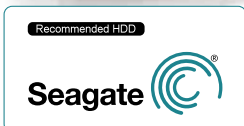# QNAP

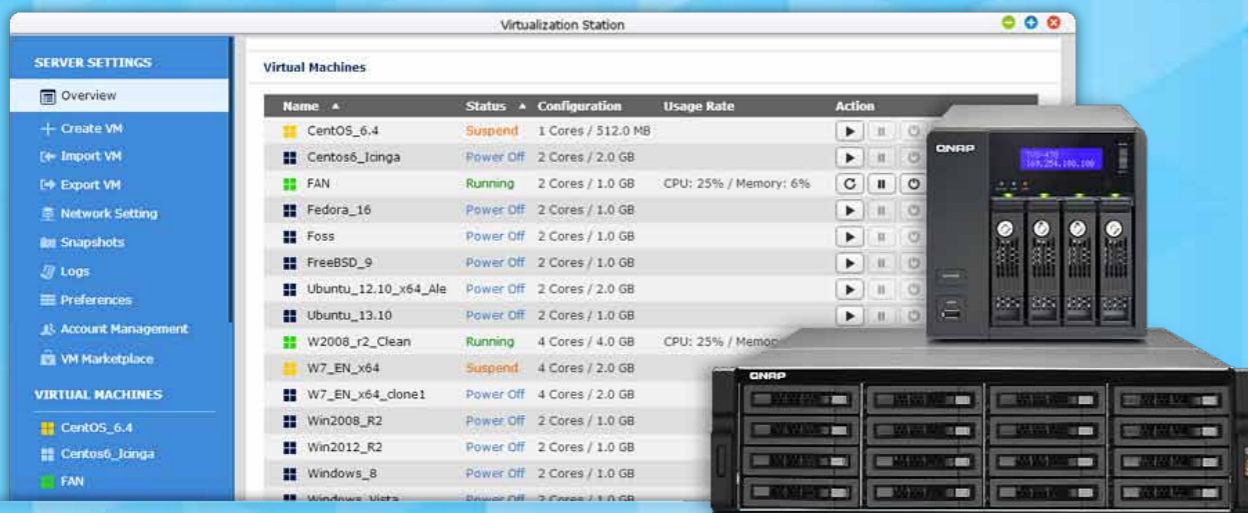# NAS built-in Virtualization Station Solution

Virtualization Station

Virtualization Station

Centralized virtualization management enhancing IT efficiency

QNAP Virtualization Station enables virtualized desktop operations on the Turbo NAS for managing multiple virtual machines. With the easy-to-use interface, you can centrally manage all virtual machines created on the Turbo NAS with least efforts.

Table of Contents

QNAP Systems, Inc. Product Manager: *Alfred Li*
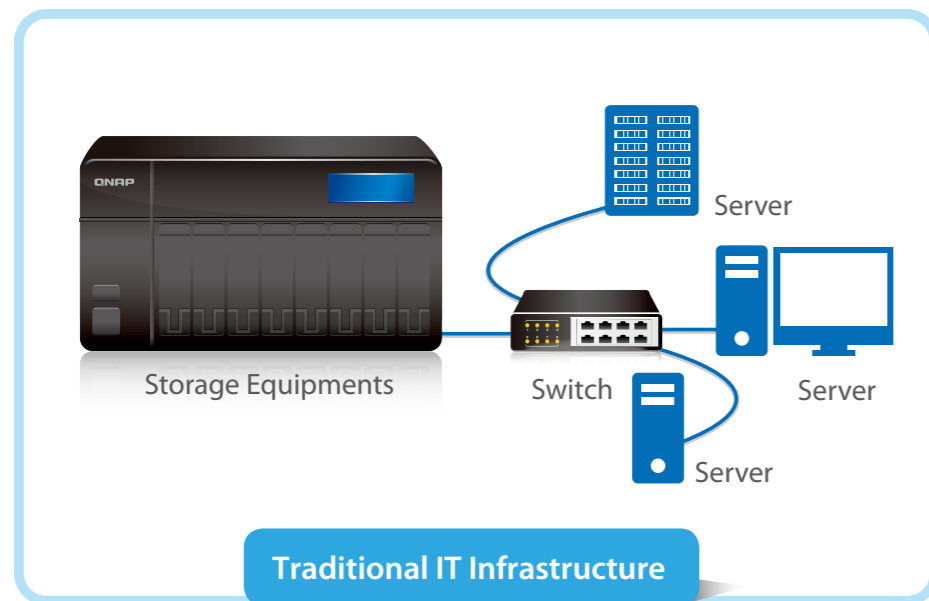Tel: +886-2-2641-2000 #13278 alfredli@qnap.com

We are committed to building the Virtualization Station for running virtual machines on the QNAP Turbo NAS. With the easy-to-use interface, you can centrally manage all virtual machines created on the QNAP Turbo NAS with least efforts. If you are interested in this product, please feel free to contact us for discussions on cooperative projects and opportunities.

Introduction

1. QNAP High-level NAS: built-in Virtualization Station

Virtualization Station is a hosted hypervisor that can be installed on Turbo NAS. It can be used to install & manage virtual machines (VMs), and allows various guest operating systems (OS) to be installed on VMs including Windows, Linux and UNIX. The built-in Virtualization Station provides compatibility with applications the Turbo NAS cannot install or run, extending its functionality and cost effectiveness. Furthermore, it is more cost efficient to use VMs on the Virtualization Station instead of using less resource-demanding physical servers. The Virtualization Station not only increases the efficiency of IT management, but also reduces management costs and physical space needed for servers.

Storage Equipments

Switch

Server

Server

Server

Traditional IT Infrastructure

Server Server Server

Virtualization Station

Storage Equipments

Advanced IT Infrastructure

2. NAS with built-in Virtualization Station – leveraging NAS storage

Previously, the main role of a Turbo NAS in a datacenter is storage that features high I/O access efficiency, cross-platform support, multiple-RAID storage, data backup, high-performance and scalable & centralized storage for multiple servers to collaborate.

As virtualization technology advances, more and more businesses have started to adopt platforms that support virtualization in their IT center, for example, VMware ESXi 5.5 and Microsoft Hyper-V. The Turbo NAS still has an indispensable role in storage management for virtualization platforms.

QNAP leverages its strengths in storage and integrates virtualization technology to offer the brand-new Virtualization Station that is integrated to the Turbo NAS, enabling users to run multiple virtual machines on a single Turbo NAS. The built-in Virtualization Station makes the Turbo NAS not only storage but also an innovative platform for virtual machine applications.

	Traditional – virtual machine on a single machine	Advanced –virtual machines on a NAS
Interoperable with virtual machine	No	Yes
Virtual machine storage	Small	Large
Web-based support	No	Yes
Access shared files	Slow	Fast
Unified management interface	Single machine	All virtual machines

3. Virtualization platform

Currently, there are two major types of virtualization platform (Hypervisor): (1) installed directly on the host (Bare metal) and (2) installed on the operating system (Hosted). Citrix XenServer, VMware ESX/ESXi and Microsoft Hyper-V are the first type; VMware Workstation and VirtualBox are the second type. As the hardware performance of business servers is high to operate and manage large amount of virtual machines, the first type of platform is more suitable to satisfy business needs. On the other hand, the second type of platform is more suitable to be used on personal workstations. It is convenient to quickly install and to create virtual machines on the existing operating system and manage those virtual machines on personal computers. For example, users can install the second type of virtualized platform on the Mac operating system to install Windows, and run Windows applications.

TYPE 2 is to create a Hypervisor on an existing operating system

TYPE 1
native (bare metal)
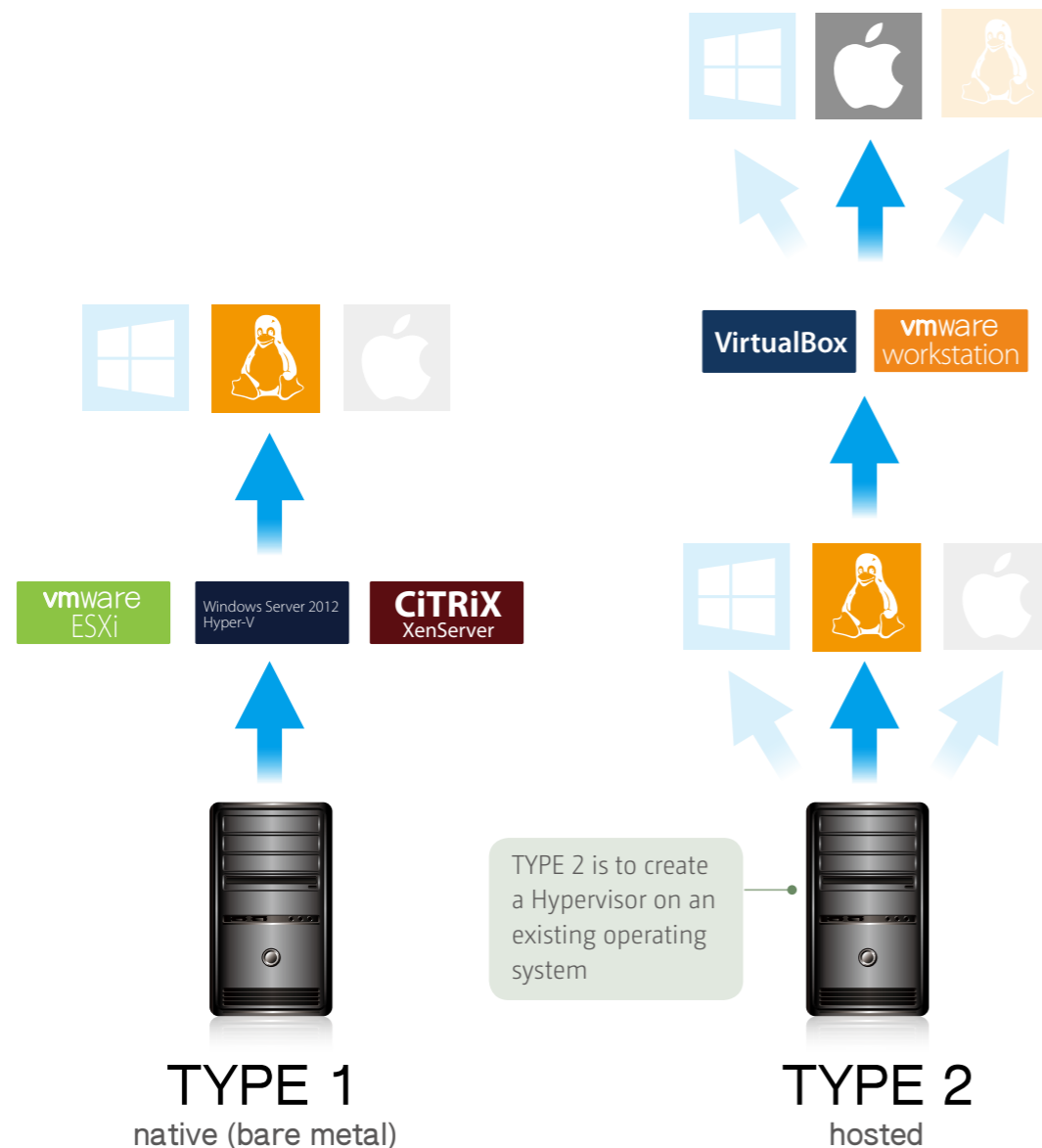
TYPE 2
hosted

	Type 1 Hypervisor (Bare-metal) e.g. VMware ESXi, Citrix XenServer, Microsoft Hyper-V	Type 2 Hypervisor (Hosted) e.g. VirtualBox, Virtualization Station
Suitable hardware	Mostly server-class (Dual-CPU)	Personal workstations, PC (Single CPU)
Hardware compatibility support	Moderate	High
Performance for virtual machine hardware	High	Moderate
Support for virtual machine remote replication	Yes	No
Expansion of applications	Many	Few
Price	Expensive	Free

In general, although the Type 1 Hypervisor supports more functions, the cost for suitable hardware is much higher than Type 2. For personal & small workstations, the Type 2 Hypervisor is apparently the ideal option as it requires no extra cost to purchase software.

The Hypervisor allows users to create and manage multiple virtual machines on a single physical host machine. The Turbo NAS, as a virtualization-ready storage solution, provides storage not only for physical host servers but also for virtual machines and relative virtualization applications. Observing that general users on personal workstations have growing demands for virtualization platforms, QNAP developed the Virtualization Station that allows users to leverage the storage of the Turbo NAS to run various virtualization applications for work and home tasks.

Benefits

1. Improve productivity

A Turbo NAS with the Virtualization Station allows administrators to run multiple applications on different operating systems such as Windows, Linux, and UNIX at the same time.

Applications	Applications	Applications	Applications
ubuntu, SQL Server	axure	SQL Server	ORACLE
VM1 Linux POWERED	**VM2** Windows 7	**VM3** Windows 8	**VM4** UNIX®

Virtualization Station

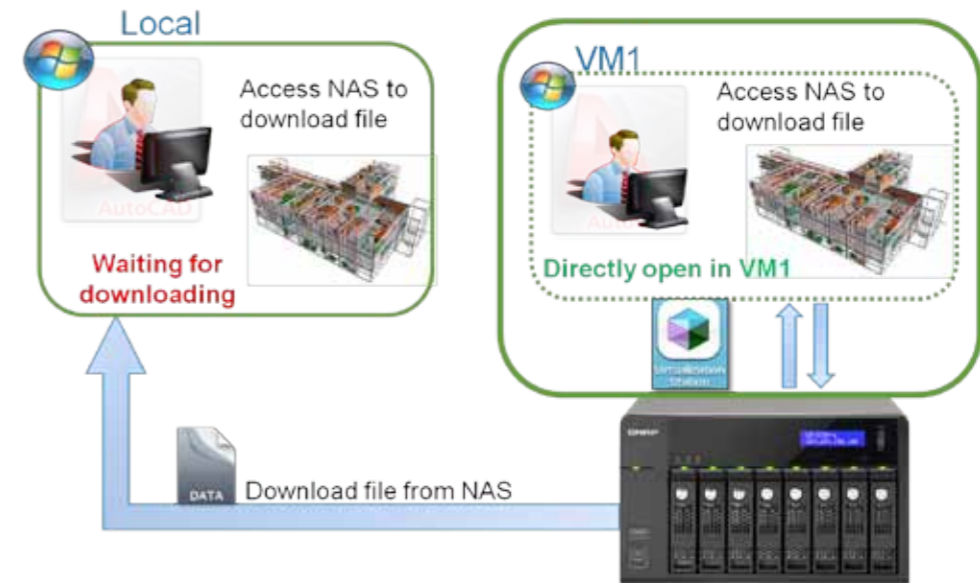| **NAS** · File Station · Backup Station · Music Station	**Storage Pool**
	RAID Group
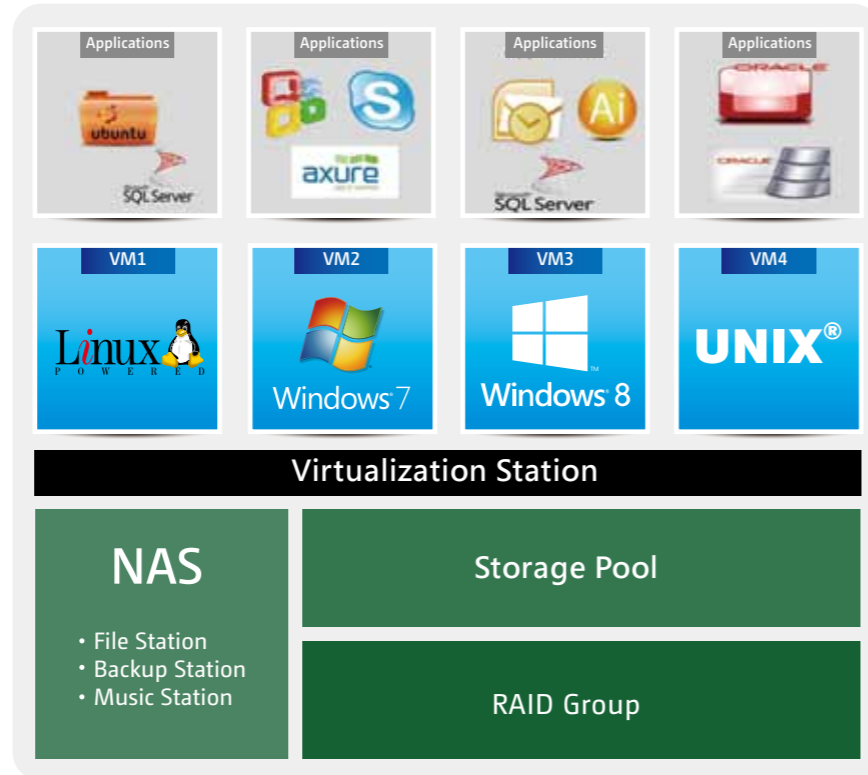
2. Direct access to files & data via VM

Specific file formats cannot be opened directly on the Turbo NAS, but the Virtualization Station makes it possible. Administrators can install Windows, Linux, and UNIX on the Turbo NAS to run any supported application or file.

QTS File Station

SolidWorks on Windows
Virtual Machine

3. Save bandwidth & time

As you download a large amount of data to a local PC, it has the potential to take a long time and to use up network bandwidth. When accessing data on the Turbo NAS through virtual machines on the Virtualization Station, you can enjoy secure data transmission and save bandwidth and time, as the data is not transmitted via physical network cables.

Local
Access NAS to download file
Waiting for downloading

VM1
Access NAS to download file
Directly open in VM1

DATA Download file from NAS

4. Enhance security

Data is always kept on the Turbo NAS, and administrators do not have to download them to their PC. With the Virtualization Station, files, data and applications can be open/run directly. This security can reduce the risk of data leaking, monitoring and interception.

Photoshop

If the data is downloaded, it may have high risk!

Windows OS (operating system)
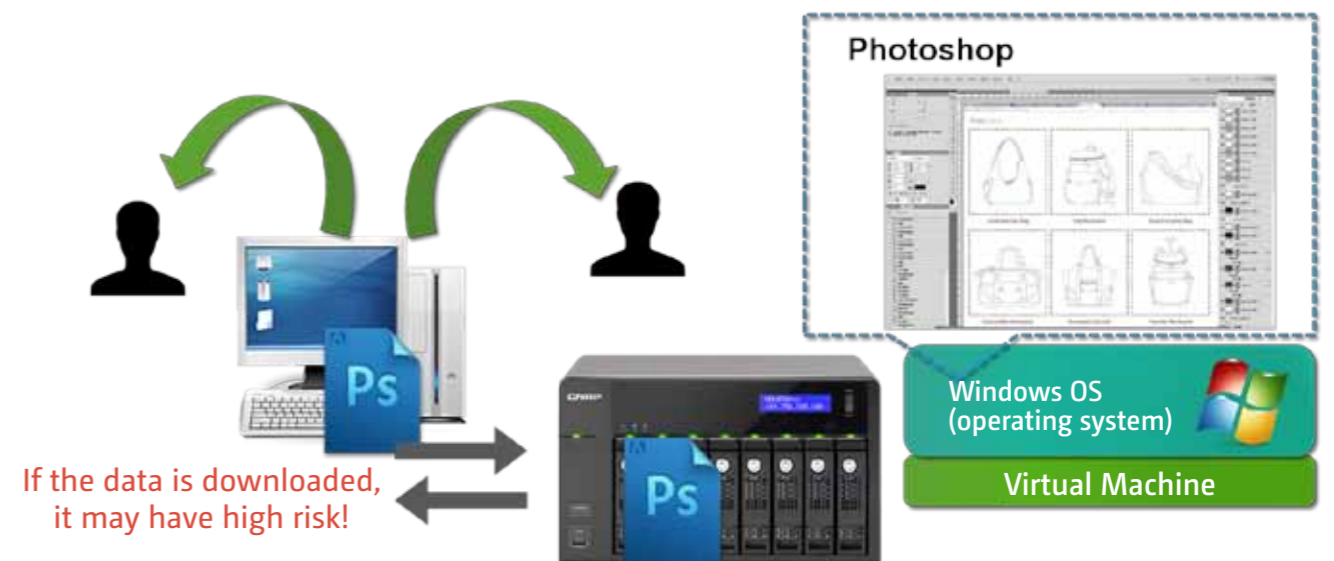
Virtual Machine

Key feature

1. Overview

With an easy-to-use interface, you can centrally manage all of the virtual machines created on the Turbo NAS and the status of hardware including the CPU and memory usage.
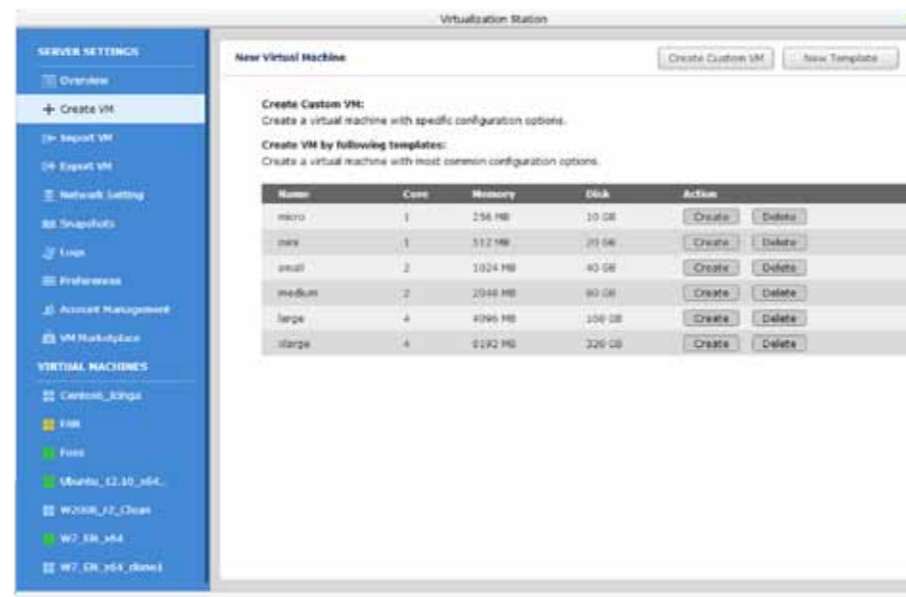

2. Fast virtual machine creation

The Virtualization Station provides several default templates for quickly choosing and creating a virtual machine. Advanced users can create custom templates, or manually create a virtual machine without choosing from the templates.

3. Virtual machine import/ export

Virtual machines of various formats can be easily imported to and exported from the Virtualization Station with a few simple steps. Administrators can enjoy extreme flexibility in arranging IT resources across machines. VMs created on the Turbo NAS can also be exported to be used elsewhere.

4. Snapshot

The Virtualization Station provides a snapshot feature to record the status of virtual machine system at a point of time. In the event of virtual machine failure, users can quickly roll back to the snapshot time to ensure continual system operations.

For example:
Before you download from unknown sources or install potentially risky applications, you can utilize the Snapshot function to record the system status of a virtual machine. If the VM gets infected by a virus or suffers from random system crashes, it can be reverted to a previous snapshot.

Snapshot 1
2013/12/18 19:27

Snapshot 2
2013/12/19 10:45

Snapshot 3
2013/12/21 12:15

Snapshot 4
2013/12/30 22:40

5. Dedicated network for VM only

The Virtualization Station provides the function of network monitoring. You can monitor all NIC (network interface controller) traffic and assign a specific NIC for use only by a certain VM.
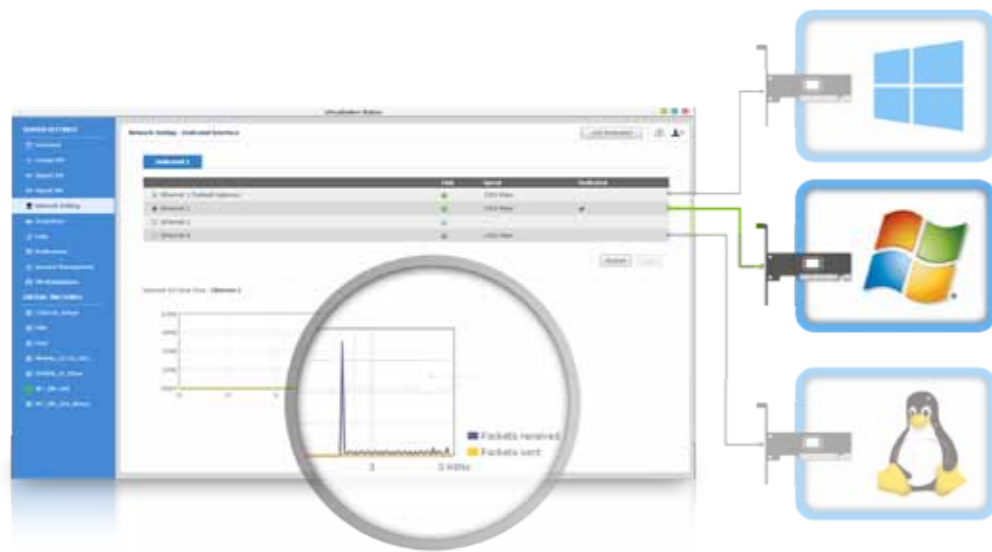
6. Operate VMs as remote desktops

You can operate the operating systems on the VMs as remote desktops to enjoy the utmost convenience. A list of buttons is provided on the left side of individual VM page allowing to suspend, shutdown, force shutdown, reset, bring up the `Ctrl` + `Alt` + `Del` combination and function keys, and even take snapshots for the VMs.
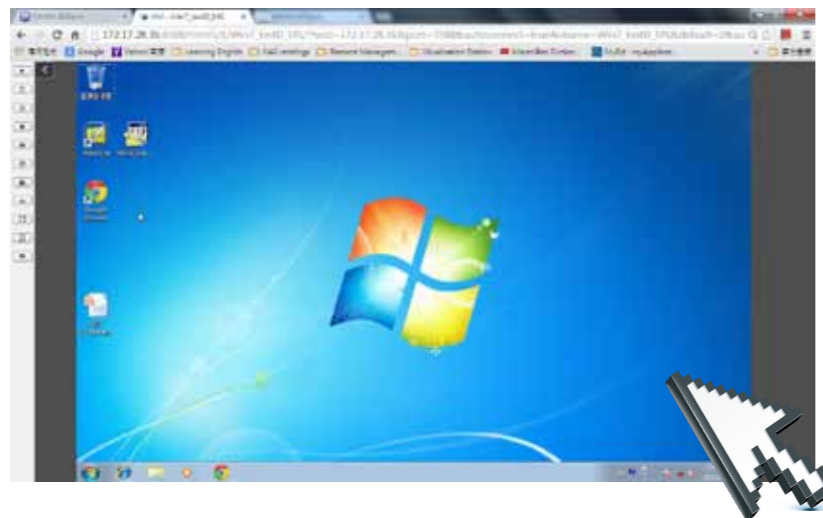
7. Add Hard-disk space for VM

According to the needs of the Virtual Machine, it is easy to allocate extra Hard-disk space to VMs. Moreover, the thin provisioning feature allows effective and efficient usage of the NAS storage pool.
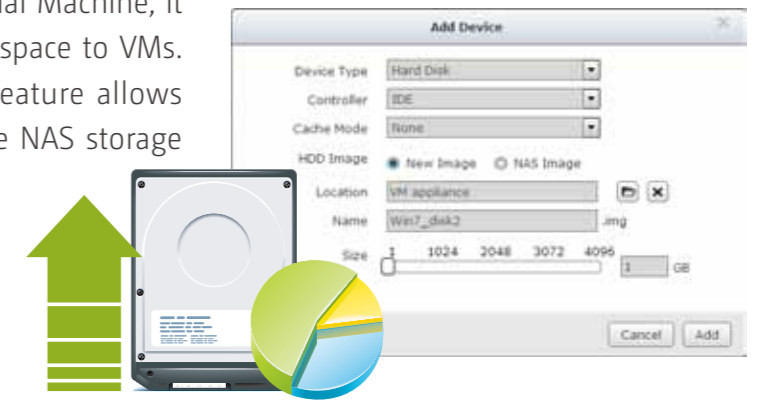
8. VM Auto-start

On NAS restart or reboot, Virtual Machines can be automatically started by setting up a certain timeframe so that the application services installed in VMs will not be disrupted.

Auto Start

9. Account Management

The Virtualization Station administrator can create users and set different user-based permissions for them. According to the purpose of the VMs and user demands, the administrator can easily and efficiently allocate the VM's resources. With these permissions, users do not need to worry about the application installed on the VM being interrupted or data being lost by other users accidentally clicking the power-off button.

User-based permissions include:
 -Console permission: Control and View-only
 -Controls for virtual machine: Power, Snapshot and Advanced

Virtualization Station

UNIX®

Control Permission   View-only Permission   View-only Permission   Control Permission

Case
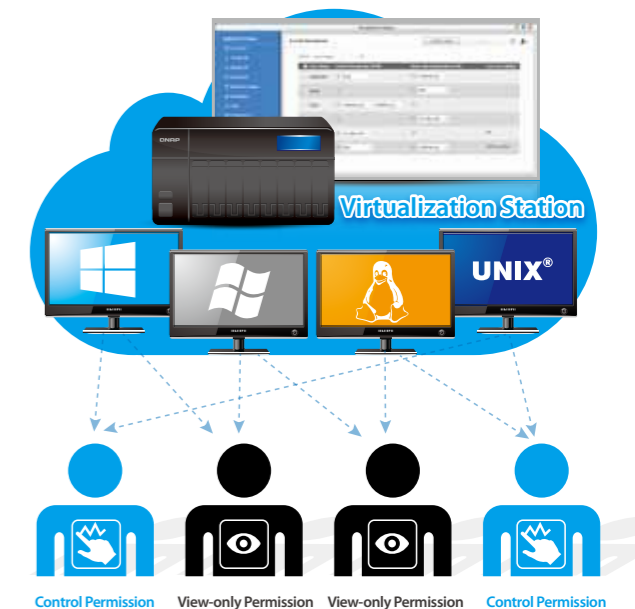
1. IIS Web Server

- Provides a high-speed connection & large storage capacity for web servers
- Operate existing ASP/ASPX web pages & databases on a Virtual Machine with a supported operating system

Virtual Machine 1   Virtual Machine 2   Virtual Machine 3

2. ERP/EIP/CRM system

- High performance computing with Intel® Quad-Core Xeon™ E3-1245 v2 3.4 GHz processor and 10 GbE network interface
- Highly reliable data protection with QNAP RAID technology
- Backup data directly to the QNAP Turbo NAS
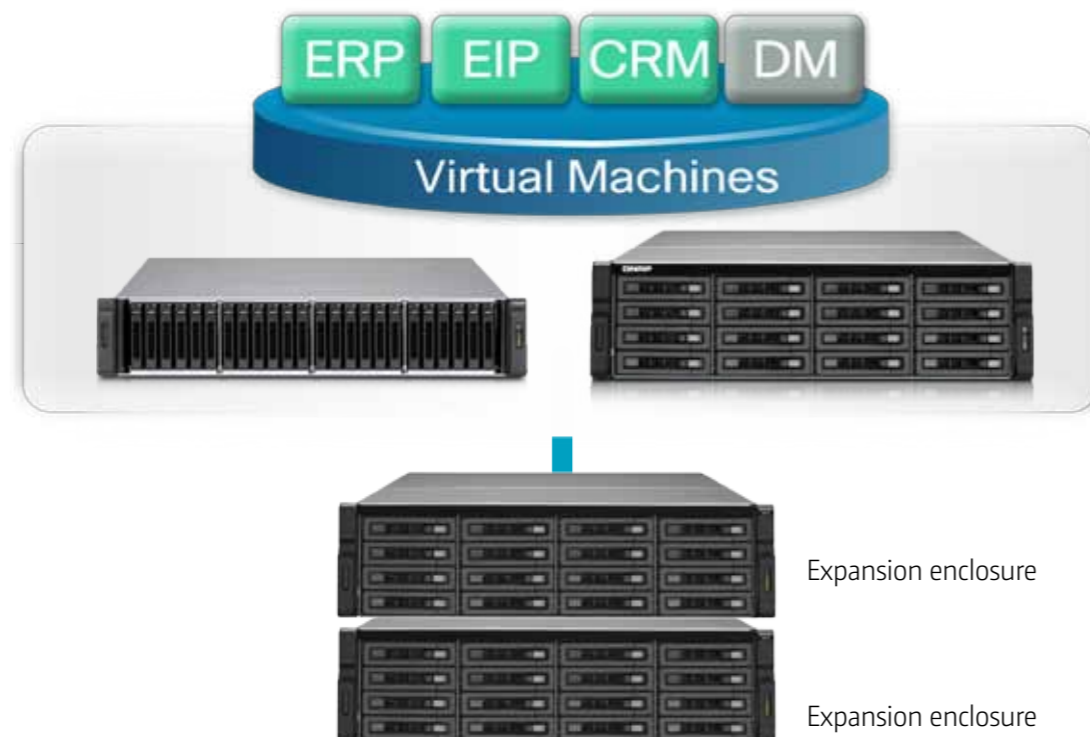
3. Microsoft Exchange Server

- Large storage capacity for storing a vast amount of emails
- Capacity expansion on data backup & storage
- Open archived emails and browse them instantly without downloading

ERP EIP CRM DM
Virtual Machines

Expansion enclosure

Expansion enclosure

Microsoft Exchange Server 2010
Virtual Machine

4. Windows Active Directory Server

Manage servers on the virtual machine easily and efficiently

5. Download more VMs in VM markets

VM markets from providers such as VMware and BitNami offer various VMs for you to download on demand and import to the Turbo NAS to use directly without any complex procedures.

QTS 4.1 Introduction

What is QTS?

QTS (QNAP Turbo NAS System) is the Turbo NAS Operating System, providing file storage, backup, disaster recovery, security management and virtualization applications for businesses; multimedia applications for home, and many more.

QTS Desktop Management

Personalized desktop, intuitive system operations, wonderful visual experience.

Centralized file storage, management and sharing

QTS provides comprehensive cross-platform file storage and sharing. The web-based management interface of File Station allows you to remotely manage, store and share files via web browser from anywhere.

Security Management

QTS offers various options for security management to prevent the system from hacking, and data from interception, theft, and loss. QTS security management meets the electronic requirements of HIPAA (Health Insurance Portability and Accountability Act), performing as an ideal storage solution to store medical records.
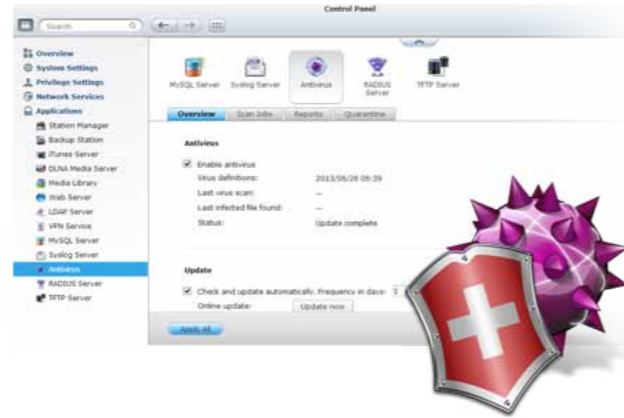
File Backup/Disaster Recovery

The QTS allows data on PCs, servers, virtual machines, and external drives to be backed up to the Turbo NAS; and provides disaster recovery solutions to back up data on the Turbo NAS to external devices or remote servers.
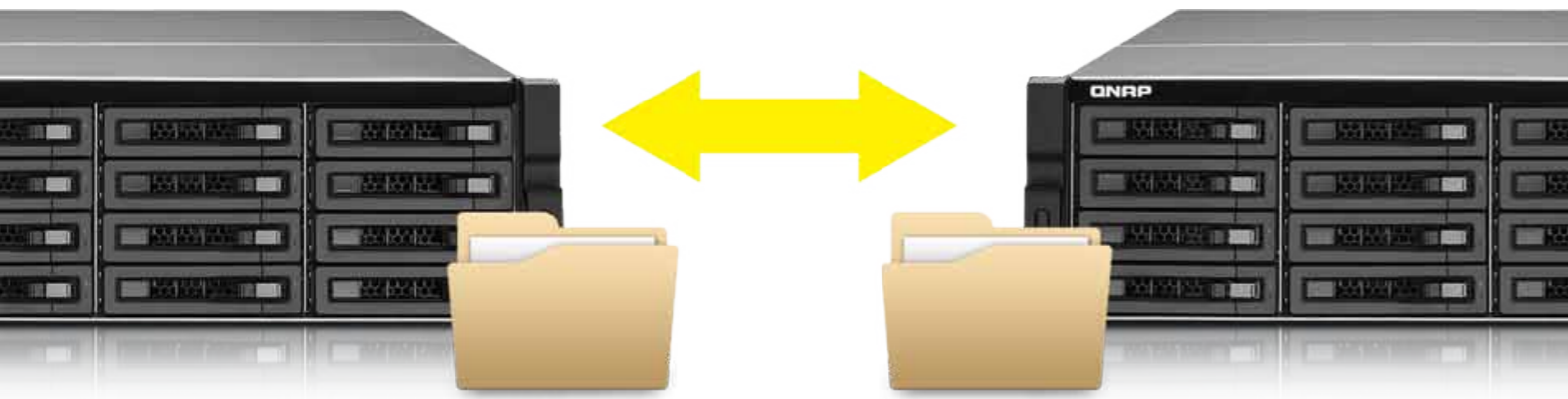
System Management

QTS has comprehensive system management options to greatly decrease time and cost in IT management. The user-friendly QTS graphic interface is easy to operate and can be done without IT expertise required.

Cloud storage and access
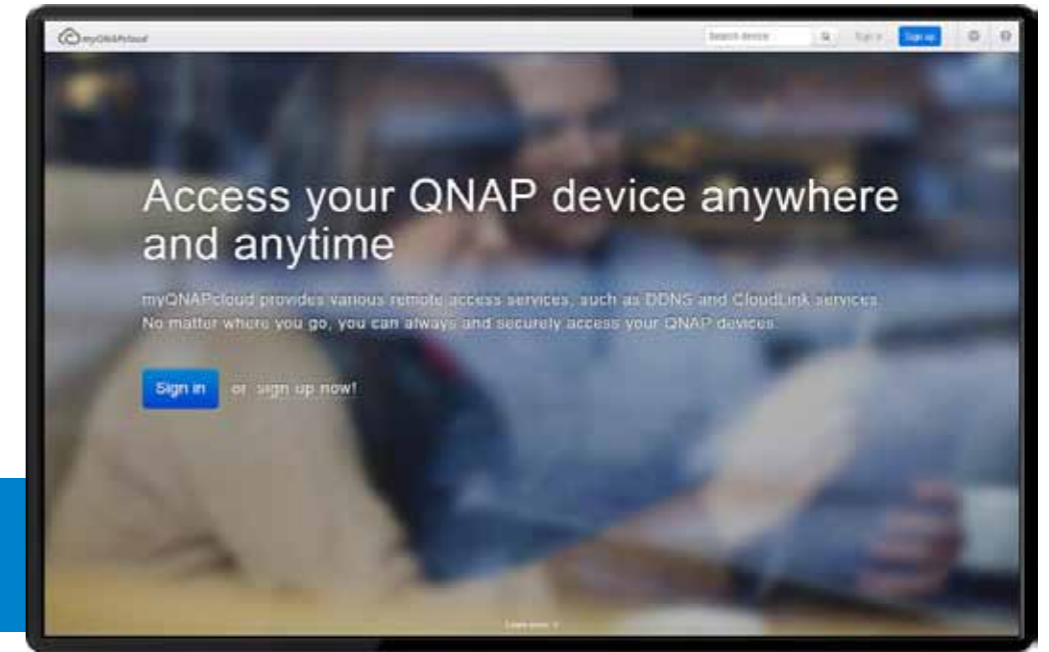
Use the Turbo NAS and myQNAPcloud to create a private cloud or personal cloud to store business documents, personal photos and videos, access the contents anytime & anywhere, and share via various devices.

myQNAPcloud connection

It's so easy to create your personal cloud or private cloud. With the myQNAPcloud service, you can always enjoy the Turbo NAS services safely and conveniently.

Dropbox-like file synchronization

QTS Qsync utility provides file synchronization feature similar to Dropbox, with even larger storage capacity. You can easily upload files in one place and access from multiple devices, and share files with different groups flexibly and effortlessly.

Multimedia Center

QTS Photo Station, Music Station and Video Station provide intuitive user interfaces to simplify the multimedia applications and make them more fun. All the multimedia files are safely stored and classified to be easily shared, even being shared via social networking sites. You can use the owerful Download Station to enrich your video collections and have more fun.

Photo Station

QTS Photo Station helps you archive your life and memories, easily mange, and quickly share with the easiest way. The unique Private Collections safeguard your private photos with the highest level of protection.

Music Station

Build a home music center easily and enjoy your music collection on the go. our Turbo NAS is your music center in the cloud.

Video Station

QTS Video Station is your personal video library with more friendly functions to enhance your video experience. Now, organizing video collectionsbecomes much easier, and sharing videos more fun!

Home theater entertainment

You can enjoy the multimedia content stored on the Turbo NAS with a TV, using the feature of HDMI, DLNA and AirPlay.

Storage Management

400TB

With QTS storage management coupled with the scale-up solution, businesses can balance the costs and benefits when deploying storage systems for big data storage.

Unified Storage and Virtualization Applications

The Turbo NAS supports iSCSI and NFS protocols, and is virtualization ready - VMware® Ready ™ , Citrix® Ready ™ , and Microsoft® Hyper-V ™ compatible, to provide businesses with powerful and flexible storage solutions for virtualization applications.

Support models

Virtualization Station supported models

TS-ECx80U-RP Seres

Model	TS-EC2480U-RP	TS-EC1680U-RP	TS-EC1280U-RP	TS-EC880U-RP
CPU	Quad-core Intel® Xeon 3.4 GHz Processor			
RAM	4GB DDR3 ECC RAM (expandable RAM, up to 32GB[2])			
USB 3.0/2.0	4/4			
eSATA	0			
Number of Internal Hard Drives [1]	24 x 2.5"/3.5" SATA 6Gb/s hard drive or SSD	16 x 2.5"/3.5" SATA 6Gb/s hard drive or SSD	12 x 2.5"/3.5" SATA 6Gb/s hard drive or SSD	8 x 2.5"/3.5" SATA 6Gb/s hard drive or SSD
Maximum Raw Capacity	120 TB	80 TB	60 TB	40 TB
Hard Drive Interface	SATA 6Gb/s (backward compatible with SATA 3Gb/s)			
10/100/1000 Mbps LAN Port	4 (Max. 8)			
10Gbps LAN Port	Yes (optional, max. 4)			
No. of PCIe Expansion Slots	2 (1 x PCIe Gen3 x 8, 1[1] PCIe Gen3 x 4)			
Internal Cache Port	Two mSATA port on board for read caching [3]			
Form Factor	4U, Rackmount	3U, Rackmount	2U, Rackmount	
Dimensions (H) x (W) x (D)	176.15 x 442.5 x 530.5 mm 6.94 x 17.42 x 20.89 inch	130 x 442.5 x 530.5mm 5.12 x 17.42 x 20.89 inch	88 x 442.5 x 530.5 mm 3.46 x 17.42 x 20.89 inch	88 x 442.5 x 530.5 mm 3.46 x 17.42 x 20.89 inch
Weight	23.08 kg/ 50.88 lb (Net) 30.6 kg/ 67.46 lb (Gross)	17.88 kg/ 39.42 lb (Net) 24.2 kg/ 53.35 lb (Gross)	14.18 kg/ 31.26 lb (Net) 20.74 kg/ 45.7 lb (Gross)	14.39 kg/ 31.72 (Net) 20.57 kg/45.35 (Gross)
Power	650W redundant power supply		400W redundant power supply	
Fan	Smart fan: 4 (8cm, 12V DC)		Smart fan: 4 (6cm, 12V DC)	
LCD Screen	No			
Noise Level	48.3 dB(A)	48.0 dB(A)	45.0 dB(A)	41.9 dB(A)
Power Consumption	HDD Standby: 129.43W In Operation: 263.81W	HDD Standby: 119.80W In Operation: 209.47W	HDD Standby: 69.42W In Operation: 121.18W	HDD Standby: 64.04W In Operation: 104.26W

TS-ECx80 Pro*

Model	TS-EC1080 Pro	TS-EC880 Pro
CPU	Quad-core Intel® Xeon 3.4 GHz Processor	
RAM	2GB DDR3 ECC RAM (expandable RAM, up to 32GB [2])	
USB 3.0/2.0	3/6	3/6
eSATA	2	
Number of Internal Hard Drives [1]	10 x 2.5"/3.5" SATA 6Gb/s hard drive or SSD	8 x 2.5"/3.5" SATA 6Gb/s hard drive or SSD
Maximum Raw Capacity	50 TB	40 TB
Hard Drive Interface	SATA 6Gb/s (backward compatible with SATA 3Gb/s)	
10/100/1000 Mbps LAN Port	4 (Max. 6)	
10Gbps LAN Port	Yes (optional, max. 2)	
No. of PCIe Expansion Slots	1 (1 x PCIe Gen3 x 8)	
Internal Cache Port	Two mSATA port on board for read caching [3]	
Form Factor	Tower	
Dimensions (H) x (W) x (D)	217.5 x 327 x 321.2 mm / 8.56 x 12.8 x 12.65 inch	
Weight	12.52 kg/27.61 lb (Net) / 19.75 kg/43.54 lb (Gross)	12.52 kg/27.61 lb(Net) / 19.75 kg/43.54 lb (Gross)
Power	350W power supply	
Fan	Smart fan: 2 (12cm, 12V DC)	
LCD Screen	Yes	
Noise Level	54.57 dB(A)	54.57 dB(A)
Power Consumption	HDD Standby: 44.21W / In Operation: 130W	HDD Standby: 42.21W / In Operation: 122W

* All specifications are subject to change without notice.
[1] The standard system is shipped without hard drives.
[2] When upgrading RAM to more than 28GB, the original 4GB RAM modules must be removed.
[3] The standard system is shipped without mSATA flash.

** More compatible models, please contact **sales@qnap.com**

*** TS-x51 series and TS-ECx80 Pro models require additional memory. For more information regarding how to upgrade memory, please visit QNAP website.

TS-ECx79U-RP Series

Model	TS-EC879U-RP	TS-EC1279U-RP	TS-EC1679U-RP
CPU	Intel® Xeon® E3-1225 v2 (3.2 GHz) Quad-Core processor		
RAM	System memory: 4 GB DDR3 ECC RAM; Memory module pre-installed: 4 GB x1 Total memory slots: ; Memory expandable up to: 32 GB (8GB x4)		
eSATA	2 (rear)		
USB	2x USB 3.0 port (rear), 4x USB 2.0 port (rear) Support USB printer, pen drive, USB hub, and USB UPS etc.		
Hard Disk Drive*	8 x 2.5"/3.5" SATA 6Gb/s hard drive or SSD	12 x 2.5"/3.5" SATA 6Gb/s hard drive or SSD	16x 2.5"/3.5" SATA 6Gb/s hard drive or SSD
Maximum storage capacity	32 TB	48 TB	64 TB
Compatible hard drive interface	SATA 6Gb/s & SATA 3Gb/s		
Gigabit LAN Port	4 x Gigabit RJ-45 Ethernet port (Optional dual-port 10 Gb and 1 Gb network card are supported, expandable to 8 x 1 GbE or 4 x 10 GbE + 4 x 1 GbE)		
PCI-E Slot	2 (for network or stoage expansion)		
Form Factor	2U, Rackmount	2U, Rackmount	3U, Rackmount
Dimension (H) x (W) x (D)	88 x 439 x 520 mm	88 x 439 x 520 mm	130 x 442.4 x 528.3 mm
Weight (Net/Gross kg)	12.52 / 20.76	15.88 / 22.92	18.14 / 25.92
Power Supply	Output: 300W	Output: 600W	
Fan	3 x (6cm, 12V DC)		
Sound Level	54.57 dB(A)	48.17 dB(A)	55.13 dB(A)
Power Consumption	Sleep mode: 68W / In operation:132W	Sleep mode: 150W / In operation: 167W	Sleep mode: 182.5W / In operation: 229W

SAS Series

Model	SS-EC1279U-SAS-RP	SS-EC1879U-SAS-RP	SS-EC2479U-SAS-RP	TS-EC1279U-SAS-RP	TS-EC1679U-SAS-RP
CPU	Intel® Xeon™ E3-1245 v2 (3.4 GHz) Quad-Core CPU				
Memory	System memory: 8 GB DDR3 ECC RAM; Memory module pre-installed: 4 GB x2 Total memory slots: 4; Memory expandable up to: 32 GB (8GB x4)				
DOM	512MB USB DOM				
Compatible hard drive interface	12 x 2.5" SAS/SATA 6Gb/s hard drive or SSD	18 x 2.5" SAS/SATA 6Gb/s hard drive or SSD	24 x 2.5" SAS/SATA 6Gb/s hard drive or SSD	12 x 2.5" SAS/SATA 6Gb/s hard drive or SSD	16 x 2.5" SAS/SATA 6Gb/s hard drive or SSD
Gigabit LSlot	2 (for network or storage expansion)				
Gigabit LAN Port	4 (Expandable up to 8 x 1 Gb LAN or 4 x 10 Gb + 4 x 1 Gb LAN by installing optional dual-port 10 Gb and 1 Gb network card)				
10GbE LAN Port	Yes (Optional dual-port 10 GbE NIC)				
I/O	USB 3.0 x 2, USB 2.0 x 4, HDMI x 1, expansion port x 1				
Dimension (H) x (W) x (D)	177(H) x 180(W) x 235(D) mm	175(H) x 257(W) x 235(D) mm	185.2(H) x 298.2(W) x 235.4(D) mm	88(H) x 439(W) x 520(D) mm	130(H) x 442.4(W) x 528.3(D) mm
Weight (Net/Gross kg)	10.8 / 16.28	10.8 / 16.28	10.8 / 16.28	16.04 / 24.78	18.3 / 27.38
Power Supply	Redundant/ Hot Swap ATX Power Supply, 600W, 100-240 V AC, 50-60Hz				
Fan	3 x 6 cm				
Power Consumption	Sleep mode: 118.1W / In operation: 157W	Sleep mode: 126.4W / In operation: 206W	Sleep mode: 138.7W / In operation: 270W	In operation: 296W	In operation: 368W

* All specifications are subject to change without notice.

** More compatible models, please contact **sales@qnap.com**

Virtualization Station supported models

TS-x51*/ TS-x51-4G Series

Model	TS-251 / TS-251-4G	TS-451 / TS-451-4G	TS-651 / TS-651-4G	TS-851 / TS-851-4G
CPU	Dual-Core Intel® Celeron® 2.41GHz (Burst up to 2.58GHz)			
Memory (RAM)	1GB SO-DIMM DDR3L-1333 / 4GB SO-DIMM DDR3L-1333			
Flash	512MB (DOM)			
Number of RAM Slots	2 (Max 8 GB)			
Max. number of HDDs/SSDs	2 x 2.5" or 3.5" SATA 6Gb/s, 3Gb/s; hot-swappable	4 x 2.5" or 3.5" SATA 6Gb/s, 3Gb/s; hot-swappable	6 x 2.5" or 3.5" SATA 6Gb/s, 3Gb/s; hot-swappable	8 x 2.5" or 3.5" SATA 6Gb/s, 3Gb/s; hot-swappable
Expansion Enclosure Support	1 (UX-800P, UX-500P)			
Gigabit LAN Ports	2			
USB Ports	USB 3.0: 2, USB 2.0: 2	USB 3.0: 2, USB 2.0: 2	USB 3.0: 3, USB 2.0: 2	USB 3.0: 3, USB 2.0: 2
IR Sensor (MCE Remote)	Yes	Yes	Yes	Yes
HDMI	1	1	1	1
LED Indicators	Power/Status, LAN, USB, HDD1-2	Power/Status, LAN, USB, HDD1-4	Power/Status, USB, LAN. HDD 1-6	Power/Status, USB, LAN. HDD 1-8
Form Factor	Tower	Tower	Tower	Tower
Dimensions (HxWxD)	168.5 x 102 x 225 mm 6.63 x 4.02 x 8.86 inch	177 x 180 x 235 mm 6.97 x 7.09 x 9.25 inch	175 x 257 x 235 mm 6.89 x10.12 x 9.25 inch	185.2 x 298.2 x 235.4 mm 7.29 x 11.74 x 9.27 inch
Weight (Net/ Gross)	1.28 kg (2.82 lbs) / 2.32 kg (5.11 lbs)	3 kg (6.61 lbs) / 4.3 kg (9.48 lbs)	"6.18 kg (13.62 lbs) / 6.9 kg (15.21 lbs)"	"7.83 kg (17.26 lbs) / 8.9 kg (19.62 lbs)"
Temperature and Humidity	0 - 40 ˚ C, 5 - 95% R.H	0 - 40 ˚ C, 5 - 95% R.H	0 - 40 ˚ C, 5 - 95% R.H	0 - 40 ˚ C, 5 - 95% R.H
Power Supply Specification	External Power Adapter, 60W, 100-240V	External Power Adapter, 90W, 100-240V	ATX 250W, Input: 110-240 Vac~, 50-60Hz, 5A	ATX 350W, Input: 110-240 Vac~, 50-60Hz, 5A
Power Consumption: HDD Sleep (W)	10.28	15.85	21.08	26.81
Power Consumption: Typical Operation (W)	19.22	31.07	39.42	56.79
Power off: S3 Sleep (W)	0.47	0.55	0.41	0.72
Windows Upload / Download - Link Aggregation (MB/s)	222 / 224	216 / 224	223 / 224	223 / 224
RAID Recovery	Yes			
Online RAID Capacity Expansion	Yes			
Online RAID Level Migration	Yes			
RAID Type	Single Disk, RAID 0, RAID 1, JBOD	Single Disk, RAID 0, RAID 1, RAID 5, RAID 6, RAID 10, RAID 5 + Spare, JBOD	Single Disk, RAID 0, RAID 1, RAID 5, RAID 6, RAID 10, RAID 5/6/10 + Spare, JBOD	
Global Hot Spare	-	Yes		
Surveillance Station - Default IP Cameras	2			
Surveillance Station - Max IP Cameras	24 (optional license purchase)			
Virtualization Station	Yes (Max 1 running VM; RAM of NAS >= 2 GB)			
VPN Server (PPTP + OpenVPN)	Yes			
Max. Number of Users	4096			
Max. Number of User Groups	512			
Max. Number of Shared Folders	512			
Max. Number of Concurrent Connections	600			

* All specifications are subject to change without notice.

** More compatible models, please contact **sales@qnap.com**

*** TS-x51 series and TS-ECx80 Pro models require additional memory. For more information regarding how to upgrade memory, please visit QNAP website.