QNAP

Upgrade your QNAP NAS to QTS 4.4.1

for FC-SAN with ATTO Celerity Fibre Channel cards

ATTO
The Power Behind the Storage

What is the user's wish?

- Is there any way I can enjoy faster and safer data access?
- How to easily expand block-level storage area network (SAN)?
- Is there any way to back up data in the SAN and implement copy data management (CDM) application?

QNAP NAS x ATTO fibre channel adapters

1. QNAP NAS high performance storage space
2. Cross-border support Fibre Channel SAN provides users with a highly reliable, scalable, and affordable storage are network (SAN) solution
3. QNAP support ATTO Celerity™ FC 32Gb & 16Gb HBAs

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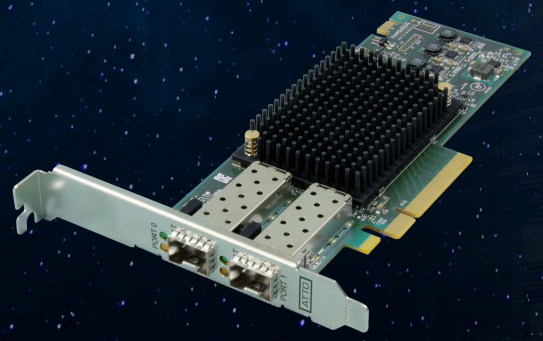
The Power Behind the Storage



Why should companies build Fibre Channel storage area network?

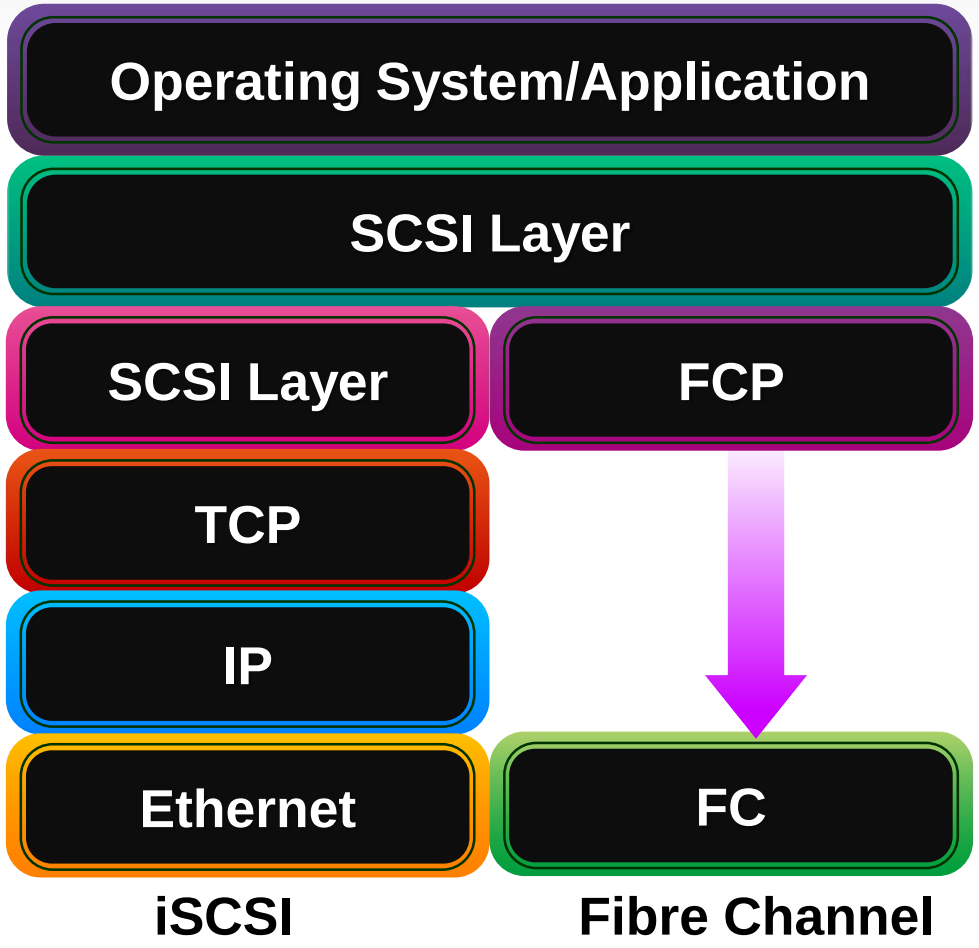
- **Good connectivity :**
  In a Fibre Channel Storage area Network (SAN) architecture, any server can be directly connected to any storage device, and any storage device can be directly connected to each other.

- **Good expandability :**
  Enterprises can perform extended actions without increasing the load on the server and the local area network.

- **Good data sharing ability :**
  Since the storage device is no longer connected to a specific server, resources can be shared by many servers and the main network performance is not affected when a large number of files are transmitted.

iSCSI vs. Fibre Channel Architecture

- Fibre Channel does not need to pass through Ethernet, and the physical layer in the system is less than iSCSI. When expanding the block-level storage network, Fibre Channel can be used to avoid network load.
- iSCSI needs to expand the block-level storage network via Ethernet.



Fibre Channel Reduces CPU Load

Speed/CPU		iSCSI		FC	
		25GbEx1	CPU%	32G	CPU%
Throughput (MB/s)	SW-1M	2709	**56%**	2946	**39%**
	SR-1M	2755	**32%**	2770	**30%**
	SW-512K	2707	**61%**	2950	**37%**
	SR-512K	2825	**43%**	2870	**35%**
IOPS	RW-4K	154793	**81%**	155197	**77%**
	RR-4K	108263	**69%**	113162	**67%**

Note: This test environment is RAID 0

Test environment: TS-1283XU-RP

- F/W: 4.4.1
- CPU: Intel(R) Xeon(R) E-2124 CPU @ 3.30GHz
- Tested SSD: Samsung SSD 850 PRO 512GB SATA*12, RAID 0
- RAM: 8 GB (4GB x 2)
- Block-based LUN; AIO enable
- FC 32G: ATTO Fibre Channel Adapter
- 25GbE: QXG-25G2SF-CX4, MTU 9000

IOmeter Global Configuration:
Maximum Disk Size: RAM*4/ Ramp Up Time: 30 seconds Seq / Run Time: 3 Minutes / 2-workers/ 64-outstanding Random / Run Time: 3 Minutes / 4-workers/ 32-outstanding

Server Environment:
- CPU: Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.40GHz
- OS: Windows Server 2016 Database Evaluation.
- Version: 10.0.14393 Build 14393
- Memory: 128 GB.
- FC 32G: ATTO Fibre Channel Adapter
- 25GbE: QXG-25G2SF-CX4, MTU 9000

QNAP

Fibre Channel performance is good

Speed/CPU		FC	
		FC32Gx1(PC)	CPU%
Throughput (MB/s)	SW-1M	3132	**30%**
	SR-1M	4798	**25%**
	SW-512K	3154	**29%**
	SR-512K	2772	**28%**
IOPS	RW-4K	92632	**40%**
	RR-4K	195360	**36%**

Note:This test environment is RAID 5

IOmeter Global Configuration: Maximum Disk Size: RAM*4/
Ramp Up Time: 30 seconds
Seq / Run Time: 3 Minutes / 2-workers/ 64-outstanding
Random / Run Time: 3 Minutes / 4-workers/ 32-outstanding

Test environment: TS-2483XU-RP

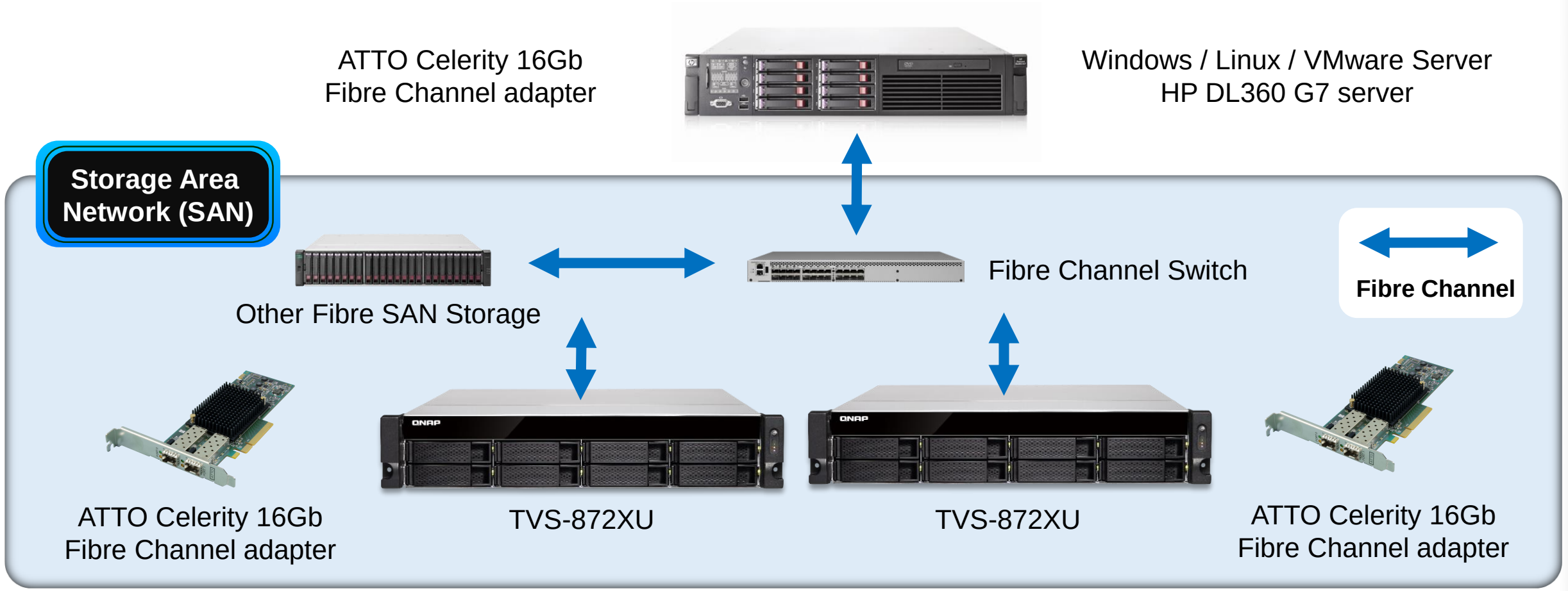
1. F/W: 4.4.1.0955 build 20190603
2. CPU: Intel(R) Xeon(R) E-2136 CPU @ 3.30GHz
3. SSD: Samsung SSD 850 PRO 512GB SATA*24,RAID 5
4. RAM: 16GB, 8GB*2
5. Thick volume; Block-based LUN; AIO enable; MPIO
6. FC32G: ATTO Fibre Channel Adapter

PC Environment
1. CPU1: Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.40GHz, 2401 Mhz, 8 Core(s), 16 Logical Processor(s)
2. OS: Windows Server 2016 Datacenter Evaluation Build 14393
3. Memory: 128 GB.
4. FC32G: ATTO Fibre Channel Adapter

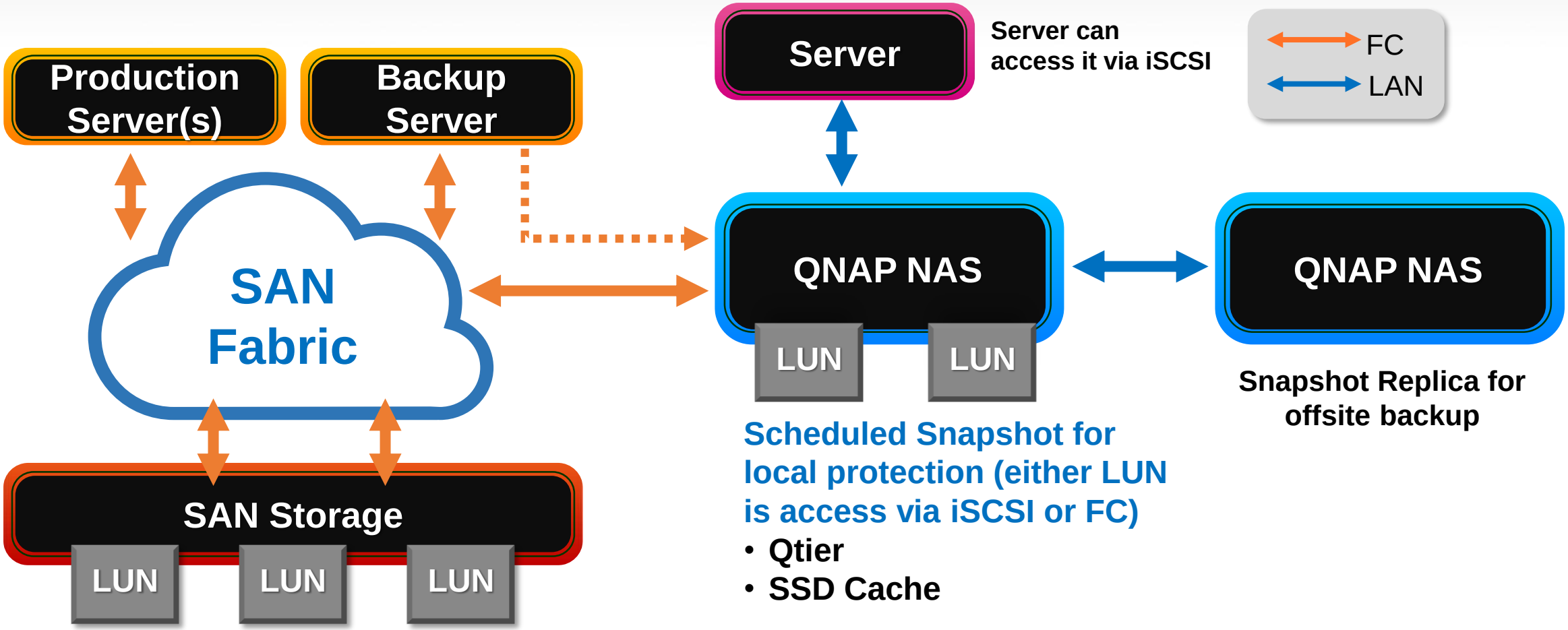
QNAP

QNAP Fibre Channel Storage Area Network (SAN) Solution

Windows / Linux / VMware Server (Initiator node) + NAS(Target mode):



Enterprise Fibre Channel Storage Area Network and CDM Application with QNAP NAS



Support ATTO Celerity™ Fibre Channel Adapters

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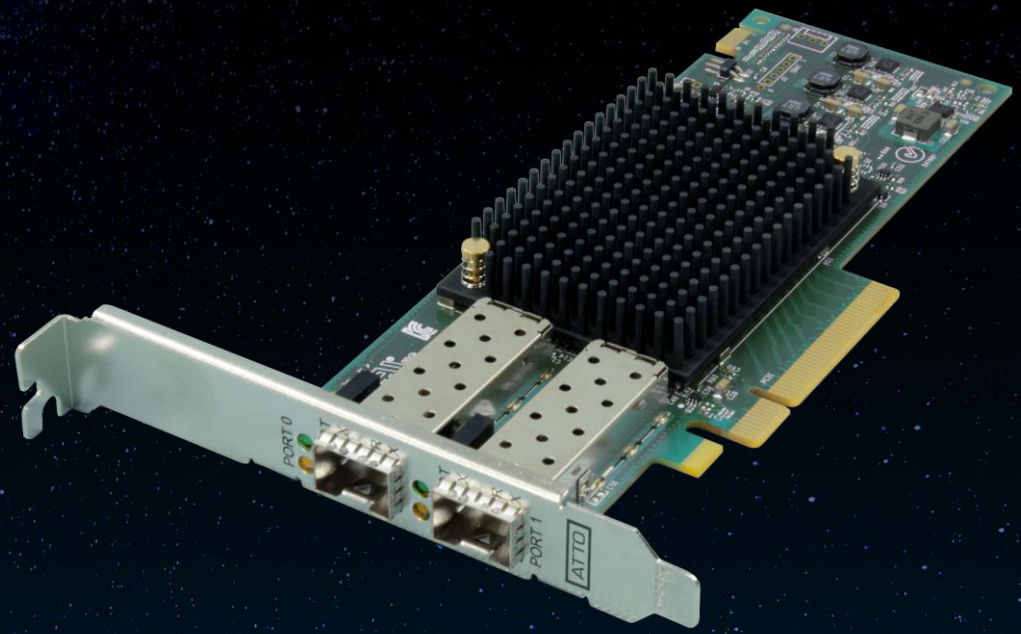
The Power Behind the Storage

Partner with industry-leading FC adapters vendors to provide the most economical FC SAN storage solution.

Support ATTO Celerity™ 32Gb & 16Gb FC HBAs



NAS Compatibility: qnap.com/compatibility/

QNAP

Compatible with a variety of FC Adapters Support 4G/8G/16G/32G

ATTO FC adapter	Interface	Speed	Tech. generation	PCIe	Spec
CTFC-322E	2 X 32GFC	32G/16G/8G	Gen 6	3.0 x8	Low profile
CTFC-321E	1 X 32GFC	32G/16G/8G	Gen 6	3.0 x8	Low profile
CTFC-162P	2 X 16GFC	16G/8G/4G	Gen 6	3.0 x8	Low profile
CTFC-161P	1 X 16GFC	16G/8G/4G	Gen 6	3.0 x8	Low profile

NAS Compatibility: qnap.com/compatibility/

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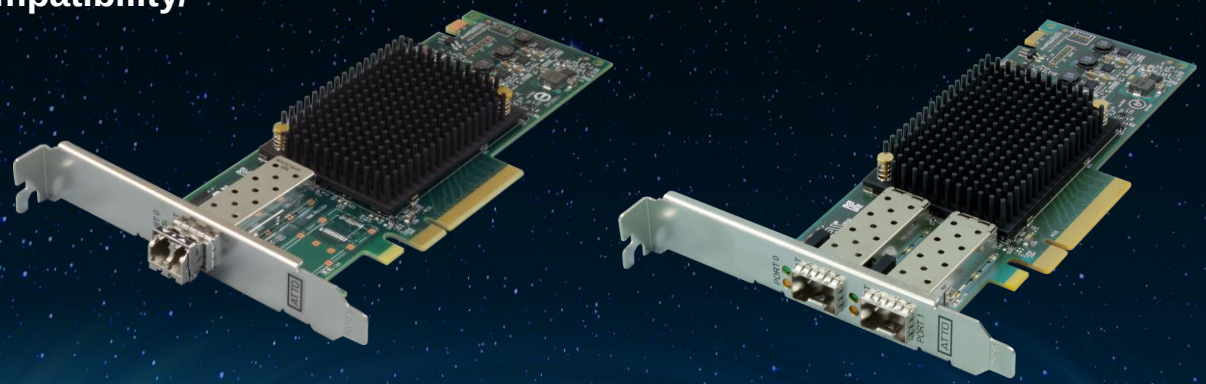

QNAP

ATTO

The Power Behind the Storage

Fibre Channel HBAs | Thunderbolt™ Adapters | Ethernet Adapters | SAS/SATA RAID | Fibre Channel Bridges | Storage Controllers

QNAP

Corporate Overview

- Established in 1988 – Upstate NY Headquarters
- Experienced engineering leadership
- Scalable manufacturing capacity
- Products – host bus adapters, NICs, storage controllers, bridging appliances and software
- Interconnect expertise – Fibre Channel, SAS, Ethernet, SATA, iSCSI, Thunderbolt, NVMe
- Customers – Original Equipment Manufacturers through End Users (supported with a robust channel)
- Worldwide distribution

Customers and Partnerships

ATTO
The Power Behind the Storage

OEM Customers

End Customers

ABC • Agilent Technologies • Amtrak • AOL • AT&T • Bank of America • Bell Laboratories
Boeing • CBC • CNN • Cox • Delta • Deutsche Bank • Disney • Dow • DreamWorks
Emory University • ESPN • FedEx • GE • H&R Block • Honeywell • Indiana University • KFC
Lockheed Martin • Lucent Technologies • Mercedes Benz • Minolta • Mitsubishi
Motorola • MTV • Nationwide • Nike • Northwestern University • P&G • Pixar
Praxair • Raytheon • RiteAid • RR Donnelley • Salomon Smith Barney • SHOWTIME
Skywalker Sound • Smithsonian Institution • SONY • Starbucks • TIME
University of Baltimore • University of Florida • University of San Diego • USA Today
US Dept. of Homeland Security • West Virginia University • Westinghouse • Ziff Davis

Technical Alliances

QNAP

Technology Meets Products

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Bridges	Thunderbolt™ Adapters	Storage Controllers
RAID Adapters	Network Interface Cards	Host Bus Adapters

SAS/SATA | Thunderbolt | Ethernet | Fibre Channel | NVMe

Core Technology

Latency Management | Bandwidth Optimization

Data Intensive Environments

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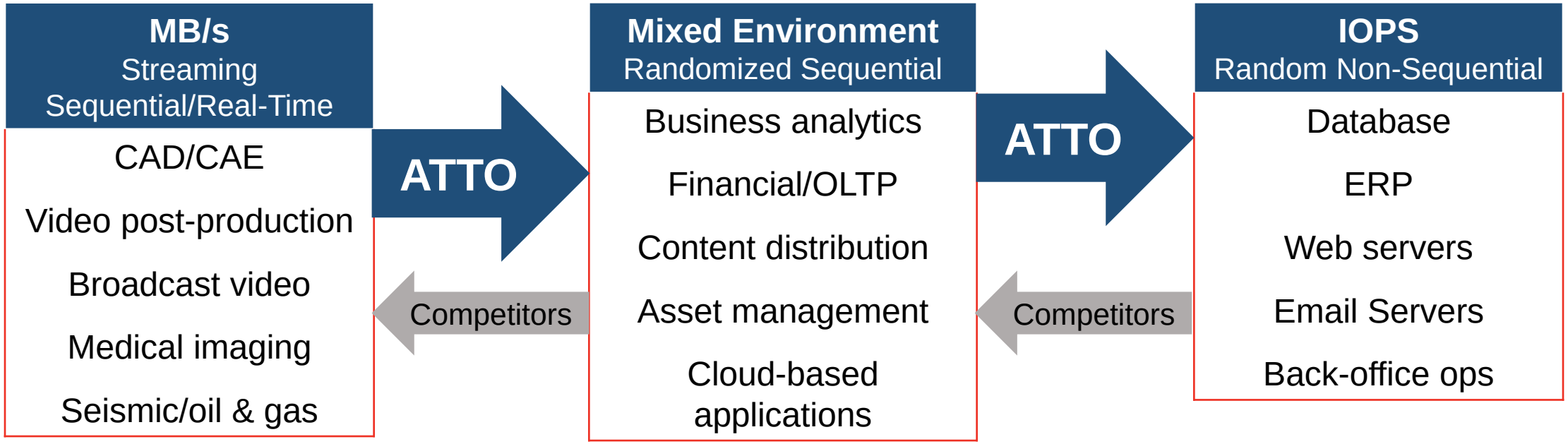
ATTO develops high-performance products that manage latency in the most demanding, real-time environments, resulting in accelerated application performance and enhanced transaction processing



Product Line

- **Host Bus Adapters**
  - Fibre Channel
  - SAS/SATA
- **Network Interface Cards**
  - 10/25/40/50/100Gb Ethernet
- **Thunderbolt™ Adapters**
  - Fibre Channel
  - Ethernet
  - SAS/SATA
- **Storage Controllers**
  - Fibre Channel-to-SAS/SATA
  - Ethernet-to-SAS/SATA
- **Software**
  - ATTO ConfigTool™
  - Latency Scout™

Technical Differentiators

- **ATTO Advanced Data Streaming (ADS™)Technology**
  - Provides controlled acceleration of data to ensure smooth streaming and most consistent performance
- **ATTO MultiPath Director™**
  - Enables macOS®, Windows® and Linux® workstations and servers to connect directly to enterprise-class storage with redundant controllers, providing failover and load balancing capabilities across multiple paths to the storage
- **ATTO DriveAssure™ Technology**
  - Compensates for misbehaving drives to prevent premature drive failures and slow downs to maximize system uptime and ensures 100% throughput during data rebuilds
- **ATTO *i*ntelligent Bridging Architecture™**
  - Combines powerful hardware with an efficient software data engine to deliver the flexibility of “anything-to-anything” connectivity
- **ATTO vConfigTool™**
  - A software plug-in to integrate centralized management and monitoring within a VMware vCenter® environment to accelerate adapter deployment; optimize configurations and reduce VMware host infrastructure costs
- **ATTO Latency Scout™**
  - A storage I/O diagnostic utility that boosts data center performance by identifying bottlenecks, allowing for the optimization of system performance and infrastructure uptime

Fibre Channel Competitive Review

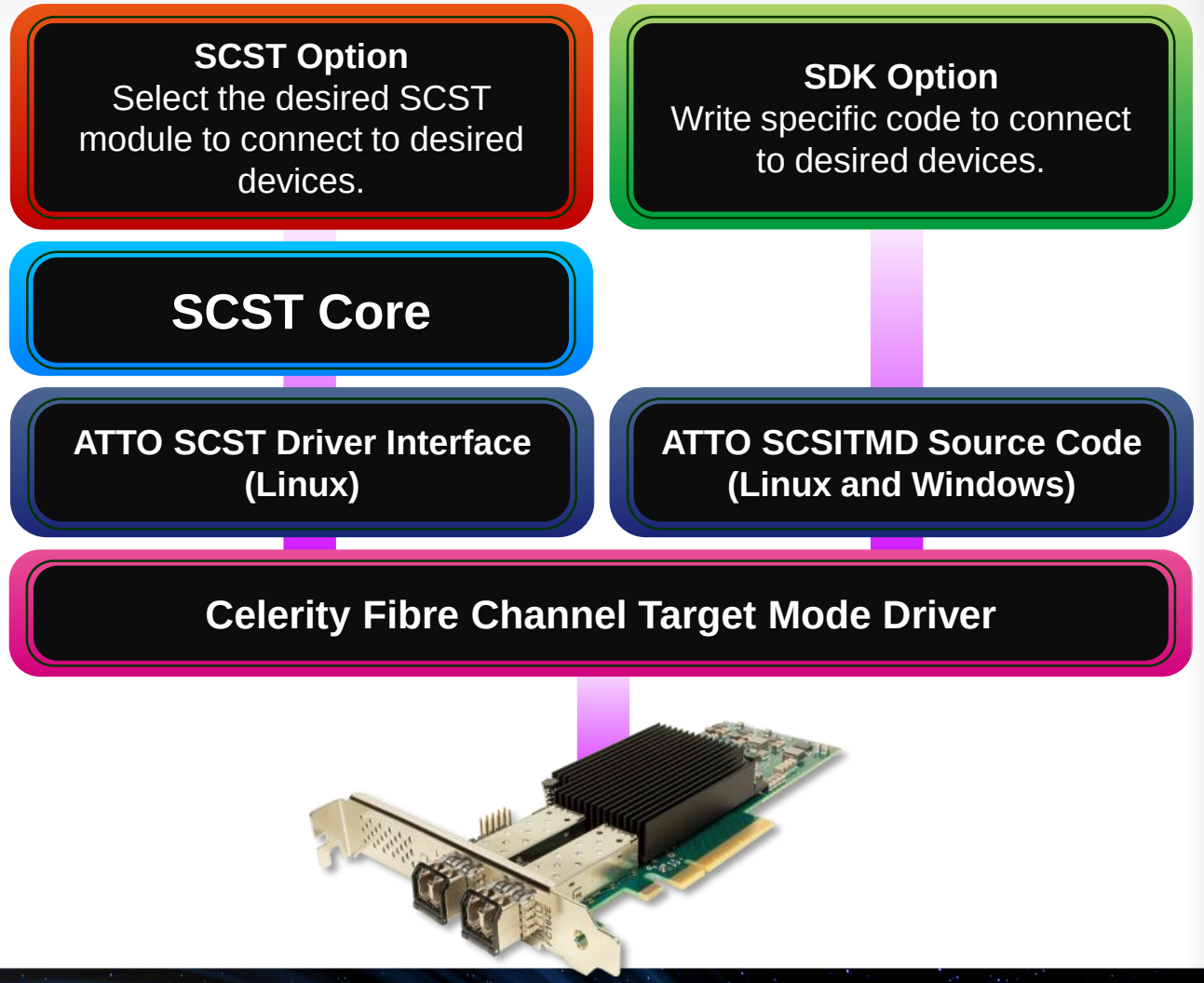
ATTO
The Power Behind the Storage

Company	Strength	Weakness	Market Perception	Competitive Strategy
ATTO	High Performance products and solutions, Support & Service	Brand awareness in IT	Performance and support leader	Niche Markets, Responsiveness, Customer Support
Marvell **Cavium** **QLogic**	Market share leader focused on driving incremental revenue from the target solutions	Limited mindshare to T2/3; so many acquisitions … are they really focused on their channel customers?		I/O solution provider focused on storage connectivity
Broadcom **Emulex**	Focus is on IT markets, Strong T1/T2 OEM relationships for both Silicon and HBA	Lacking mindshare to T3; so many acquisitions … are they really focused on their channel customers?	Strong feature set, IT market leader	IT and T1/T2 OEM focus

Target Mode Support

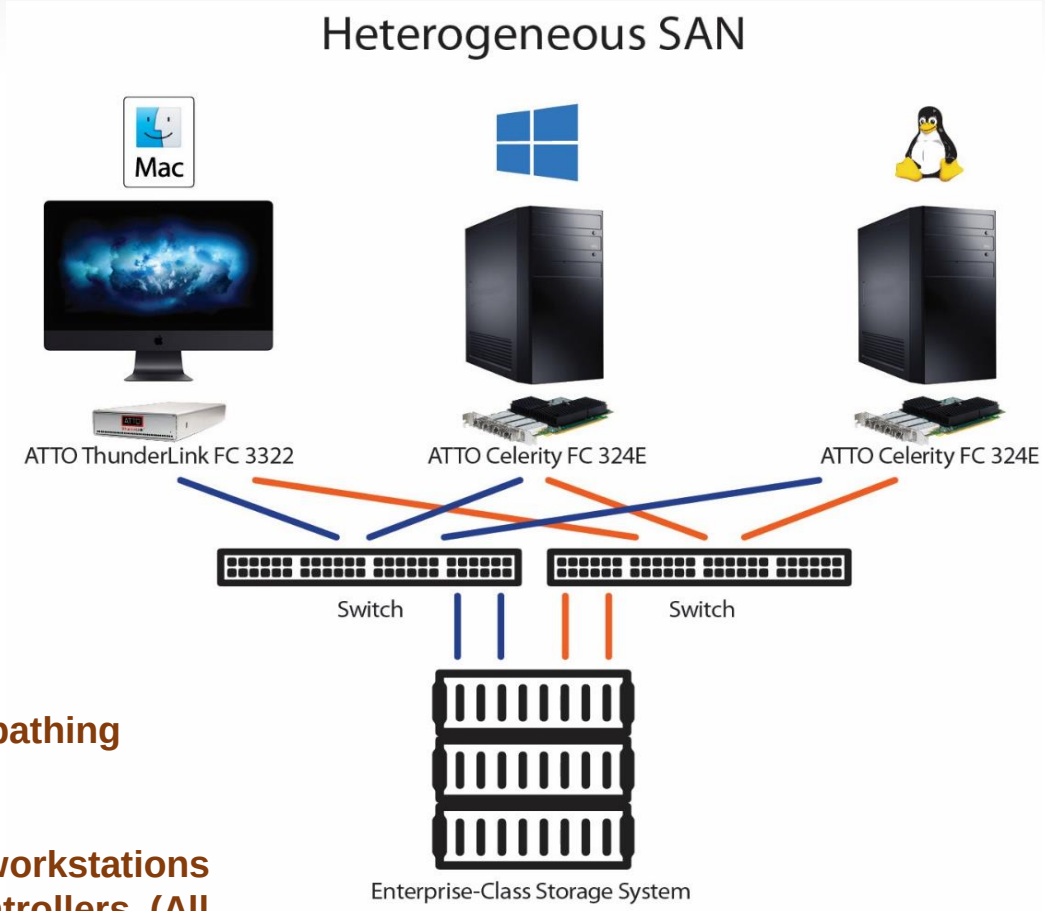
Celerity 32Gb/s and 16Gb/s Fibre Channel HBAs

- Target Mode Support
  - Design solutions from ground up for the greatest flexibility with ATTOs Software Developers Kit (SDK)
    - Provides the ability to offer value added features/software
    - Available for Linux, Windows and FreeBSD platforms
  - Design solutions from pre-set modules for quicker time to market with ATTOs SCST
    - Available for Linux platforms



MultiPath Director

- High-Availability Storage - Automatic path failover and failback provides uninterrupted access to storage.
- Superior Performance - Load balancing increases overall system performance by using more than one Fibre Channel path to transfer data.
- Improved Productivity - Workstations can share storage, enabling collaborative workflows and real-time access to content to meet project deadlines.
- Flexible Connectivity - Ability to mix Windows, Linux and Mac workstations in a heterogeneous environment.
- Simplified Management - ATTO Configuration Tool simplifies administration, troubleshooting and management of multiple paths to storage.



*** ATTO is the ONLY Fibre Channel HBA manufacturer with its own multipathing driver – MultiPath Director.**

*** In addition to Server environments, ATTO's MultiPath Director allows workstations to connect directly to Enterprise-class storage enclosures with dual controllers. (All competitors are forced to use multipathing functions available only in Server Operating Systems.)**

Where to Purchase

- Solkenix has been ATTO's Distributor in Taiwan since 2001
  - Experts in first-line support for ATTO product & solutions. Fibre Channel, iSCSI/Ethernet, SAS, and Thunderbolt products
  - https://www.solkenix.com/
- Rest of the World
  - https://www.atto.com/howtobuy/

QNAP x ATTO Summary

- **Together QNAP and ATTO offer the highest-performing and lowest cost solutions**
- **Take advantage of the Try-before-you-buy offer in 2019 Q3**

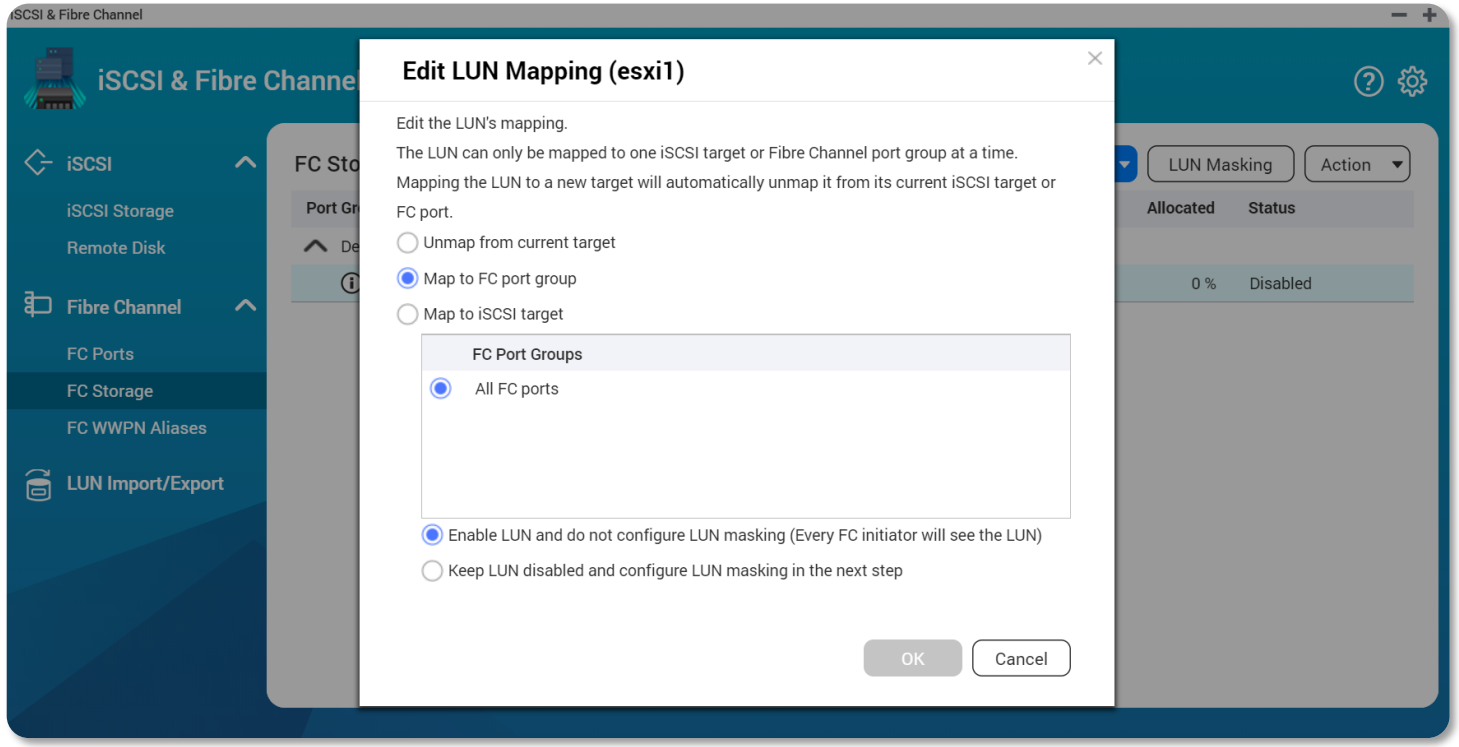
QNAP® & 

iSCSI and Fibre Channel manager

Features

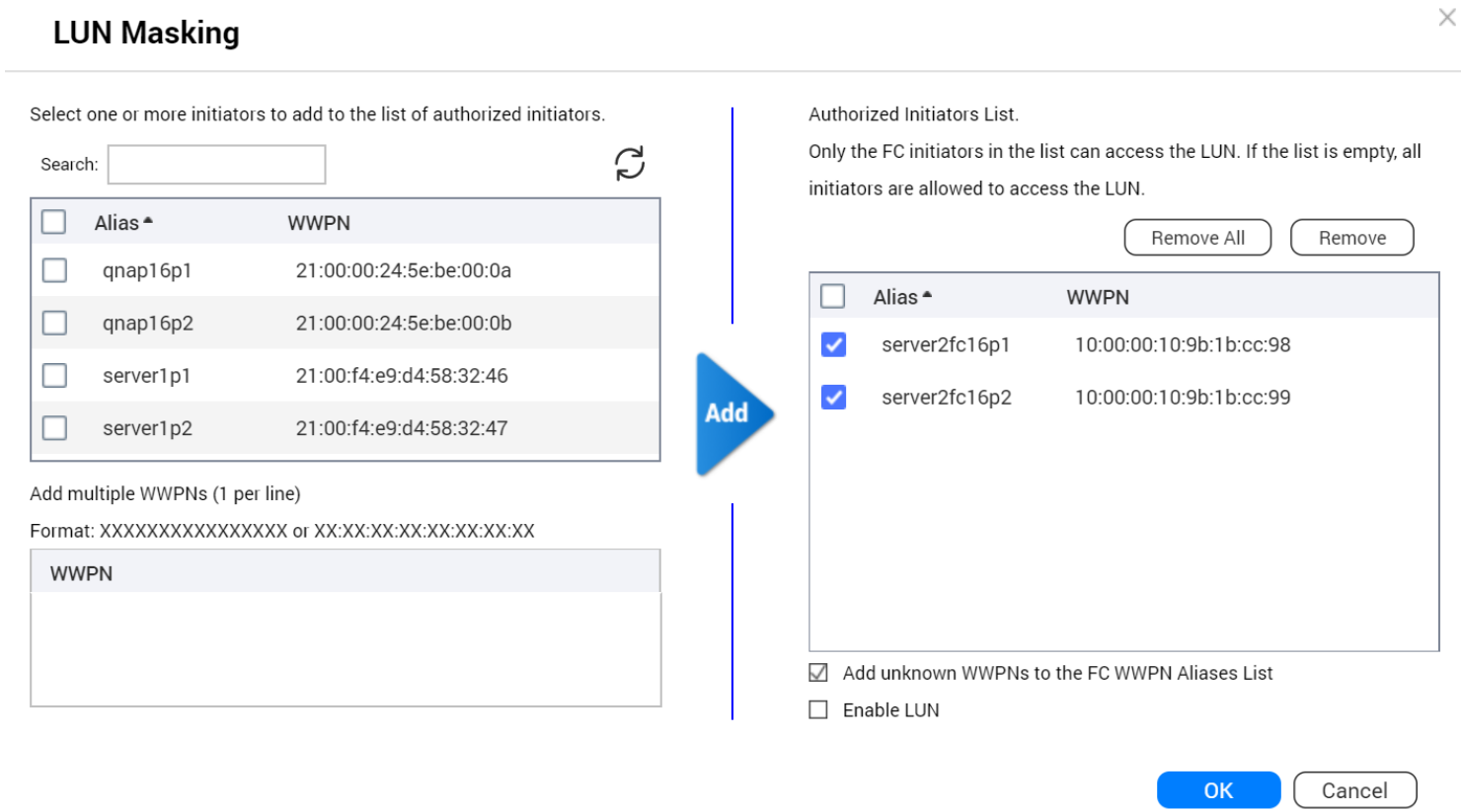
- **Flexible settings**
  1. **LUN Mapping : LUN can be mapped to iSCSI or FC.**
  2. **LUN Masking:**
     Set which server can access LUN.
  3. **FC Port Binding: which server can access which ports.**

- **Easy to identify**
  Fibre Channel's WWPN can edit aliases.



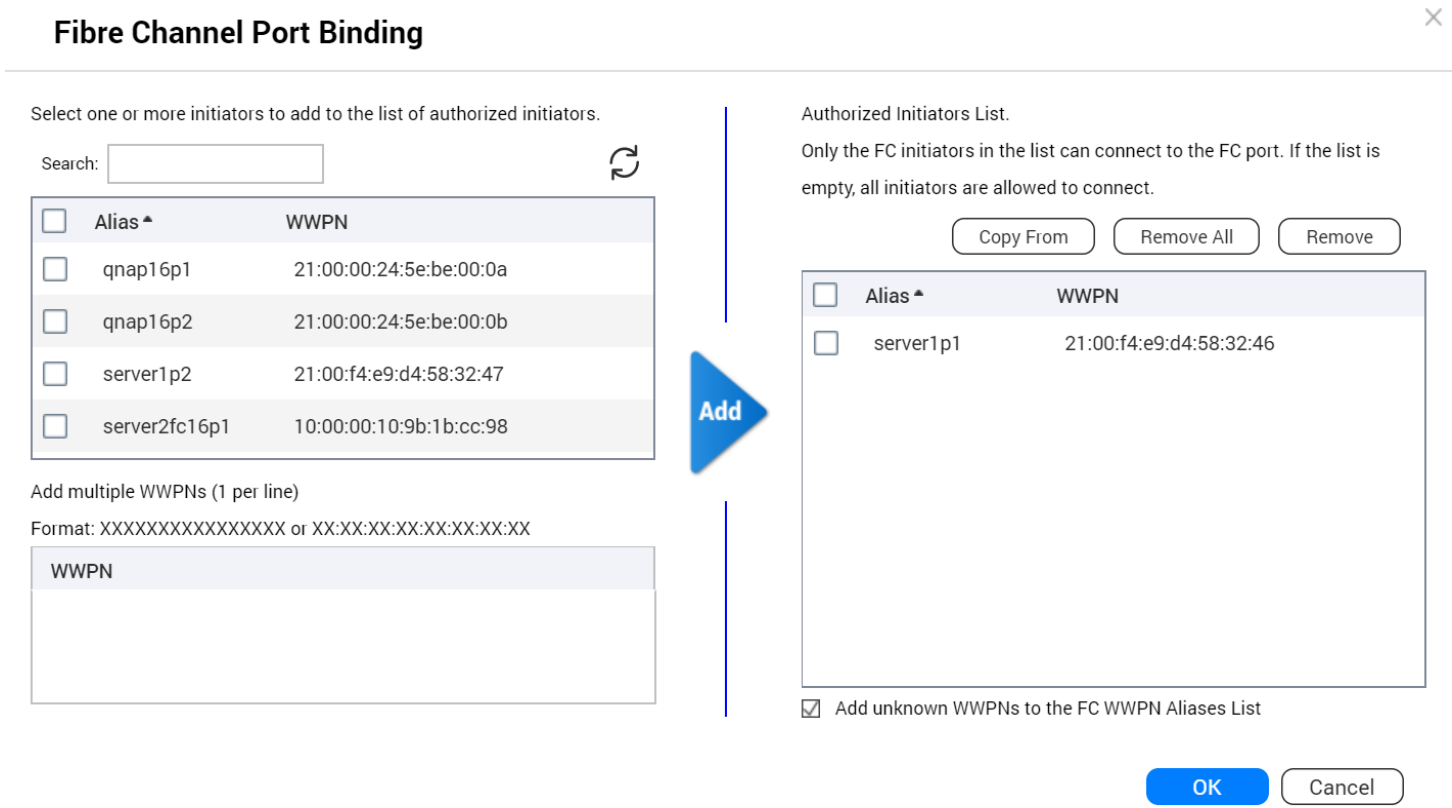
Set LUN Masking

- **LUN Masking:**
  Specify which server can access which LUN.



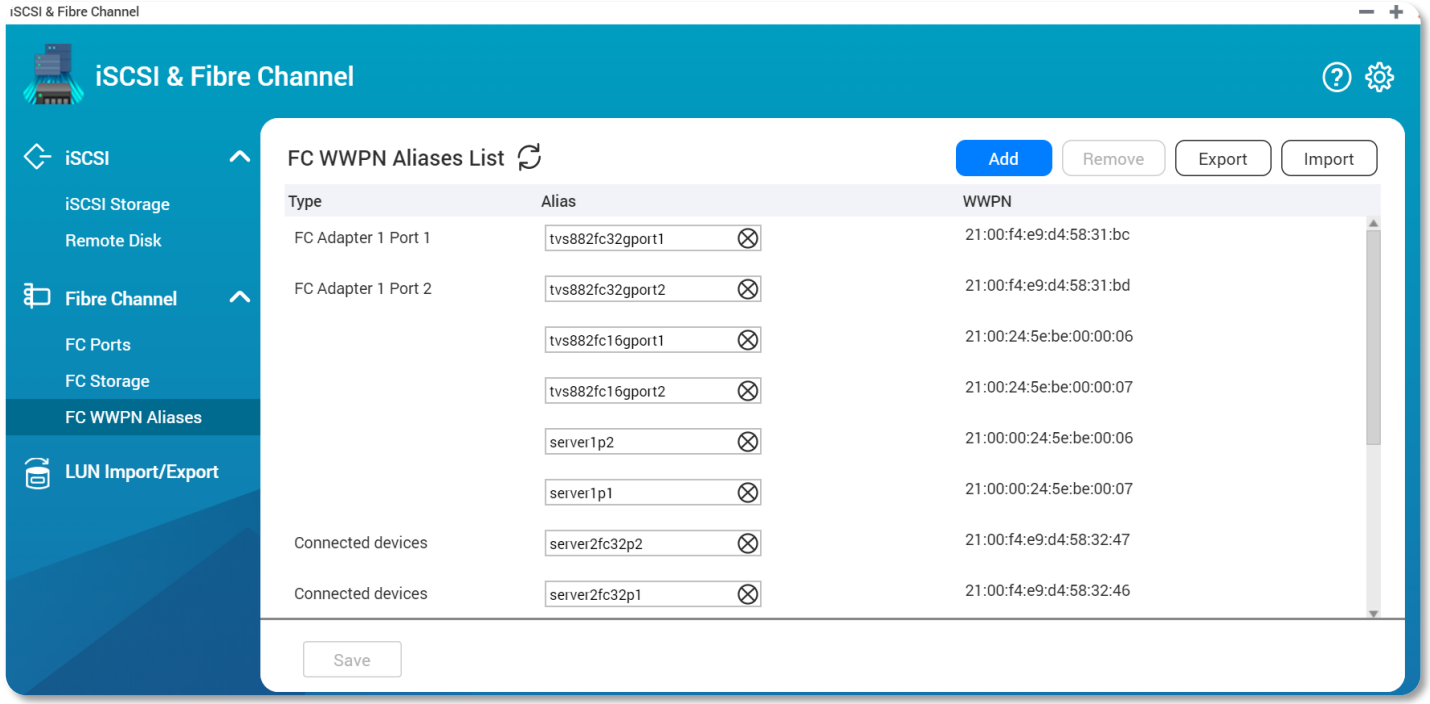
Set FC Port Binding (Binding)

- **FC Port Binding ：**
  Set which server can bind which ports.



Identify the server and Fibre Channel connections through the alias list

- **Edit alias :**
  Specifies a list of WWPN aliases for Fibre Channel. The user can easily identify the server and Fibre Channel ports in the storage area network.



Fibre Channel SAN with snapshot protection and Qtier, SSD cache function
Data security, Operational efficiency

iSCSI & Fibre Channel management
Simple and fast creation of a Fibre SAN environment

Snapshot
Snapshot Replica
Snapshot Vault

Qtier, SSD cache
Accelerate transmission efficiency

Snapshot and Snapshot Replica

Local Snapshot

Using QNAP NAS to easily create, manage and restore your file with snapshot

Snapshot Space Management

The “Out of volume” snapshot allows a Conservative but Completed snapshot protection

Snapshot Replica

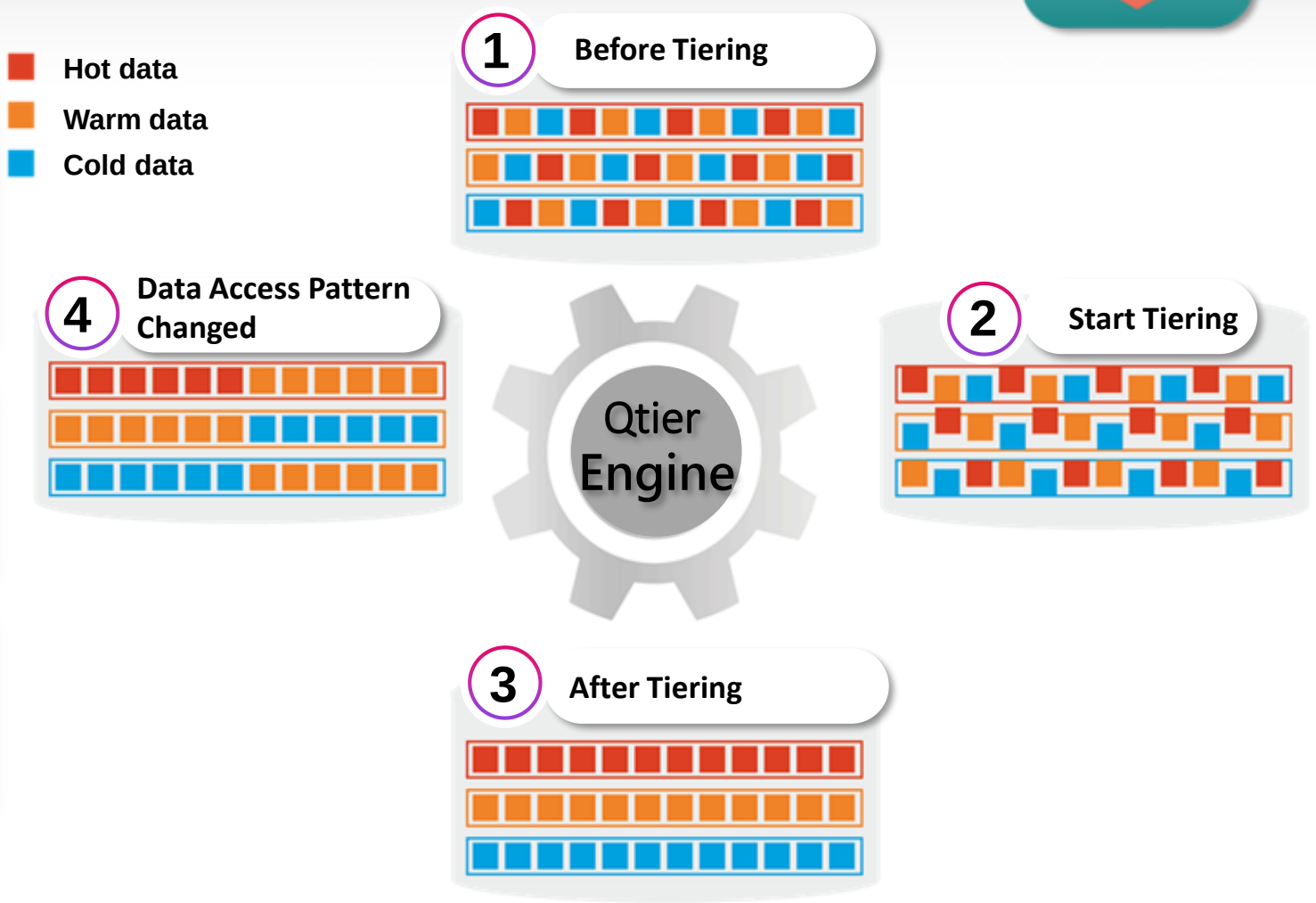
Backup your snapshot to a remote NAS and enjoy a fast restoration experience with remote restore and 10GbE solution

Qtier

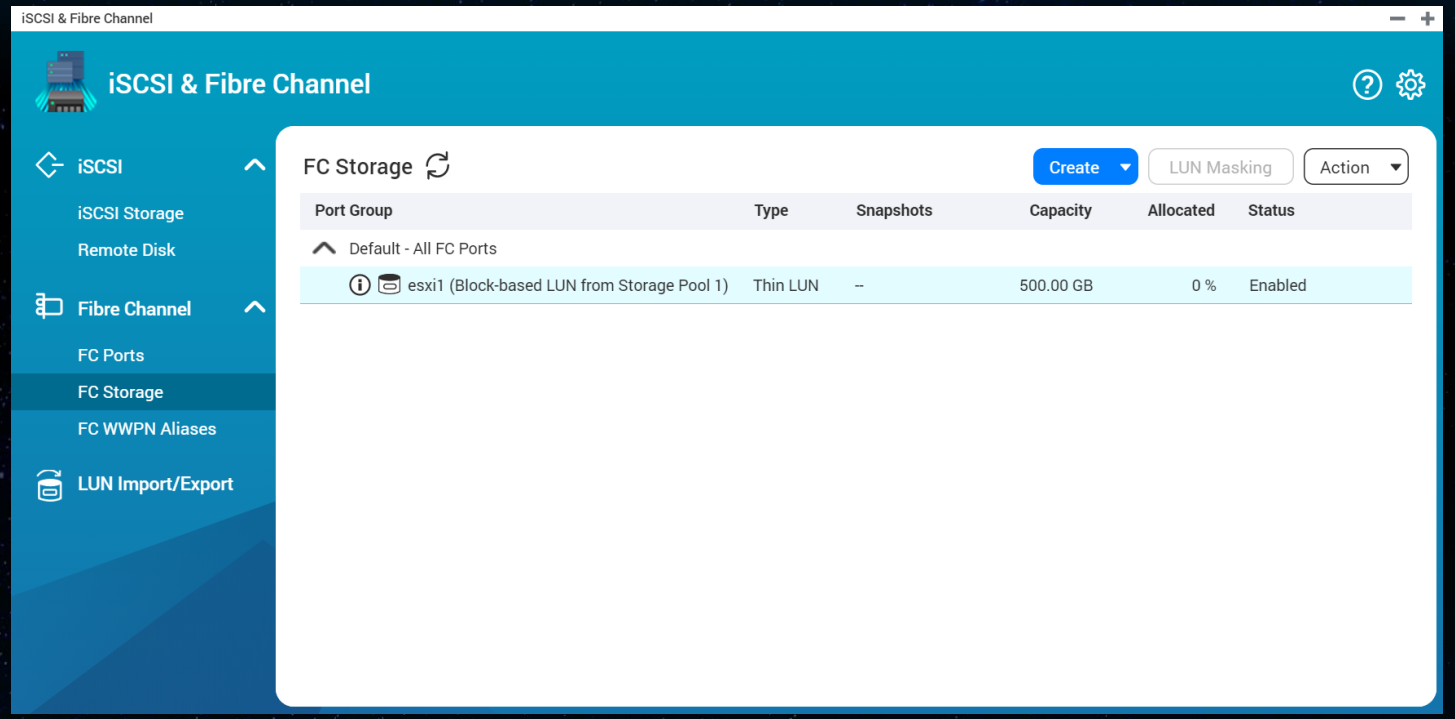
QNAP allows the combination of SSD and HDD RAID into the same pool and migrate data automatically based on accessing pattern.

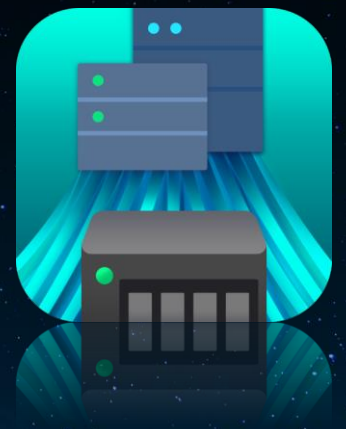
Support SATA, SAS, M.2, QM2 and U.2 SSD.

Provide higher capacity as SSD can be used to store data.



Live Demo


iSCSI & Fibre Channel
iSCSI & Fibre Channel
iSCSI
iSCSI Storage
Remote Disk
Fibre Channel
FC Ports
FC Storage
FC WWPN Aliases
LUN Import/Export
FC Storage
Create
LUN Masking
Action
Port Group
Type
Snapshots
Capacity
Allocated
Status
Default - All FC Ports
esxi1 (Block-based LUN from Storage Pool 1)
Thin LUN
--
500.00 GB
0 %
Enabled



Fibre Channel Supported Rackmount NAS

Intel & AMD NAS **support 32Gb/s & 16Gb/s ATTO FC adapters**

- TES-3085U (QTS), TES-1885U (QTS), TDS-16489U
- TS-2483XU, TS-1683XU-RP, TS-1283XU-RP, TS-983XU-RP, TS-983XU, TS-883XU-RP, TS-883XU
- TVS-EC2480U/1680U/1580MU/1280U, TS-EC880U
- TS-2477XU-RP, TS-1677XU-RP, TS-1277XU-RP, TS-977XU-RP, TS-977XU, TS-877XU-RP, TS-877XU
- TVS-2472XU-RP, TVS-1672XU-RP, TVS-1272XU-RP, TVS-972XU-RP, TVS-972XU, TVS-872XU-RP, TVS-872XU

Fibre Channel Supported Desktop NAS

Intel & AMD NAS support 32Gb/s & 16Gb/s ATTO FC adapters

- TS-2888X
- TS-1685
- TVS-1282, TVS-882, TVS-682
- TS-1677X, TS-1277, TS-877, TS-677
- TVS-872XT, TVS-672XT, TVS-472XT
- TVS-873/873e, TVS-673/673e, TVS-473/473e
- TS-873, TS-673, TS-473
- TVS-863, TVS-663, TVS-463

Suggested models for Fibre Channel

FC 16Gb
TS-1277

- 12 bay (8 x 3.5” + 4. 2.5”)
- AMD Ryzen 7 8-core 3.0GHz
- Max 64GB RAM

FC 32Gb
TS-2483XU

- 24 bay (24 x 3.5”)
- Intel® Xeon® E-2136 6-core 3.3 GHz
- Max 64GB RAM

FC 32Gb
TDS-16489U R2

- 16 bay (16 x 3.5”)
- Intel® Xeon® E5-2630 v4 10-core 2.2 GHz
- Max 256GB RAM

QNAP

QNAP NAS
X
ATTO Celerity™ FC adapters

Affordable price
Easy to use
Flexible settings

Fibre Channel
Storage Area Network Solution

QNAP

QNAP

QTS 4.4.1

is your best choice!