# QNAP

# TL-R1200PES-RP
# TL-R1600PES-RP
# TL-R2400PES-RP

## PB-scale with cascade PCIe JBOD
## / Expansion card series
## for enterprise QNAP NAS



QXP-3X8PES
expansion card



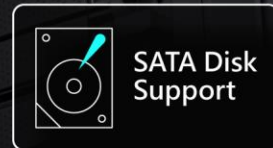QXP-3X4PES
expansion card



CAB-PCIE10M-8644-8X
PCIe JBOD special cable
( For QXP-3X8PES only )
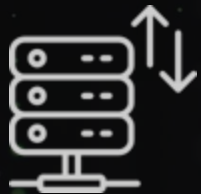


CAB-PCIE10M-8644-4X
PCIe JBOD special cable



SATA Disk
Support

# TL-R1200PES-RP, TL-R1600PES-RP TL-R2400PES-RP petabyte-scale storage

PB Scale

## PB-scale solutions

SATA HDD (22 TB Each) with 12 units in series for a total capacity of 4 PB

## Maximum 12 JBODs supported

A single NAS can support up to 12 TL PES SATA JBOD units (depending on the NAS platform and the number of PCIe slots, please refer to the NAS/JBOD compatibility list)

## Bandwidth up to 64 Gb/s

With the QXP-3X8PES expansion card, the bandwidth can reach up to 64 Gb/s, making data transfer much faster

## Support up to 288 SATA drives

12 x TL-R2400PES-RP JBOD can support up to 288 cost-effective (SATA) disks

## Host-based power management

JBOD power status is linked with the host NAS, which helps to reduce hardware management tasks for IT staff.

HOT SWAP

## Hot-swappable functionality for easy migration

In addition to supporting hot-swappable hard drives, JBOD hot-swappable is also provided, making it faster for IT personnel to migrate large amounts of data between NAS models

# Budget-conscious 1PB space?
# Private on-premise cloud v.s. public cloud

AWS S3 public cloud storage cost is calculated based on the western US region with 1 petabyte (uploading 85 TB per month) which costs about US$25,500, and you need to pay separately for removing data. QNAP has launched the new TL PCIe Interface SATA JBOD, which uses 2 x TL-R2400PES JBOD, 1 x QXP-3X8PES expansion card and 46 x 22TB hard drives, with a total cost of only $24,500. Buying the NAS with JBOD can provide significant cost saving in the long run.

| | Private cloud expansion | Public cloud augmentation |
|---|---|---|
| Control | Take full control | Partial control |
| Sensitive data security | Higher | Could be lower |
| Hardware required | Necessary | Unnecessary |
| Configuration | Customize | Preset configurations |
| Scalability | limited | Higher |
| Performance | Higher | Lower |
| 1PB cost | low | Ignore (does not include cost of reading data) |

Link: https://aws.amazon.com/tw/s3/pricing/

# Add additional PB storage for QNAP all-flash NAS models

## Enterprise - All-Flash NAS series

## Rack-mounted PCIe JBOD series
TL-R1200PES-RP, TL-R1600PES-RP, TL-R2400PES-RP



As enterprises set up QNAP's high-speed, all-flash NAS storage devices, IT can expand the QNAP PCIe JBOD series to reach up to 4 petabytes of storage capacity whenever the company grows with more storage need.

To find out what NAS models that are compatible with PCIe JBOD, refer to the compatibility list below
https://www.qnap.com/go/compatibility-expansion/pcie

# Expand NAS capacity with TL PCIe JBOD, total up to **288** disks, and **4 PB** capacity

12 x TL-R2400PES-RP
PCIe JBOD

288 x 22TB
3.5-inch SATA HDD

Note: For details about the number of NAS systems supported, see Compatibility List
https://www.qnap.com/go/compatibility-expansion/pcie

# QNAP all-flash NAS supports the new TL PCIe JBOD for additional petabyte capacity

| | TDS-h2489FU | TS-h2490FU | TS-h1090FU | TS-h3088XU-RP (coming soon) |
|---|---|---|---|---|
| **CPU** | 2 x Intel Xeon Silver Series | AMD EPYC 7002 series | AMD EPYC 7002 series | Intel® Xeon W-1200 series |
| **NAS max RAM support** | 1 TB | 4 TB | 1 TB+ (12 x 128 GB) | 128 GB |
| **Form factor** | 2U rackmount | 2U rackmount | 1U rackmount | 2U rackmount |
| **Storage Interface** | 2.5-inch U.2 NVMe | 2.5-inch U.2 NVMe | 2.5-inch U.2 NVMe / SATA | 2.5-inch SATA SSD |
| **Drive bay** | 24-bay | 24-bay | 10-bay | 30-bay |
| **NAS max capacity** | 118 TB | 118 TB | 34.5 TB | 150 TB |
| **Max support PCIe JBODs** | 10 | 12 | 8 | 4 |
| **PCIe JBOD max capacity** | 3 PB | 4 PB | 2 PB | 1 PB |

Note:
1. U.2 Is based on 7.68TB
2. JBOD max capacity is based on 3.5" SATA 22TB HDD

3. Based on NAS QuTS hero h5.1.2 and above

# The supported NAS models as of Dec. 2023

| Model | PCIe Slot | Recommend Card | Max Bandwidth | Max capacity | Max JBODs | Max Memory | BIOS | Notes |
|---|---|---|---|---|---|---|---|---|
| TS-h3087XU-RP | Slot 2, Slot 3 | QXP-3X4PES | 32Gb/s | 1 PB | 4 | 128 GB | Q08HAR16 above | |
| TS-h2287XU-RP, TS-h1887XU-RP | Slot 2, Slot 3 | QXP-3X4PES | 32Gb/s | 1 PB | 4 | 128 GB | Q084AR15 above | |
| TS-h987XU-RP | Slot 1 | QXP-3X8PES | 64Gb/s | 1 PB | 4 | 128 GB | Q08DAR17 above | |
| TDS-h2489FU | Slot 1 | QXP-3X8PES | 64Gb/s | 3 PB | 10 | 1000 GB | Q053AR24 above | |
| TS-h2490FU | Slot 1, Slot 2, Slot 3 | QXP-3X4PES QXP-3X8PES ( Slot 2 only ) | 64Gb/s | 4 PB | 12 | 4000 GB | Q03XAR19 above | Only PCIe slot 2 can support 64Gb/s and the maximum # of JBOD is 4. However, if the slot 3 is used, then the slot 2 bandwidth becomes 32Gb/s. |
| TS-h1090FU | Slot 1, Slot 2 | QXP-3X8PES | 64Gb/s | 2 PB | 8 | 1000 GB | Q09BRR10 above | |
| TS-855eU, TS-855eU-RP | Slot 2 | QXP-3X4PES | 32Gb/s | 0.5 PB | 2 | 64 GB | Q0BUAR08 above | |

# The 2ⁿᵈ phase of compatible rackmount NAS is planned for 2024 Q1

## Models

TS-h1886XU-RP R2, TS-h2483XU-RP, TS-2483XU-RP, TS-h1683XU-RP, TS-1683XU-RP, TS-h1283XU-RP, TS-1283XU-RP, TS-883XU-RP, TS-983XU-RP, TS-h3088XU-RP, TS-h2477XU-RP, TS-h1677XU-RP, TS-h1277XU-RP, TS-877XU-RP, TS-h977XU-RP, TS-h977XU, TS-1273AU-RP, TS-1673AU-RP, TS-873AeU, TS-873AeU-RP, TS-h3077AFU-RP, TS-h1677AXU-RP, TS-h1277AXU-RP

# [ Purchase accessories ] Dual-port PCIe expansion cards QXP-3X8PES, QXP-3X4PES & connection cables CAB-PCIE10M-8644-4X, CAB-PCIE10M-8644-8X

The new high-speed dual-port PCIe expansion card with 8X/4X special cable supports TL-R1200PES-RP, TL-R1600PES-RP, and TL-R2400PES-RP PCIe JBOD series, providing up to 64Gb/s bandwidth support for QNAP-compatible NAS. **Please note that the JBOD unit does not include an expansion card; it only contains an 8X connection cable. The expansion card and 4X connection cable must be purchased separately.** Please refer to the PCIe JBOD compatible list for selection.
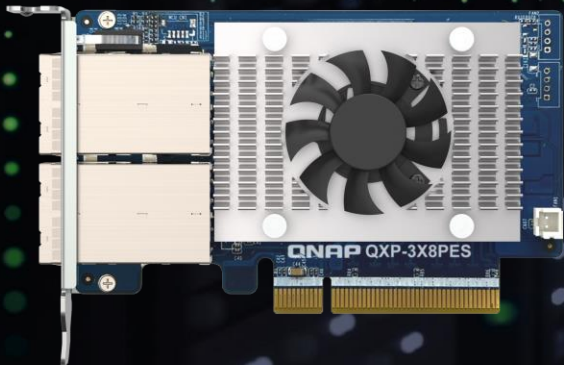


QXP-3X8PES expansion card
( Optional )

CAB-PCIE10M-8644-8X
PCIe JBOD special cable ( For QXP-3X8PES
only, JBOD package contains 1 cable )

QXP-3X4PES expansion card
( Optional )

CAB-PCIE10M-8644-4X
PCIe JBOD special cable
( Optional )

# The NAS operating system must be QuTS hero h5.1.2 / QTS 5.1.2 or higher, and the BIOS may be required for an update.

Please check the compatible list first and update your NAS QTS/QuTS hero version and BIOS firmware. For more details, refer to the compatibility list.

Compatibility: https://www.qnap.com/go/compatibility-expansion/pcie

QTS 5.1.2
QuTS hero 5.1.2

BIOS

QNAP
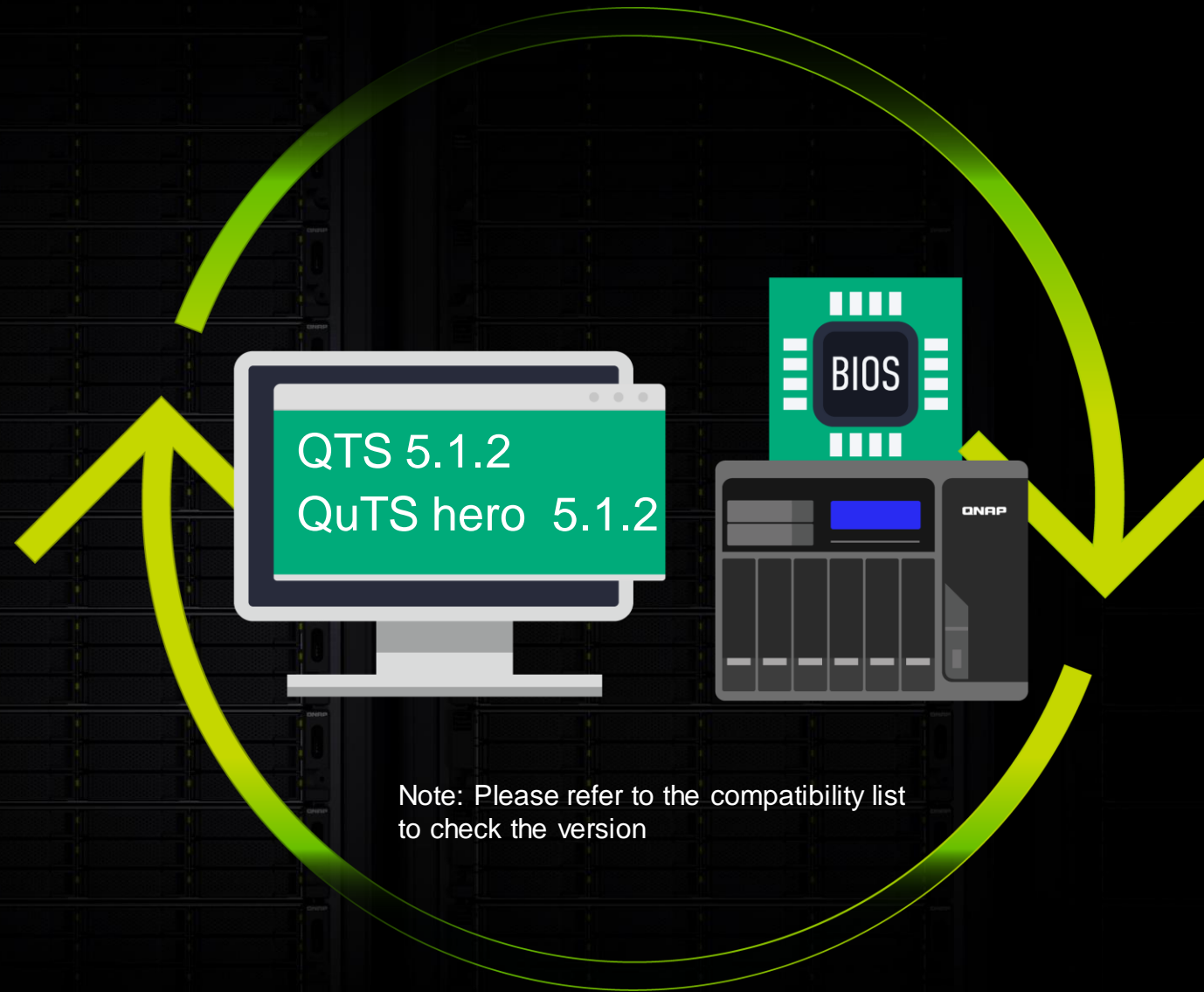
Note: Please refer to the compatibility list to check the version

# NAS TS-h2490FU + 3 x QXP-3X4PES cards connecting 12 x TL-R1200PES-RP
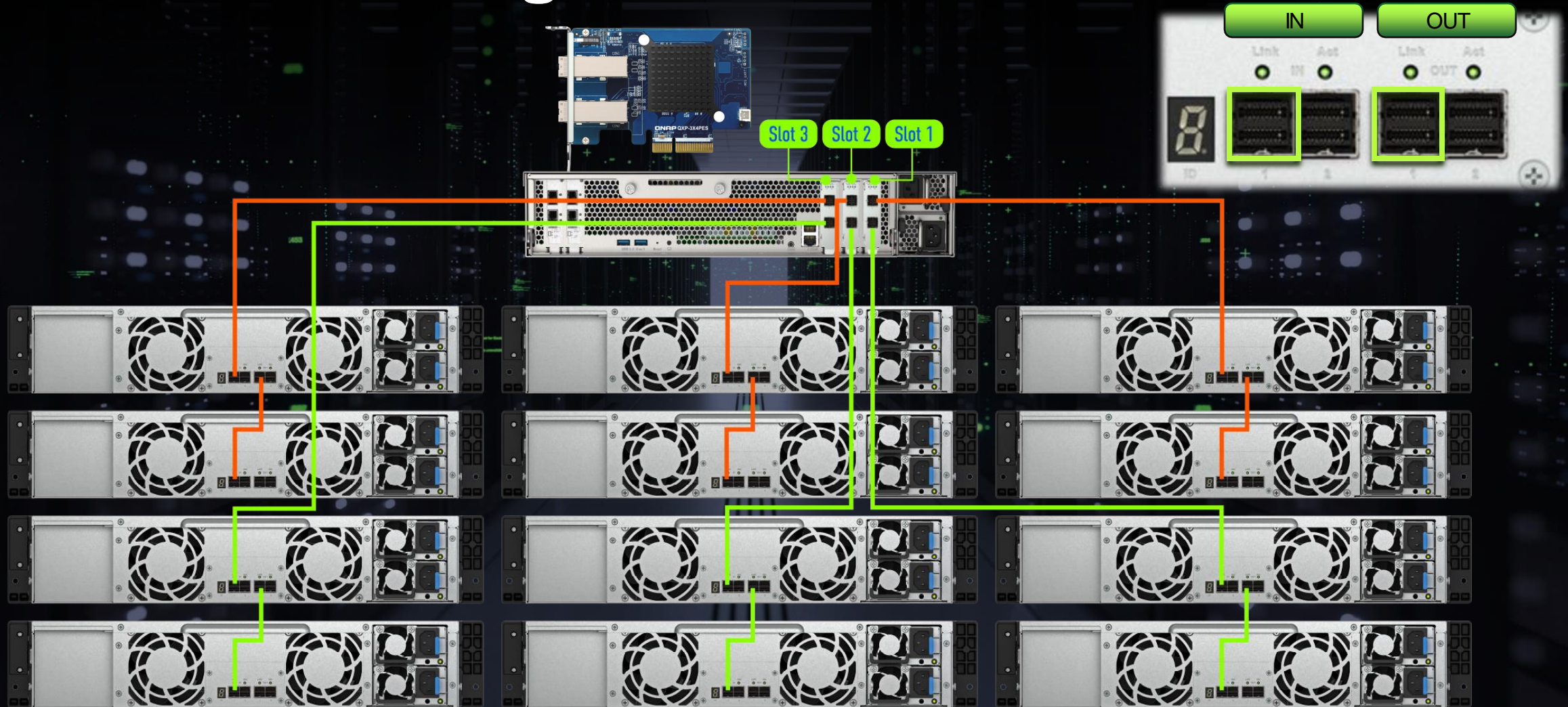
# TL-R1200PES-RP & TL-R1600PES-RP short-depth 37-cm / 14.6-inch design

Different from the typical 2U/3U rackmount JBODs that are over 60 cm deep and heavy, the QNAP PCIe JBOD series has a 30% smaller and lightweight design, making it the top choice for business users with redundant power design.

The volume is significantly reduced by 30%, which can save transportation costs.

The 37cm / 14.6-inch short-depth chassis is designed to be lightweight and friendly for setting up.

37cm /14.6 inch

TL-R1600PES-RP

13.1cm / 5.17 inch

43.2cm / 17 inch

37cm /14.6 inch

TL-R1200PES-RP

8.9cm / 3.49 inch

43.2cm / 17 inch

short depth
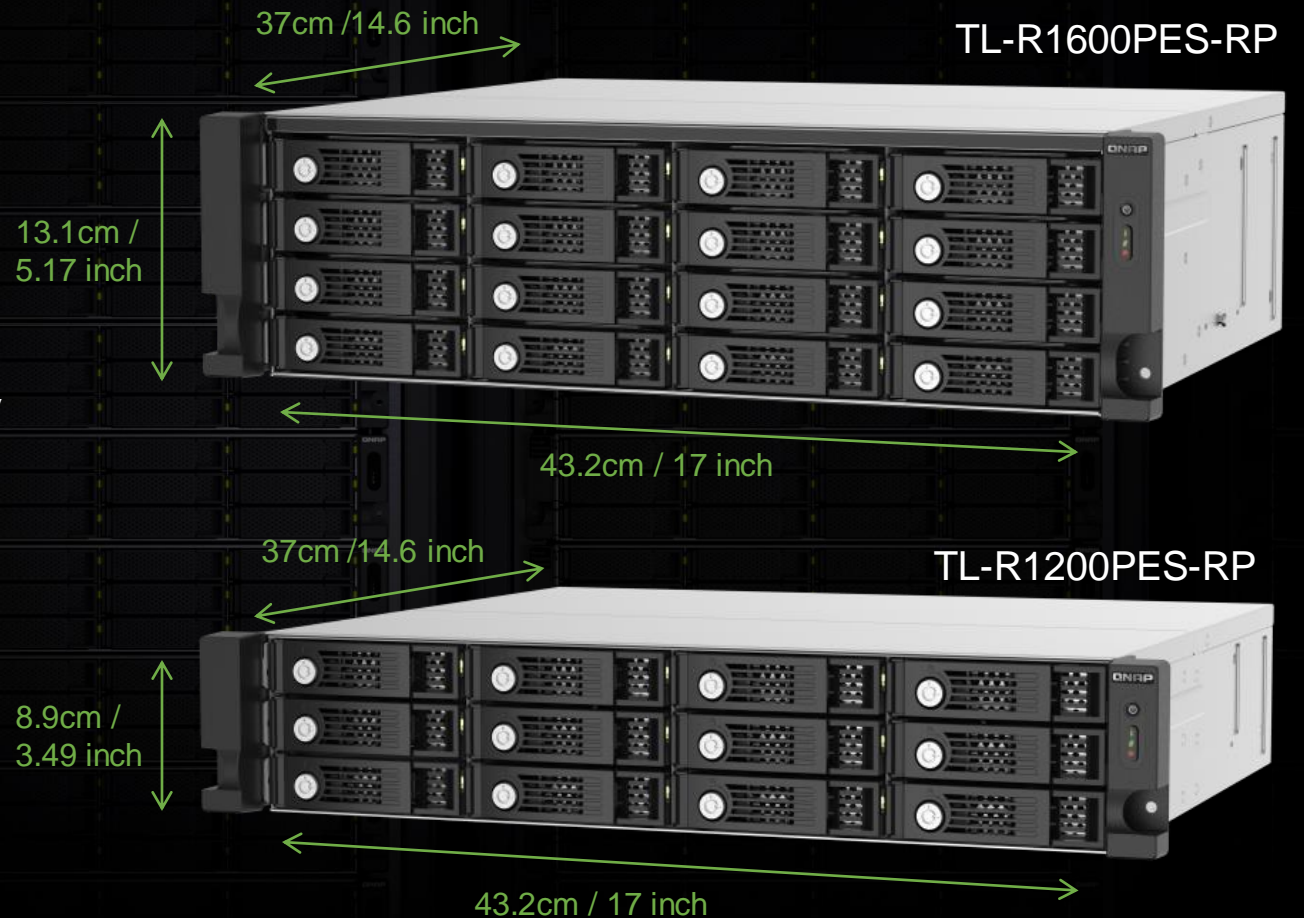
# The hot-swappable function makes it easier for IT to migrate large-capacity JBODs

When NAS transmits a large number of files or a single large amount of data over a network, it not only takes a long time to transfer but also occupies a lot of bandwidth, resulting in reduced work efficiency. The TL-R1200PES-RP, TL-R1600PES-RP, and TL-R2400PES-RP support hot-swappable data migration: just install the QXP-3X4PES or QXP-3X8PES on another NAS B, safely uninstall the JBOD from NAS A, and then arrange the migration, transport the JBOD to another location, and then connect and mount it with the NAS.
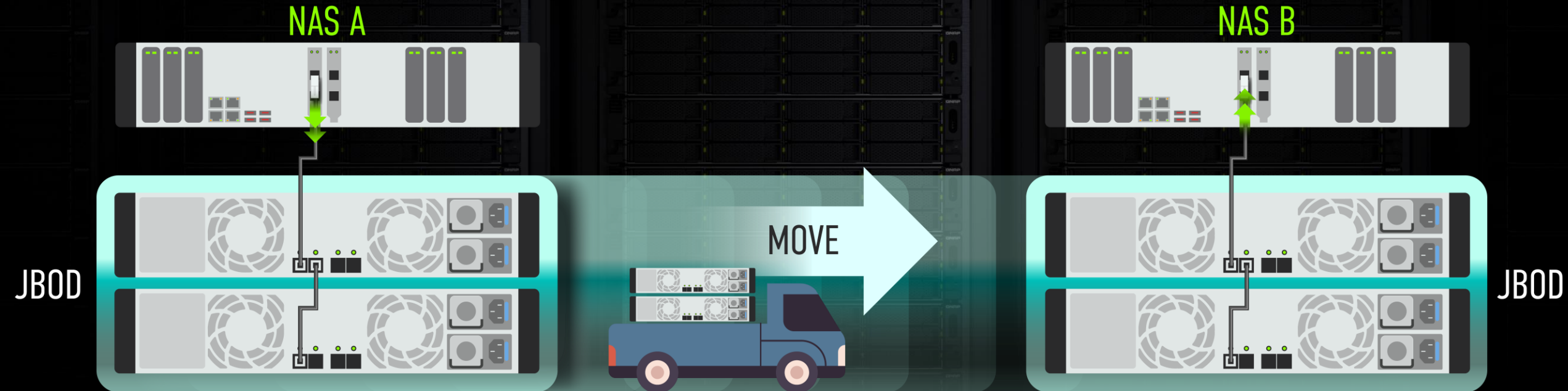
# Host-based power management

When the power outage occurs, usually the expansion JBOD device of NAS will also shut down. When the power is recovered, IT personnel needs to press the power button on-site to restart the expansion JBOD device, making it difficult to restart the JBOD if the server room is at a remote location or during off-work hours. To eliminate the inconvenience of switching on JBODs physically on site, the new QNAP TL PCIe JBODs provide a convenient function that allows the power on/off to be linked to the power status of NAS host, which can be used to turn on the JBOD together when the NAS is restarted after a power recovery.

# TL-R1200PES-RP front / rear view

**Power button**

**Status**

**Link**

**FAN error**

QNAP

LOCK

**Disk Tray with Lock**

**Disk status**
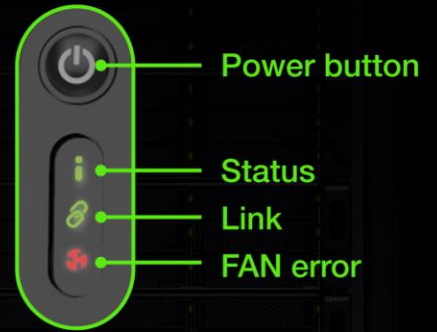
**2 x Cooling Fans**

**Tray keys in pack**

H x W x D

(88.65 x 482.2 x 423.8 mm)

(3.49 x 18.98 x 16.69 inch)
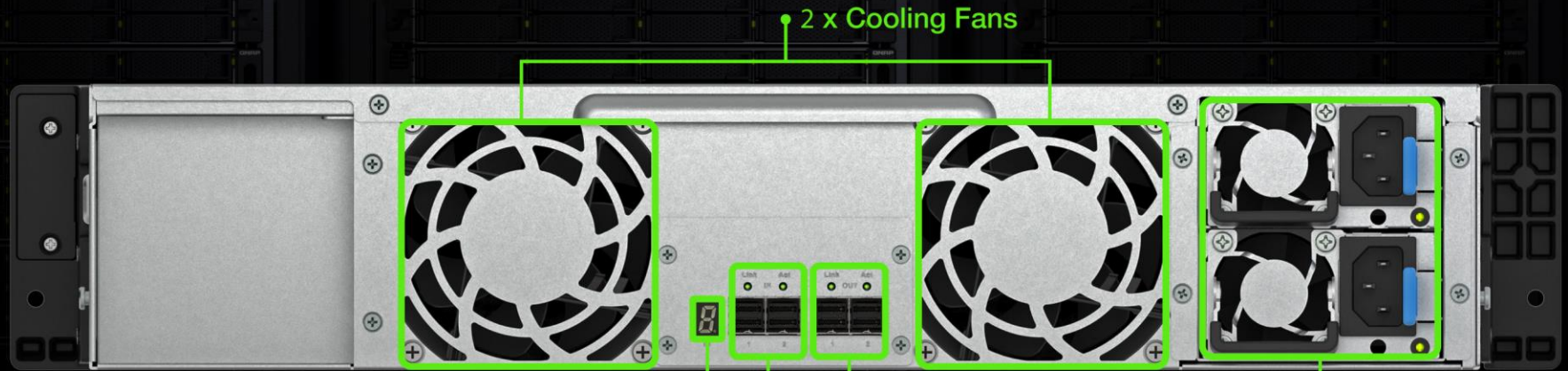
**Enclosure ID**    **input**    **output**

**Redundant Power**

# TL-R1600PES-RP front / rear view

QNAP

Power button

Status

Link

FAN error

**Disk Tray with Lock**

LOCK
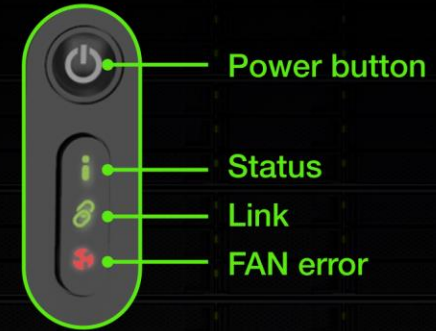
**Disk status**

**3 x Cooling Fans**

**Tray keys in pack**

H x W x D

(131.3 x 482.2 x 425.3 mm)

(5.17 x 18.98 x 16.74 inch)
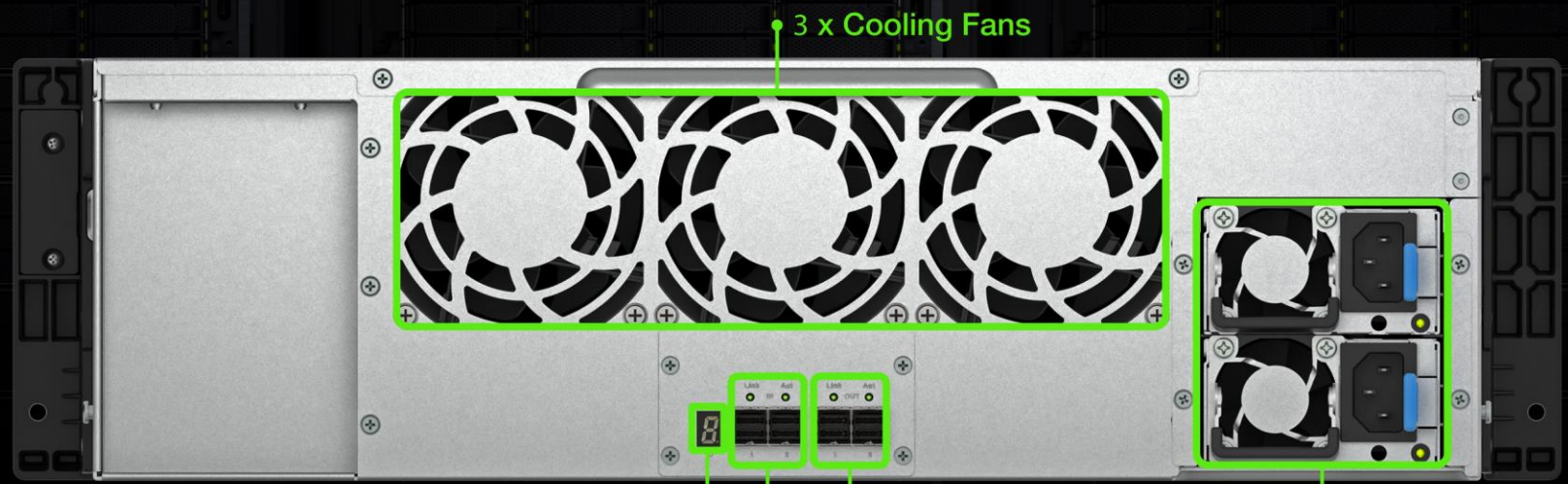
Enclosure ID input output

**Redundant Power**

# TL-R2400PES-RP front / rear view

Power button

Status

Link

FAN error
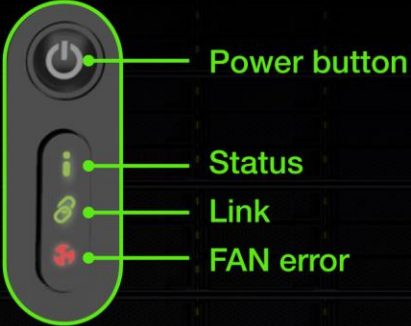
Disk status

Redundant Power

H x W x D

(176.15 x 442.4 x 630.2 mm)

(6.94 x 17.42 x 24.81 inch)
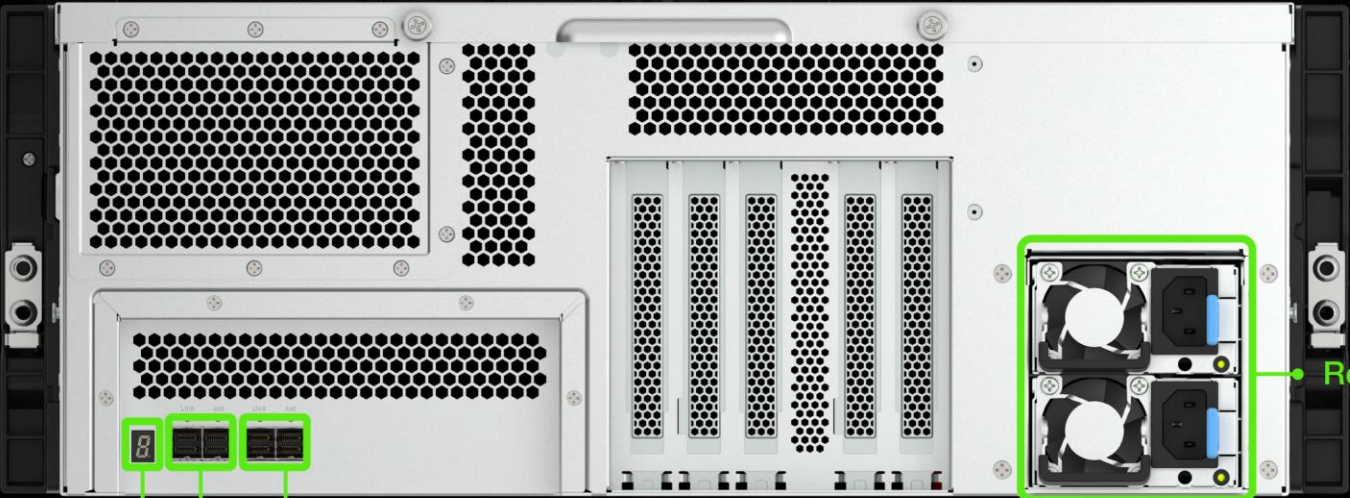
Enclosure ID ● input ●← output

# PCIe JBOD port I/O & LED of TL-R1200PES-RP, TL-R1600PES-RP, and TL-R2400PES-RP

| No. | Component | Description |
|-----|-----------|-------------|
| 1 | Enclosure ID | Show enclosure ID (0 - 9, A, b, c) |
| 2 | IN | Connect to NAS host or upstream JBOD |
| 3 | OUT | Connect to downstream JBOD |
| 4 | LINK LED | When the connection bandwidth is PCIe Gen 3x8, the LED is green, and it will turn to amber at lower. |
| 5 | ACT LED | Steady green LED when the JBOD link connection is normal; blinking green LED during activity. |
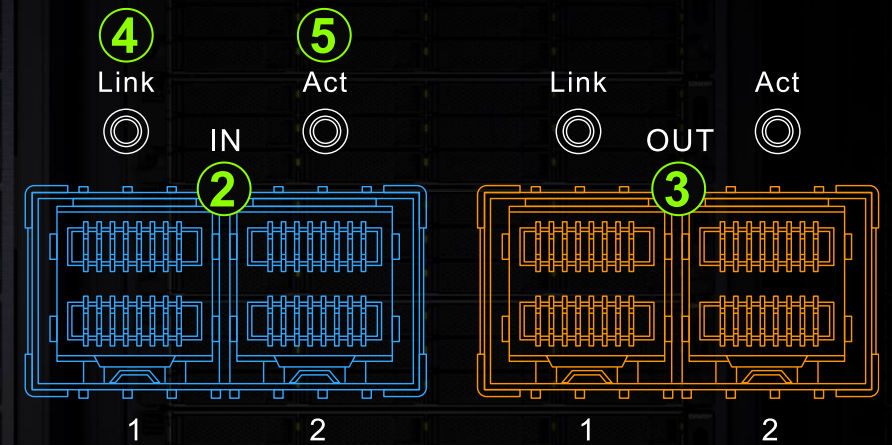
# Expand the NAS storage pool capacity

Expand NAS storage pool: It is a commonly used function for IT personnel to expand the capacity of the NAS. After the NAS correctly identifies the new JBOD, select the storage pool where the JBOD is located in the QTS UI, and then select [Expand Pool] in the action, and follow the steps to get more storage space.



⚠ Storage pool expansion allows only the same kinds of disks, SSDs and HDDs cannot be mixed

Live
Demo

# SAS JBOD data migration:
# SATA HDDs from SAS JBOD to PCIe SATA JBOD

To migrate the JBOD with SATA HDD expansion on the original NAS from SAS JBDO to SATA JBOD, perform the following steps: 1. Safely detach pool, 2. Normal shutdown, 3. To install the PCIe expansion card, 4. Transferring SATA HDD to PCIe JBOD, 5. Remove SAS JBOD, 6. Boot NAS after connecting the PCIe JBOD, 7. Mount and restore.



SAS expansion card

TS-h2490FU (NAS)

PCIe expansion card

Safely detach

Recover

TL-R1620Sep-RP
(SAS JBOD)

TL-R1600PES-RP
(PCIe JBOD

16 x HDDs

| Action ▾ | Action ▾ |
|---|---|
| Locate | Locate |
| Rename enclosure | Rename enclosure |
| Attach and Recover Storage Pool | Attach and Recover Storage Pool |
| Safely Detach | Safely Detach |
| Update firmware | Update firmware |
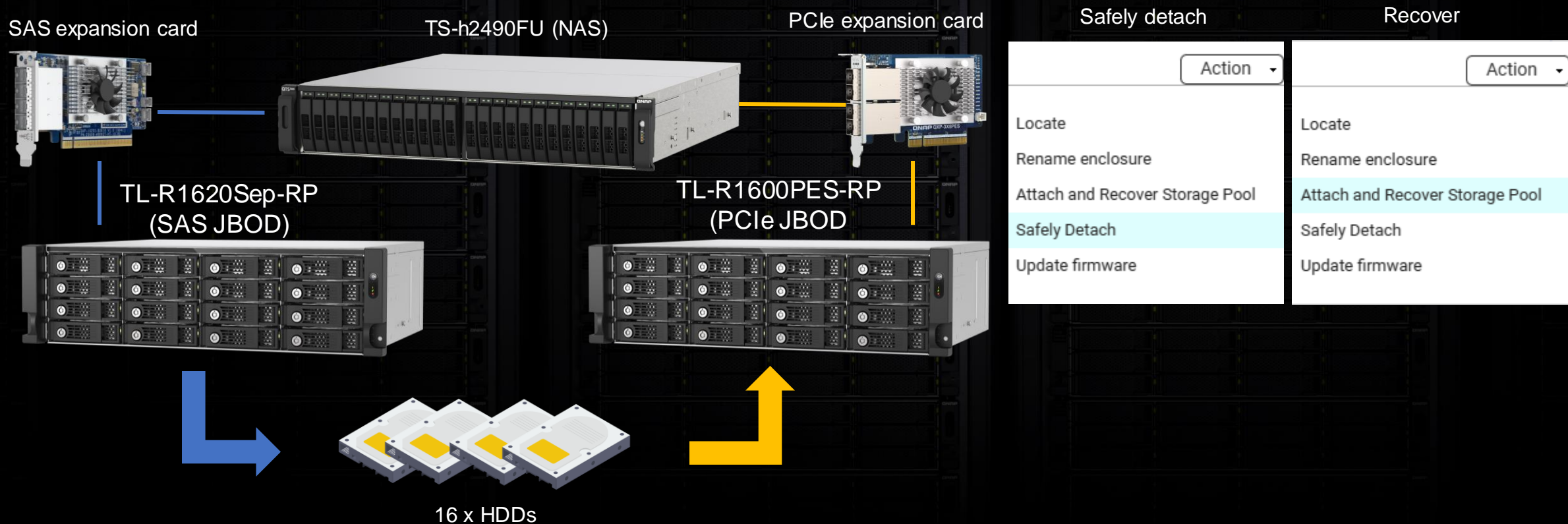
# Comprehensive QNAP JBOD choices for storage expansion

* JBOD is calculate with 3.5" 22TB HDD

| | PCIe JBOD | SATA JBOD | USB JBOD | SAS JBOD |
|---|---|---|---|---|
| **Model** | TL-R1200PES-RP, TL-R1600PES-RP, TL-R2400PES-RP | TL-D400S, TL-R400S, TL-D800S, TL-R1200S-RP, TL-D1600S | TL-D800C, TL-R1200C-RP | TL-R1220Sep-RP, TL-R1620Sep-RP |
| **Form factor** | Rackmount | Rackmount / Tower | Rackmount / Tower | Rackmount |
| **Operating system** | QTS/QuTS hero | QTS/QuTS hero/Windows/Ubuntu | QTS/QuTS hero/Windows/Ubuntu | QTS/QuTS hero/Windows |
| **Max support 3.5" HDD** | 24-bay ✅ | 12-bay | 12-bay | 16-bay |
| **Max support JBODs** | 12 (not support Multipath) | 2 | 2 | 16 (support Multipath) ✅ |
| **Max expansion capacity** | 4 PB ✅ | 347 TB | 347 TB | 4 PB ✅ |
| **Max support HDDs** | 288 ✅ | 24 | 24 | 256 |
| **Application** | DATA-intensive application | Low-load or moderately loaded | Low-load or moderately loaded | DATA-intensive application |
| **Max Bandwidth** | 64 Gb/s ✅ | 64 Gb/s ✅ | 10 Gb/s | 96 Gb/s ✅ |
| **Required expansion card** | v | v | Optional | Optional |
| **Cost** | $$ | $ 💰 | $ 💰 | $$$ |
| **Pool combined with NAS** | v ✅ | x | x | v ✅ |

# Use [ Storage & Snapshot ] to easily manage JBOD in NAS QTS 5.1.2 / QuTS hero h5.1.2

The TL PCIE JBOD series, the same as the TL SAS JBOD series, can be monitored and managed in NAS [Storage & Snapshot]. Compared with the TR-002/TR-004/TR-004U RAID DAS series, it can support more QTS/QuTS hero local drive management functions.

## QTS JBOD & Disk Information

- Disk S.M.A.R.T. info
- Disk performance test
- Locate JBOD
- Attach and Recover Storage Pool
- Safety Detach

Note: Because of the maximum 22TB HDD capacity and the maximum supported JBOD units per NAS, QuTS hero can support up to 4PB pool, QTS can support up to 304TB pool.

# Expand NAS storage flexibly or as backup space

The TL series JBOD can be used as a QNAP NAS expansion space and can expand the local storage capacity of the NAS.  Supports all operations that can be done with normal storage pools, or create a snapshot backup job to back up snapshots of disk blocks and LUNs to TL JBOD.

Based on the software RAID architecture, the TL JBOD series is suitable for fixed expansion devices on the same NAS platform.

**NAS snapshot Replica**

**NAS data backup**

PCIe JBOD series

NAS series

# Enterprise-ready with a 5-year standard warranty covering hardware and technical support

## 5-year standard warranty

TL-R1200PES-RP & TL-R1600PES-RP & TL-R2400PES-RP include standard five-year warranty.
QNAP's warranty starts from the product sold

● Repairs under normal use during the warranty period, Replacement parts are free of charge (except consumables and accessories)

https://www.qnap.com/service/product-warranty/en/

# TL PCIe JBOD series specifications

| | TL-R1200PES-RP | TL-R1600PES-RP | TL-R2400PES-RP ( 2024 Q1 launch ) |
|---|---|---|---|
| Drive bay | 12 x 2.5 / 3.5-inch, SATA 6Gb/s | 16 x 2.5 / 3.5-inch, SATA 6Gb/s | 24 x 2.5 / 3.5-inch, SATA 6Gb/s |
| Cascade | v | v | v |
| Form factor | 2U Rackmount | 3U Rackmount | 4U Rackmount |
| Expansion port | 1 port SFF8644(IN), 1 x port SFF8644(OUT) | 1 port SFF8644(IN), 1 x port SFF8644(OUT) | 1 port SFF8644(IN), 1 x port SFF8644(OUT) |
| Expansion interface | PCIe Gen3 x8 | PCIe Gen3 x8 | PCIe Gen3 x8 (internal) |
| Redundant power | v | v | v |
| FAN | 2 x 80mm | 3 x 80mm | 3 x 80mm |
| Enclosure ID indicators | 1 | 1 | 1 |
| Operating temperature | 0 - 40 °C (32°F - 104°F) | 0 - 40 °C (32°F - 104°F) | 0 - 40 °C (32°F - 104°F) |
| Power | Redundant PSU | Redundant PSU | Redundant PSU |
| Dimensions (HxWxD) | 88.65 × 432 × 370.65 mm<br>3.49 x 17.01 x 14.59 inch | 131.3 × 432.4 × 370.85 mm<br>5.17 x 17.02 x 14.6 inch | 176.15 x 442.4 x 630.2 mm<br>6.94 x 17.42 x 24.81 inch |

# QNAP

# TL-R1200PES-RP
# TL-R1600PES-RP
# TL-R2400PES-RP

PB-scale with cascade PCIe JBOD

/ expansion card series for QNAP enterprise

& SMB NAS