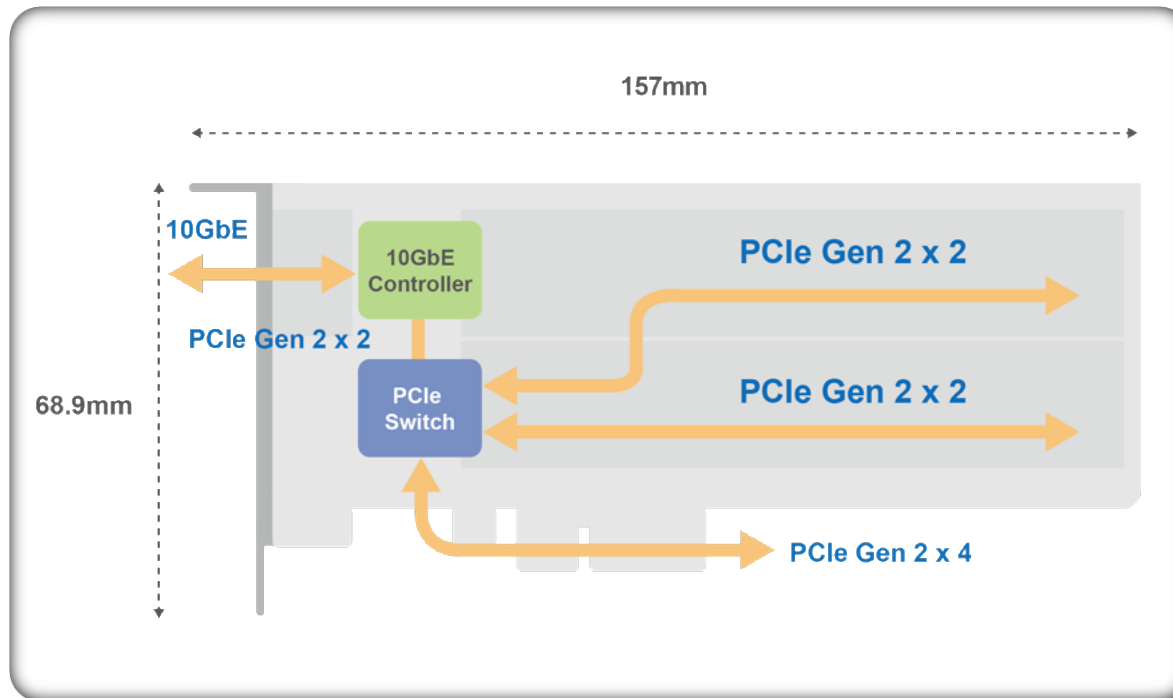


SSD cache and 10GbE in one card



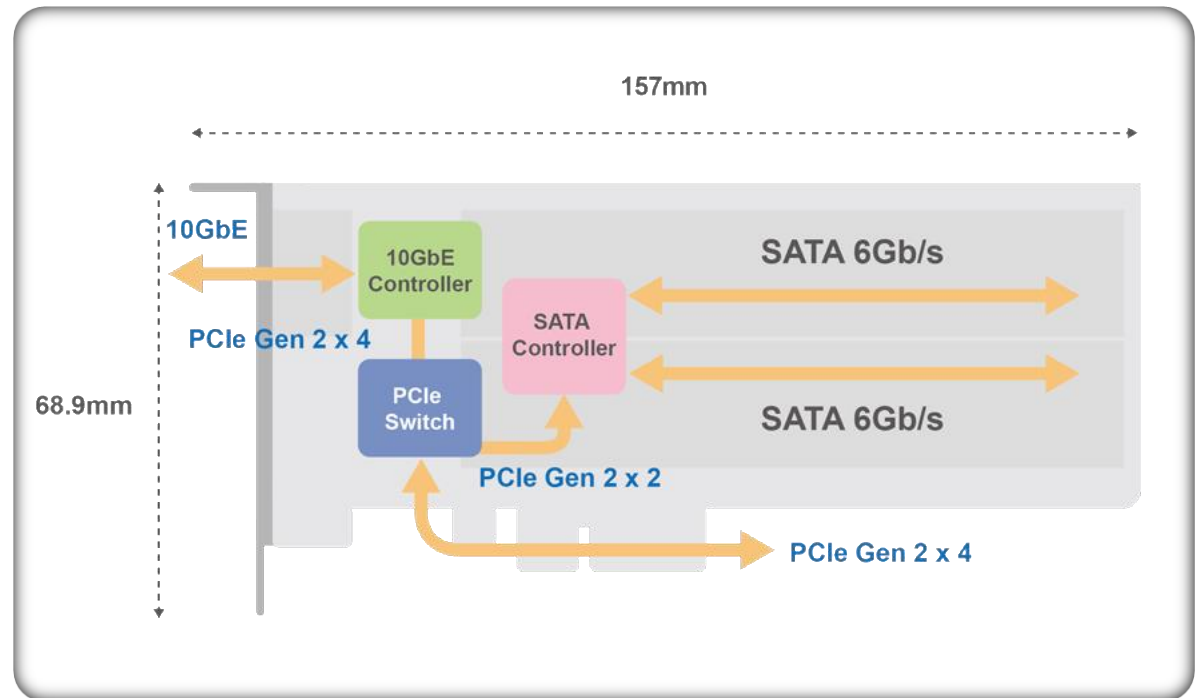
QM2-2P10G1TA

Supports maximum 2 x PCIe NVMe SSD (M-key), provides Gen2 x2 on each slot



QM2-2S10G1TA

Supports maximum 2 x SATA M.2 SSD, provides 6Gb/s on each slot



Expand cache capacity or 10GbE redundant



TS-1283XU



Expand cache capacity by installing QM2 in idle PCIe slots



TVS-672XT



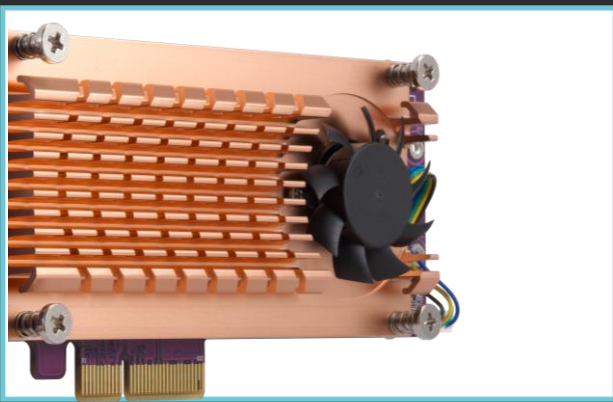
Provide redundant 10GbE for fail-over



3rd party operating system support

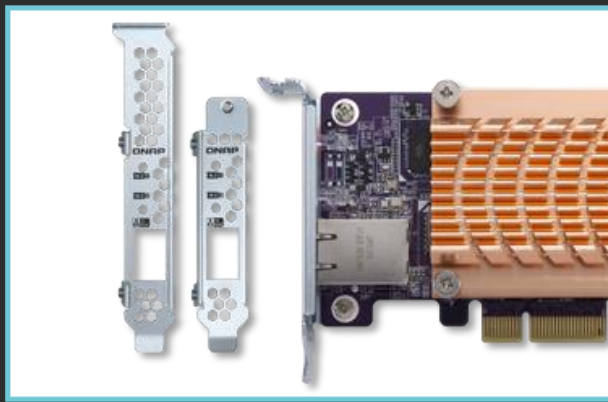


Active cooling module



Self-monitored with thermal sensors to control the speed of smart fan modules.

Compliant with PCIe standards



Low-profile PCIe add-on cards, bundled with full-height bracket.

AQC-107S



Linux & Windows
Dual platform supported



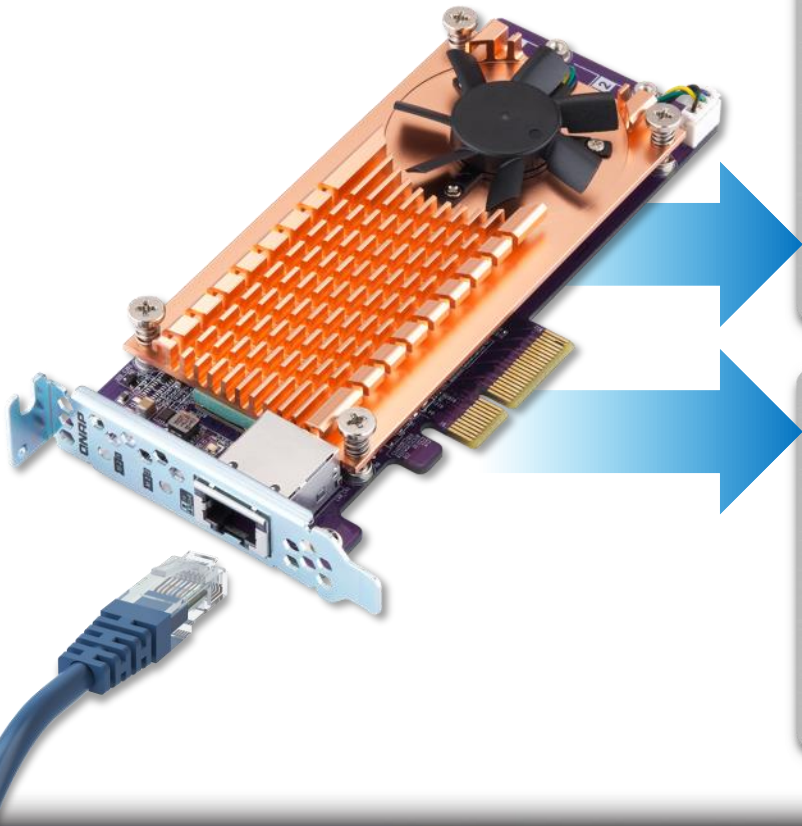
QNAP NAS don't need to install Driver, Windows/Linux platforms please visit QNAP website to download the driver

Note: M.2 SSD compatibility and function supported depends on the hardware design and platform. Please check with your motherboard manufacturer for details.

Multi-Gigabit supported



Support Multi-Gigabit **NBASE-T** standard.



QSW-1208-8C



Provides 12 ports of 10Gbps transfer

QSW-804-4C



Provides 8 ports of 10Gbps transfer

	CAT 5e	CAT 6	CAT 6A & CAT 7
100 M	✓	✓	✓
1G	✓	✓	✓
2.5G	✓	✓	✓
5G	✓	✓	✓
10G	✗	✓ (55M)	✓

Efficient cooling dissipation

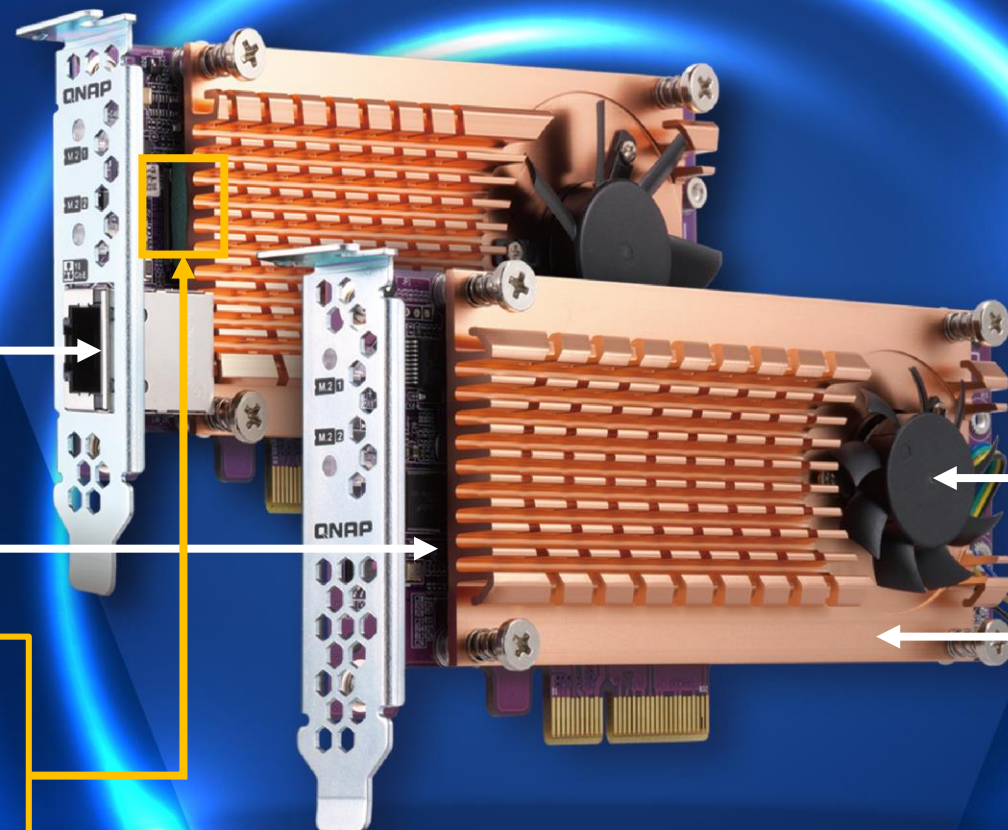
QM2 *series*

10GbE
10GBASE-T port

M.2 slots



M.2 thermal pad is
bundled, provides
more efficient heat
transfer



Active cooling fan

Fin array heatsink

QNAP

QM2-2P10G1TA performance up

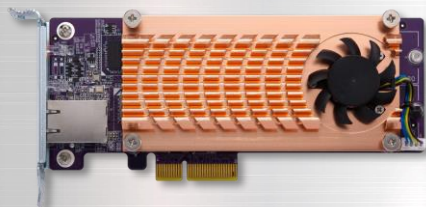


QM2-2P10G1TA

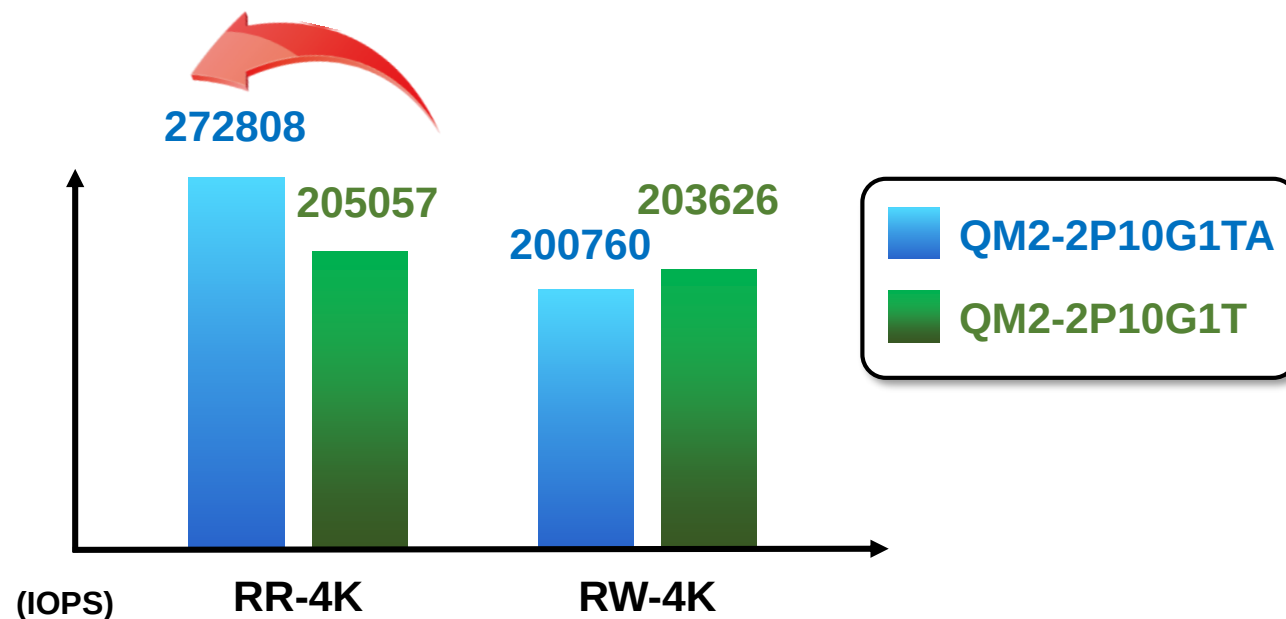


VS

QM2-2P10G1T

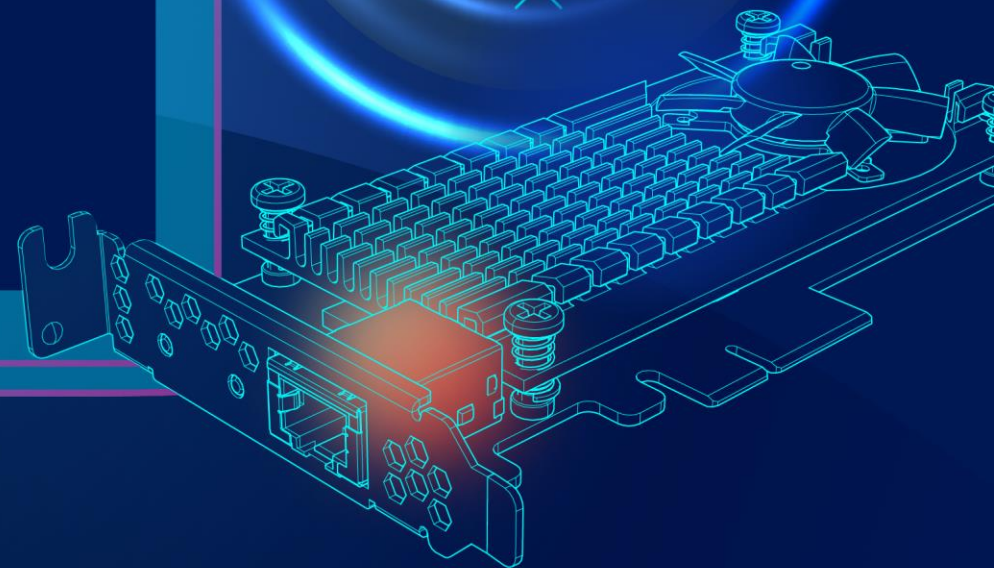


Random read enhanced nearly 25%



Iometer on PC, tested in QNAP Lab,
PC Environment
1. CPU: Intel (R) Core(TM) i7-6700 CPU@ 3.40GHz.
2. OS: Windows 10.
3. Memory: 64 GB.
4. SSD: Samsung SSD 860 EVO 1TB M.2 SATA *2, Software-RAID 1.

NAS/PC supported,
experience super speed
NVMe SSD



Ideal choice to boost performance: M.2 PCIe NVMe SSDs



You don't need to change motherboards or HW configurations, just simply install the QM2-2P10G1TA on your PC's Gen2 x4 slot then you can enjoy the high speed of NVMe SSD

M.2 PCIe NVMe SSDs have more than 2Xa
performance enhancement

Interfaces	Theoretical Speed
M.2 SATA III	6Gb/s
M.2 PCIe Gen 3 x2	16G/s
M.2 PCIe Gen 2 x4	20Gb/s
M.2 PCIe Gen 3 x4	★ Mainstream 32Gb/s

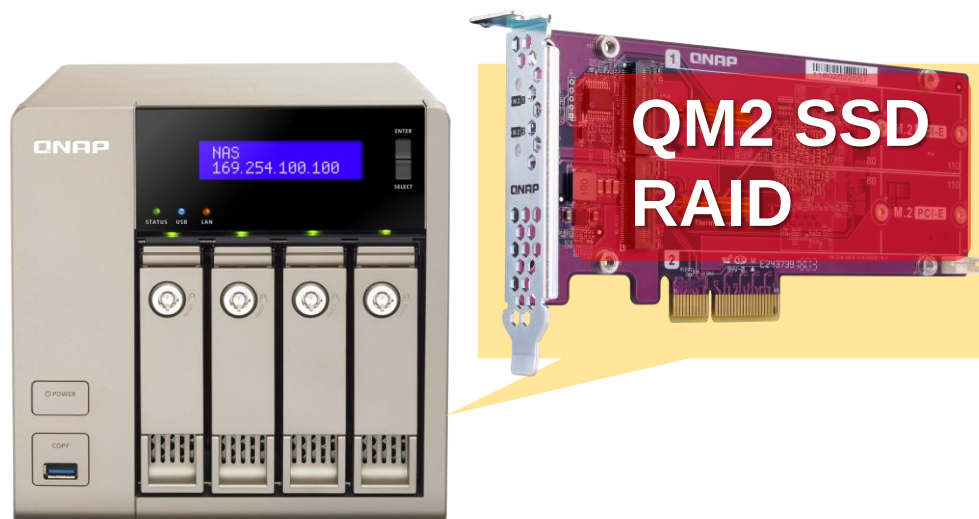


Leave the 3.5" slots for huge capacity HDDs



Without changing existing configurations

Freely upgrade a normal pool to a **Qtier pool** without starting over



NAS



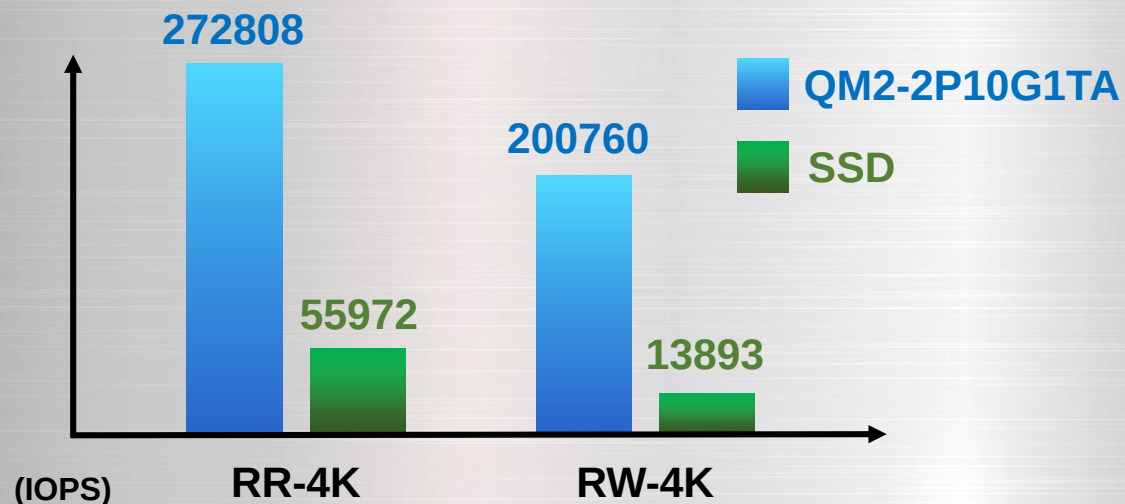
PC

High performance NVMe in PC



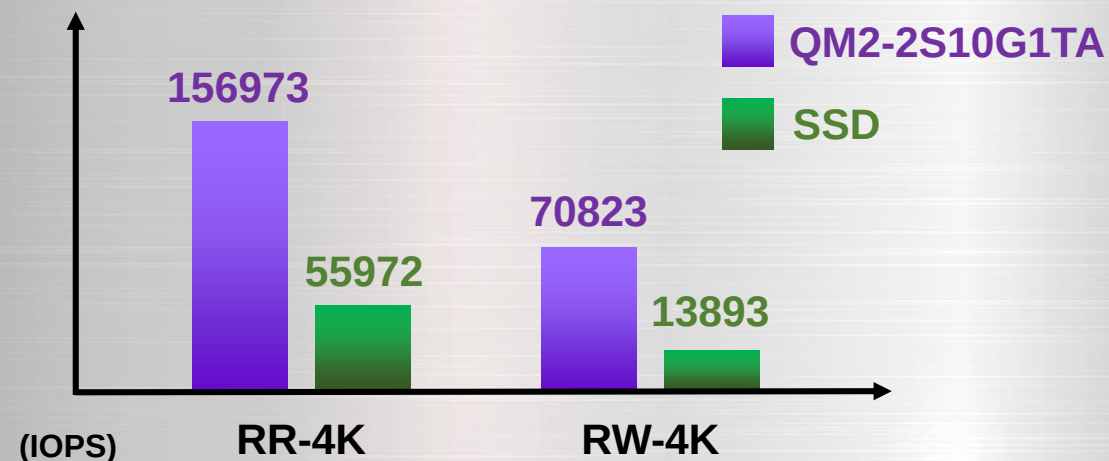
Upgrade your PC to NVMe!

QM2-2P10G1TA



PC Environment
1. CPU: Intel (R) Core(TM) i7-6700 CPU@ 3.40GHz.
2. OS: Windows 10.
3. Memory: 64 GB.

QM2-2S10G1TA

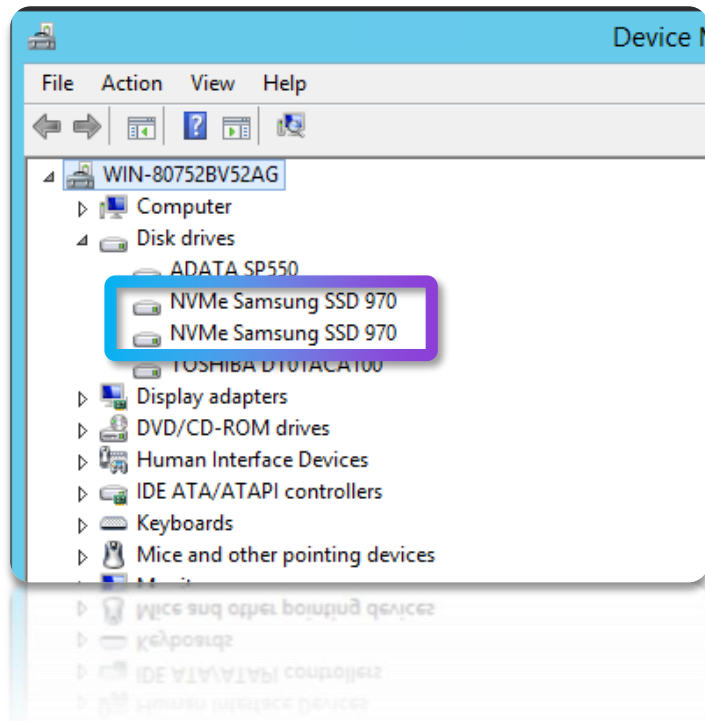


4. PC SSD: ADATA Prod_SP550 120GB
5. QM2 SSD: Samsung SSD 970 EVO 256GB M.2 NVMe *2, RAID1;
Samsung SSD 860 EVO 1TB M.2 SATA *2, Software-RAID 1.

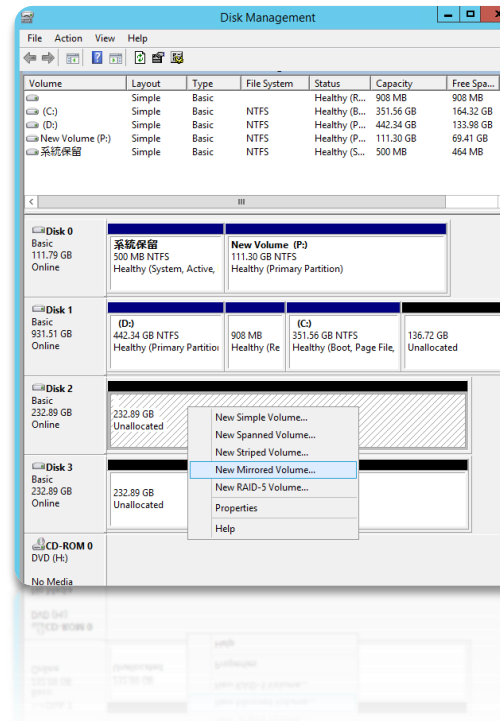
QM2 series on Windows PC



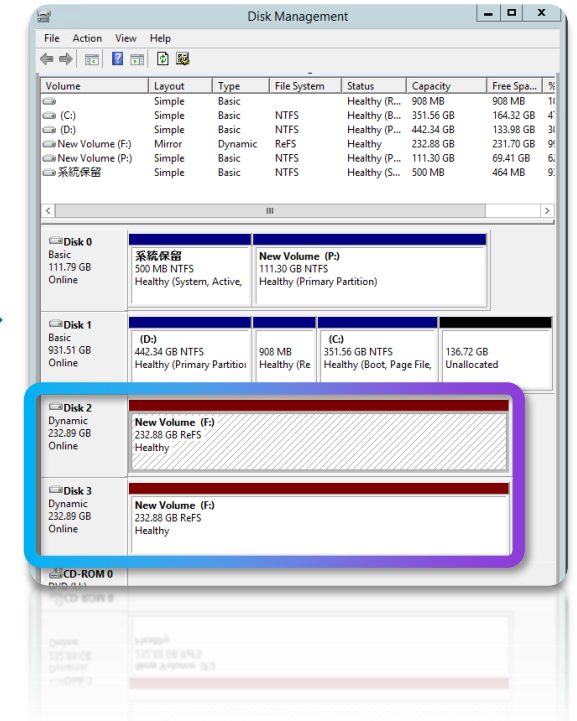
Catch the NVMe SSD information from device manager



Disk partition



Set RAID1 protection



QTS Supports M.2 SSD Cache Acceleration

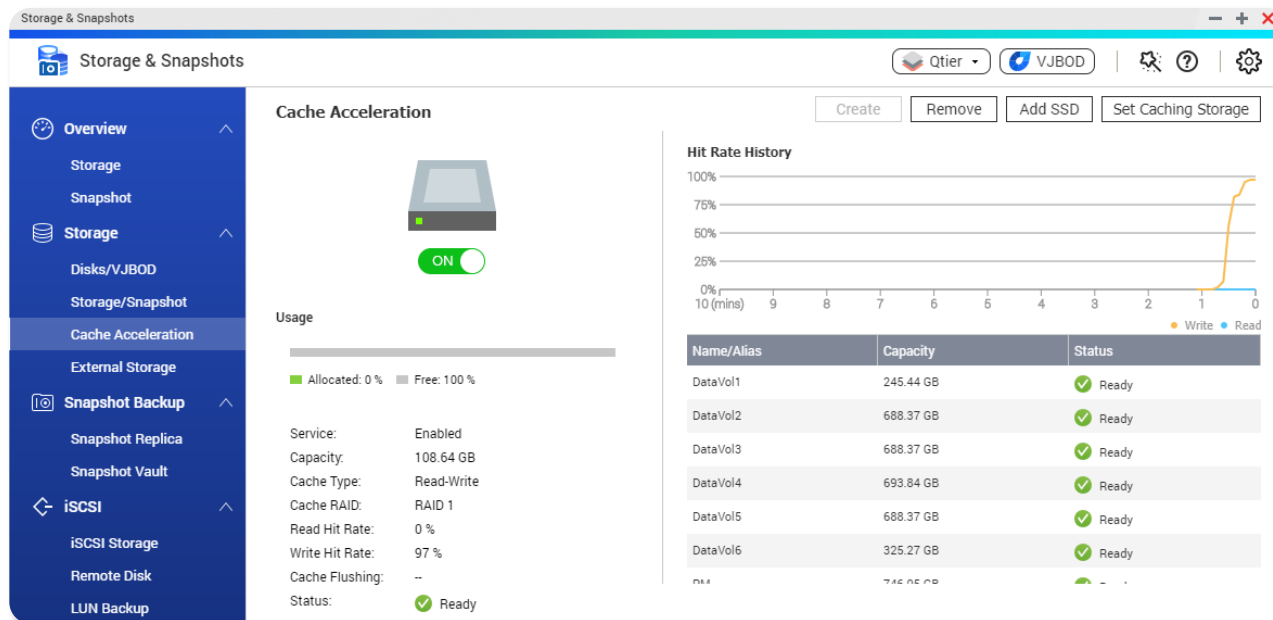
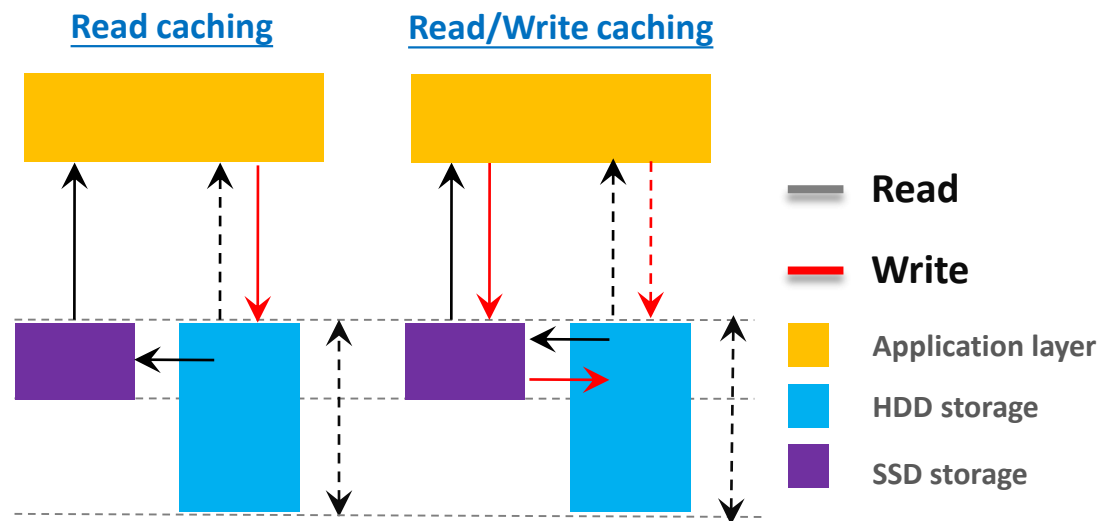


Reduce I/O latency

Global read-write cache

Accelerates IOPS performance

Applies SSD cache to all volumes and LUNs with a single setup process, or specified volumes only



Expand high-speed M.2 SSD tier with Qtier



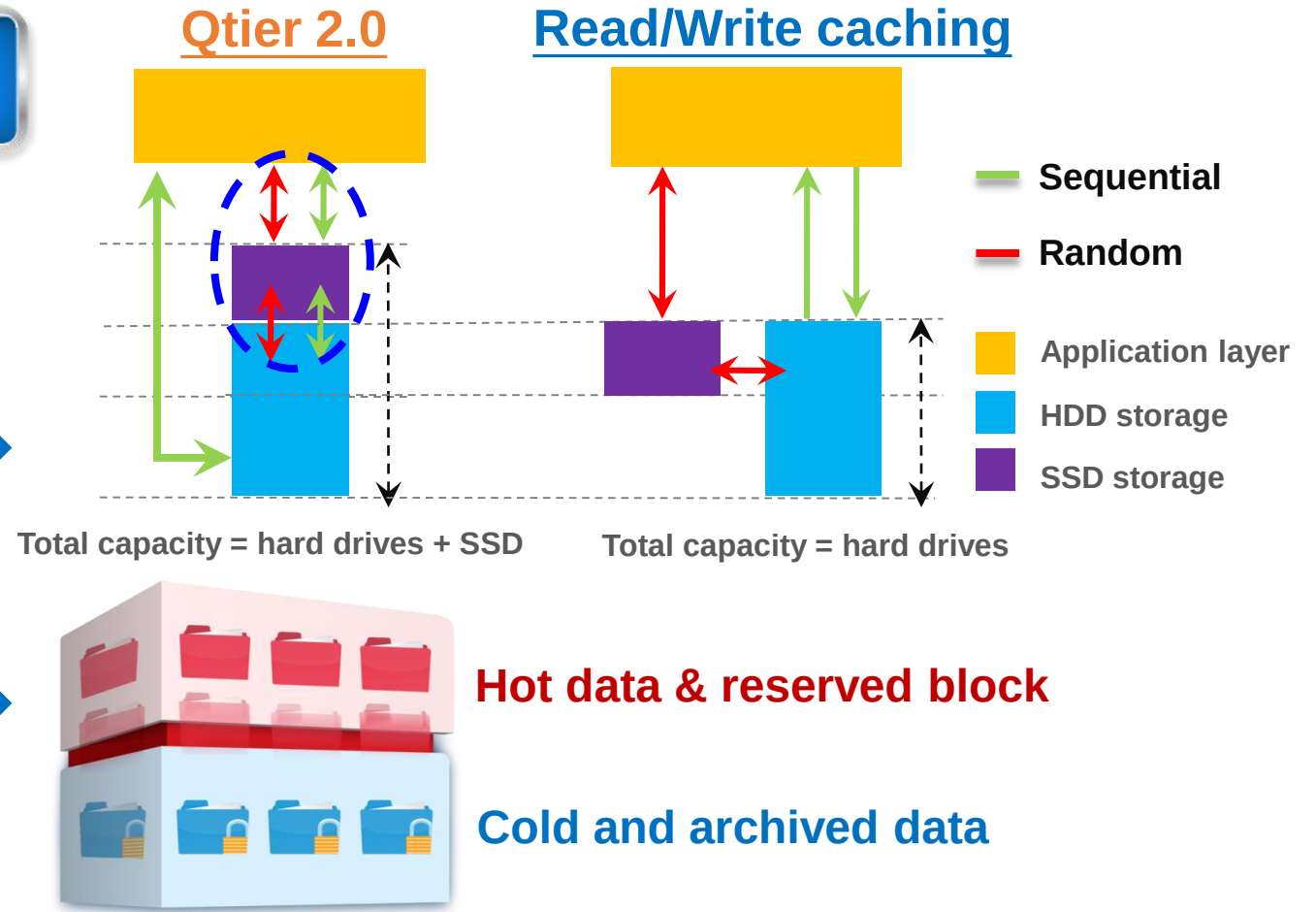
Storage space and SSD caching

Keep flexibility to accelerate performance of key data and increase cost/performance ratio



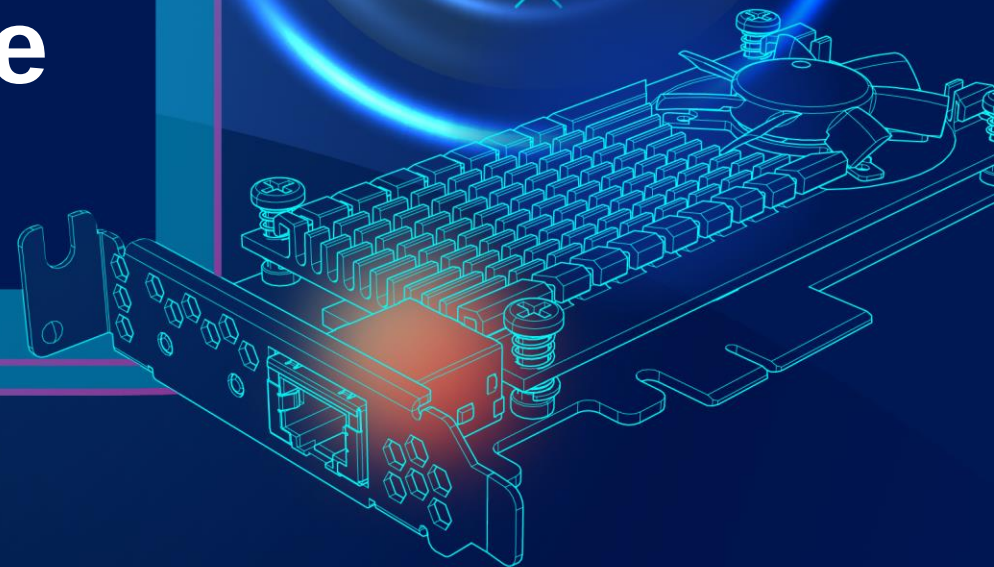
I/O aware

Tiering on



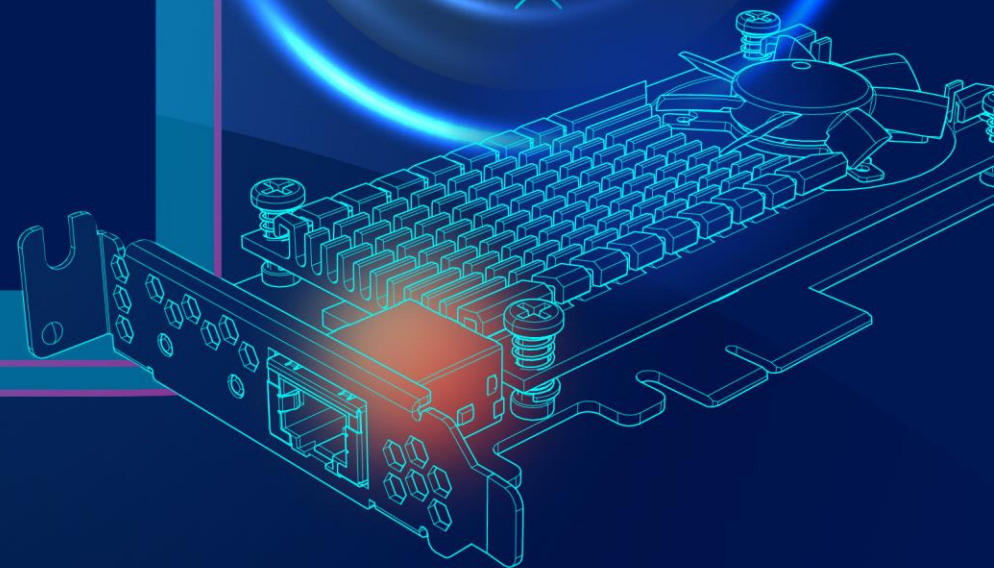
Live Demo

Install QM2 on PC
to enhance performance



QTS 4.4.1

Fully utilize SSD's performance



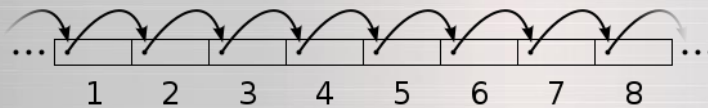
SSD Evolution Trend



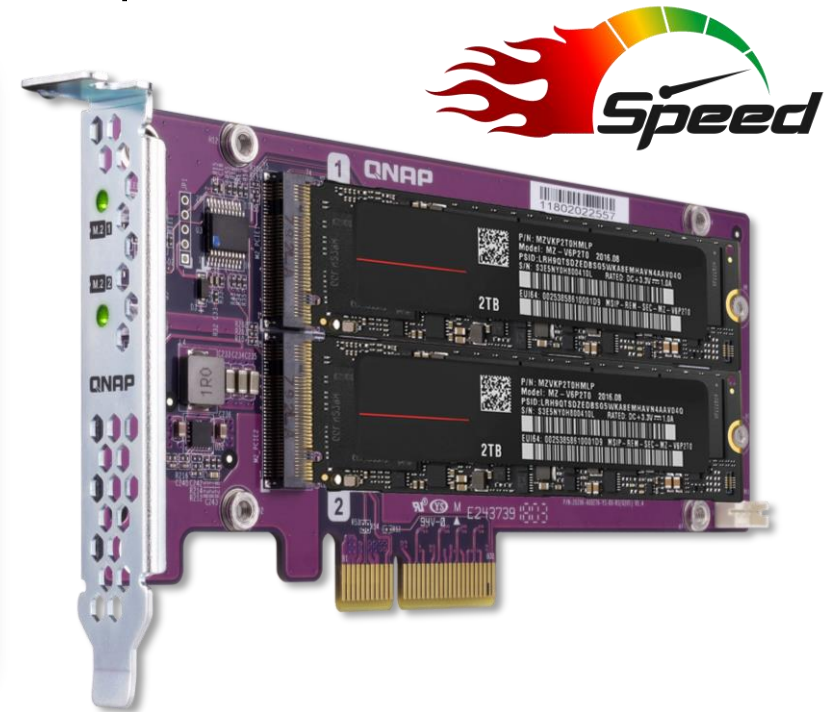
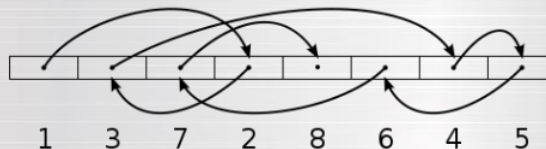
QNAP QM2 in QNAP NAS is ideal on sharing data, applications and virtualized server applications for multi users. Install the QM2 on the NAS which has no other HDD slots available then combine with the 10GbE port and QTS 4.4.1's remove and re-create Qtier solution, keep improving the random access speed (IOPS) to experience dramatic performance improvements.

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

Sequential access



Random access



One Global Cache with Three Modes



QNAP SSD Cache can be applied to all volumes and LUNs once set with 3 modes:

Read-Only → Copy frequently used data to SSD

Read-Write → Not only copy data, new data can also be temporarily stored in SSD

Write-Only → Only new data will be written into the cache

How Read-write Cache work:

Data from clients and storage will be cached at the block-level in real time



The Write-only Cache Increase ROI of SSD Cache with high Writing Demand

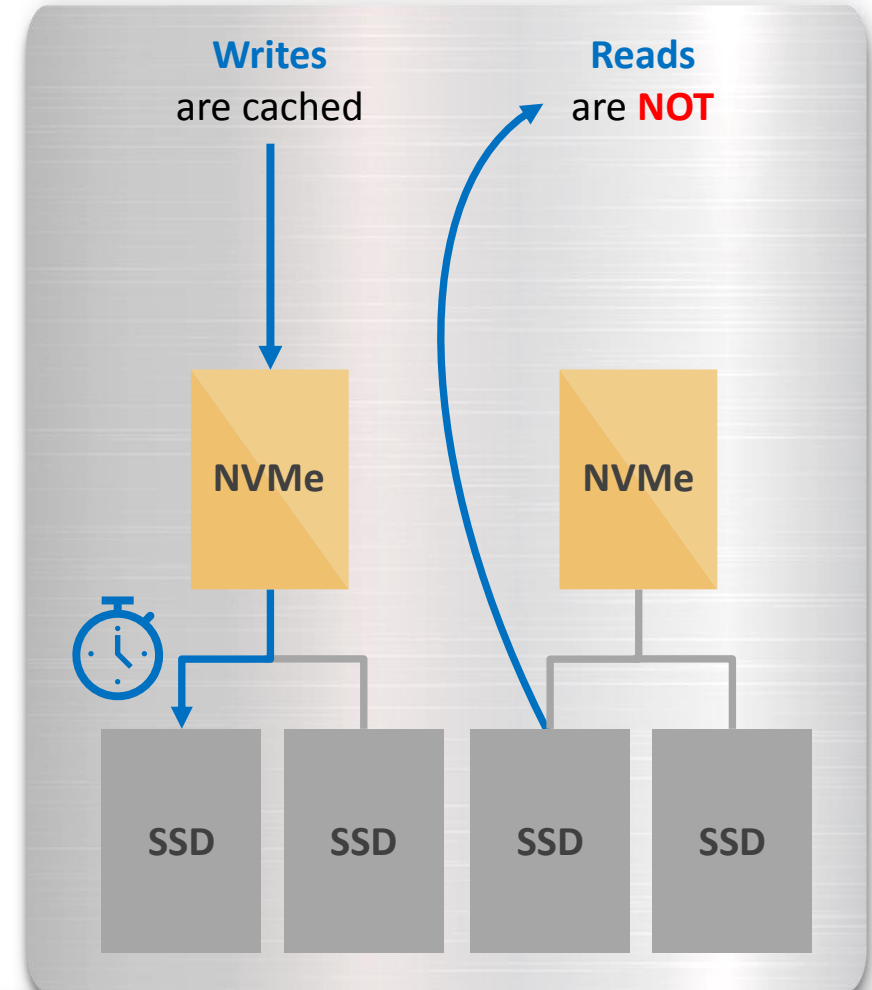


- Write-only cache is promoted by Microsoft for endurance control.
- QNAP believes that Write-only Cache can increase the ROI of SSD in below scenario:

1. File Server focusing on write operations
2. Database with more write operation (Such as IoT monitoring server)
3. Use high endurance SSD (Intel Optane™)

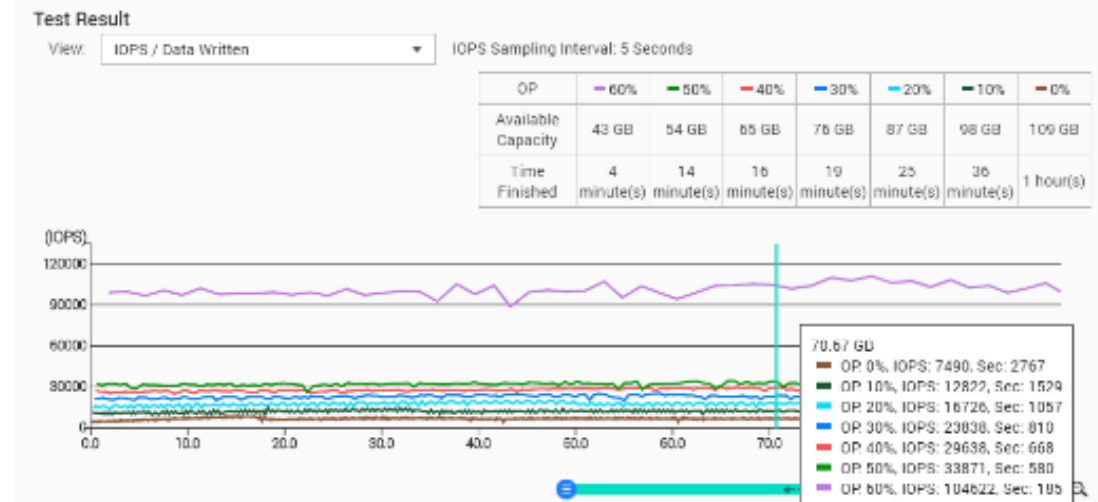
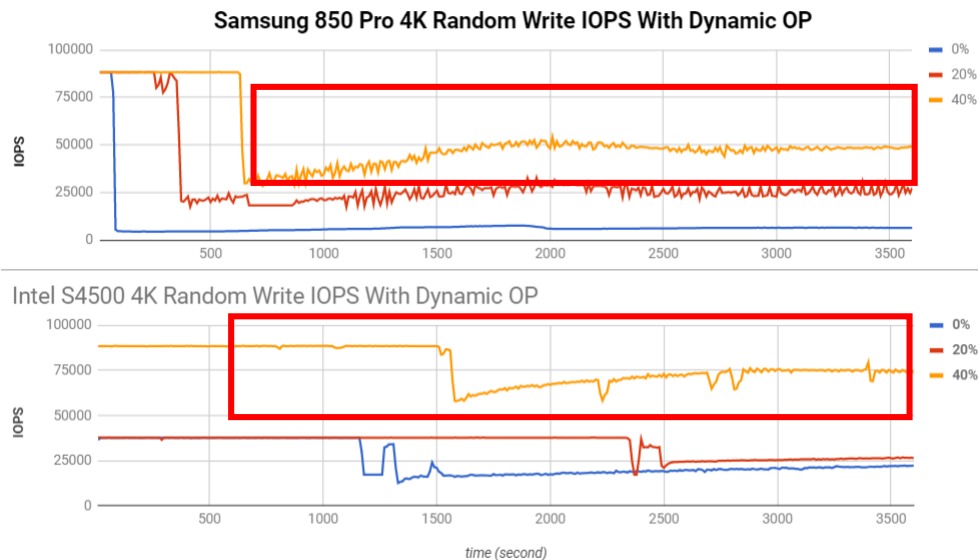


Reference: <https://docs.microsoft.com/en-us/windows-server/storage/storage-spaces/understand-the-cache>



The Advantage of Software-defined Over-provisioning >>>

- SSD vendor will reserve 7% or more SSD space for internal operation usage.
- QNAP allow user to test and increase the over-provisioning ratio from the software to increase that consist performance and endurance of SSD.



Reference: <http://www.atpinc.com/technology/ssd-over-provisioning-benefits-configure>

FIO used with parameters: --direct=0 --bs= 4k(random)1M(sequential), --io depth=1(random) 32(sequential), --file size= 90G

Alternative for Cache: Qtier Tiering Storage



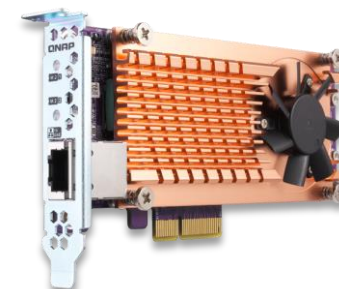
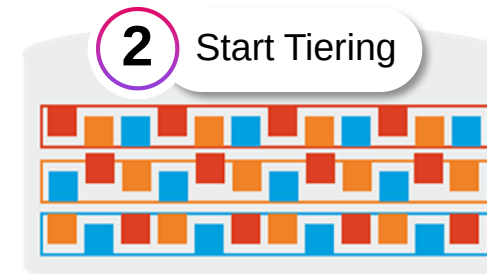
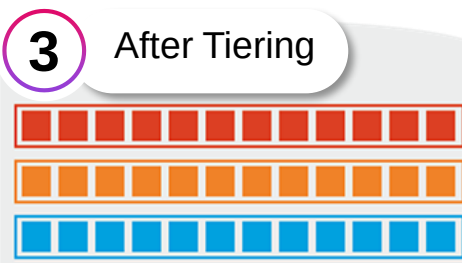
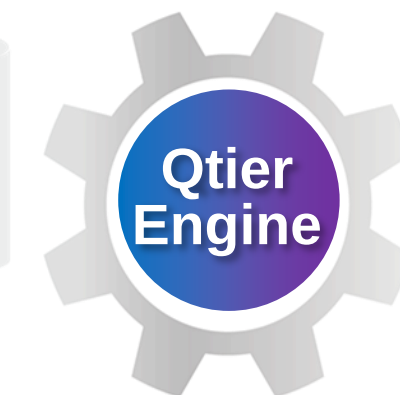
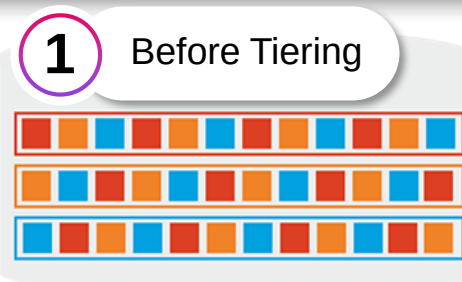
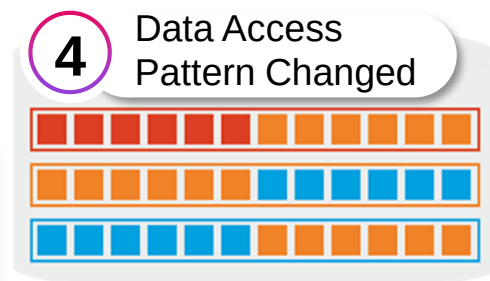
QNAP allows the combination of SSD and HDD RAID into the same pool and migrate data automatically based on accessing pattern.

Support SATA, SAS, M.2, QM2 and U.2 SSD with QNAP Over-provisioning.

Provide higher capacity as SSD can be used to store data

On QTS, PCIe NVMe SSD can only work as SSD Cache currently.

- Hot Data
- Warm Data
- Cold Data

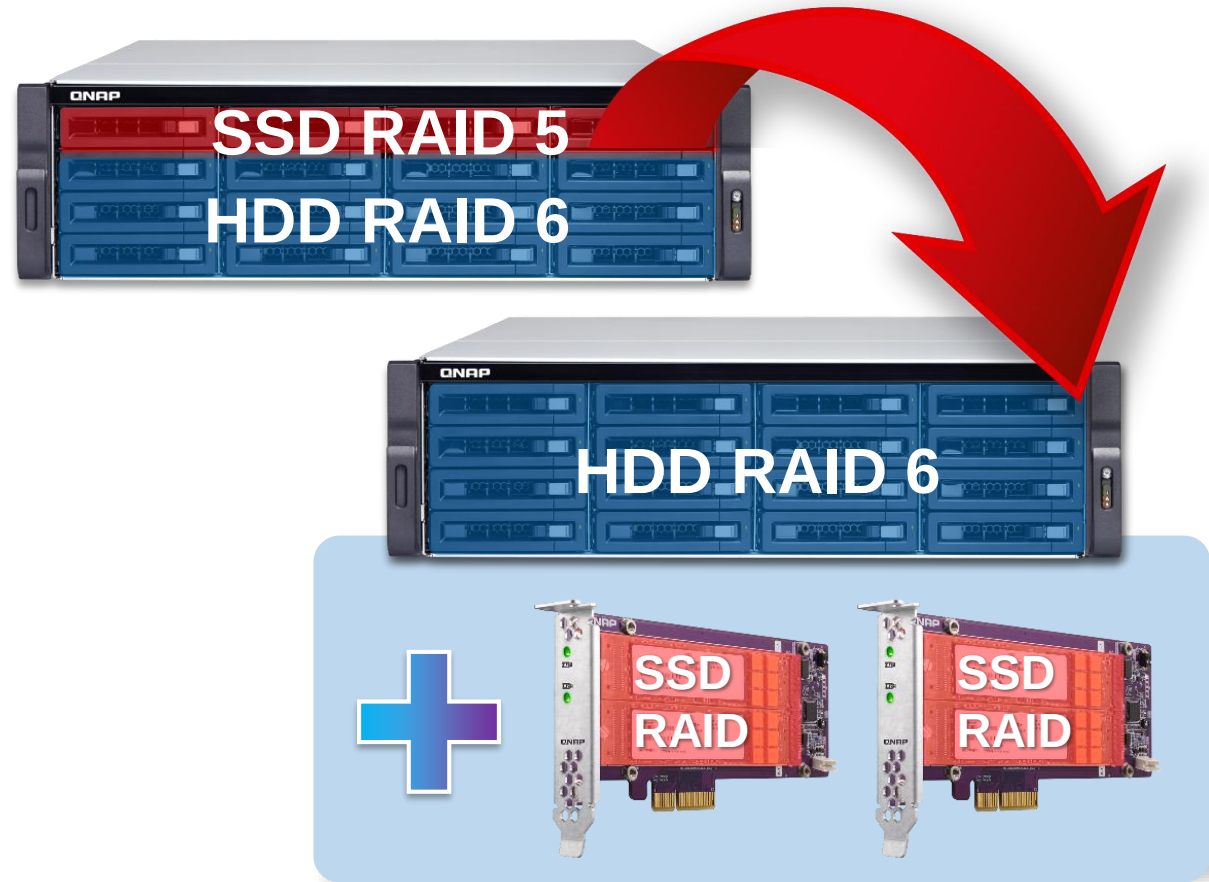


Challenge: Changing SSD Tier Interface



Challenge

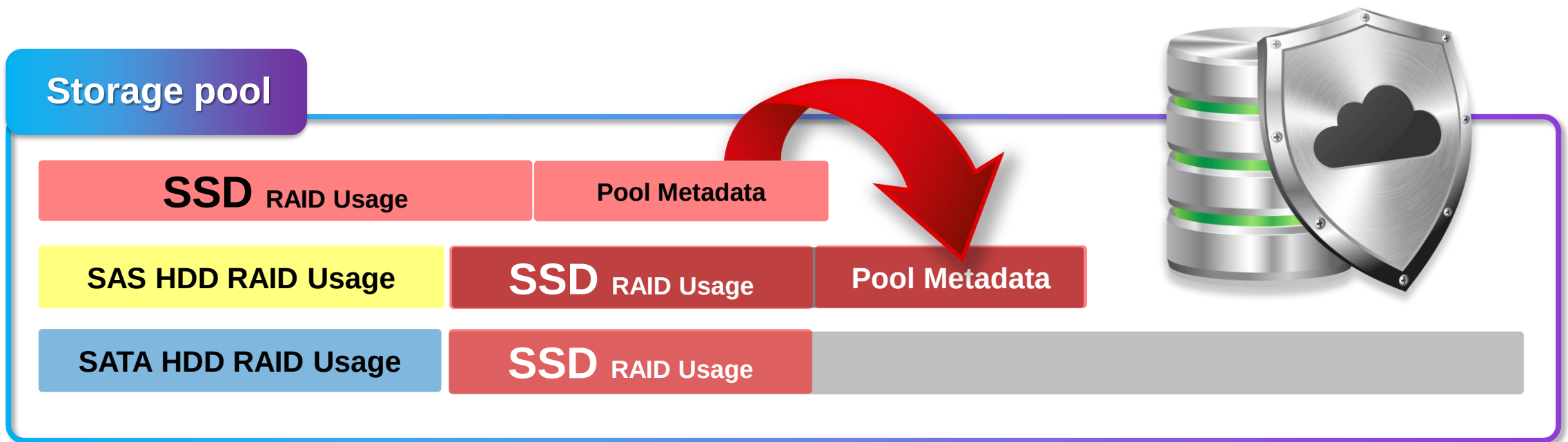
While SSD Tier is already created with SATA Disk, how can I replace it with QM2 to expand the NAS while improving the SSD Tier performance?



QTS 4.4.1 Support Remove Qtier SSD Tier



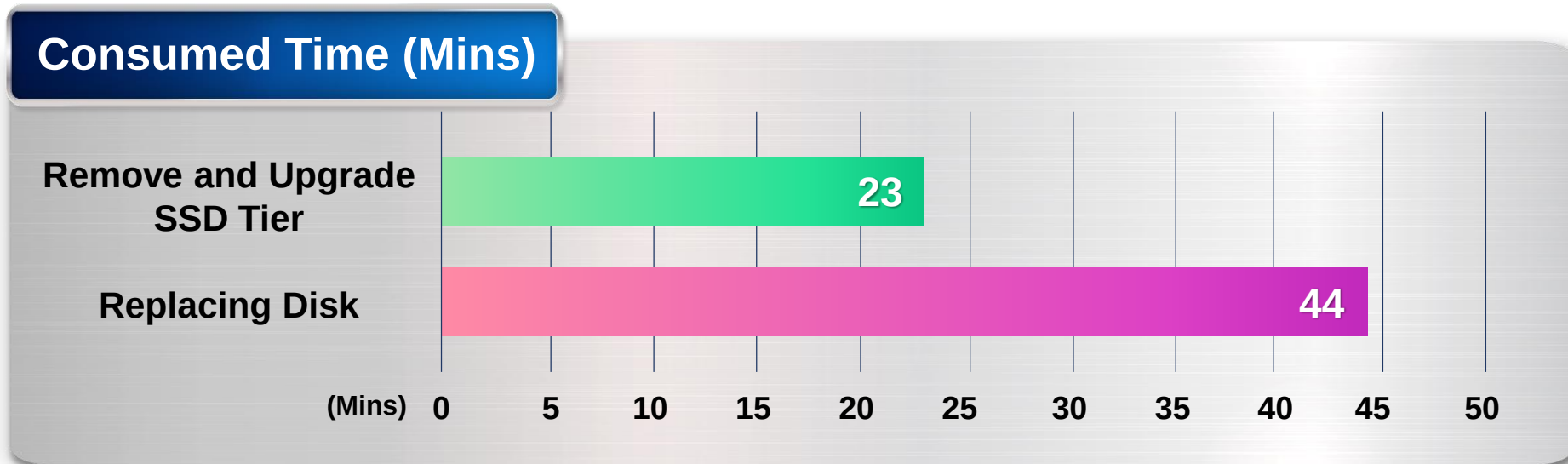
- QNAP QTS 4.4.1 supports remove Qtier SSD Tier, the users can remove then re-create SSD tier as required.
- When removing the SSD tier, all the storage pool data will be retained as data on SSD only to be moved to HDD.



Test of recreating 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. The replacing disk method also does not support changing SSD on different interface.

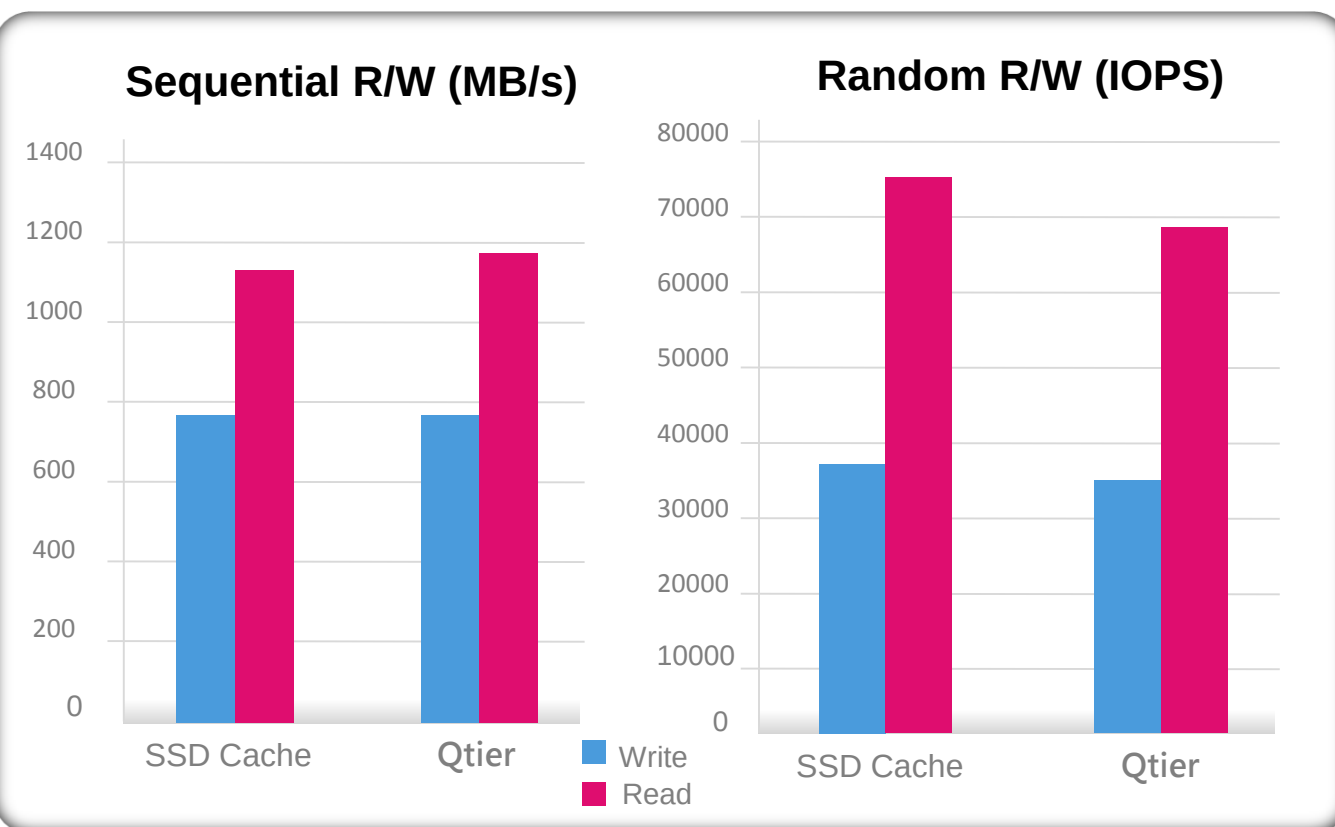


* Using TVS-1282T with 4 enterprise HDD for testing.

Choose Between SSD Cache & Qtier



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



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

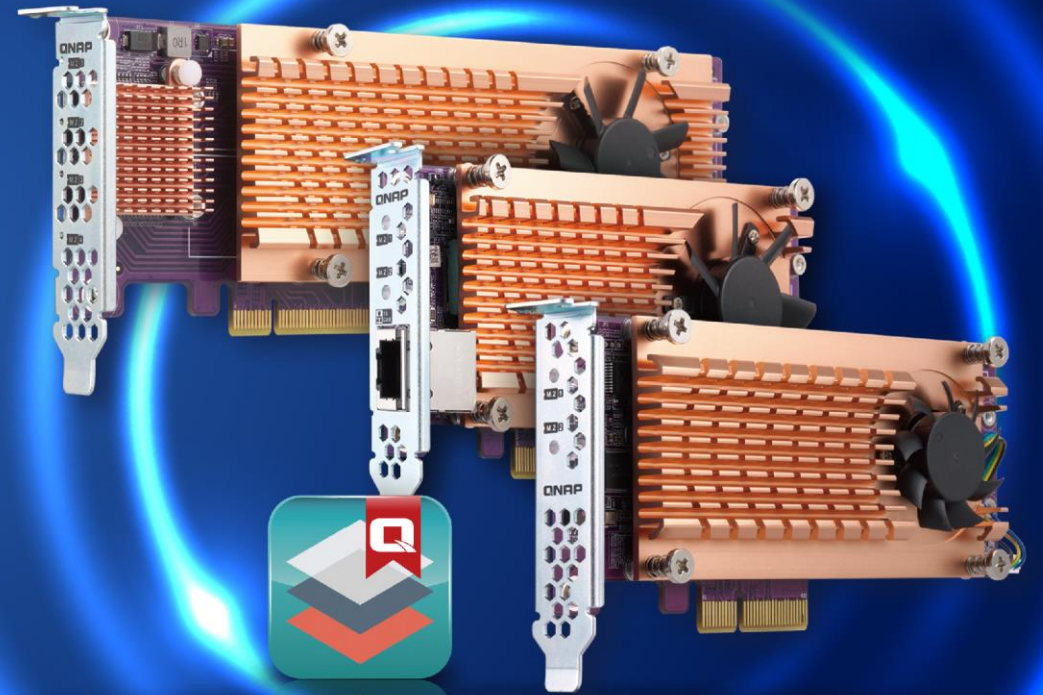
1. For boosting IO with fixed pattern such as mail or database server.
2. With IO Aware Qtier can also support database operations.

* TVS-871T-i7-16G with QM2 card and ADATA 512GB SSD cache and Qtier SX8000NP

QM2 Highlight points with QTS

QTS 4.4.1 fully utilize SSD's performance

- Improve random access performance when the NAS has no idle HDD slots and 10GbE ports
- Improve NAS performance by using read only, read-write and write-only 3 type of caches for the whole NAS storage space via QM2
- Software-defined Over-provisioning increase Performance and endurance of SSD
- QTS Qtier improves both performance and capacity, in QTS 4.4.1 · users can easily change the SSD to QM2 in the SSD Tier.
- 4.4.1 Beta will be released at End of May!



QNAP

QM2

Expansion Card

feat. **Qtier** Your Best Choice!

