ES2486dc introduction
Business Storage Requirements
All Flash Storage Applications

- SSD is high speed, low latency and low power consumption
- SSD random access performance is 500X better than hard drive
Enterprise Storage Requirements

High availability
System can prevent single point of failure and remain working

High reliability
System can provide stable services

High performance
System can provide enough performance for applications
Solutions for Business Storage
Designed for mission critical applications

- Dual controller storage for high availability
- Active-active architecture
- Asymmetric Logical Unit Access
- Near zero down time
- ZFS for data consistency
ES2486dc
Hardware Introduction
New Member in QNAP Dual-controller NAS Family

**ES1686dc**
- 3U 16-bay 2.5” /3.5”
- SAS/ SATA high capacity NAS

**ES2486dc**
- 2U 24-bay 2.5”
- SAS/ SATA all flash NAS
ES2486dc Dual-controller NAS

- Dual controller
- Multiple LAN
- Dual PSU
- QES OS
- Firmware Rolling Update
Intel Xeon Enterprise Processor

Intel Xeon D-2142IT
- 8-core/16-thread
- 1.9 GHz (Max. 3.0GHz)
Ordering Information

ES2486dc-2142IT-96G
- Intel D-2142T 8-core/16-thread, 1.9 GHz (Max. 3.0GHz)
- 96GB DDR4 ECC memory (48GB per controller)

ES2486dc-2142IT-128G
- Intel D-2142T 8-core/16-thread, 1.9 GHz (Max. 3.0GHz)
- 128GB DDR4 ECC memory (64GB per controller)
5-Year Standard Warranty
Optimize System Design

Controller A
- 8 x DDR4 slot
- 2 x PCIe Slot (Gen3 x8)
- 4 x 10GbE SFP+ port
- 3 x 1GbE port
- 2 x NVMe M.2
- CPU
- DMI3 Gen3 x4
- PCH Block

Controller B
- 8 x DDR4 slot
- 2 x PCIe Slot (Gen3 x8)
- 4 x 10GbE SFP+ port
- 3 x 1GbE port
- 2 x NVMe M.2
- CPU
- DMI3 Gen3 x4
- PCH Block

NTB (PCIe Gen3 x8)
24 x 2.5” HDD/ SSD Tray
- Supports SAS 12Gb/s SSD and HDD
- Supports SATA SSD via QDA-SA3* adapter

*QDA-SA3 is optional purchased
Clear Information with OLED Indicator

Provides system status for each controller

- Power status
- Fan status
- Battery status
- HA status
- Controller status

OLED ON/OFF button
Rear View

- PCIe Gen3 x8 slot
- 1 x 1GbE management port
- Reset button
- 770W redundant PSU
- 4 x 10GbE SFP+ LAN port
- Power button
- 2 x 1GbE LAN port
- BBU
- 2 x USB 3.0
Inside the Controller

- 2 x PCIe Gen3 x8 slot
- 8 x DDR4 RAM Slot • Max. 512GB
- Intel Xeon CPU and heat sink
- Fan module (3 x 6cm 16000rpm)
- Built-in 64GB M.2 for Battery Backup Storage (under the fan module)
Battery Backup Unit (BBU)

Ensuring data consistency when encounter power outage

Model: BBU-A02-2900MAH
Battery type: Li-ion
Rating: 10.9V 2200mAh
Dimension (H x W x D): 118 x 79 x 32 mm
Weight: 218 g
How BBU Protect Your Data

**Normal**
- Cache in memory
- M.2 Cache
- Pool

**Power loss**
- Copy data to M.2 cache
- Power has returned
- Copy data back
- Write to pool

**Power has returned**
- M.2 Cache
- Pool
Accessories
QNAP Dual-port 10GbE NIC

QXG-10G2SF-CX4

• Mellanox ConnectX®-4 Lx NIC
• 2 x 10GbE SFP+ port

Accessory
SFP+ 10GbE DAC cable
or TRX-10GSFP-SR-MLX optical transceiver

Cooling system
QNAP Dual-port 40GbE NIC

LAN-40G2SF-MLX
- Mellanox ConnectX®-3 Pro NIC
- 2 x 40GbE QFP+ port
- Supports iSER/RoCE Hardware Offload

Cooling system

QSFP+ 40GbE DAC cable
Dual-Path Mini-SAS Expansion

SAS-12G2E
SAS 12Gb/s expansion card

EJ1600 v2
SAS 12Gb/s Dual-controller expansion
  • Avoid single point of failure
  • Cascade up to 7 JBODs
  • 48Gb/s high-speed transmission

ES2486dc

- 48Gb/s high-speed transmission
Enterprise dual-controller ZFS NAS Series can flexibly install SATA 6Gbps SSD or HDD to save costs.
SAS SSD vs SATA SSD

Price in Amazon, 12/04/2019

SATA SSD provides lower TCO

Nytro 3331 SAS SSD XS3840SE70004
Capacity: 3.84TB
Random read: 230K IOPS
Random write: 80K IOPS

Nytro 1351 SATA SSD XA3840LE10063
Capacity: 3.84TB
Random read: 94K IOPS
Random write: 61K IOPS

Price:
- Nytro 3331 SAS SSD: $1,152.99
- Nytro 1351 SATA SSD: $704.84
Full-duplex data transfer and dual-port

**SAS drives** are dual-port
- Designed for high-availability (HA) architecture

**SATA drives** are single-port
- Not for high-availability (HA) architecture
QDA-SA3 6Gb/s SAS to SATA adapter

Optional Accessory

Marvell 9110 6Gb/s SAS to SATA bridge IC
SAS 6Gb/s
SATA 6Gb/s
Marvell 9110 600 MHz processor

Ordering information: QDA-SA3-4PCS (4 units)
Compatible with Enterprise ZFS NAS
2.5” drive trays
Support HA in dual-controller
ZFS File System Highlights

**Data Efficiency**
- Offers inline compression & inline deduplication for better storage utilization
- ZIL / L2ARC: provides a better cache mechanism

**Data Protection**
- The native ZFS snapshot feature allows smart definitions of guaranteed snapshots
- A nearly unlimited number of 65,536 snapshots (supports folder/LUN)
  - SnapSync
  - More RAID types available
  - WORM (write once read many)

**Data Integrity**
- QES longer needs file system checks (FSCK), with ZFS Mirror layer, COW (copy on Write) could keep the data integrity

**System Stability**
- Provide ECC RAM supported model to reach the enterprise level stability
- Provide the faster RAID Rebuild function: Resilver
Near-unlimited Snapshots

Snapshot Manager is operated based on shared folder. With [Clone], [Restore] & [Folder Revert] support.

- **Shared folder snapshot**
- **LUN snapshot**
- **NAS Maximum Snapshot**: 65,536

**Shared Folder Snapshot**

**iSCSI LUN Snapshot**
In-line Compression

- Data Compression (LZ4 algorithm)
- Thin Provisioning with Space Reclaim

ES NAS
50%
Less capacity
In-line Deduplication

Deduplication rates for VM deployments can range as high as 95% savings.

Deduplicated data is cached for much better performance by reducing disk access!

Note: In-Dedup will use a LOT of RAM (deduplication table),
- 32GB RAM is highly recommended.
- Add 1 GB RAM per 1 TB data of deduplicated storage.
- BTRFS uses Out-of-band dedupe.
Extend SSD Endurance by Data Reduction

ZFS File System With Deduplication & Compression Features.

The ZFS File System can be the best choice to pair with the SSD with its Deduplication and Compression functions by reducing the data size and pattern that need to be written to the SSD directly.

![Diagram]

Original Data → Deduplication → Deduplicated Data → Compression → Compressed Data → SSD Pool

Write to SSDs as sequential as much as possible.
QES 2.1.0 features QNAP’s exclusive Write Coalescing algorithm that is engineered for flash optimization by transforming all random writes to sequential writes along with reduced I/O. It not only effectively increases random write performance for all-flash environments, but also can improve SSD lifespan.
ES2486dc iSCSI Performance

Random read **600K+ IOPS**

Sequential read **8,700+ MB/s**

iSCSI Performance (IOPS)

- 4K Random Read: 603162
- 4K Random Write: 200681

iSCSI Performance (MB/s)

- 64K Sequential Read: 8752
- 64K Sequential Write: 4065
Over-Provisioning Ensures Consistently Performance

Layer 1 – pool over-provisioning

Layer 2 – SSD over-provisioning
QES Pool Over Provisioning Provides More Stable Performance

In general: Not enough space to put Data E

Data E is put discretely

Remove Data B and Write Data E

Over-provisioning: No space for Data E

Reserved space
QoS ensures consistent primary storage performance

Maximum IOPS

Minimum IOPS

Workload 1

Noisy neighbor

Workload 2

QoS protects against noisy neighbor

Maximum IOPS

Minimum IOPS

Workload 1

Workload 2
QNAP NAS
is Your Best Choice

ZFS
ES2486dc
NAS

Copyright © 2019 QNAP Systems, Inc. All rights reserved. QNAP® and other names of QNAP Products are proprietary marks or registered trademarks of QNAP Systems, Inc. Other products and company names mentioned herein are trademarks of their respective holders.