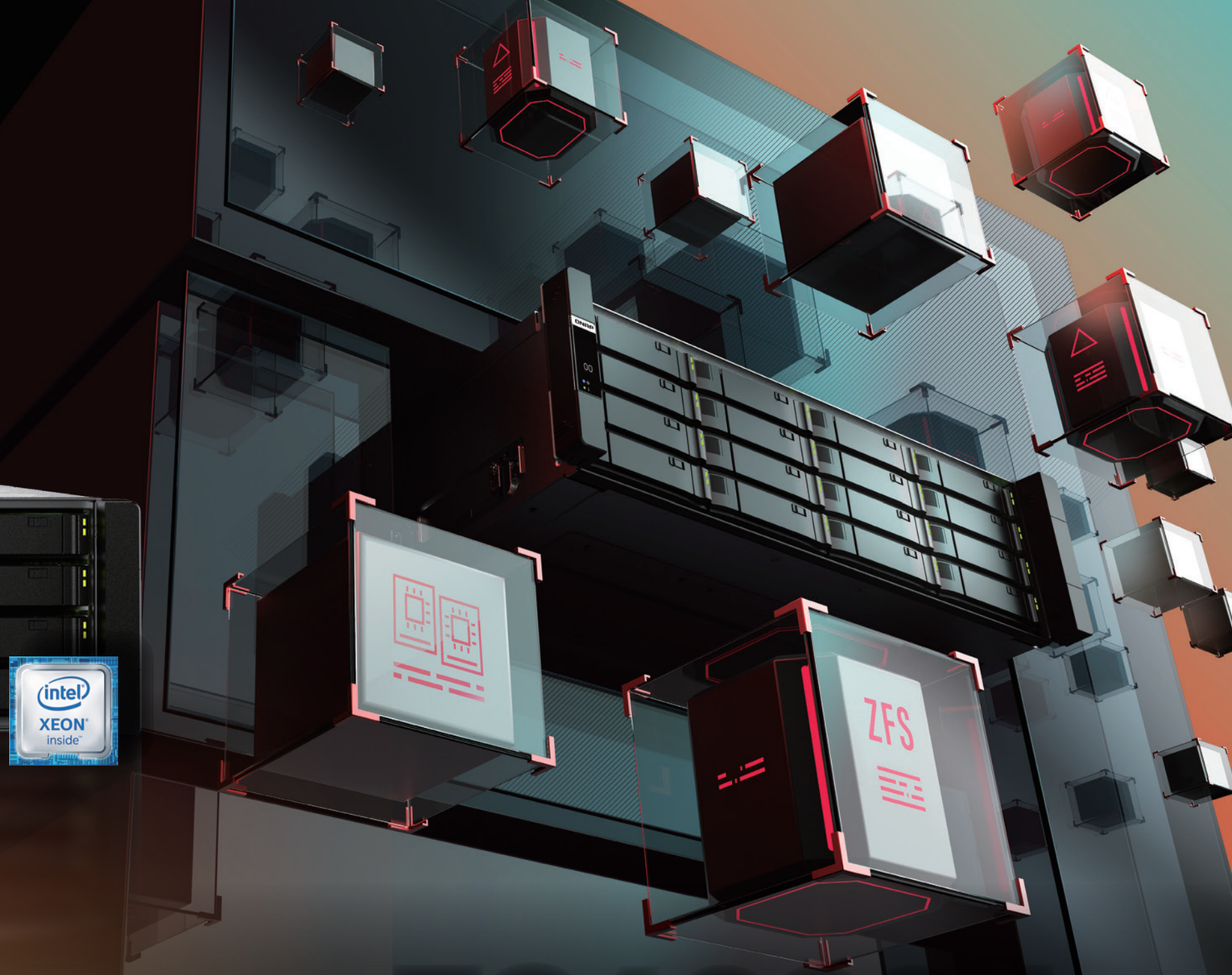
ES1686dc

Enterprise ZFS ES1686dc



ES1686dc

Enterprise-Class Storage

High Efficiency
Data reduction technology

High Availability
Active-active controller architecture

Ensured Data Integrity
ZFS file system

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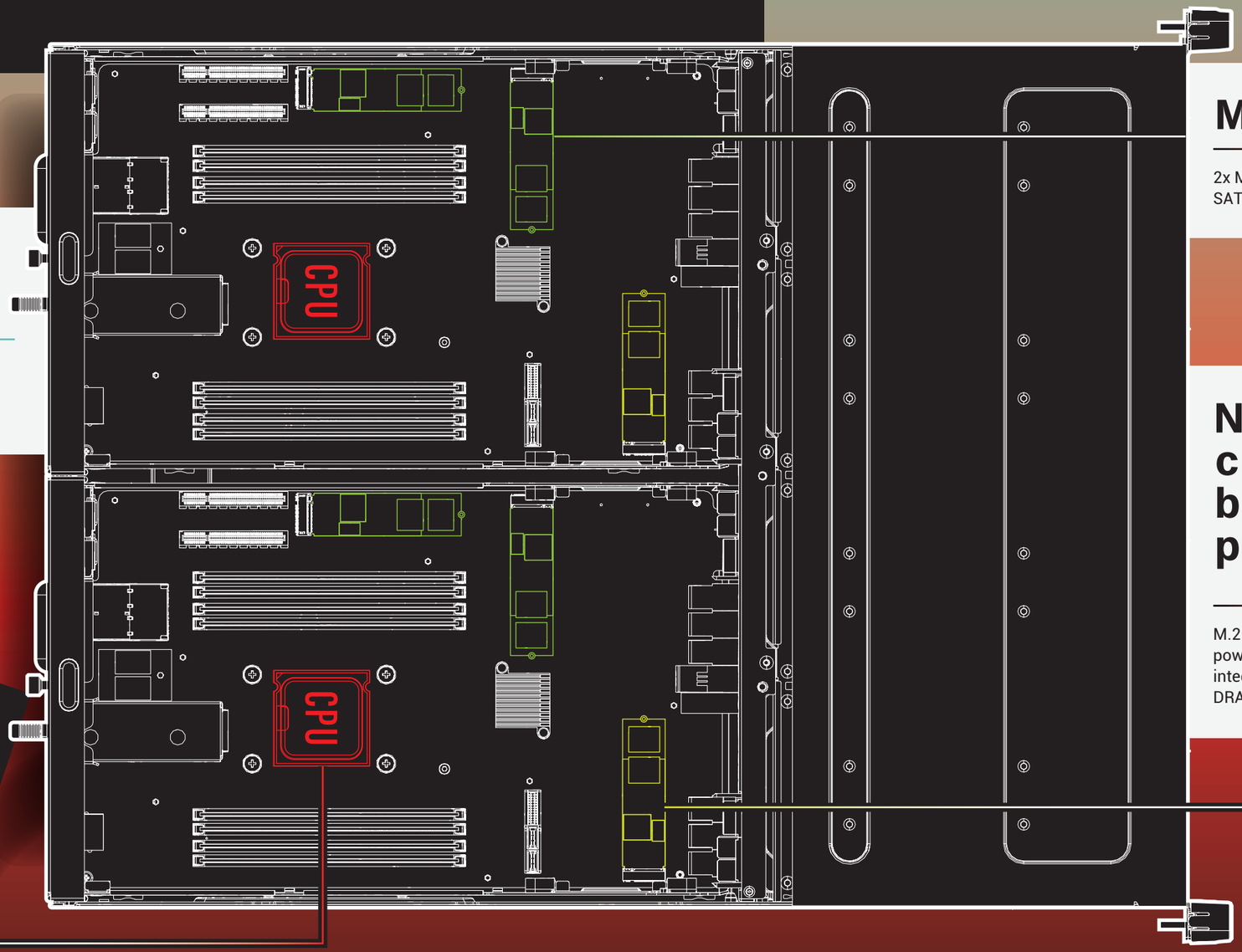
Hardware Architecture



Intel Xeon D-2100 series processor

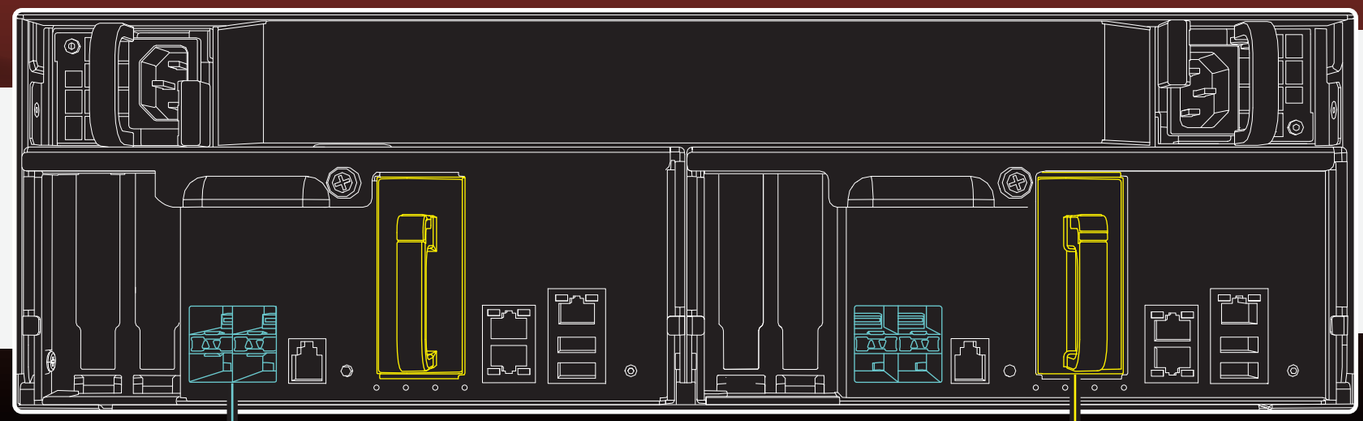
Provides the performance needed for enterprise-level storage and mission-critical applications.

M.2 SSD slot

2x M.2 SSD slots for read acceleration. Supports SATA 6Gb/s or NVMe Gen3 x4 2280 SSDs.

NVRAM write cache with battery data protection

M.2 SSD for copy-to-flash (C2F) backup. If a power outage occurs, the system ensures data integrity by moving write cache data from DRAM to M.2 SSD using BBU power.



Built-in 10GbE SFP+ network interface

4x 10 GbE (SFP+) ports satisfy iSCSI, NFS, CIFS, and other data transmission needs.

Battery Backup Unit (BBU)

The hot-swappable battery provides sufficient power to maintain NVRAM during power outages.

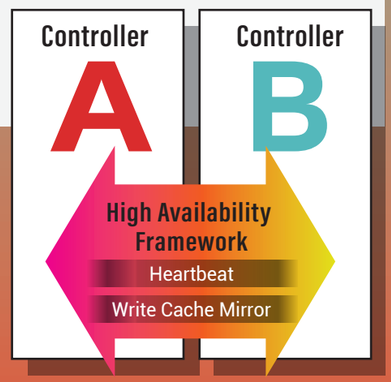
Software Architecture

Excellent random read/write performance

SSD Cache allows the client to accelerate read performance on HDD-based storage pools. While write coalescing assists in transferring random writes to sequential writes to provide industry-leading performance.

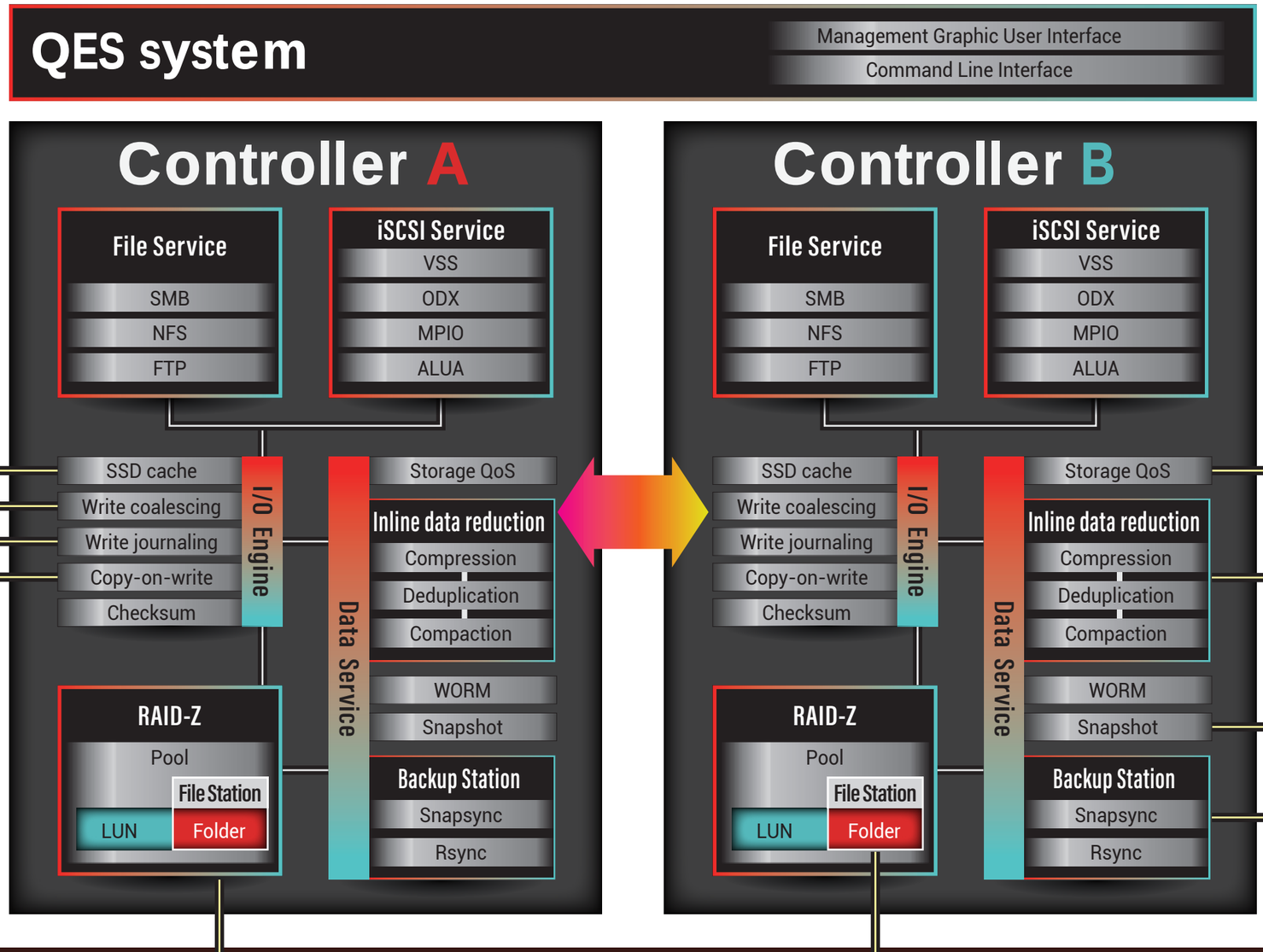
High availability

The active-active controller architecture can withstand a single point of failure to ensure business continuity. The two controllers constantly synchronize write data and system status and are always ready to takeover in the event of controller failure.



- Immune to power failure
- No silent data corruption

See page 6



- Solves the "Noisy Neighbor" effect
- Enhanced SSD lifespan
- Robust data protection

See pages 7 and 8

RAID-Z supports triple-parity protection for large-capacity drives

Triple-parity RAID provides more protection for the system to finish rebuilding the array, which is especially useful for restoring high-capacity disks.

File management with a visualized interface

Files are easily managed using the QES File Station.

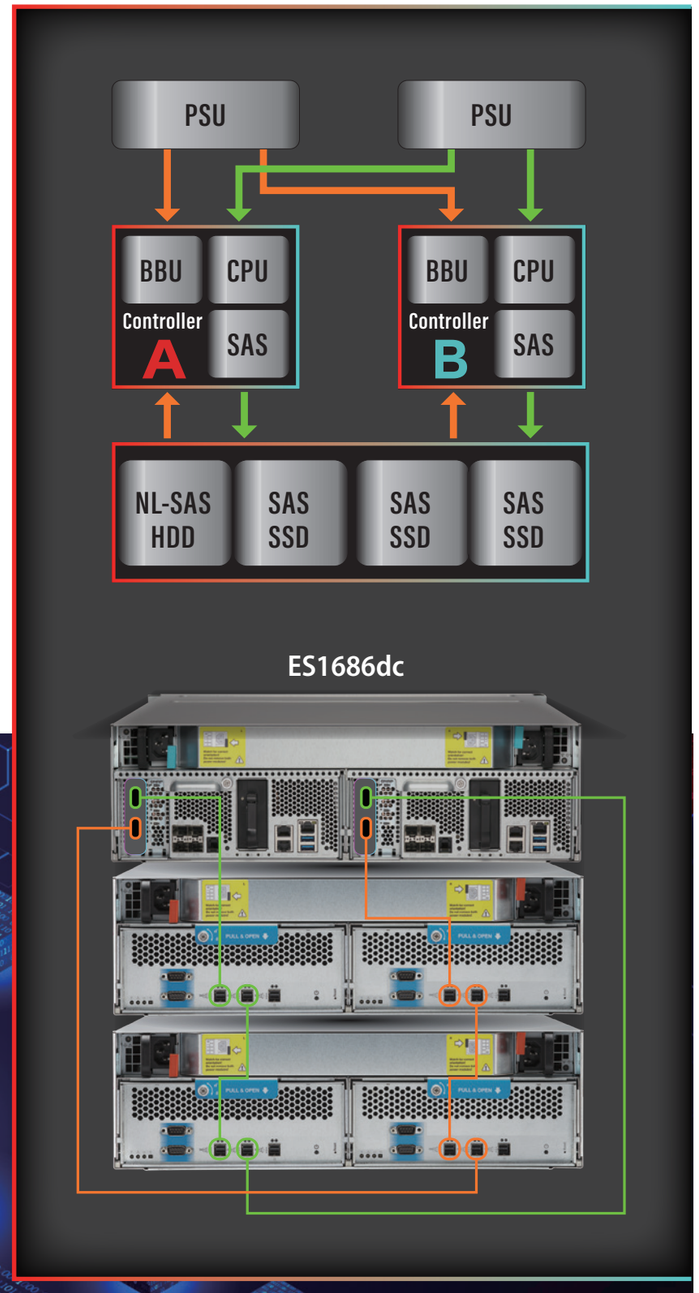
Built for mission-critical applications, the QNAP ES1686dc features ZFS, dual-active controllers, and a user-friendly GUI to provide users with ensured data integrity, high availability, and excellent performance.

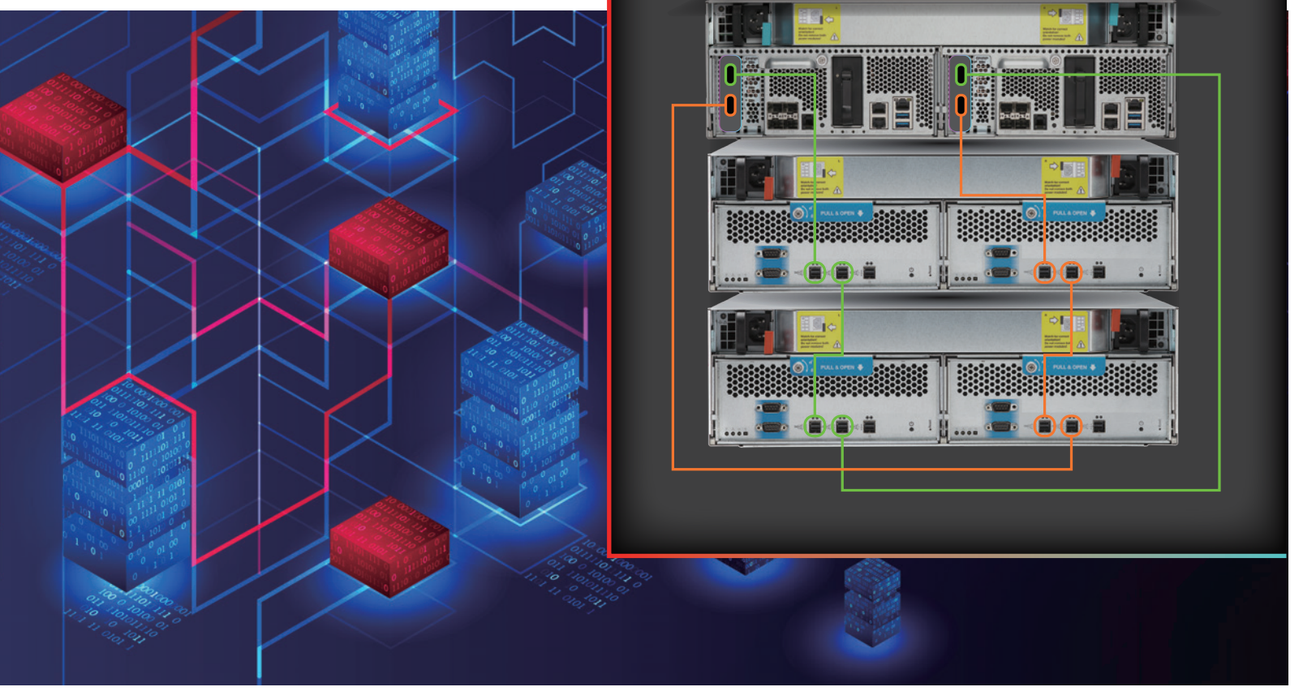
Redundant controllers ensure high availability

The redundant-controller design of the ES1686dc ensures uninterrupted operations. As the cache memory between the two controllers is continuously synchronizing with each other, if one of the controllers fails, the data written in cache memory can still be written to disks to ensure data integrity.

Performance elasticity with active-active controller mechanisms

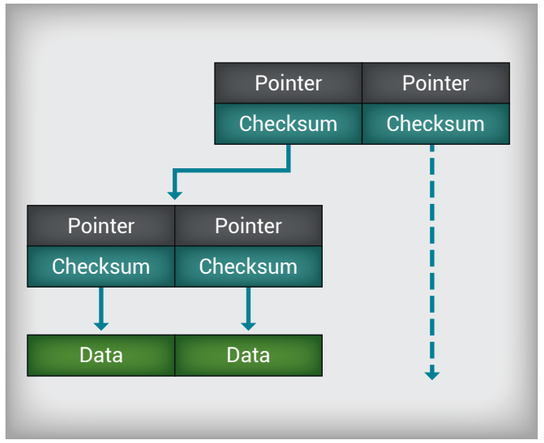
To ensure sufficient system resources during an unexpected controller failure, it is recommended to keep controller workloads at 50%. This configuration can then use the remaining system resources to reinforce performance-demanding applications during peak usage times.





Robust data integrity with ZFS

ZFS is built to ensure data integrity, and features mechanisms suited for enterprise-level storage solutions.



Protects against silent data corruption

Self-Healing

Within ZFS, each block of data is checksummed. When reading a RAID-Z block, ZFS compares it against its checksum, and if the data disks did not return the right answer, ZFS reads the parity and then figures out which disk returned bad data. Then, it repairs the damaged data and returns good data to the requestor, thus preventing silent data corruption.

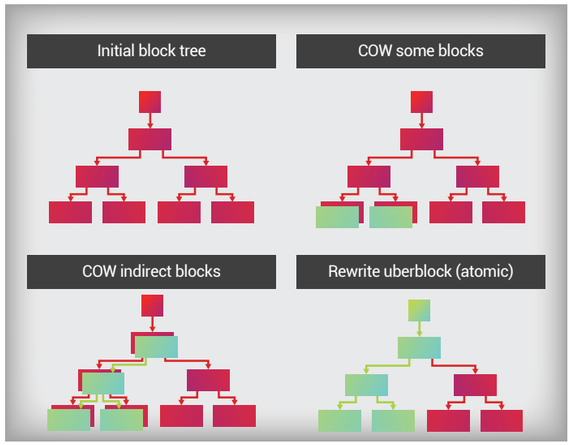
Immune to power failure

Write Journaling

ZFS tracks file changes not-yet-committed to the file system by recording the intentions of such changes in its data structure. In the event of a system crash or power failure, ZFS checks the journal logs and then applies the scheduled changes, enabling the file system to be brought back online more quickly with a lower likelihood of becoming corrupted.

Copy-On-Write (COW)

ZFS uses a copy-on-write transactional object model. Blocks containing active data are never overwritten in place; instead, a new block is allocated, modified data is written to it, then any metadata blocks referencing it are similarly read, reallocated, and written. By operating with write journaling, the copy-on-write model ensures that users can still find the most-recent data before the latest write operation.

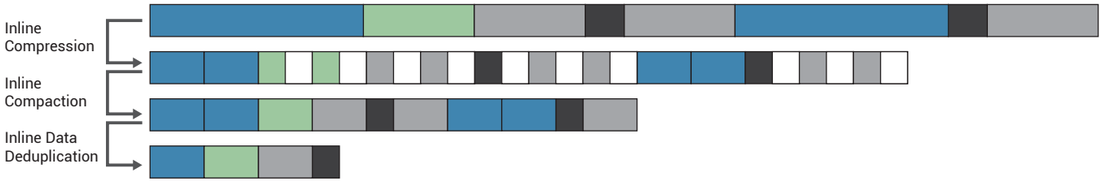


Efficient data reduction with inline compression, deduplication, and compaction

The QNAP ES family features data reduction technology, making it especially useful for all-flash storage arrays.

Reduce Storage Footprint

Every read-modify-write operation consumes the life of a flash cell. Inline data compression is being used to reduce the size of the data set to be stored. Data compaction stores multiple user data blocks and files within a single 4 KB block. Without data compaction, each file would get its own 4 KB block, consuming more 4KB blocks for the same amount of data. Inline deduplication then checks new data ready to be sent to storage against data that already exists in storage and doesn't store any of the redundant data it discovers. By minimizing the amount of physical blocks allocated for data storage, QNAP's data reduction technology helps to further extend the lifespan of users' SSDs - allowing the utilization of more cost-efficient SSDs without worrying about flash-cell wear-out.



Robust Performance Optimization

Performance optimization-Write coalescing

Write coalescing is a mechanism that transfers random writes (small blocks) into sequential writes (large blocks), which reduces the times of writes on drives. In an all-flash configuration, reduced write times result in minimized garbage collection, therefore minimizing the effect of write amplification.

Supports NVMe SSD as system read cache

The ES1686dc has two M.2 NVMe slots on each controller, and supports the QM2 adapter (four M.2 SSDs on a single PCIe card). These SSDs can be configured as system read cache to improve total performance without occupying drive bays.

Use cost-efficient QNAP Drive Adapters to boost system performance

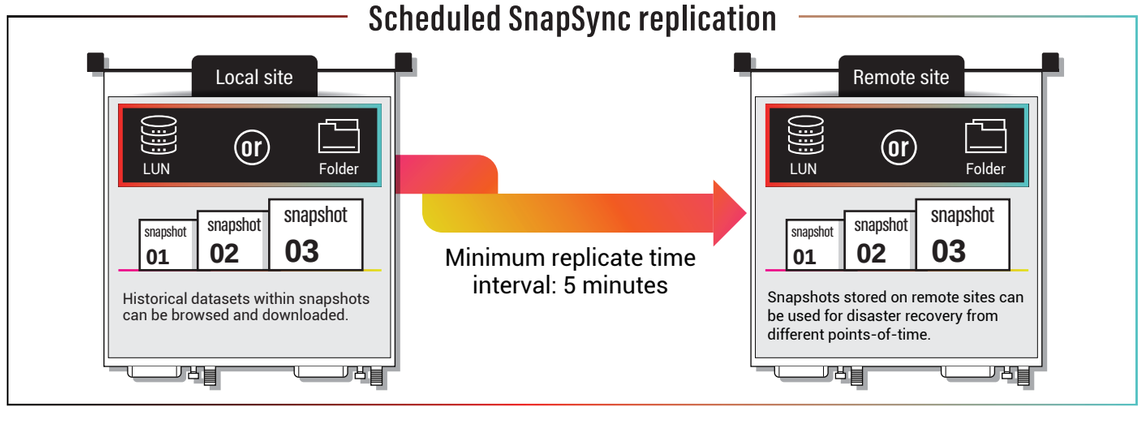
The QNAP Drive Adapter (QDA) allows users to install SATA disks on dual controller models. This enables users to utilize cost-efficient SATA SSDs on the dual-controller ES1686dc system for all-flash configurations and SSD Cache.

Storage QoS

The ES1686dc is a powerful storage system that is capable of serving multiple applications in a single array. This raises the concern of the "Noisy Neighbor" effect where low-priority applications consume the resources necessary for more-important services. Storage QoS allows users to define the priority of every application running on the array by setting the system resources that should be allocated for LUNs and Shared Folders.

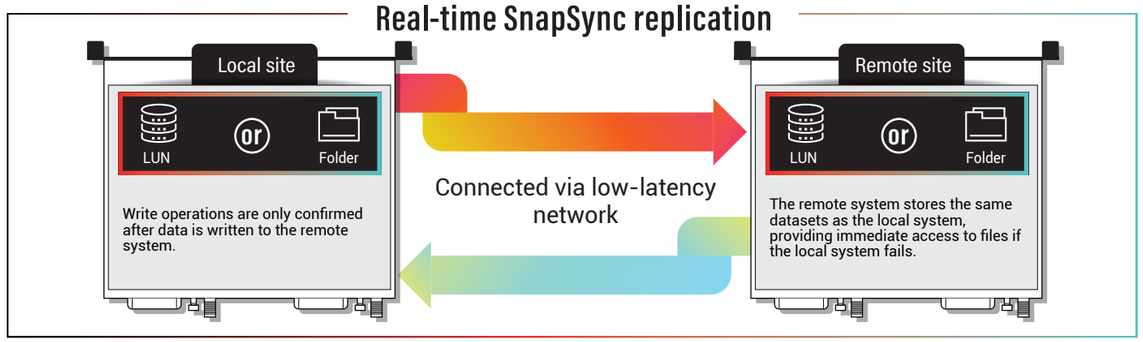
Snapshot and SnapSync

QNAP NAS snapshots store differential datasets from folders and iSCSI LUNs with no performance impact. Snapshots can be further replicated to another QES system by using QNAP's SnapSync technology.



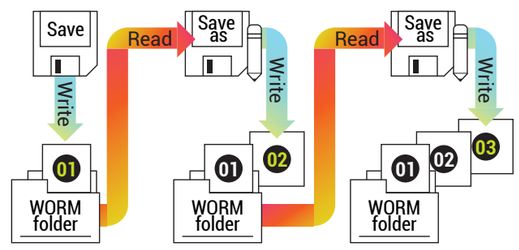
SnapSync creates either a real-time or a scheduled replication job between two QES systems. Disaster recovery can be performed through remote replication to minimize the impact from site failure, as data can be immediately retrieved from the remote backup site.

QES Backup Station allows browsing snapshot content, allowing users to download historical datasets without remounting the entire shared folder.



WORM folder

With increasingly stringent regulations on how information is stored, many countries require government agencies, financial institutions, and healthcare providers to comply with strict data archiving regulations. To meet the security requirements of enterprise storage, the QNAP ES Series NAS has WORM functionality to help users protect important organizational information. WORM (Write Once, Read Many) is used to avoid modification of saved data. After this feature is enabled, data in shared folders can only be written, and cannot be deleted or modified to ensure data integrity. WORM folders can be deployed on thin-provisioning pools for future expansion flexibility as well as being configured with folder quotas for capacity management. Data reduction technology can also be applied to optimize storage utilization.



- Data cannot be deleted from the file system.
- Supports data retention periods and indefinite data retention.

Hardware Specification

	ES1686dc-2123IT-64G	ES1686dc-2145NT-96G	ES1686dc-2145NT-128G
Form Factor	3U		
Processor	Intel Xeon D 4-core 2.2GHz	Intel Xeon D 8-core 1.9GHz	Intel Xeon D 8-core 1.9GHz
Memory	64GB	96GB	128GB
Max. Memory	1TB		
Memory slots	16 (DDR4, RDIMM/LRDIMM)		
Drive bays	16 x 3.5-inch SAS/SATA		
M.2 SSD slots	4 (supports SATA 6Gb/s or NVMe Gen3 x4 2280)		
SSD cache	Yes		
Copy to Flash battery	12v, 2200mAh		
Management ports	1 per controller		
On-board network ports	4x 1GbE (RJ45) 8x 10GbE (SFP+)		
PCIe slots	4 (Gen3x8)		
USB ports	4 (USB3.0)		
Dimensions (mm)	132 x 483.05 x 630.62 mm		
Weight (kg)	32.69 kg (Gross) ; 25.83 kg (Net)		
Temperature	0 - 40 °C (32°F - 104°F)		
Relative humidity	5% - 95%		
Power supply	90~264VAC; 770W		
Power consumption	Normal 500.87W		
Noise	55.8 db		

Expansion Enclosure Specifications

	EJ1600v2	EJ1600
Form Factor	3U rackmount	
Host Interface	SAS 12Gbps	SAS 6Gbps
Dimensions	132 × 446.2 × 618 mm	
Weight (Net)	33.76 kg (Gross), 24.11 kg (Net)	
Drive slots	16 x 3.5-inch SAS/SATA	
Temperature	0 - 40 °C (32°F - 104°F)	
Relative Humidity	5~95% RH non-condensing, wet bulb: 27˚C.	
Power Supply	2x 450W, 90-240Vac~, 50-60Hz	
Power Consumption	Normal: 344.19 W	
Sound Level	53.5 db(A)	

Network Expansion Cards

Brand	Model	Description
QNAP	LAN-10G2T-X550	Dual-port (10GBASE-T) 10GbE network expansion card
Mellanox	MCX312B-XCCT	Dual-port (SFP+) 10GbE network expansion card
Mellanox	MCX314A-BCCT	Dual-port (QSFP) 40/56GbE network expansion card
Mellanox	MCX313A-BCCT	Single-port (QSFP) 40/56GbE network expansion card
Mellanox	MCX311A-XCCT	Single-port (SFP+) 10GbE network expansion card
QNAP	LAN-40G2SF-MLX	Dual-port (QSFP+) 40GbE network expansion card
QNAP	LAN-10G2SF-MLX	Dual-port (SFP+) 10GbE network expansion card

Software Specification

High Availability
- Active-active dual controller for NAS
- Active-active dual controller for JBOD expander
- MPIO for iSCSI high availability
- Firmware update without interrupting service
- Link aggregation for network high availability

Supported Client OS
- Windows 7 (32/64-bit), Windows 8 (32/64-bit), Windows 10 (32/64-bit), Windows Server 2008 R2/2012/2012R2/2016
- Apple Mac OS X
- Linux and UNIX

Supported Browsers
- Google Chrome
- Microsoft Internet Explorer
- Mozilla Firefox
- Apple Safari

Multilingual Support
- Chinese (Traditional & Simplified), Czech, Danish, Dutch, English, Finnish, French, German, Greek, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese (Brazil), Romanian, Russian, Spanish, Swedish, Thai, Turkish

File System
- ZFS

Networking
- TCP/IP (IPv4 & IPv6)
- 10 Gigabit NICs with jumbo frame (LACP, Load Balance, Failover, Round Robin)
- Service binding based on network interfaces
- Proxy server
- Protocols: CIFS/SMB2/SMB3, NFS v3/NFS v4, FTP, FTPS, TFTP, HTTP, HTTPS, SSH, iSCSI, SNMP, SMTP, and SMSC
- iSER (iSCSI Extensions for RDMA)
- Bonjour Discovery

File Server
- Shared folder for CIFS/SMB, NFS and FTP
- File sharing across Windows, Mac, and Linux/UNIX
- Windows ACL

Security
- Network access protection with auto-blocking: SSH, HTTP(S), FTP, CIFS/SMB
- CIFS/SMB host access control for shared folders
- FIPS 140-2 validated AES 256-bit volume-based and shared folder data encryption
- Importable SSL certificates
- Instant alert via E-mail, SMS, beep

Storage Management
- Storage space utilization monitoring
- Storage pool with RAID 0, 1, 5, 6, 10, 50, 60, RAID TP, triple mirror
- Global hot spare
- SSD read cache
- NVRAM write cache (BBU-protected)
- Scheduled Backup Battery Unit (BBU) learning
- Share folder/LUN with thin provisioning
- Checksum for end-to-end data integrity
- Silence error detection and self-healing
- Pool scrub for data verification
- Share folder quota management
- Inline deduplication for shared folder/LUN
- Inline compression for shared folder/LUN
- Inline encryption for shared folder/LUN
- WORM (Write Once Read Many) for shared folder
- Storage QoS (Quality of Service) for shared folder/LUN
- Shared Folder/LUN snapshot
- Online pool, share folder, and LUN expansion
- S.M.A.R.T. Information for drives and Predictive S.M.A.R.T. Migration
- SSD Life monitors the remaining lifespan of solid-state drives
- Time-Limited Error Recovery (TLER)
- JBOD ID Reinitialized

Thirty Party Plug-ins
- SMI-S Provider
- vSphere Web Client Plugin
- VAAI Plug-in: NFS, iSCSI
- VMware Storage Replication Adapter (SRA)
- QNAP Cinder Driver for Openstack block storage
- QNAP Manila Driver for Openstack shared file storage

Power Management
- Wake on LAN
- Automatic power on after power recovery
- Network UPS support with SNMP management

Access Right Management
- Batch users creation
- Import/Export users
- User quota management
- Local user access control for CIFS/SMB and FTP

Domain Authentication Integration
- Microsoft Active Directory support
- LDAP client
- Domain users login via CIFS/SMB, FTP

Administration
- Multi-window, multi-tasking based system management
- Movable Icons and personalized desktop
- Smart toolbar and dashboard for neat system status display
- Smart Fan control
- SNMP (V1/V2 & V3)
- Resource monitor
- Network recycle bin for file deletion via CIFS/SMB, File Station and FTP
- Smart file filter
- Comprehensive logs (events & connection)
- Syslog client management
- System settings backup and restore
- Command Line Interface (CLI)