DAS Over FC Technology Allows ATTO to Disaggregate Storage and Complete vSAN Certification Suite

ATTO

White Paper

Recently ATTO Technology, Inc. completed the VMware vSAN® ReadyNode certification suite in a manner that has never been done before.

The test bed itself was formulaic, featuring three Dell® R640 servers as hosts. No internal storage existed, aside from an SD card for boot and a single SAS SSD for logging, and all storage was placed within external SAS JBODs.

What made this test groundbreaking was the storage configuration: the transport protocol was Fibre Channel (FC).

Two ATTO Technology 16Gb Celerity® Fibre Channel dual port host adapters were installed into each host. The storage, divided between three external SAS JBODS, became accessible via FC by connecting them to two ATTO XstreamCORE® 7550 *i*ntelligent bridges, which present SAS LUNS as FC LUNS.

For testing of various scenarios, each port from the first dual-port HBA plugged directly into a FC port on each XstreamCORE. Both ports on the second HBA connected to a FC switch and the XstreamCORE's fourth FC port uplinked to the switch as well to create a fabric.

In a FC fabric zoning typically manages the pairing of FC initiators and targets. This, however, is not granular enough for vSAN. vSAN needs each host to have exclusive access to the disks it manages as the vSAN file system lacks reserve release support, precluding a typical SAN environment.

ATTO XstreamCORE has resolved this issue with its Host Group Mapping function. Host Group Mapping bonds FC initiators with individual SAS LUNS ensuring each host has exclusive access to a disk and does not see any disks intended for another node.
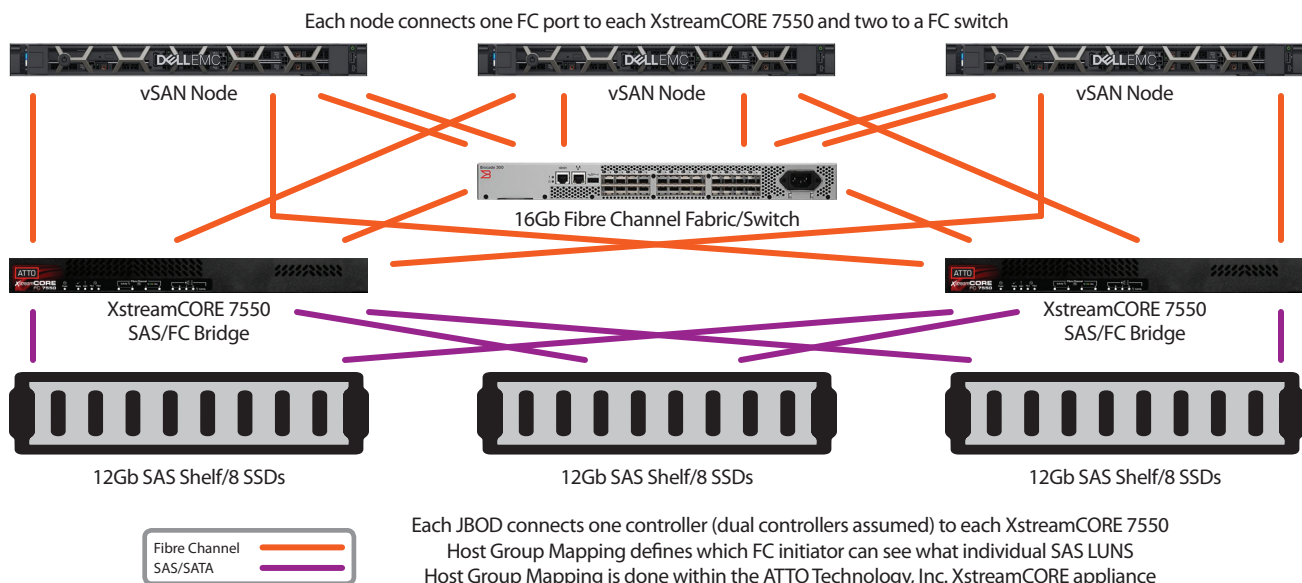
With this functionality, ATTO has created a direct-attached storage environment with disaggregation using FC as a transport protocol, while ensuring that nodes get exclusive access to disks. We have been referring to this as "DAS over FC". Marking the disks as local SSD and assigning capacity or cache tags to them ensured the ability to create disk groups and allow auto ingestion of the disks. A topology of the testing environment is included below.

With the successful completion of all tests in the All-Flash testing suite (All-Flash excepting a shared boot disk, which was deemed irrelevant for this purpose) ATTO will share the testing data with all of the manufacturers involved. This list includes Dell for the hosts, AIC, HP, and Dell (SAS JBOD), Lenovo and Toshiba (disks), as well as VMware.

Additional tests are expected with no anticipated issues.

Test Environment
Overall Test Bed

vSAN storage disaggregation using ATTO XstreamCORE technology Disk Group Expansion for existing Nodes

Each node connects one FC port to each XstreamCORE 7550 and two to a FC switch

vSAN Node   vSAN Node   vSAN Node

16Gb Fibre Channel Fabric/Switch

XstreamCORE 7550 SAS/FC Bridge   XstreamCORE 7550 SAS/FC Bridge

12Gb SAS Shelf/8 SSDs   12Gb SAS Shelf/8 SSDs   12Gb SAS Shelf/8 SSDs

Fibre Channel
SAS/SATA

Each JBOD connects one controller (dual controllers assumed) to each XstreamCORE 7550
Host Group Mapping defines which FC initiator can see what individual SAS LUNS
Host Group Mapping is done within the ATTO Technology, Inc. XstreamCORE appliance

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Server Data

Server Make and Model	CPU	RAM	HBAs installed FC	HBAs installed NIC	Boot
Dell R640 x3	Intel Xeon Silver 4214 x2	128GB	2x ATTO Celerity FC162-P	2x Embedded	32GB SD

Fibre Channel Connectivity

Dell Node   Dell Node   Dell Node

Fbre Channel Switch

XstreamCORE 7550   Fibre Channel   XstreamCORE 7550
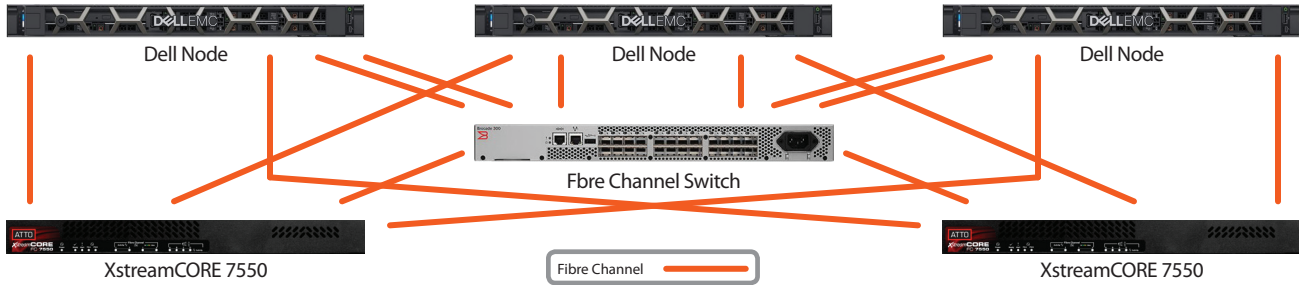
HBA Port	Connects to	HBA Port	Connect to	HBA Port	Connects to	HBA Port	Connects to
FC HBA 1-1	ATTO 7550-1 FC1	FC HBA 1-2	ATTO 7550-2 FC1	FC HBA 2-1	FC Switch-1	FC HBA 2-2	FC Switch-2
FC HBA 1-1	ATTO 7550-1 FC2	FC HBA 1-2	ATTO 7550-2 FC2	FC HBA 2-1	FC Switch-2	FC HBA 2-2	FC Switch-4
FC HBA 1-1	ATTO 7550-1 FC3	FC HBA 1-2	ATTO 7550-2 FC3	FC HBA 2-1	FC Switch-3	FC HBA 2-2	FC Switch-6
FC1	vSAN 1 FC1-1	FC2	vSAN 2 FC1-1	FC3	vSAN 3 FC1-1	FC4	FC Switch-7
FC1	vSAN 1 FC1-2	FC2	vSAN 2 FC1-2	FC3	vSAN 3 FC1-2	FC4	FC Switch-8

SAS Connections

SAS/SATA

XstreamCORE 7550 1   XstreamCORE 7550 2

AIC J2024-02   Dell MD1420   HP D3700
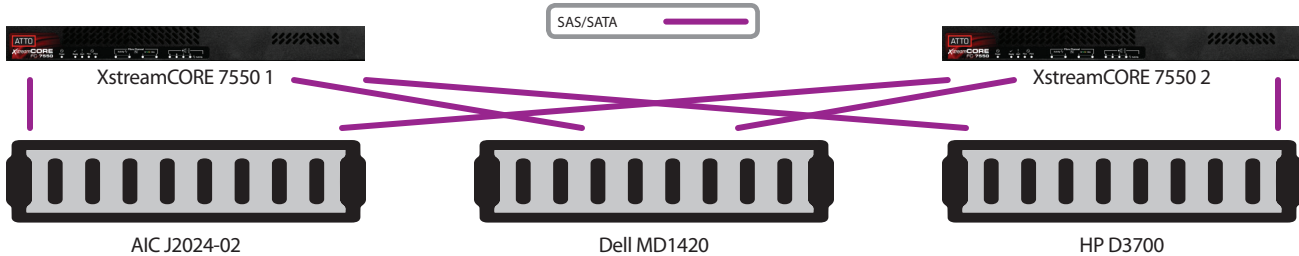
SAS Connections

XstreamCORE	Port	JBOD Port	Port	JBOD Port	Port	JBOD Port
ATTO 7550-1	SAS1	AIC J2024-02 SAS1	SAS2	Dell MD1420 SAS1	SAS3	HP D3700 SAS1
ATTO 7550-2	SAS1	AIC J2024-02 SAS2	SAS2	Dell MD1420 SAS2	SAS3	HP D3700 SAS2

JBOD	Slots Used	Drive Manufacturer	Drive Part Number	Drive Type	Drive Size	Server Assigned to
AIC J2024-02	9-16	Lenovo System X	MZILS400HCGRV3	12Gb SAS SSD	400GB	vSAN1
Dell MD1420	9-16	Lenovo System X	MZILS400HCGRV3	12Gb SAS SSD	400GB	vSAN1
HP D3700	9-16	Toshiba	PX04SVB384	12Gb SAS SSD	3.84TB	vSAN1