

**QNAP**

# TS-251B

Powered by an Intel® dual-core processor,  
supporting PCIe expandability



**HDMI**<sup>TM</sup>  
HIGH-DEFINITION MULTIMEDIA INTERFACE



# Affordable dual-core multimedia NAS w/ PCIe



Dual-core **J3355**  
Apollo Lake SoC

2.0GHz  
Base

2.5GHz  
Max burst



## Dual-channel RAM

Up to DDR3L-1866

2 x **SODIMM** slots, up to **8 GB** total (4+4)



## TS-251B-2G

2 GB RAM (1 x **2 GB**)

## TS-251B-4G

4 GB RAM (1 x **4 GB**)

# TS-251B

# QNAP

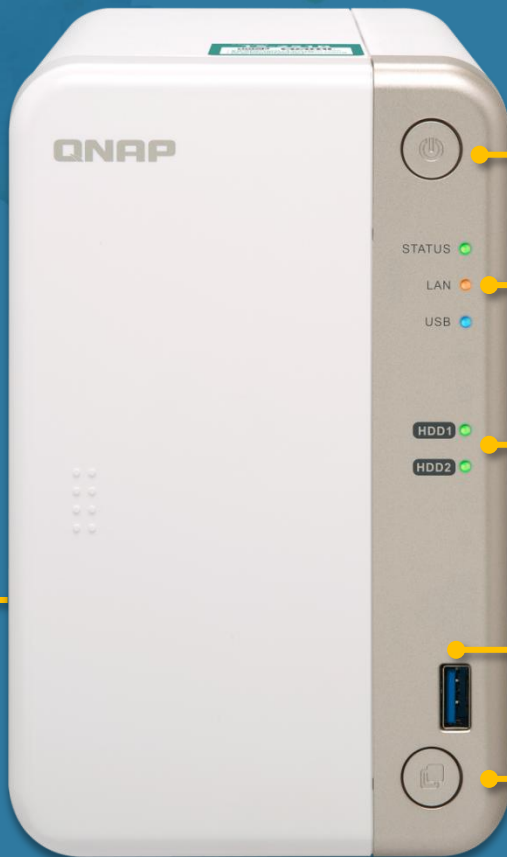


# TS-251B front view

2 x 3.5"/2.5"  
SATA 6Gb/s  
HDD/SSD



Lockable  
magnetic  
front cover



Power button

LEDs:  
STATUS, LAN, USB

LEDs:  
Drive 1, Drive 2

1 x USB 3.0 port

Copy button



# TS-251B rear view

2 x 3.5mm microphone input

1 x 3.5mm audio line out

1 x 4K HDMI v1.4b 30Hz

1 x USB 3.0

3 x USB 2.0

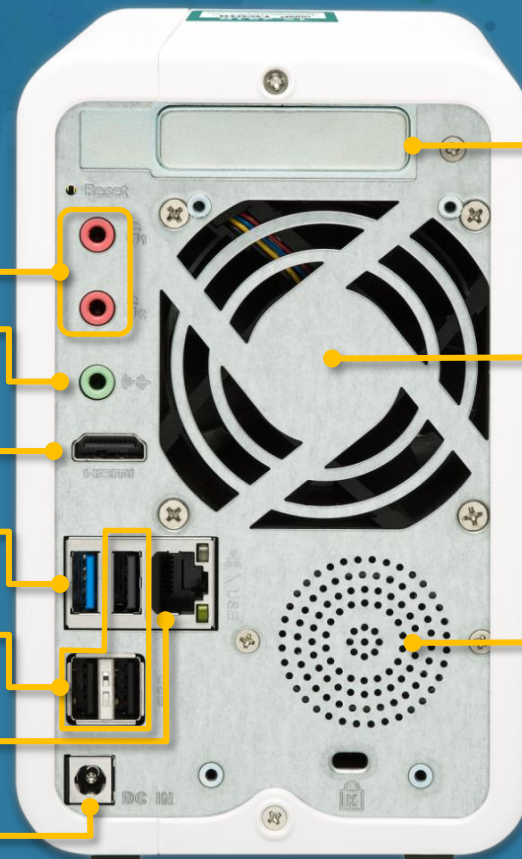
1 x RJ45 GbE LAN

DC 12V power input

1 x PCIe 2.0 (x2) slot

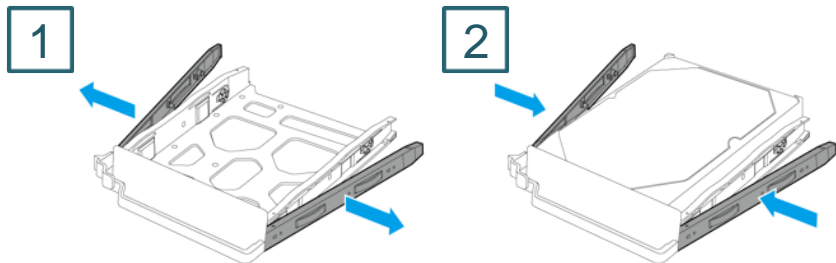
1 x 7cm smart fan

1 x speaker

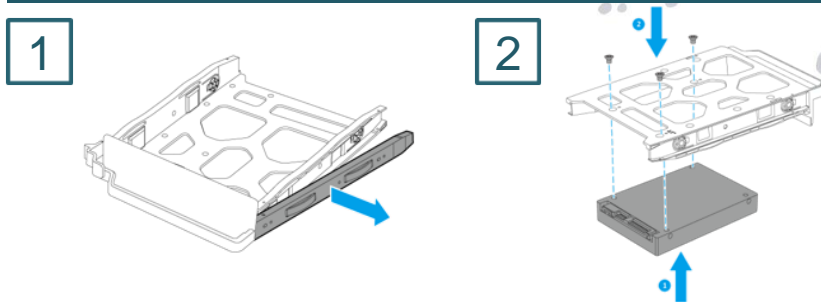


# Easy to get started

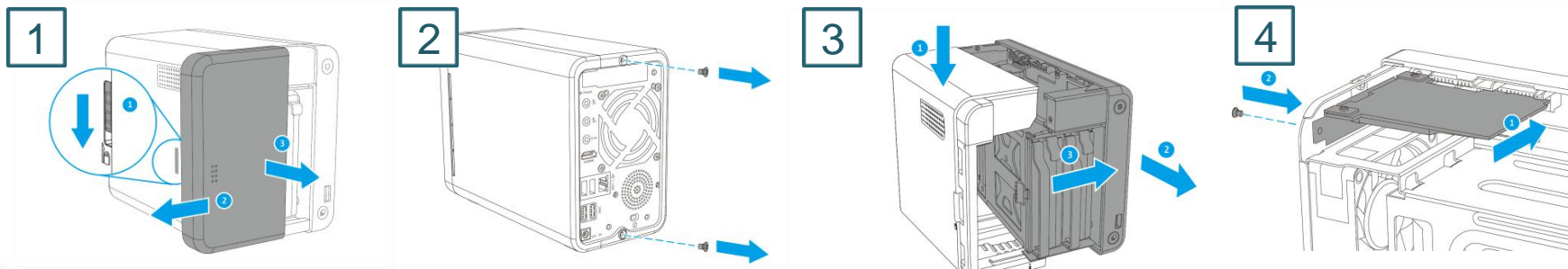
## 3.5-inch HDD : tool-less installation



## 2.5-inch HDD/SSD : screw installation



## Install a PCIe card by removing a few screws and the cover



# Full multimedia experience over competitors

**HDMI™**  
HIGH-DEFINITION MULTIMEDIA INTERFACE

4K HDMI v1.4b 30Hz output



Integrated speaker for  
system events and music



Up to 2-ch 4K real-time  
transcoding



Use Cinema28 for multi-room  
streaming



Optional RM-IR004 remote

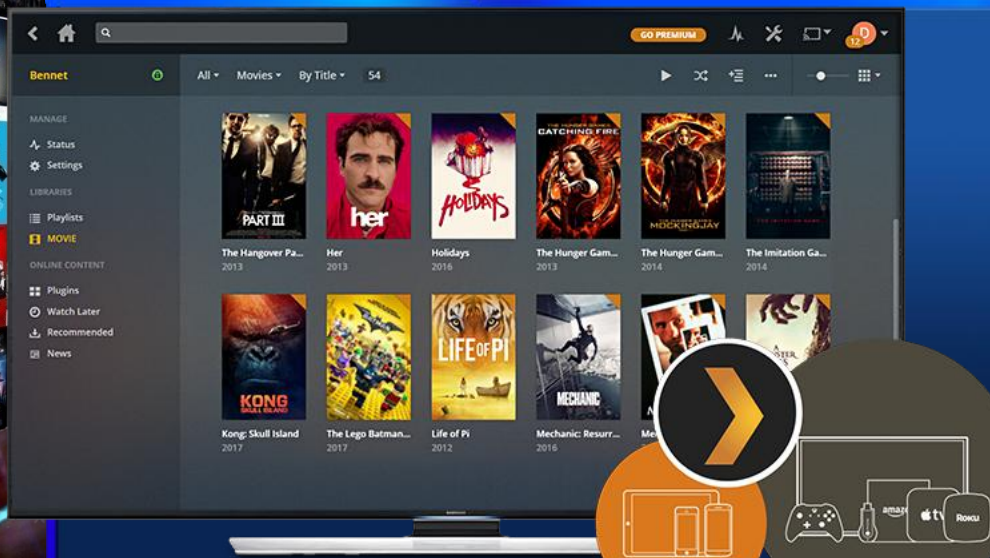


# 2-channel 4K video real-time transcoding

Integrates Intel® HD Graphics 500 graphics processor, up to 700 MHz, providing up to **2** channels of video playback and transcoding for smooth playback on versatile client devices.



**Integrates Intel® HD Graphics 500 graphics processor, up to 700 MHz, providing up to 2 channels of video playback and transcoding for smooth playback on versatile client devices.**

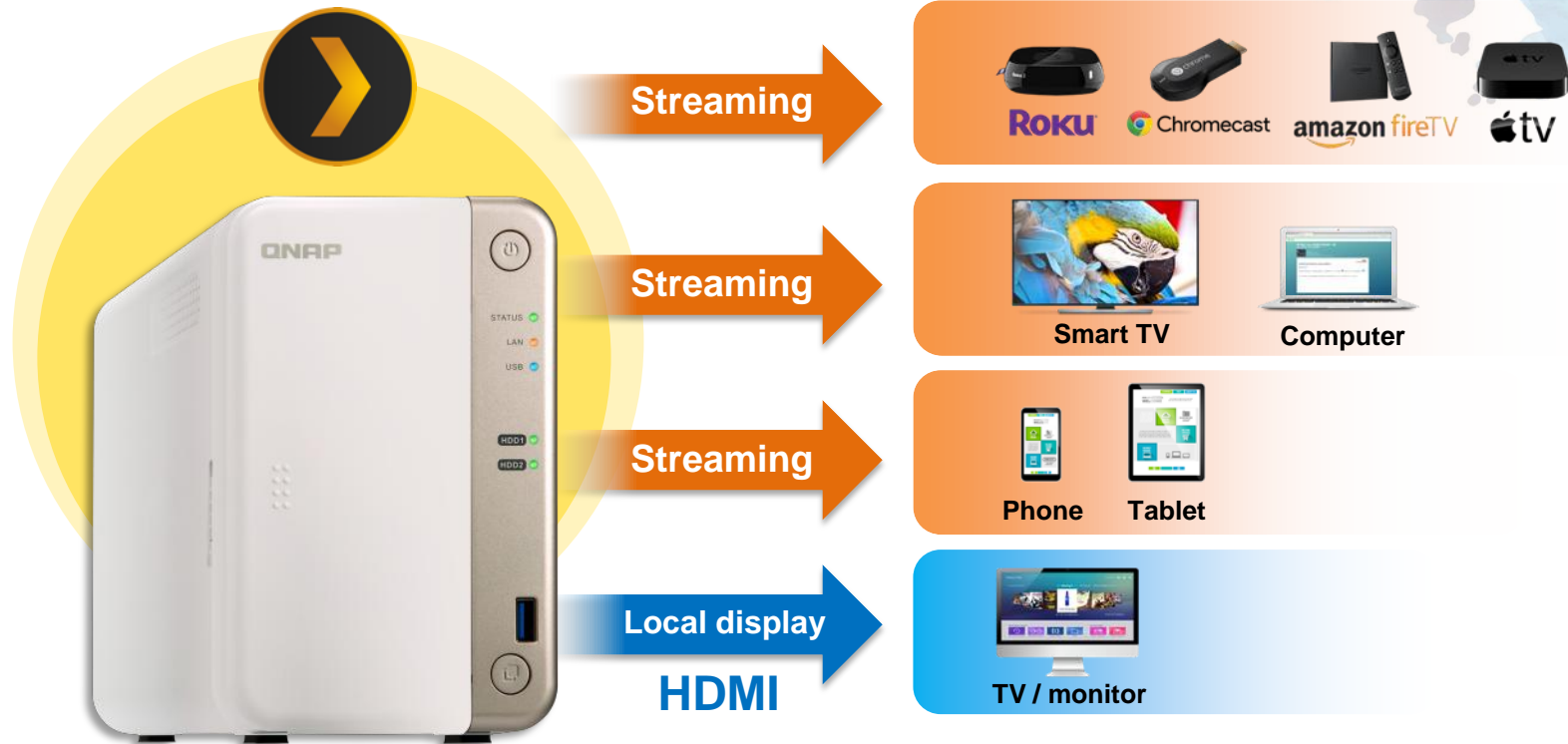


# Plex Media Server





# Play content via network or HDMI



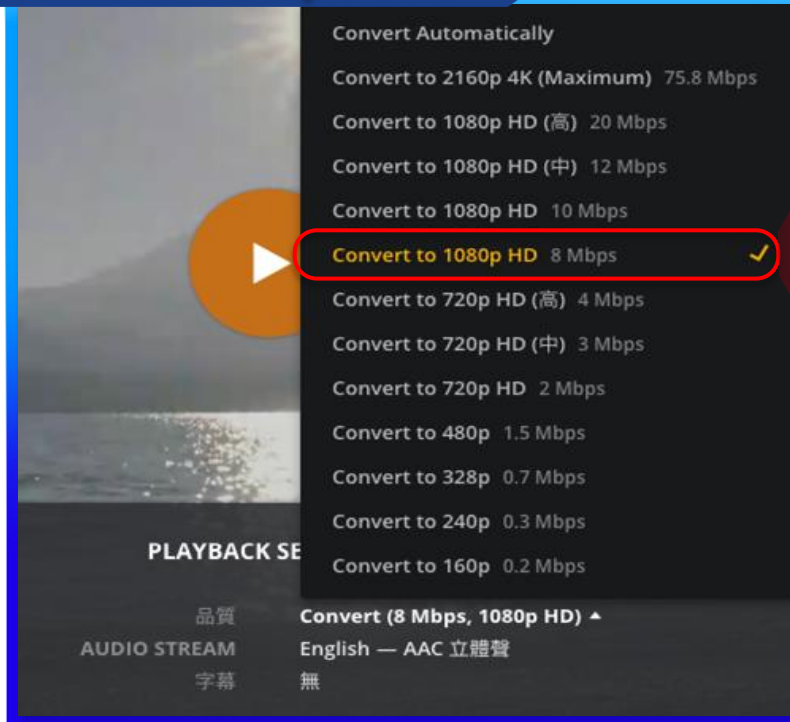
# Get more with Plex Pass

Feature	Free	Plex Pass
Supports most media formats	✓	✓
Support various devices, such as Apple TV	✓	✓
Library Organization	✓	✓
Sharing	✓	✓
Trailers and Extras	✗	✓
Hardware Acceleration	✗	✓

For details, please visit: <https://www.plex.tv/>

# Plex real-time transcoding

## Transcode options



The screenshot shows the Plex transcoding options menu. On the left is a video player with a play button. The menu lists various transcoding options with their corresponding bitrates. The option 'Convert to 1080p HD 8 Mbps' is highlighted with a red circle and a checkmark. Below the menu, there are sections for 'PLAYBACK SE', '品質' (Quality), 'AUDIO STREAM', and '字幕' (Subtitles).

Transcoding Option	Bitrate
Convert Automatically	
Convert to 2160p 4K (Maximum)	75.8 Mbps
Convert to 1080p HD (高)	20 Mbps
Convert to 1080p HD (中)	12 Mbps
Convert to 1080p HD	10 Mbps
<b>Convert to 1080p HD</b>	<b>8 Mbps</b>
Convert to 720p HD (高)	4 Mbps
Convert to 720p HD (中)	3 Mbps
Convert to 720p HD	2 Mbps
Convert to 480p	1.5 Mbps
Convert to 328p	0.7 Mbps
Convert to 240p	0.3 Mbps
Convert to 160p	0.2 Mbps

**PLAYBACK SE**

品質 **Convert (8 Mbps, 1080p HD) ^**

AUDIO STREAM English — AAC 立體聲

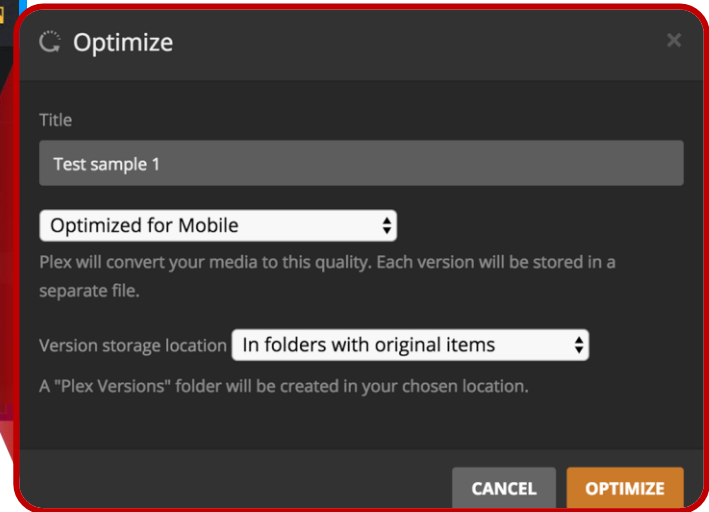
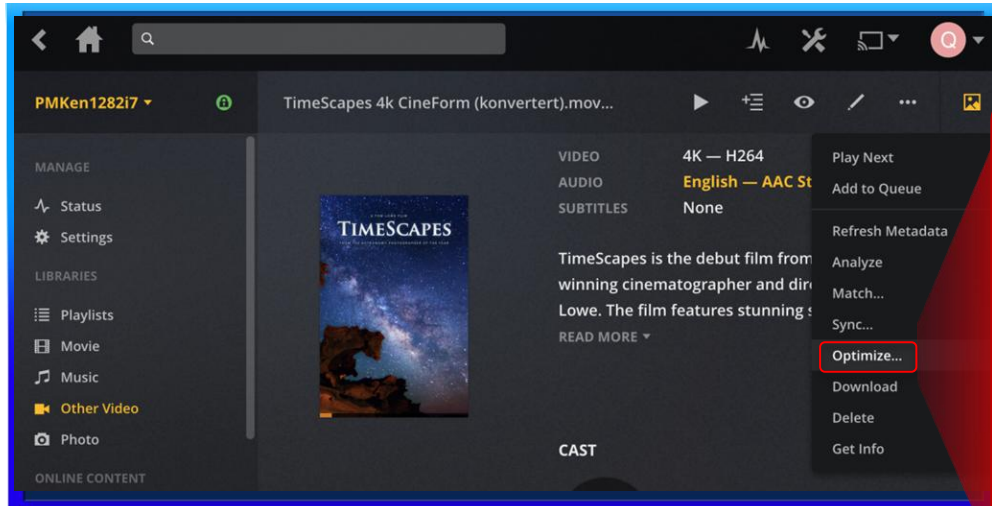
字幕 無

**Video quality:**  
The higher the resolution selection, the greater the network bandwidth requirement.

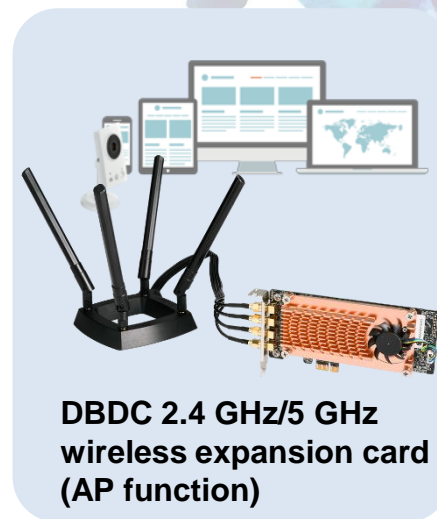
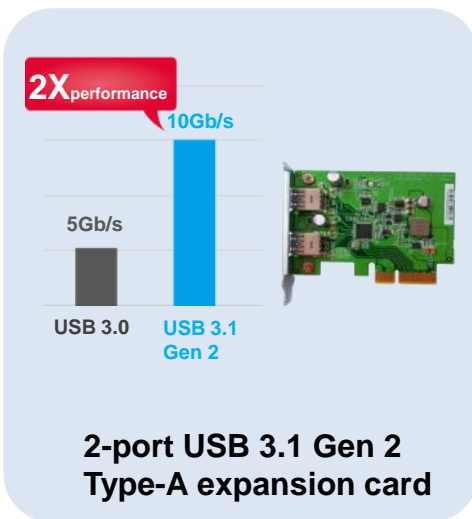
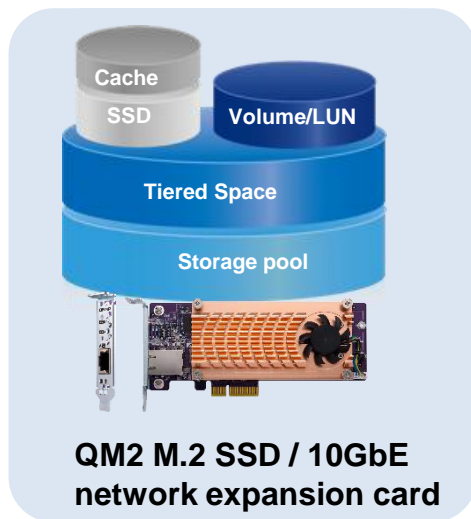


# Offline transcoding

## Set up a offline transcoding process



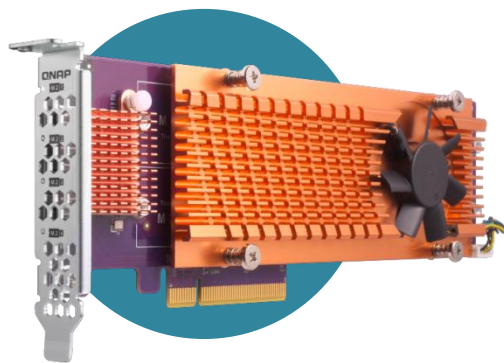
# A versatile NAS that moves forward with you



**1 PCIe 2.0 x2 slot**

# Demo

## Install a PCIe expansion card



# TS-251B





# Accessories for TS-251B

## Memory modules



RAM-4GDR3LA0-SO-1866

RAM-2GDR3LA0-SO-1866

## USB 3.1 Gen 2 expansion card



USB-U31A2P01



## Wired network adapters



LAN-10G2SF-MLX



QXG-10G1T



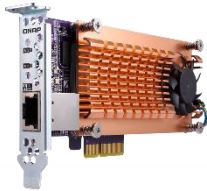
LAN-1G2T-I210

## Wireless network adapter



QWA-AC2600

## QM2 M.2 SSD/10GbE network expansion cards



QM2-2S

QM2-2P

QM2-2S10G1T

QM2-2P10G1T

...and many more

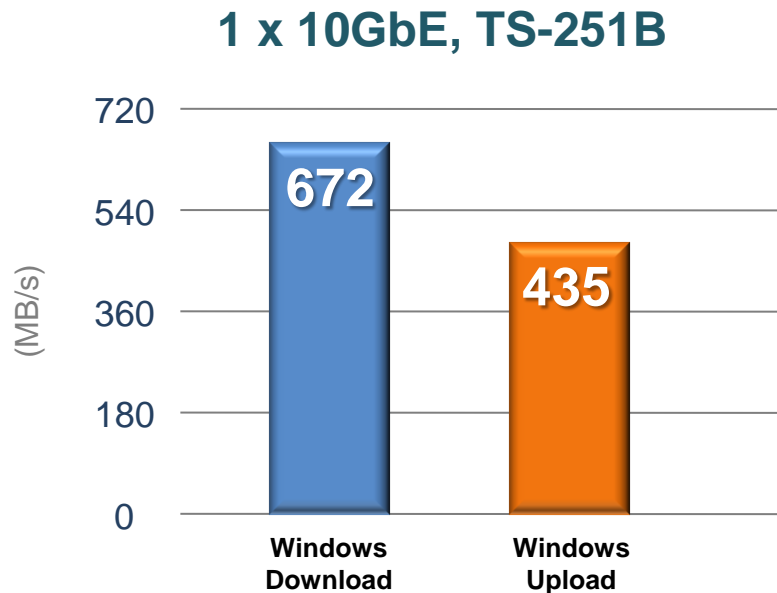
## 256GB M.2 SATA 6Gb/s SSD\*



SSD-M2080-256GB-B01

\* To install M.2 SSD to TS-251B, a QM2 expansion card is required.

# 10GbE via PCIe expansion



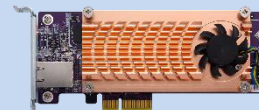
**2 x SFP+**

**LAN-10G2SF-MLX**



**1 x 10GBASE-T**

**QM2-2S10G1T  
QM2-2P10G1T**



**1 x 10GBASE-T**

**QXG-10G1T**



Tested in QNAP lab. Results vary depending on the environment.

Test Configurations: NAS: TS-251B, QTS 4.3.4

RAID Configuration: RAID 0; 2 x Intel S3500 240GB SSDs (SSDSC2BB240G4);

QNAP LAN-10G2SF-MLX 2 port 10GbE SFP+

Client PC: Intel® Core™ i7-4770 3.40GHz CPU; DDR3L 1600Hz  
16GB; WD 1TB WD10EZEX; Intel Gigabit CT (MTU 1500) ;  
Windows® 7 Professional 64bit SP1 & Windows 8.1 Pro 64-bit

# Demo

## 10GbE performance

### QXG-10G1T

1 x 10GBASE-T  
2 x 2.5"SSD: RAID 0



### TS-251B



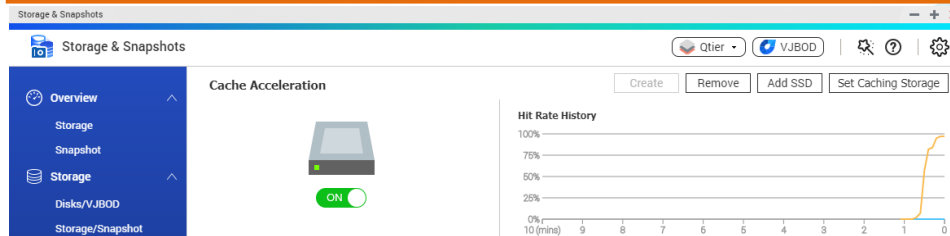


# Add M.2 SSD slots to TS-251B with a QM2 card



Accelerates random IOPS

SSD  
cache



SSD tier

Performance and storage capacity



Create Storage Pool Wizard

Introduction Select Disk(s) Summary

Select an Introduction

Tier: Ultra-high Speed (SSD)

SSD SATA

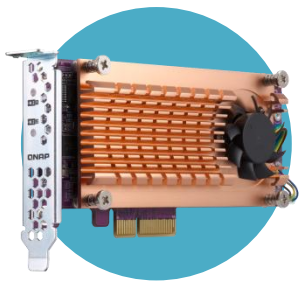
Enclosure Unit [Total: 1 Unit(s)]: NAS Host [available disk(s): 2/4]

The image shows the 'Create Storage Pool Wizard' interface in the QNAP web management console. It features a 'Select Disk(s)' step with a 'Select an Introduction' button. Below this is a 'Tier: Ultra-high Speed (SSD)' section with 'SSD' and 'SATA' buttons. At the bottom, it shows 'Enclosure Unit [Total: 1 Unit(s)]: NAS Host [available disk(s): 2/4]'.

# QM2-2S-220A: Add two M.2 SATA SSD slots

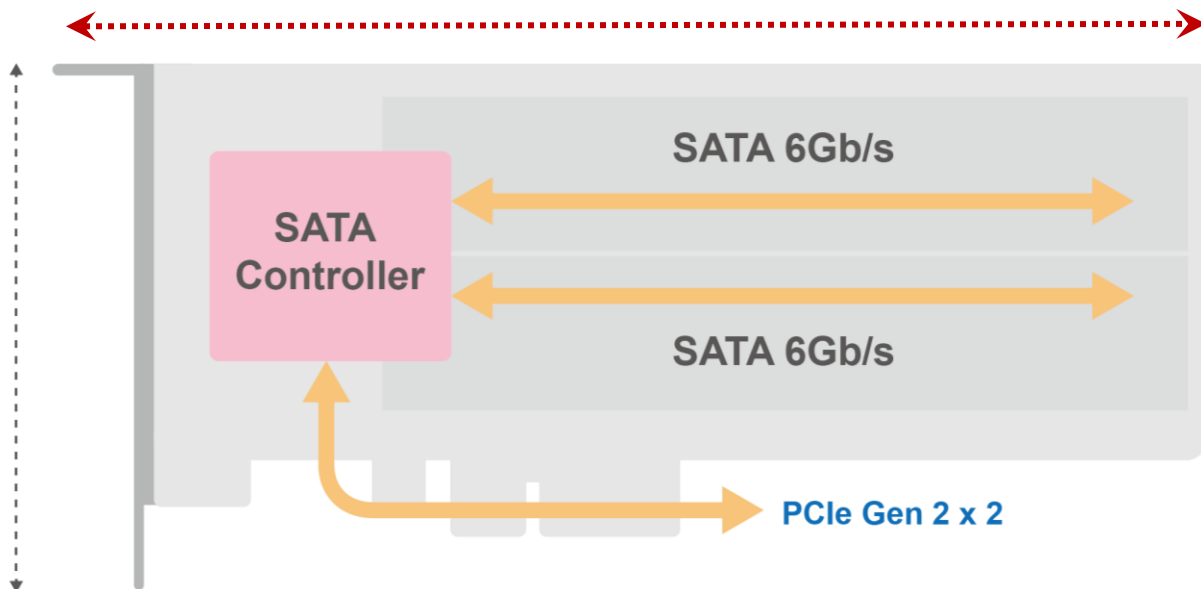
QM2-2S-220A

2 x M.2 2280 SATA 6Gb/s



68.9mm

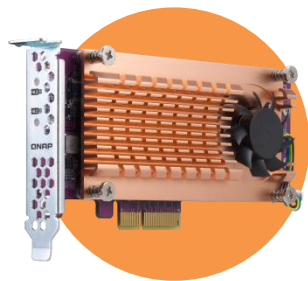
147 mm



# QM2-2P-244A: add two M.2 NVMe SSD slots

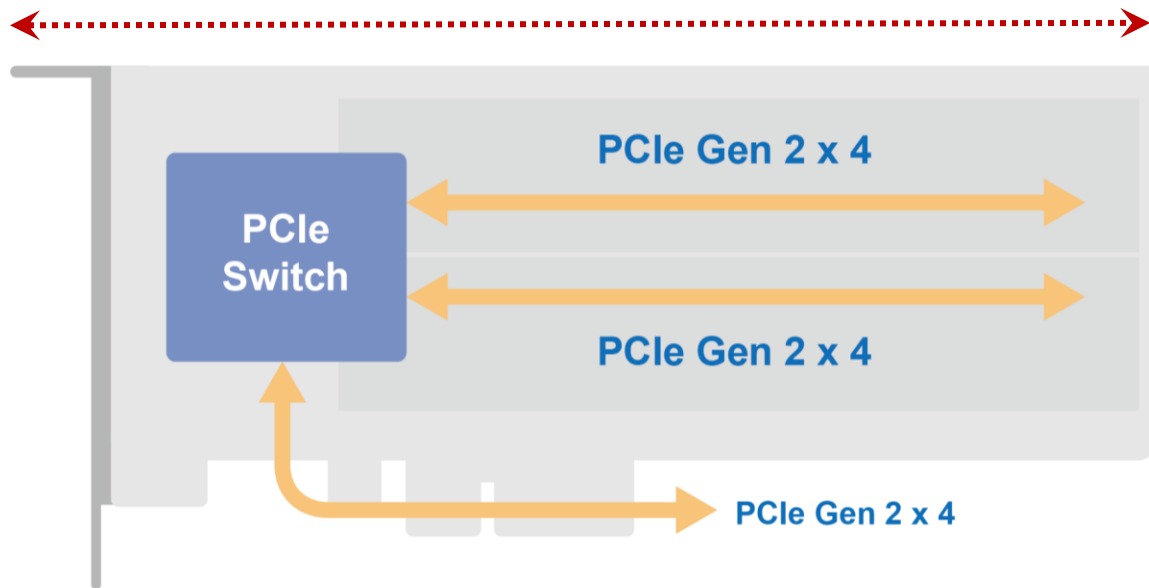
QM2-2P-244A

2 x M.2 2280 PCIe NVMe



68.9mm

147 mm



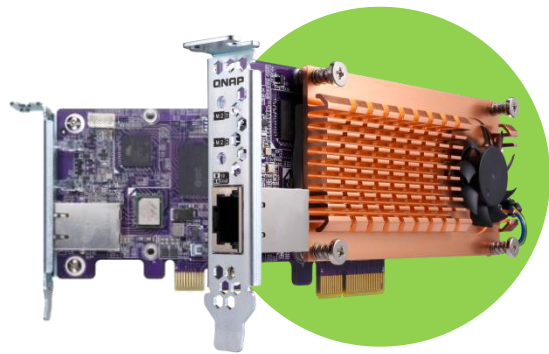


# QM2-2S10G1T: add two M.2 SATA SSD slots + 10GBASE-T

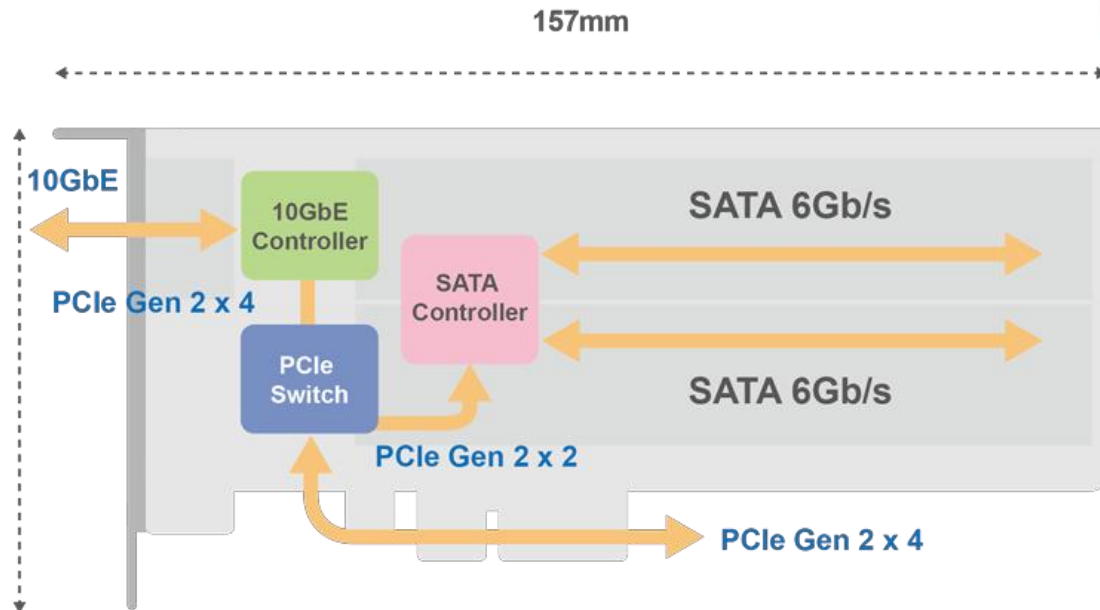
**QM2-2S10G1T**

2 x M.2 2280 SATA 6Gb/s SSD +  
1 x 10GBASE-T (10G/5G/2.5G/1G/100M)

**10GbE**  
upgraded  
version



68.9mm

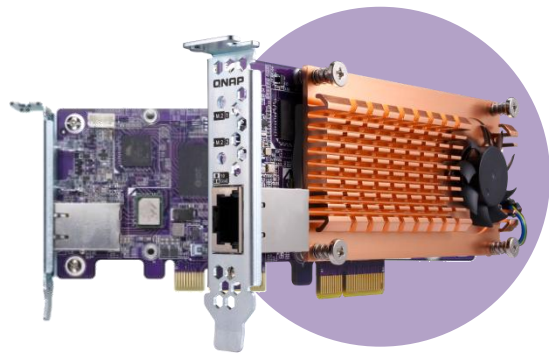


# QM2-2P10G1T: add two M.2 NVMe SSD slots + 10GBASE-T

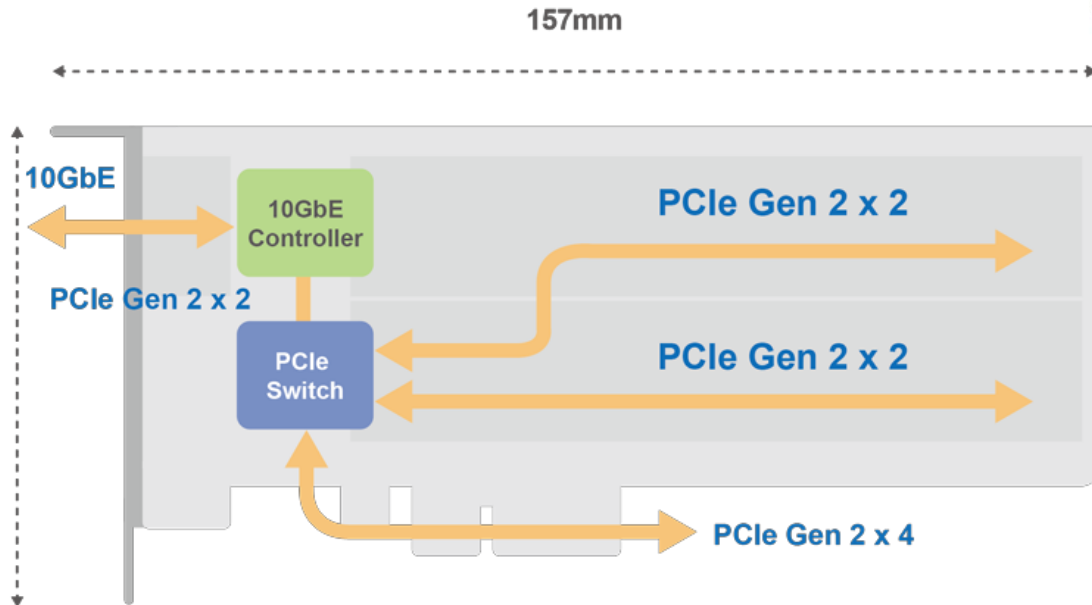
**QM2-2P10G1T**

2 x M.2 2280 PCIe NVMe SSD +  
1 x 10GBASE-T (10G/5G/2.5G/1G/100M)

**10GbE**  
upgraded  
version



68.9mm

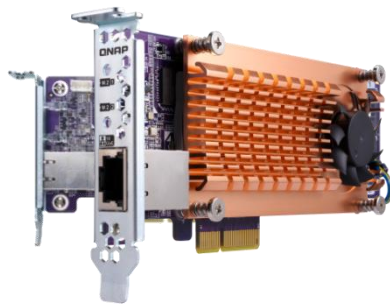


# Demo

## Qtier 10GbE performance

### QM2-2S10G1T

1 x 10GBASE-T  
2 x M.2 SATA SSD: RAID 1  
2 x HDD: RAID 1



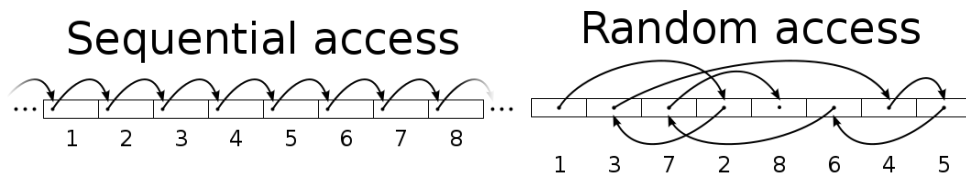
### TS-251B



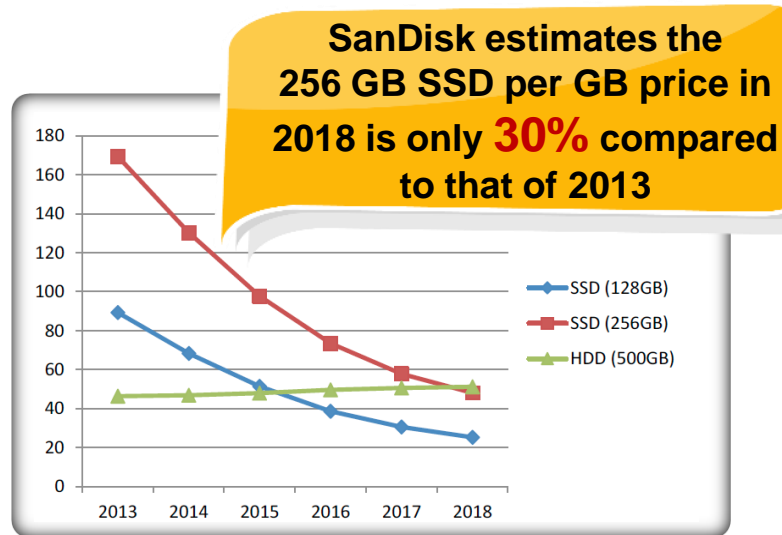
# SSD usage in Network Attached Storage

- SSD can provide high random IOPS for multi-client sync and business applications that can not be achieved with HDD.
- In 2018, SSD price also comes close to the sweet spot.
- You need not only choose the right SSD, but also choose the right NAS!

Drive Type	Sequential Access (MB/s)	Random Access (IOPS)
HDD	100	350
SSD	300	60000



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



SanDisk's Statistic for Global SSD/HDD Price Trend



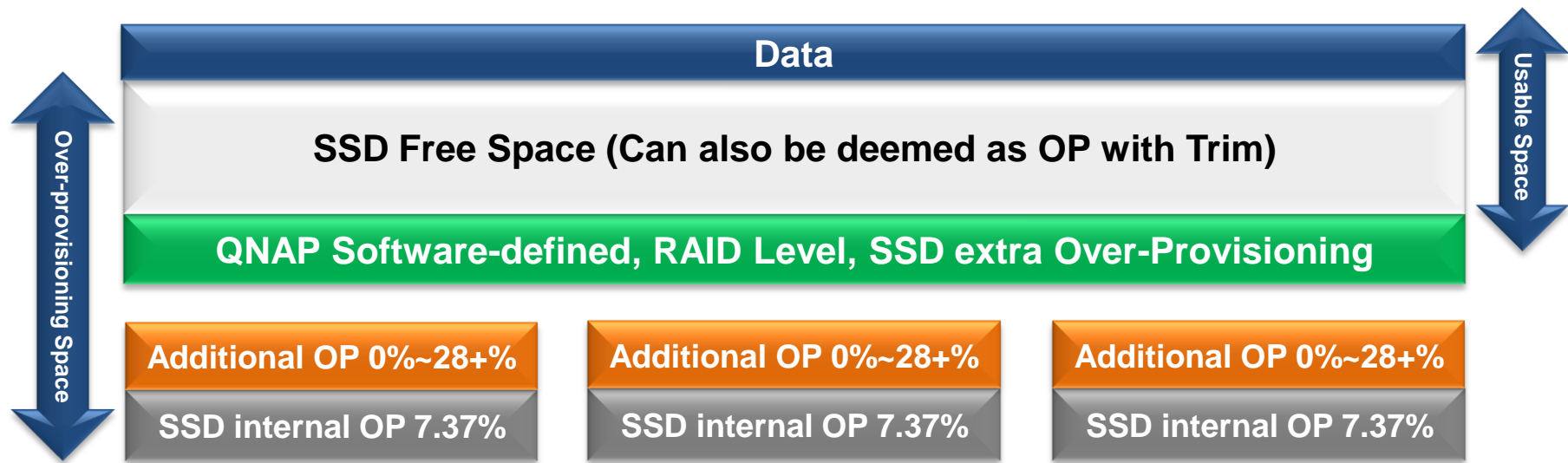
# SSD internal over-provisioning

- SSD as Flash storage, its capacity should be presented with Gibibyte (GiB)  
 $2^{30} = 1,073,741,824$  Bytes °
- As storage device, SSD actually reports it's capacity back with Gigabyte (GB)  
 $10^9 = 1,000,000,000$  Bytes °
- Every GB in SSD contains 73,741,824 Bytes(7.37%) for the Garbage Collection operation, and enterprise SSD may reserve more!

SSD actual size (GiB)	SSD present size (GB)	Vendor designed OP %	Actual internal OP %	Size show in the NAS (GiB)
256 GB	256 GB	0%	7%	238 GB
256 GB	240 GB	7%	15%	223 GB
256 GB	200 GB	28%	37%	186 GB

In the NAS system, all capacity are actually be calculated and showed in the GiB format  
<https://www.seagate.com/tw/zh/tech-insights/ssd-over-provisioning-benefits-master-ti/>  
Data Source: <https://www.kingston.com/us/ssd/maintaining>

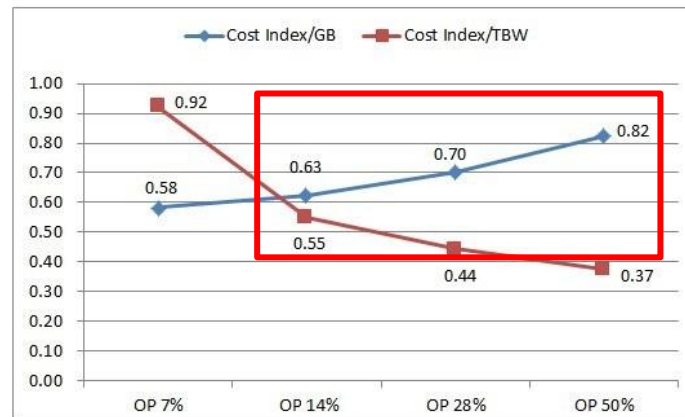
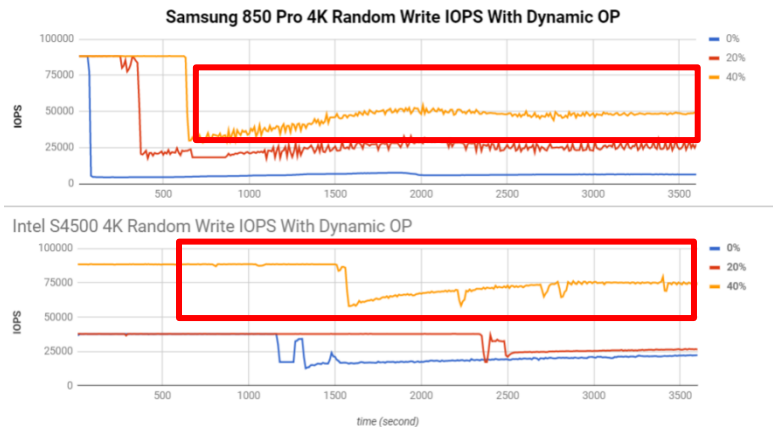
- Having more over-provisioning is proven to be beneficial.
- Besides SSD internal over-provisioning (OP), QTS introduces the extra over-provisioning that can be adjusted based on usage.



# The advantage of software-defined over-provisioning

- Performance and endurance of SSD can be increased.
- Let consumer-grade SSD reach near enterprise-grade SSD performance & reliability, and further enhance enterprise SSD advantages with reduced TCO (Total Cost of Ownership)

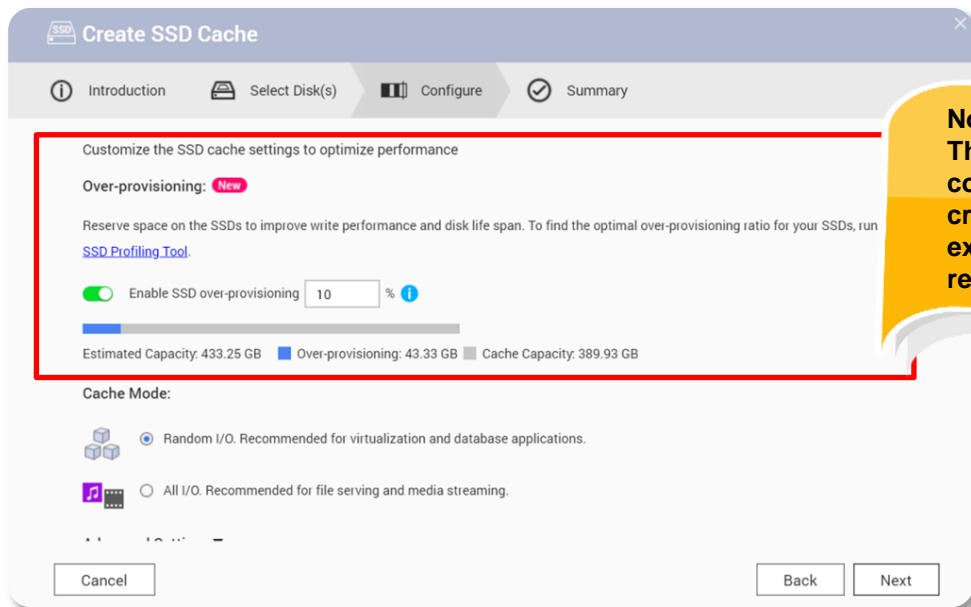
(Although usable space is reduced, actual used space is unchanged.)



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

# Configure the software-defined SSD extra over-provisioning

- Since QTS 4.3.5, user can decide OP amount for SSD cache, Qtier pool and static volume.
- A number between 1% to 60% in addition to vendor defined amount.



**Create SSD Cache**

Introduction Select Disk(s) **Configure** Summary

Customize the SSD cache settings to optimize performance

Over-provisioning: **New**

Reserve space on the SSDs to improve write performance and disk life span. To find the optimal over-provisioning ratio for your SSDs, run [SSD Profiling Tool](#).

☒ Enable SSD over-provisioning 10 % ⓘ

Estimated Capacity: 433.25 GB Over-provisioning: 43.33 GB Cache Capacity: 389.93 GB

Cache Mode:

☒ Random I/O. Recommended for virtualization and database applications.

☐ All I/O. Recommended for file serving and media streaming.

Cancel Back Next

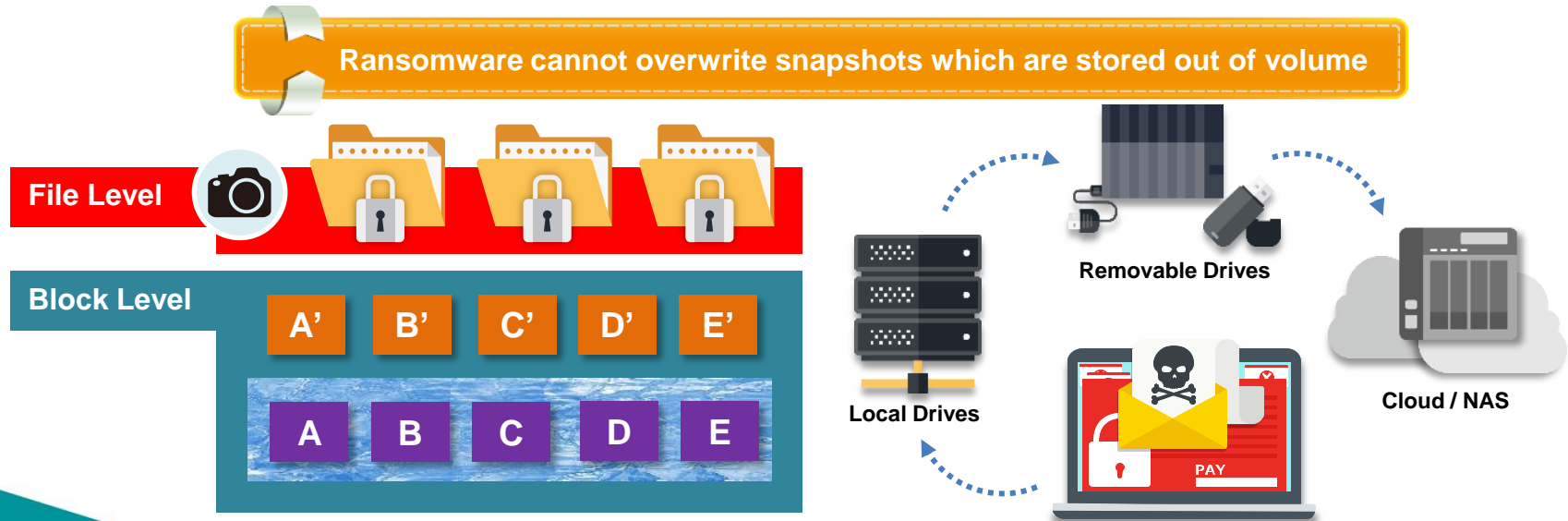
## Note:

The over-provisioning can only be configured when a storage space is created and cannot be enabled for existing cache/volume unless recreating the storage.



# How Snapshots protect data from ransomware attack

- Snapshots are stored out of volume and cannot be seen normally at the file system level.
- This not only keeps snapshots from accidental modifications, but further from ransomware attacks.



# QNAP Snapshot features

1. Fully supports all storage configurations at the storage pool level.
2. Easily take, manage and restore snapshots.
3. Using the mature Ext4 file system for “out of volume” snapshots
4. Supports all latest QNAP with flexible snapshot number.

(Every 1 TB of Volume/LUN need 0.5 MB of RAM for mounting each Snapshot)

RAM Size	TS-251B SKU	Maximum Total Snapshot Number	Maximum Snapshot Number per Volume/LUN
2GB	TS-251B-2G	64	32
4GB and more	TS-251B-4G	1024	256

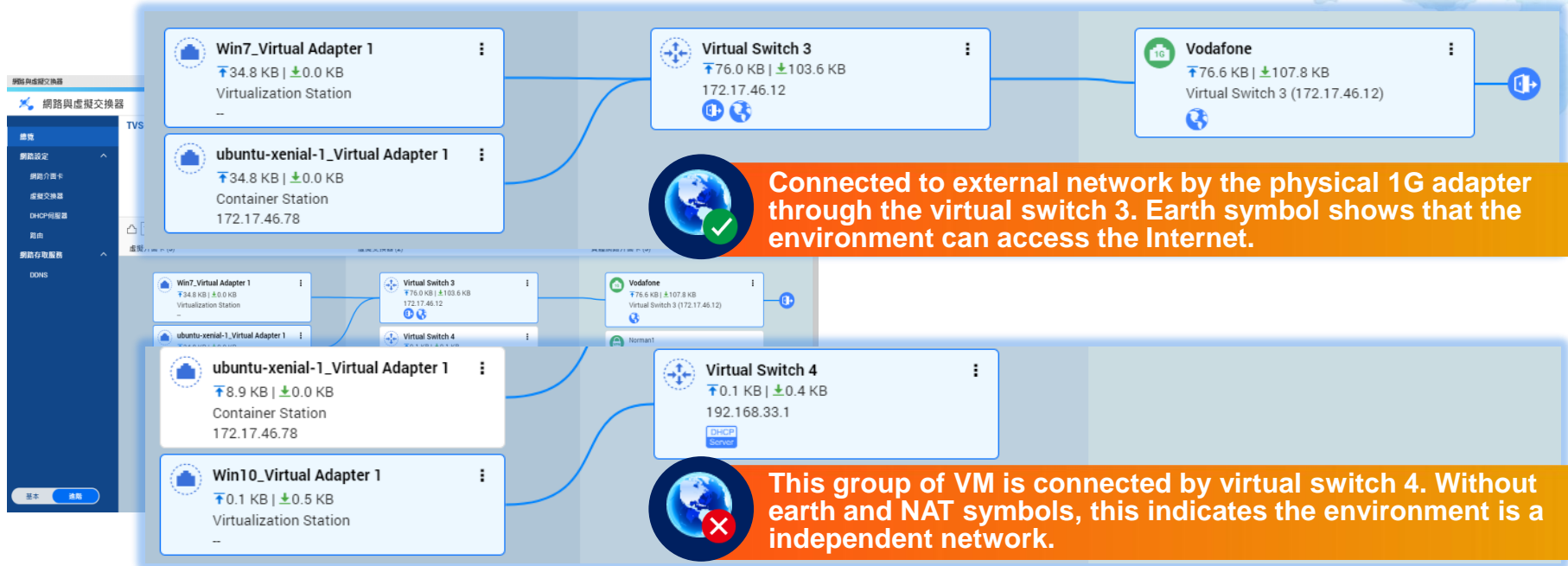
# QNAP NVS (Network & Virtual Switch)

QNAP NVS strings the high speed network between physical and virtual interfaces. It's the best tool to bridge your versatile devices and NAS!





# Overview helps you quickly check overall status





Faster wireless AP network  
delivered with new QNAP solution



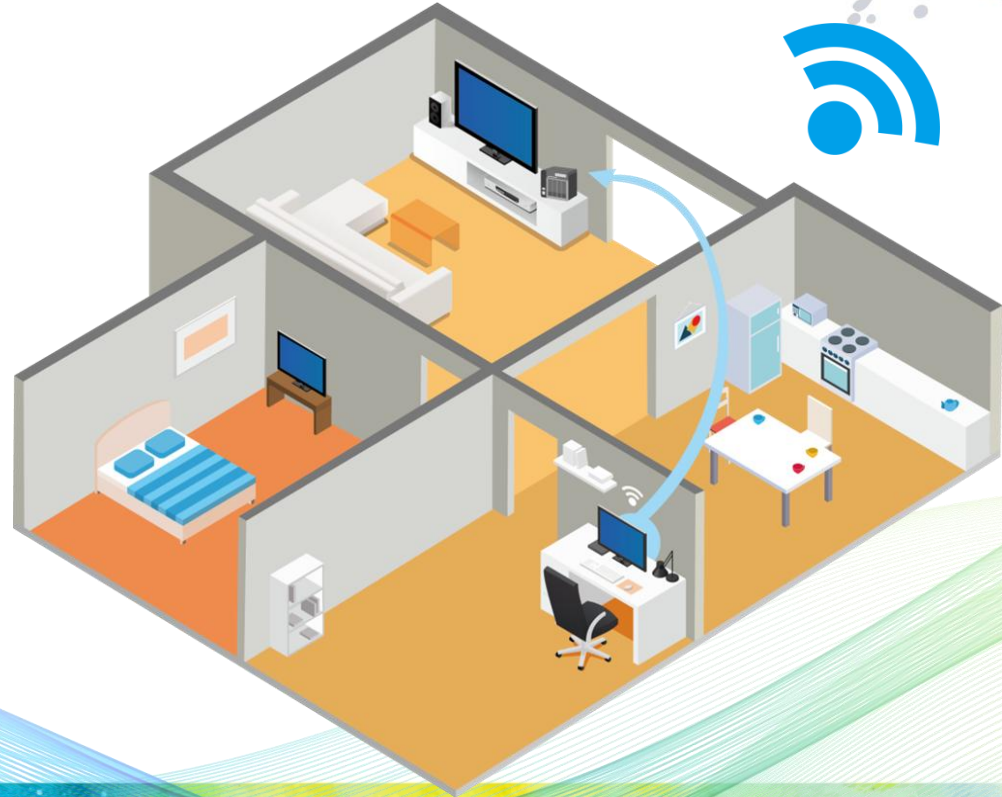
QWA-AC2600 PCIe AC wireless adapter

**TS-251B**

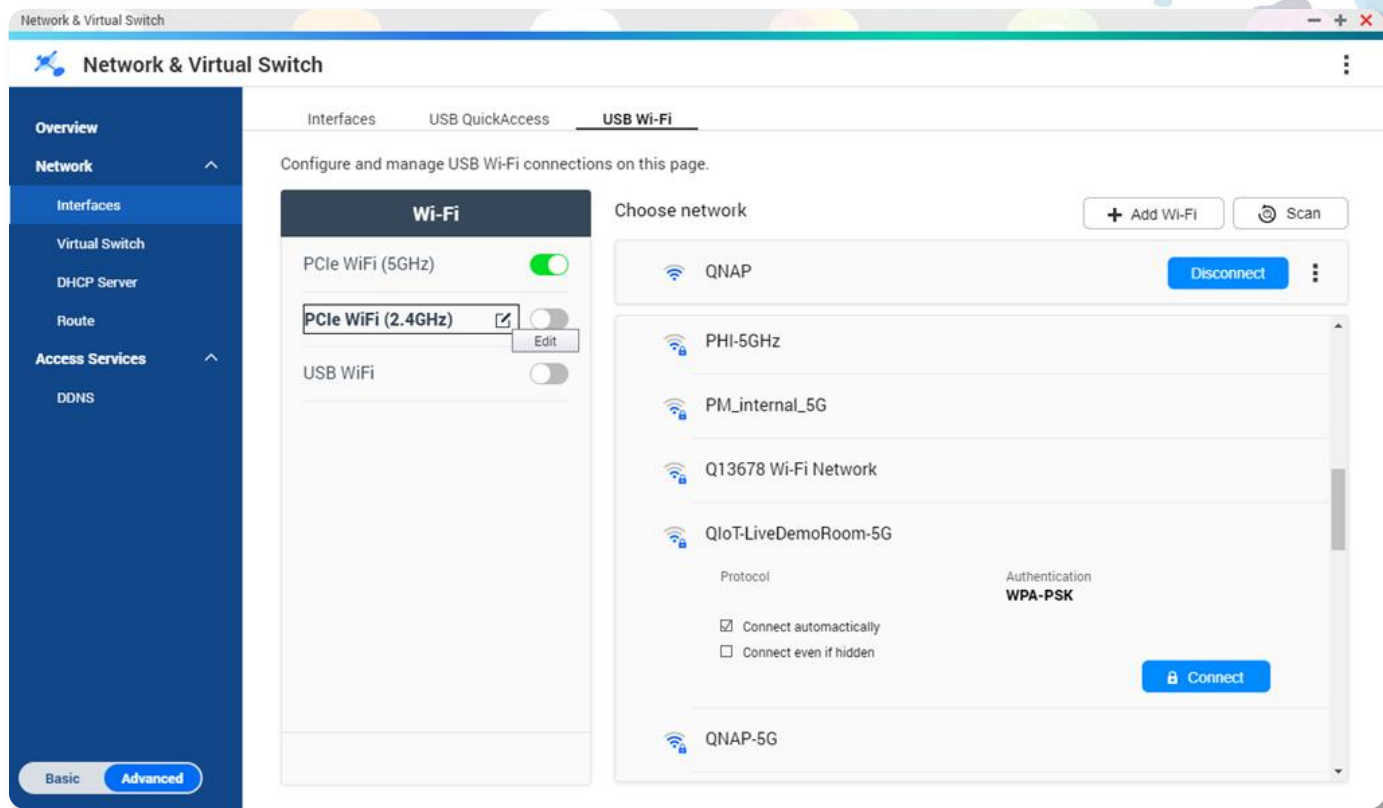


# Wireless makes things easier...

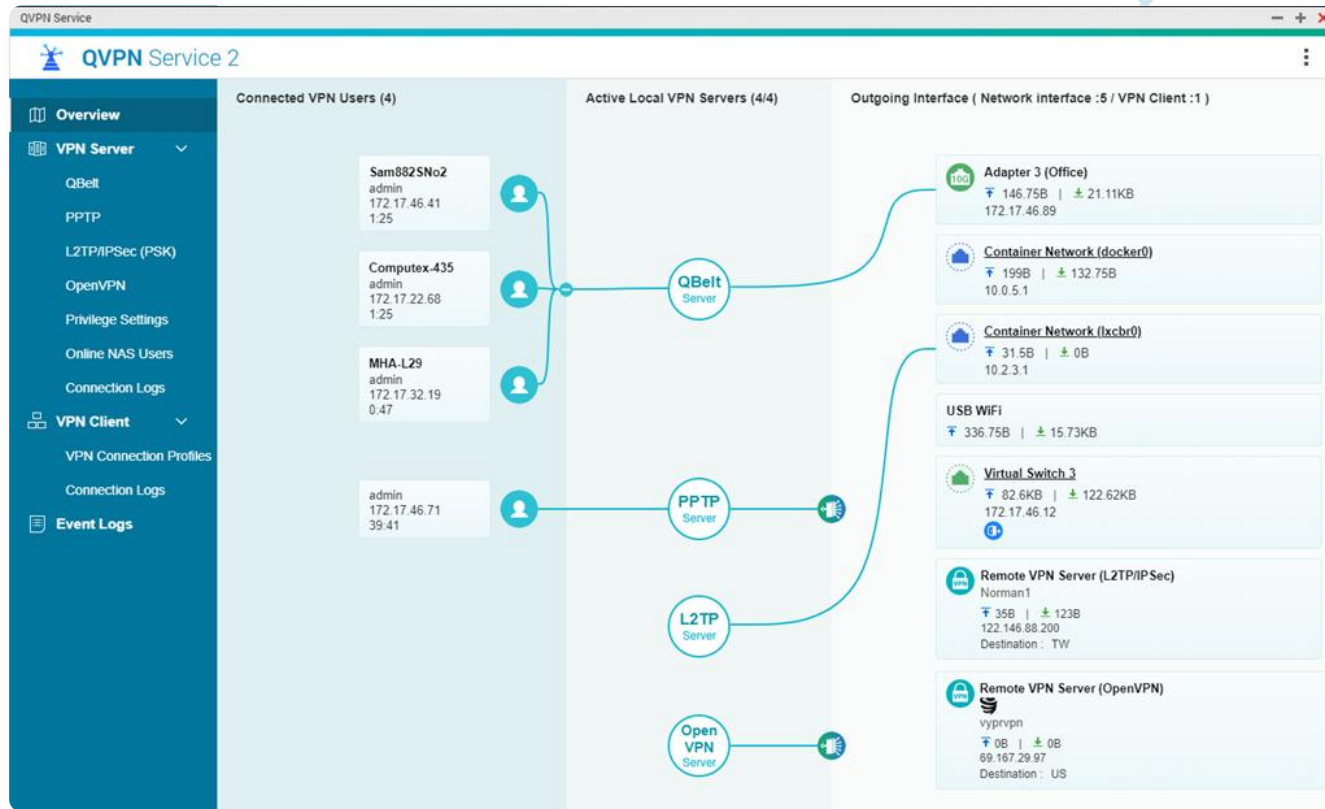
**When physical wiring for your home is not feasible.**



# Wireless setup made easy



# QVPN topology map





# QNAP's new proprietary VPN protocol - QBelt



**Secure Encrypted Connection:**

**DTLS + SSL + AES-256 encryption**



**New protocol:**

**Decreases the chance of being detected**



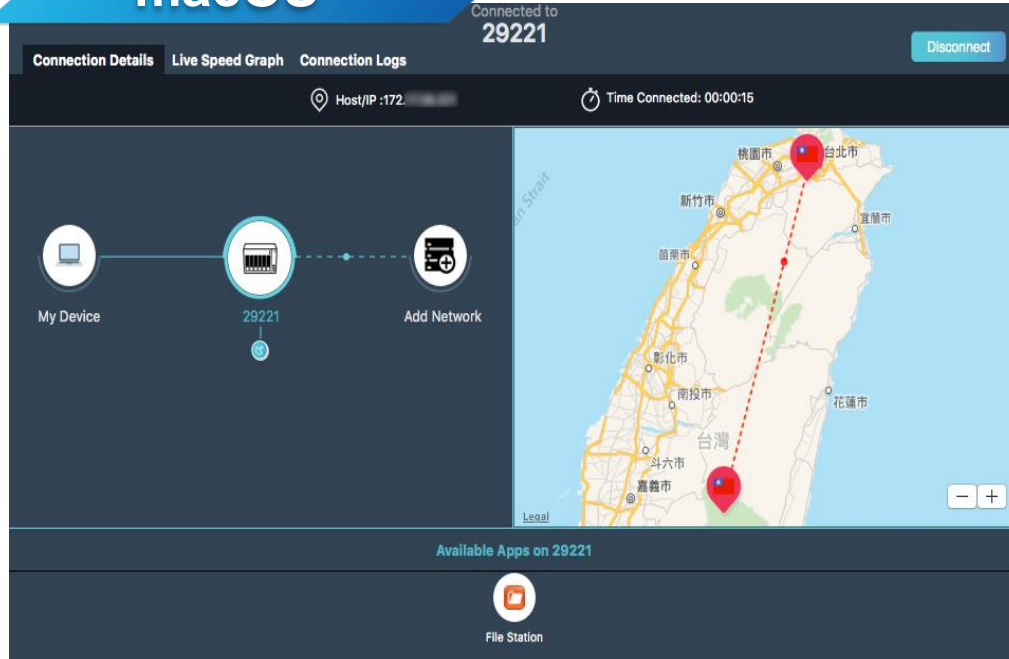
**Works on (almost) all your devices**



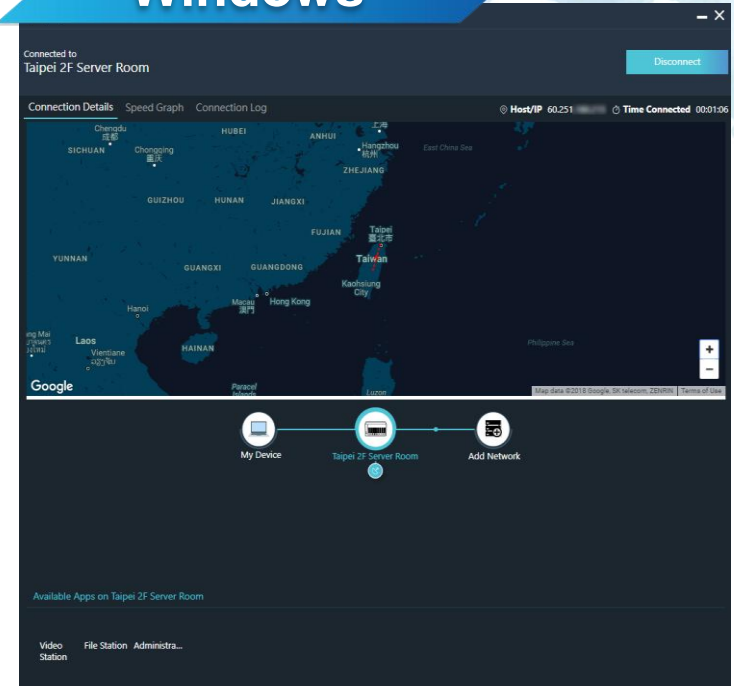
**Easy to Use**

# New desktop app will soon be available

## macOS

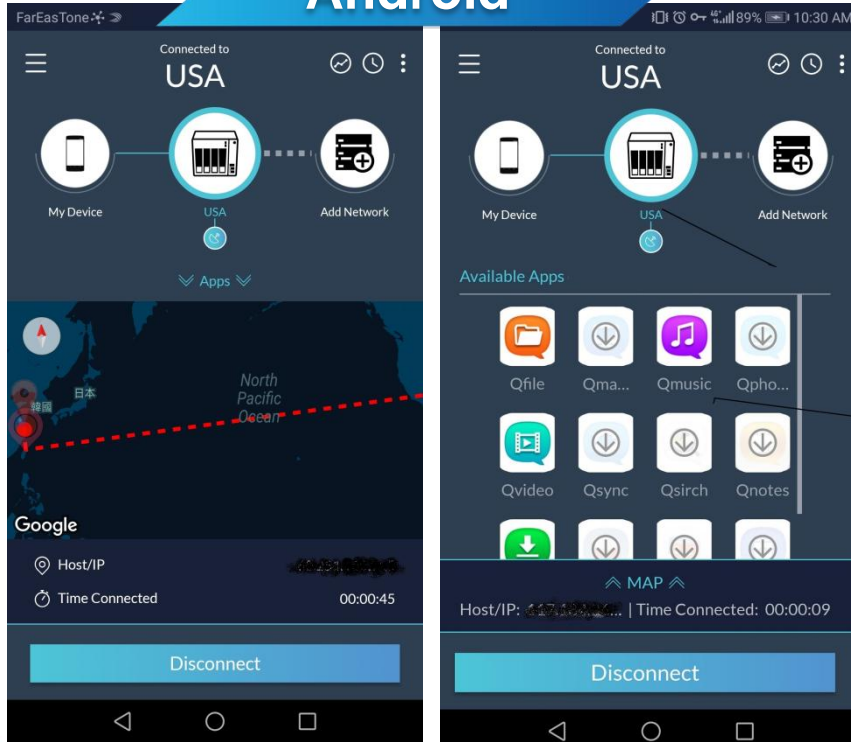


## Windows

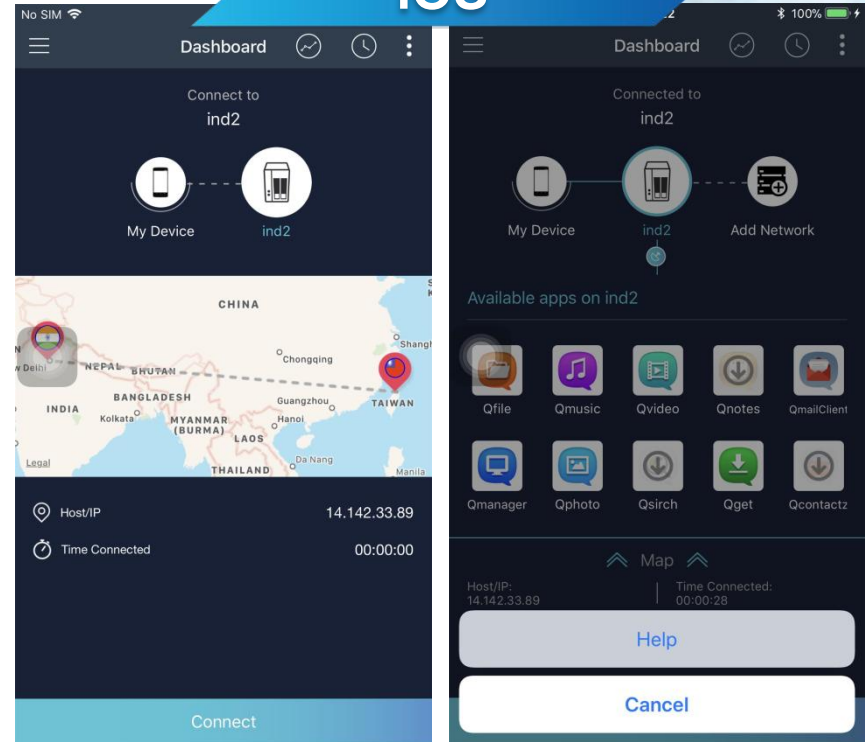


# New mobile app will soon be available

## Android



## iOS



# QTS and virtualization applications

**Many OS in one NAS**  
Run Windows/Linux VMs and containers



**Virtualization  
Station**



**Container  
Station**





# QVR Pro surveillance solution



**5,000+ compatible IP cameras**

**8 free camera channels**

**128 channels max. (optional license)**

**QUSBCam2 for webcam recording**

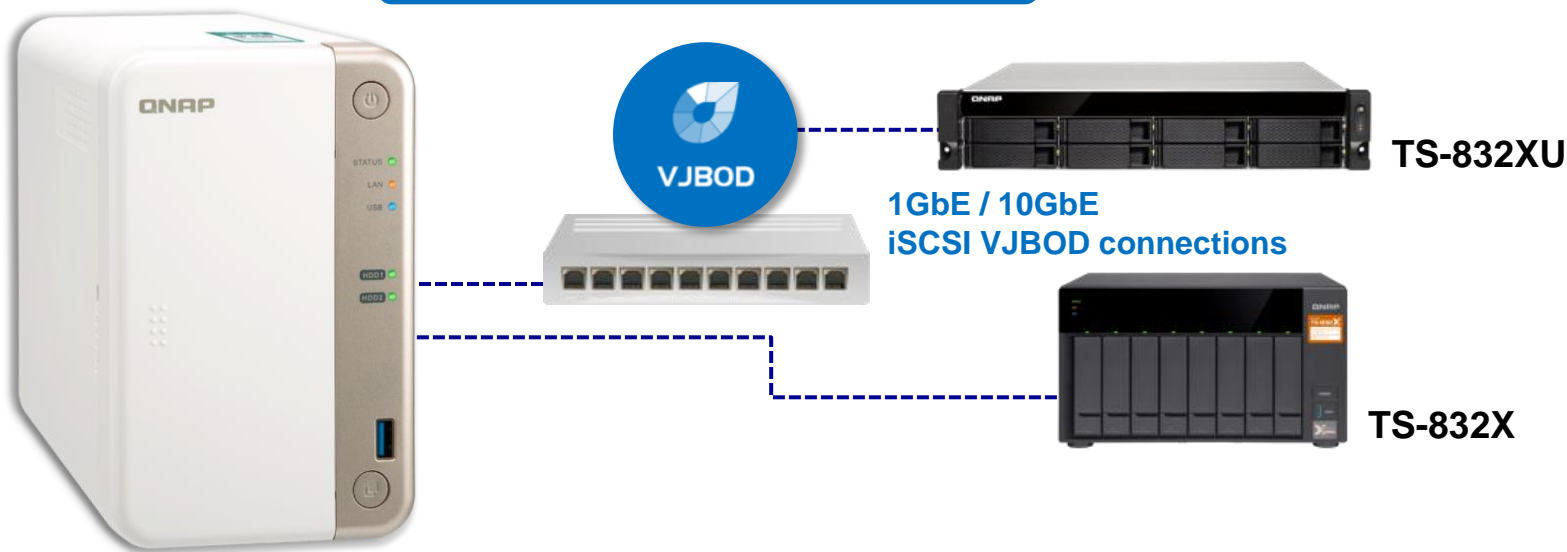


**Surveillance Station 5.1**

- 2 free channels
- 32 channels max. (optional license)

# Use Virtual JBOD to expand NAS capacity

Max 8 VJBOD connections





# TS-251B sets the new standard

NAS model	TS-251B	Synology DS218+
Processor	Intel x86 Celeron J3355 dual-core 2.0 GHz · burst up to 2.5 GHz	
Memory (expandable)	TS-251B-2G: 2 GB TS-251B-4G: 4 GB Max. 8 GB (4 GB + 4 GB)	2 GB Max. 6 GB (2 GB + 4 GB)
PCIe slot	1 x Gen2 (x2) slot	---
10GbE LAN	Expandable via a PCIe adapter	---
Performance	Read 672 MB/s; Write 435 MB/s	Read/Write 113 MB/s
M.2 SSD slots	Expandable via a QM2 PCIe adapter	---
HW transcoding	Yes	Yes
HDMI output	4K HDMI v1.4b 30Hz, optional remote	---
USB 3.0 / 2.0	USB 3.0: 2 USB 2.0: 3	USB 3.0: 3 USB 2.0: 0
Audio in/out	2 x 3.5mm MIC in + 3.5mm line out + speaker	---
Camera licenses	free: 8 / max: 128	free: 2 / max: 25

**QNAP**

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Powered by an Intel® dual-core processor,  
supporting PCIe expandability



**HDMI**<sup>TM</sup>  
HIGH-DEFINITION MULTIMEDIA INTERFACE



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