



THE MDS ADVANTAGE: INTEROPERABILITY

CISCO MDS 9000 – ENABLING MULTI-VENDOR SAN

As the storage area networking ecosystem has evolved, Cisco has actively promoted interoperability between different Fibre Channel switch vendors. Cisco set multiple goals towards achieving interoperability:

- Deliver seamless interoperability between multiple switch vendors' products.
- Interoperate with minimal impairment to third party storage area networks' capabilities.
- Provide services and management functionalities to protect customer investments in legacy technology.

The Cisco MDS 9000 Family of Multilayer Switches was designed from the ground up to interoperate with other vendors' switches by adhering to the Fibre Channel Method of Interconnect (FC-MI) standard released by the ANSI T11 technical committee. Since 2002 Cisco has invested and continues to heavily invest in interoperability labs dedicated to test and certify interoperability of the MDS 9000 Family of switches.

Cisco MDS Advantage

The Cisco MDS 9000 switches can seamlessly interoperate with Brocade, McData and Qlogic switches. Cisco customers have multiple interoperability modes available, based on their requirements. These modes can be configured on a per-Virtual SAN (VSAN) basis, thereby enabling a single MDS switch to connect to multiple vendors' switches, each having their own connectivity requirements. The five interoperability modes available are listed in Table 1.

Table 1 Interoperability Modes Available on the Cisco MDS 9000 Family of switches

Default or Native Mode: This is a default mode for SAN composed entirely of Cisco MDS 9000 switches or interconnected with Qlogic switches.

Mode 1 – FC-MI Standard: This is the FC-MI standard-based interoperability mode and enables interoperability with Brocade and McData switches. This mode requires both McData and Brocade switches to run in their respective Interoperability or Open Fabric modes. Customers with dual fabric topology or who can afford to take a small disruption by enabling interoperability mode on Brocade or McData switches can make use of this mode. Customers who need a fully non-disruptive solution should look to use modes 2, 3 or 4. This mode has been available since Cisco MDS 9000 SAN-OS 1.0(1).

Mode 2 – Brocade Native: This mode also known as Legacy Switch Interoperability mode 2, allows integration with Brocade switches running in their own native mode of operation. This mode supports non-disruptive native interoperability with Brocade 2400, 2800, 3200 and 3800 series switches, which are confined in a dedicated VSAN. This mode has been available since Cisco MDS 9000 SAN-OS 1.2(2).

Mode 3 – Brocade Native: This mode was introduced for Brocade switches with more than 16 ports. With this VSAN based interoperability mode, Brocade switches will not have to be altered from their native mode and can seamlessly be added to a new or existing MDS VSAN. This mode supports non-disruptive native interoperability with Brocade 48000, 24000, 12000 or 3900 series switches. This mode has been available since Cisco MDS 9000 SAN-OS 1.3(1).

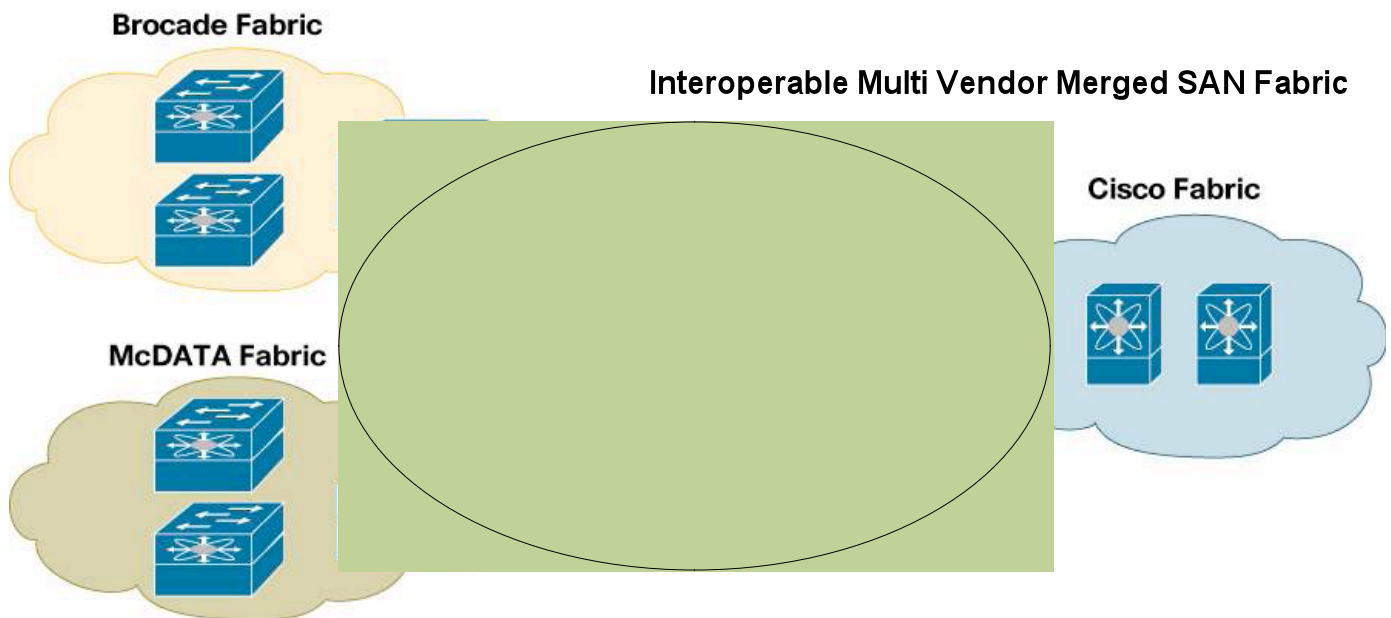
Mode 4: McData Native Mode. This mode supports non-disruptive native interoperability with McData switches running in McData 1.0 mode. McData fabric can be added to a Cisco MDS VSAN without disruption. This mode has been available since Cisco MDS 9000 SAN-OS 3.0(1).



Cisco MDS 9000 interoperability has been widely deployed by customers who are leveraging this connectivity option as part of a migration strategy away from their legacy SAN switches. Cisco recommends that customers make use of one of the interoperability modes as they plan their migration from Brocade or McData to Cisco MDS SANs. Cisco continues to stand behind its commitment to interoperability by providing documentation, training, support and professional services to help customers with such technology upgrade.

Figure 1 illustrates an example of a Cisco MDS 9000 interoperating with two legacy fabrics. The Cisco MDS VSAN feature combined with Inter-VSAN Routing (IVR) allows existing devices on the legacy fabrics/VSANs to communicate with devices that reside on another VSAN, *even if the target VSAN is in a different interoperability mode*.

Figure 1: Cisco MDS 9000 Interoperability



- **VSAN B** is assigned to Brocade fabric. Interoperate modes 1, 2 or 3 could be enabled depending on the operational parameters of the existing Brocade fabric.
- **VSAN M** is assigned to the McData fabric. Interoperate mode 1 or 4 can be configured depending on the operational parameters of the existing McData fabric.
- **VSAN C** is assigned to a Cisco fabric and is running the default interoperability mode. It does not require any modifications to the interoperability mode.

Configuring IVR, the MDS can route traffic between the three VSANs. Interoperability with IVR allows the MDS 9000 switch in the core to consolidate multiple physical third party fabrics into a single physical fabric, logically protected by VSANs.



Interoperability Resources

Cisco's interoperability labs continue to test and certify on an on-going basis the interoperability of new software and hardware from the various Fibre Channel switch vendors. Cisco's OSM partners continue to support interoperability between the MDS 9000 Family and third party switches. Table 2 lists third party switch models interoperating with Cisco MDS 9000 Family of Multilayer Switches. Table 3 highlights real customer scenarios where interoperability has been leveraged.

Table 2: Switch Model Interoperability

Switch Vendor	Switch Models
Brocade	2400, 2800, 200E, 3800, 3850, 3900, 4012, 4024, 4100, 12000, 24000, 48000, DCX
McData	3032, 3232, 4500, 6040, 6064, 6140, i10K
Qlogic	Sanbox2, Sanbox64, Sanbox5200, Sanbox5600

Table 3: Deployment Case studies

Company profile	Interoperability Scenarios
Retail Firm	Customer had McData switches in the data center and used Cisco MDS interoperability mode 1 to interoperate. Over the course of 2 years the customer was able to migrate the entire McData install base to Cisco MDS switches.
Hi-tech Firm	Customer used MDS interoperability mode 3 to interconnect with existing Brocade fabric. In less than a year, the customer fully replaced Brocade switches with Cisco MDS Directors.
Financial Firm	Customer had both McData and Brocade in the same data center. They used MDS Directors in interoperability mode 4 and mode 3 to natively interoperate with McData and Brocade switches respectively. Customer made use of VSAN technology to have McData on one VSAN and Brocade on another VSAN interoperating with Cisco MDS. Customer leveraged IVR to route traffic between the VSANs. The migration to Cisco MDS 9000 SAN was successfully completed in 9 months.

For more detailed information about Cisco MDS 9000 interoperability capabilities, please refer to the documentation listed below.

Cisco MDS 9000 Family Switch to Switch Interoperability Configuration Guide

http://www.cisco.com/en/US/docs/storage/san_switches/mds9000/interoperability/guide/intopgd.html

Cisco Data Center Interoperability Matrix

http://www.cisco.com/en/US/docs/storage/san_switches/mds9000/interoperability/matrix/intmatrx.html

In conclusion, the Cisco MDS 9000 Family of Multilayer Switches provides seamless interoperability between multiple SAN switch vendors, protects customer investments in data center technology and enables non-disruptive upgrade path to migrate to MDS SANs. Cisco has tested and qualified these interoperability modes to help ensure that the integrity, stability, and quality of customers' mission-critical storage area networks are not compromised.

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