



Cisco MDS 9000 Family Release Notes for Cisco MDS NX-OS Release 5.2(8)

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This document describes the caveats and limitations for switches in the Cisco MDS 9000 Family. Use this document in conjunction with documents listed in the “[Related Documentation](#)” section on page 54.

Release notes are sometimes updated with new information on restrictions and caveats. Refer to the following website for the most recent version of the *Cisco MDS 9000 Family Release Notes*:

http://www.cisco.com/en/US/products/ps5989/prod_release_notes_list.html

Table 1 shows the on-line change history for this document.

Table 1 Online History Change

Revision	Date	Description
A0	December 10, 2012	Created the release notes.
B0	February 13, 2013	Updated the “ New Features in Cisco MDS NX-OS Release 5.2 ” section to include new features from earlier 5.2 releases.
C0	March 5, 2013	<ul style="list-style-type: none">Added open caveats CSCud62557 and CSCud72991.Added resolved caveats CSCtx41288, CSCty59570, CSCty68838, CSCuc17269, CSCuc34454, CSCud01052, and CSCud14600.
D0	March 12, 2013	Added resolved caveat CSCuc84790 .
E0	April 2, 2013	Added open caveat CSCuf31077 .
F0	June 13, 2013	Added open caveat CSCub47799 .
G0	August 13, 2013	Added open caveat CSCuh27347 .

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Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

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Introduction

The Cisco MDS 9000 Family of Multilayer Directors and Fabric Switches provides industry-leading availability, scalability, security, and management, allowing you to deploy high performance storage-area networks with lowest total cost of ownership. Layering a rich set of intelligent features onto a high performance, protocol agnostic switch fabric, the Cisco MDS 9000 Family addresses the stringent requirements of large data center storage environments: uncompromising high availability, security, scalability, ease of management, and seamless integration of new technologies.

Cisco MDS 9000 NX-OS software powers the award-winning Cisco MDS 9000 Series Multilayer Switches. It is designed to create a strategic SAN platform with superior reliability, performance, scalability, and features. Formerly known as Cisco SAN-OS, Cisco MDS 9000 NX-OS software is fully interoperable with earlier Cisco SAN-OS versions and enhances hardware platform and module support.

Components Supported

[Table 2](#) lists the NX-OS software part numbers and hardware components supported by the Cisco MDS 9000 Family.

**Note**

For the latest information about supported transceivers, see the [Cisco MDS 9000 Family Pluggable Transceivers](#) data sheet.

Table 2 Cisco MDS 9000 Family Supported Software and Hardware Components

Component	Part Number	Description	Applicable Product
Software	M95S2K9-5.2.8	MDS 9500 Supervisor/Fabric-2, NX-OS software	MDS 9500 Series only
	M92S2K9-5.2.8	MDS 9200 Supervisor/Fabric-2, NX-OS software	MDS 9222i Switch only
	M91S3K9-5.2.8	MDS 9148 Supervisor/Fabric-3 NX-OS software	MDS 9148 Switch
	M91S2K9-5.2.8	MDS 9100 Supervisor/Fabric-2, NX-OS software	MDS 9134 Switch and MDS 9124 Switch
Licenses	M9500SSE184K9	Storage Services Enabler License for one MSM-18/4 module	MDS 9500 Series only
	M9222ISSE1K9	Storage Services Enabler License	MDS 9222i Switch only
	M9200SSE184K9	Storage Services Enabler License for one MSM-18/4 module	MDS 9200 Series only
	M95DMM184K9	Data Mobility Manager License for one MSM-18/4 module	MDS 9500 Series only
	M9222IDMMK9	Data Mobility Manager License for Cisco MDS 9222i	MDS 9222i Switch
	M92DMM184K9	Data Mobility Manager License for one MSM-18/4 module	MDS 9200 Series only
	M95DMM184TSK9	Data Mobility Manager for one MSM-18/4 module — Time Limited to 180 days only	MDS 9500 Series only
	M9222IDMMTSK9	Data Mobility Manager — Time Limited to 180 days only	MDS 9222i Switch only
	M92DMM184TSK9	Data Mobility Manager for one MSM-18/4 module — Time Limited to 180 days only	MDS 9200 Series only
	M92SSESSNK9	Cisco Storage Services Enabler License for SSN-16 (1 engine)	MDS 9200 Series only
	M95SSESSNK9	Cisco Storage Services Enabler License for SSN-16 (1 engine)	MDS 9500 Series only
	M92SMESSNK9	Cisco Storage Media Encryption License for SSN-16 (1 engine)	MDS 9200 Series only
	M95SMESSNK9	Cisco Storage Media Encryption License for SSN-16 (1 engine)	MDS 9500 Series only
	M92IOASSN	Cisco I/O Accelerator License for SSN-16 (1 engine)	MDS 9200 Series only
	M95IOASSN	Cisco I/O Accelerator License for SSN-16 (1 engine)	MDS 9500 Series only
	M92IOA184	Cisco I/O Accelerator License for MSM-18/4	MDS 9200 Series only
	M95IOA184	Cisco I/O Accelerator License for MSM-18/4	MDS 9500 Series only
	M9222IIOA	Cisco I/O Accelerator License for Cisco MDS 9222i base switch	MDS 9222i Switch only
	M92EXTSSNK9	Cisco SAN Extension License for SSN-16 (1 engine)	MDS 9200 Series only
	M95EXTSSNK9	Cisco SAN Extension License for SSN-16 (1 engine)	MDS 9500 Series only
	M9200XRC	Cisco XRC Acceleration	MDS 9200 Series only
	M9500XRC	Cisco XRC Acceleration	MDS 9500 Series only

Table 2 Cisco MDS 9000 Family Supported Software and Hardware Components (continued)

Component	Part Number	Description	Applicable Product
Chassis	DS-C9513	Cisco MDS 9513 Multilayer Director (13-slot multilayer director with 2 slots for Supervisor-2 modules, with 11 slots available for switching modules — SFPs sold separately)	MDS 9513 Switch
	DS-C9509	Cisco MDS 9509 Multilayer Director (9-slot multilayer director with 2 slots for Supervisor modules, with 7 slots available for switching modules — SFPs sold separately)	MDS 9509 Switch
	DS-C9506	Cisco MDS 9506 Multilayer Director (6-slot multilayer director with 2 slots for Supervisor modules, with 4 slots available for switching modules — SFPs sold separately)	MDS 9506 Switch
	DS-C9222i-K9	Cisco MDS 9222i Multilayer Fabric Switch (3-rack-unit (3RU) semimodular multilayer fabric switch with 18 4-Gbps Fibre Channel ports, 4 Gigabit Ethernet ports, and a modular expansion slot for Cisco MDS 9000 Family Switching and Services modules)	MDS 9222i Switch
	DS-C9148-K9	Cisco MDS 9148 48-Port Multilayer Fabric Switch (1RU fixed-configuration multilayer fabric switch with 48 8-Gbps Fibre Channel ports)	MDS 9148 Switch
	DS-C9134-K9	Cisco MDS 9134 34-Port Multilayer Fabric Switch (1RU fixed-configuration multilayer fabric switch with 32 4-Gbps and 2 10-Gbps Fibre Channel ports)	MDS 9134 Switch
	DS-C9124-K9	Cisco MDS 9124 24-Port Multilayer Fabric Switch (1RU fixed-configuration multilayer fabric switch with 24 4-Gbps Fibre Channel ports)	MDS 9124 Switch
Supervisor Modules	DS-X9530-SF2-K9	Cisco MDS 9500 Series Supervisor-2 Module	MDS 9500 Series
	DS-X9530-SF2A-K9	Cisco MDS 9500 Series Supervisor-2A Module	MDS 9500 Series

Table 2 Cisco MDS 9000 Family Supported Software and Hardware Components (continued)

Component	Part Number	Description	Applicable Product
Switching Modules	DS-X9112	Cisco MDS 9000 12-port 4-Gbps Fibre Channel Switching Module with SFP LC connectors	MDS 9500 Series MDS 9200 Series
	DS-X9124	Cisco 24-port 4-Gbps Fibre Channel Switching Module with SFP LC connectors	MDS 9500 Series MDS 9200 Series
	DS-X9148	Cisco MDS 9000 48-port 4-Gbps Fibre Channel Switching Module with SFP LC	MDS 9500 Series Mds 9200 Series
	DS-X9704	Cisco MDS 9000 Family 4-Port 10-Gbps Fibre Channel Switching Module with SFP LC	MDS 9500 Series MDS 9200 Series
	DS-X9224-96K9	Cisco MDS 9000 24-Port 8-Gbps Fibre Channel Switching Module with SFP and SFP+ LC connectors	MDS 9500 Series
	DS-X9248-96K9	Cisco MDS 9000 48-Port 8-Gbps Fibre Channel Switching Module with SFP and SFP+ LC connectors	MDS 9500 Series
	DS-X9248-48K9	Cisco MDS 9000 4/44-Port Host-Optimized 8-Gbps Fibre Channel Switching Module with SFP and SFP+ LC connectors	MDS 9500 Series MDS 9222i Switch
	DS-X9708-K9	Cisco MDS 9000 8-port 10-Gbps Fibre Channel over Ethernet (FCoE) Module	MDS 9500 Series
	DS-X9232-256K9	Cisco MDS 9000 32-port 8-Gbps Advanced Fibre Channel Switching Module	MDS 9500 Series
	DS-X9248-256K9	Cisco MDS 9000 48-port 8-Gbps Advanced Fibre Channel Switching Module	MDS 9500 Series
Services Modules	DS-X9316-SSNK9	Cisco MDS 9000 Family 16-Port Storage Services Node (SSN-16) — 16 fixed 1-Gbps Ethernet ports, plus 4 service engines that support 16 Gigabit Ethernet IP storage services ports.	MDS 9500 Series MDS 9222i Switch
	DS-X9304-18K9	Cisco MDS 9000 18/4-Port Multiservice Module (MSM-18/4) — 18-port, 4-Gbps Fibre Channel plus 4-port Gigabit Ethernet IP services and switching module with SFP LC connectors	MDS 9500 Series MDS 9200 Series
External crossbar module	DS-13SLT-FAB1	Cisco MDS 9513 Switching Fabric 1 Module	MDS 9513 Switch
	DS-13SLT-FAB2	Cisco MDS 9513 Switching Fabric 2 Module	MDS 9513 Switch
	DS-13SLT-FAB3	Cisco MDS 9513 Switching Fabric 3 Module	MDS 9513 Switch

Table 2 Cisco MDS 9000 Family Supported Software and Hardware Components (continued)

Component	Part Number	Description	Applicable Product
Optics	SFP-10G-SR	10GBASE-SR SFP+ Module	MDS 9500 Series, 8-port 10-Gbps FCoE Module (DS-X9708-K9)
	SFP-10G-LR	10GBASE-LR SFP+ Module	MDS 9500 Series, 8-port 10-Gbps FCoE Module (DS-X9708-K9)
	SFP-H10GB-CU1M	10GBASE-CU SFP+ cable 1 meter	MDS 9500 Series, 8-port 10-Gbps FCoE Module (DS-X9708-K9)
	SFP-H10GB-CU3M	10GBASE-CU SFP+ cable 3 meter	MDS 9500 Series, 8-port 10-Gbps FCoE Module (DS-X9708-K9)
	SFP-H10GB-CU5M	10GBASE-CU SFP+ cable 5 meter	MDS 9500 Series, 8-port 10-Gbps FCoE Module (DS-X9708-K9)
	SFP-H10GB-ACU7M	10GBASE-CU SFP+ active copper cable 7 meter	MDS 9500 Series, 8-port 10-Gbps FCoE Module (DS-X9708-K9)
	SFP-H10GB-ACU10M	10GBASE-CU SFP+ active copper cable 10 meter	MDS 9500 Series, 8-port 10-Gbps FCoE Module (DS-X9708-K9)

Table 2 Cisco MDS 9000 Family Supported Software and Hardware Components (continued)

Component	Part Number	Description	Applicable Product
LC-type fiber-optic SFP	DS-FC10G-SW	SFP+ optics (LC type) for 10-Gbps Fibre Channel for shortwave mode	32-port 8-Gbps Advanced Fibre Channel Module (DS-X9232-256K9), 48-port 8-Gbps Advanced Fibre Channel Module (DS-X9248-256-K9)
	DS-FC10G-LW	SFP+ optics (LC type) for 10-Gbps Fibre Channel for longwave mode	32-port 8-Gbps Advanced Fibre Channel Module (DS-X9232-256K9), 48-port 8-Gbps Advanced Fibre Channel Module (DS-X9248-256-K9)
	DS-SFP-FC8G-ER	SFP+ optics (LC type) for 2-, 4-, or 8-Gbps Fibre Channel for extended reach (40 km reach)	MDS DS-X9200 Series switching modules, MDS 9148
	DS-SFP-FC8G-SW	SFP+ optics (LC type) for 2-, 4-, or 8-Gbps Fibre Channel for shortwave mode	MDS DS-X9200 Series switching modules
	DS-SFP-FC8G-LW	SFP+ optics (LC type) for 2-, 4-, or 8-Gbps Fibre Channel for longwave mode; supports distances up to 10 km	MDS DS-X9200 Series switching modules
	DS-SFP-FC4G-SW	SFP optics (LC type) for 1-, 2-, or 4-Gbps Fibre Channel for shortwave mode	MDS 9124, MDS 9134, MDS 9148, MDS 9222i, DS-X9100, and DS-X9200 Series switching modules
	DS-SFP-FC4G-MR	SFP optics (LC type) for 1-, 2-, or 4-Gbps Fibre Channel for longwave mode; supports distances up to 4 km	MDS 9124, MDS 9134, MDS 9222i, DS-X9100, and DS-X9200 Series switching modules
	DS-SFP-FC4G-LW	SFP optics (LC type) for 1-, 2-, or 4-Gbps Fibre Channel for longwave mode; supports distances up to 10 km	MDS 9124, MDS 9134, MDS 9222i, DS-X9100, and DS-X9200 Series switching modules
	DS-SFP-FCGE-SW	SFP optics (LC type) for 1-Gbps Ethernet and 1- or 2-Gbps Fibre Channel for shortwave mode; not supported for use in 4-Gbps-capable ports	MDS 9000 Series
	DS-SFP-FCGE-LW	SFP optics (LC type) for 1-Gbps Ethernet and 1- or 2-Gbps Fibre Channel for longwave mode; not supported for use in 4-Gbps-capable ports	MDS 9000 Series
	DS-SFP-GE-T	SFP (RJ-45 connector) for Gigabit Ethernet over copper	MDS 9000 Series
Cisco Coarse Wavelength - Division Multiplexing (CWDM)	DS-CWDM-xxxx	CWDM Gigabit Ethernet and 1- or 2-Gbps Fibre Channel SFP LC type, where product number xxxx = 1470, 1490, 1510, 1530, 1550, 1570, 1590, or 1610 nm	MDS 9000 Family
	DS-CWDM4Gxxxx	CWDM 4-Gbps Fibre Channel SFP LC type, where product number xxxx = 1470, 1490, 1510, 1530, 1550, 1570, 1590, or 1610 nm	MDS 9000 Family

Table 2 Cisco MDS 9000 Family Supported Software and Hardware Components (continued)

Component	Part Number	Description	Applicable Product
Dense Wavelength - Division Multiplexing (DWDM)	DWDM-X2-xx.xx	DWDM X2 SC optics for 10-Gbps Fibre Channel connectivity to an existing Ethernet DWDM infrastructure, with 15xx.xx nm wavelength, where xx.xx = 60.61, 59.79, 58.98, 58.17, 56.55, 55.75, 54.94, 54.13, 52.52, 51.72, 50.92, 50.12, 48.51, 47.72, 46.92, 46.12, 44.53, 43.73, 42.94, 42.14, 40.56, 39.77, 38.98, 38.19, 36.61, 35.82, 35.04, 34.25, 32.68, 31.90, 31.12, or 30.33	MDS 9500 Series MDS 9200 Series
	DWDM-SFP-xxxx	DWDM Gigabit Ethernet and 1- or 2-Gbps Fibre Channel SFP LC type, where product number xxxx = 3033, 3112, 3190, 3268, 3425, 3504, 3582, 3661, 3819, 3898, 3977, 4056, 4214, 4294, 4373, 4453, 4612, 4692, 4772, 4851, 5012, 5092, 5172, 5252, 5413, 5494, 5575, 5655, 5817, 5898, 5979, or 6061nm	MDS 9000 Family
Add/Drop Multiplexer (ADM)	DS-CWDMOADM4A	4-channel CWDM optical ADM (OADM) module (Cisco CWDM 1470, 1490, 1510, or 1530 NM Add/Drop Module)	MDS 9000 Family
	DS-CWDMOADM4B	4-channel CWDM OADM module (Cisco CWDM 1550, 1570, 1590, or 1610 NM Add/Drop Module)	MDS 9000 Family
	DS-CWDM-MUX8A	ADM for 8 CWDM wavelengths	MDS 9000 Family
CWDM Multiplexer Chassis	DS-CWDMCHASSIS	2-slot chassis for CWDM ADMs	MDS 9000 Family
Power Supplies	DS-CAC-300W	300W AC power supply	MDS 9100 Series
	DS-C24-300AC	300W AC power supply	MDS 9124 Switch
	DS-CAC-845W	845W AC power supply for Cisco MDS 9200 Series	MDS9200 Series
	DS-CAC-3000W	3000W AC power supply for Cisco MDS 9509	MDS 9509 Switch
	DS-CAC-2500W	2500W AC power supply	MDS 9509 Switch
	DS-CDC-2500W	2500W DC power supply	MDS 9509 Switch
	DS-CAC-6000W	6000W AC power supply for Cisco MDS 9513	MDS 9513 Switch
	DS-CAC-1900W	1900W AC power supply for Cisco MDS 9506	MDS 9506 Switch
CompactFlash	MEM-MDS-FLD512M	External 512-MB CompactFlash memory for supervisor module	MDS 9500 Series
Port Analyzer Adapter	DS-PAA-2, DS-PAA	Standalone Fibre Channel-to-Ethernet adapter that allows for simple, transparent analysis of Fibre Channel traffic in a switched fabric	MDS 9000 Family
Smart Card Reader	DS-SCR-K9	Storage Media Encryption (SME) Smart Card Reader	MDS 9000 Family
Smart Card	DS-SC-K9	SME Smart Card	MDS 9000 Family

MDS 9000 Chassis and Module Support

Table 3 lists the MDS hardware chassis supported by Cisco MDS NX-OS 5.x.

Table 3 Cisco MDS NX-OS 5.x Chassis Support Matrix

Switch	NX-OS 5.x Support
MDS 9513	Yes
MDS 9509	Yes
MDS 9506	Yes
MDS 9222i	Yes
MDS 9148	Yes
Cisco MDS 8-Gb Fabric Switch for HP c-Class Blade System	Yes
MDS 9134	Yes ¹
MDS 9124	Yes ¹
Cisco MDS 4-Gbps Fabric Switch for HP c-Class BladeSystem	Yes ¹
Cisco MDS 4-Gbps Fabric Switch for IBM BladeCenter	Yes ¹

1. This switch supports Cisco MDS NX-OS Release 5.2(2) and later releases, but does not support Release 5.2(1).

Table 4 lists the MDS hardware modules supported by Cisco MDS NX-OS 5.x. For the list of MDS hardware modules supported by Cisco MDS SAN-OS 4.x, see Table 5. For the list of MDS hardware modules supported by Cisco MDS SAN-OS 3.x, see Table 6.

Table 4 Module Support Matrix for Cisco MDS NX-OS 5.2

Module	Description	MDS 9500 Series		MDS 9222i	
		NX-OS 5.2(x)	NX-OS 5.0(x)	NX-OS 5.2(x)	NX-OS 5.0(x)
DS-X9530-SF2-K9	MDS 9500 Supervisor-2 Module	Yes	Yes	N/A	N/A
DS-X9530-SF2A-K9	MDS 9500 Supervisor-2A Module	Yes	Yes	N/A	N/A
DS-13SLT-FAB3	MDS 9513 Fabric Module 3	Yes	No	N/A	N/A
DS-13SLT-FAB2	MDS 9513 Fabric Module 2	Yes	Yes	N/A	N/A
DS-13SLT-FAB1	MDS 9513 Fabric Module 1	Yes	Yes	N/A	N/A
DS-X9708-K9	8-port 10-Gbps FCoE Module	Yes ^{1,2}	No	No	No
DS-X9232-256K9	32-port 8-Gbps Advanced Fibre Channel Switching Module	Yes ¹	No	No	No
DS-X9248-256K9	48-port 8-Gbps Advanced Fibre Channel Switching Module	Yes ¹	No	No	No
DS-X9224-96K9	24-port 8-Gbps Fibre Channel Switching Module	Yes ¹	Yes ¹	No	No
DS-X9248-96K9	48-port 8-Gbps Fibre Channel Switching Module	Yes ¹	Yes ¹	No	No
DS-X9248-48K9	4/44-port Host Optimized 8-Gbps Fibre Channel Switching Module	Yes	Yes	Yes	Yes

Table 4 *Module Support Matrix for Cisco MDS NX-OS 5.2 (continued)*

Module	Description	MDS 9500 Series		MDS 9222i	
		NX-OS 5.2(x)	NX-OS 5.0(x)	NX-OS 5.2(x)	NX-OS 5.0(x)
DS-X9316-SSNK9	16-port Storage Services Node (SSN-16)	Yes	Yes	Yes	Yes
DS-X9304-18K9	18/4-Port Multiservice Module (MSM-18/4)	Yes	Yes	Yes	Yes
DS-X9112	12-port 4-Gbps Fibre Channel Switching Module	Yes	Yes	Yes	Yes
DS-X9124	24-port 4-Gbps Fibre Channel Switching Module	Yes	Yes	Yes	Yes
DS-X9148	48-port 4-Gbps Fibre Channel Switching Module	Yes	Yes	Yes	Yes
DS-X9704	4-port 10-Gbps Fibre Channel Switching Module	Yes	Yes	Yes	Yes

1. Requires DS-13SLT-FAB3 or DS-13SLT-FAB2 in the MDS 9513.
2. Requires the Supervisor-2A module.

Table 5 *Module Support Matrix for Cisco MDS NX-OS 4.x*

Module	Description	MDS 9500 Series	MDS 9222i	MDS 9216i
DS-X9530-SF2-K9	MDS 9500 Supervisor-2 Module	Yes	N/A	N/A
DS-X9530-SF2A-K9	MDS 9500 Supervisor-2A Module	Yes ¹	N/A	N/A
DS-X9530-SF1-K9	MDS 9500 Supervisor-1 Module	No	N/A	N/A
DS-13SLT-FAB2	MDS 9513 Fabric Module 2	Yes	N/A	N/A
DS-13SLT-FAB1	MDS 9513 Fabric Module 1	Yes	N/A	N/A
DS-X9224-96K9	24-port 8-Gbps Fibre Channel Switching Module	Yes ²	No	No
DS-X9248-96K9	48-port 8-Gbps Fibre Channel Switching Module	Yes ²	No	No
DS-X9248-48K9	4/44-port Host Optimized 8-Gbps Fibre Channel Switching Module	Yes	Yes	No
DS-X9316-SSNK9	16-port Storage Services Node (SSN-16)	Yes	Yes	Yes
DS-X9304-18K9	18/4-Port Multiservice Module (MSM-18/4)	Yes	Yes	Yes
DS-X9112	12-port 4-Gbps Fibre Channel Switching Module	Yes	Yes	Yes
DS-X9124	24-port 4-Gbps Fibre Channel Switching Module	Yes	Yes	Yes
DS-X9148	48-port 4-Gbps Fibre Channel Switching Module	Yes	Yes	Yes
DS-X9704	4-port 10-Gbps Fibre Channel Switching Module	Yes	Yes	Yes
DS-X9302-14K9	14/2-port Multiprotocol Services (MPS-14/2) Module	Yes	No	Yes
DS-X9016	16-port 1-, 2-Gbps Fibre Channel Switching Module	Yes	No	Yes

Table 5 *Module Support Matrix for Cisco MDS NX-OS 4.x (continued)*

Module	Description	MDS 9500 Series	MDS 9222i	MDS 9216i
DS-X9032	32-port 1-, 2-Gbps Fibre Channel Switching Module	Yes	No	Yes
DS-X9032-SSM	32-port Storage Services Module (SSM)	Yes	Yes	Yes
DS-X9308-SMIP	8-port 1-, 2-Gbps IP Switching Module	No	No	No
DS-X9304-SMIP	4-port 1-, 2-Gbps IP Switching Module	No	No	No

1. In software releases earlier than Cisco NX-OS Release 4.2(7a), the Supervisor-2A module appears as unsupported hardware in Device Manager, but the Supervisor-2A module does work with Cisco NX-OS release 4.x software.

2. Requires DS-13SLT-FAB2 in the MDS 9513.

Table 6 lists the MDS hardware modules supported by Cisco MDS SAN-OS 3.x.

Table 6 *Module Support Matrix for Cisco MDS SAN-OS 3.x*

Module	Description	MDS 9500 Series	MDS 9222i	MDS 9216i	MDS 9216A	MDS 9216
DS-X9530-SF2-K9	MDS 9500 Supervisor-2 Module	Yes	N/A	N/A	N/A	N/A
DS-X9530-SF2A-K9	MDS 9500 Supervisor-2A Module	Yes ¹	N/A	N/A	N/A	N/A
DS-X9530-SF1-K9	MDS 9500 Supervisor-1 Module	Yes	N/A	N/A	N/A	N/A
DS-13SLT-FAB2	MDS 9513 Fabric Module 2	Yes	N/A	N/A	N/A	N/A
DS-13SLT-FAB1	MDS 9513 Fabric Module 1	Yes	N/A	N/A	N/A	N/A
DS-X9224-96K9	24-port 8-Gbps Fibre Channel Switching Module	No	No	No	No	No
DS-X9248-96K9	48-port 8-Gbps Fibre Channel Switching Module	No	No	No	No	No
DS-X9248-48K9	4/44-port Host Optimized 8-Gbps Fibre Channel Switching Module	No	No	No	No	No
DS-X9316-SSNK9	16-port Storage Services Node (SSN-16)	No	No	No	No	No
DS-X9304-18K9	18/4-Port Multiservice Module (MSM-18/4) ²	Yes	Yes	Yes	Yes	No
DS-X9112	12-port 4-Gbps Fibre Channel Switching Module	Yes	Yes	Yes	Yes	No
DS-X9124	24-port 4-Gbps Fibre Channel Switching Module	Yes	Yes	Yes	Yes	No
DS-X9148	48-port 4-Gbps Fibre Channel Switching Module	Yes	Yes	Yes	Yes	No
DS-X9704	4-port 10-Gbps Fibre Channel Switching Module	Yes	Yes	Yes	Yes	No
DS-X9302-14K9	14/2-port Multiprotocol Services (MPS-14/2) Module	Yes	No	Yes	Yes	Yes
DS-X9016	16-port 1-, 2-Gbps Fibre Channel Switching Module	Yes	No	Yes	Yes	Yes

Table 6 Module Support Matrix for Cisco MDS SAN-OS 3.x (continued)

Module	Description	MDS 9500 Series	MDS 9222i	MDS 9216i	MDS 9216A	MDS 9216
DS-X9032	32-port 1-, 2-Gbps Fibre Channel Switching Module	Yes	No	Yes	Yes	Yes
DS-X9032-SSM	32-port Storage Services Module (SSM)	Yes	Yes	Yes	Yes	Yes
DS-X9308-SMIP	8-port 1-, 2-Gbps IP Switching Module	Yes	No	Yes	Yes	Yes
DS-X9304-SMIP	4-port 1-, 2-Gbps IP Switching Module	Yes	Yes	Yes	Yes	Yes

1. In software releases earlier than Cisco NX-OS Release 3.3(5a), the Supervisor-2A module appears as unsupported hardware in Device Manager, but the Supervisor-2A module does work with Cisco NX-OS release 3.x software.
2. Cisco SAN-OS Release 3.2(1) and later support the 18/4-Port Multiservice Module (MSM-18/4).

Software Download Process

Use the software download procedure to upgrade to a later version, or downgrade to an earlier version, of an operating system. This section describes the software download process for the Cisco MDS NX-OS software and includes the following topics:

- [Determining the Software Version, page 12](#)
- [Determining Software Version Compatibility, page 12](#)
- [Downloading Software, page 13](#)
- [Selecting the Correct Software Image for an MDS 9100 Series Switch, page 14](#)
- [Selecting the Correct Software Image for an MDS 9200 Series Switch, page 14](#)
- [Selecting the Correct Software Image for an MDS 9500 Series Switch, page 14](#)
- [NPE Software Images, page 15](#)

Determining the Software Version

To determine the version of Cisco MDS NX-OS or SAN-OS software currently running on a Cisco MDS 9000 Family switch using the CLI, log in to the switch and enter the **show version EXEC** command.

To determine the version of Cisco MDS NX-OS or SAN-OS software currently running on a Cisco MDS 9000 Family switch using Cisco DCNM for SAN, view the Switches tab in the Information pane, locate the switch using the IP address, logical name, or WWN, and check its version in the Release column.

Determining Software Version Compatibility

Table 7 lists the software versions that are compatible in a mixed SAN environment, the minimum software versions that are supported, and the versions that have been tested. We recommend that you use the latest software release supported by your vendor for all Cisco MDS 9000 Family products.

Table 7 **Software Release Compatibility**

Cisco NX-OS Software	Minimum NX-OS or SAN-OS Release	Tested NX-OS and SAN-OS Releases
NX-OS Release 5.2(8)	NX-OS Release 5.0(1a) or later	NX-OS Release 5.0(1a) and later
	NX-OS Release 4.2(3) or later	NX-OS Release 4.2(3) and later
	SAN-OS Release 3.3(5) or later	SAN-OS Release 3.3(5) and later

Downloading Software

The Cisco MDS NX-OS software is designed for mission-critical high availability environments. To realize the benefits of nondisruptive upgrades on the Cisco MDS 9500 Directors, we highly recommend that you install dual supervisor modules.

To download the latest Cisco MDS NX-OS software, access the Software Center at this URL:

<http://www.cisco.com/cisco/software/navigator.html?a=a&i=rpm>

See the following sections in this release note for details on how you can nondisruptively upgrade your Cisco MDS 9000 switch. Issuing the **install all** command from the CLI, or using Cisco DCNM for SAN to perform the downgrade, enables the compatibility check. The check indicates if the upgrade can happen nondisruptively or disruptively depending on the current configuration of your switch and the reason.

Compatibility check is done:

Module	bootable	Impact	Install-type	Reason
1	yes	non-disruptive	rolling	
2	yes	disruptive	rolling	Hitless upgrade is not supported
3	yes	disruptive	rolling	Hitless upgrade is not supported
4	yes	non-disruptive	rolling	
5	yes	non-disruptive	reset	
6	yes	non-disruptive	reset	

At a minimum, you need to disable the default device alias distribution feature using the **no device-alias distribute** command in global configuration mode. The **show incompatibility system bootflash:system image filename** command determines which additional features need to be disabled.



Note

If you would like to request a copy of the source code under the terms of either GPL or LGPL, please send an e-mail to mds-software-disclosure@cisco.com.

Selecting the Correct Software Image for an MDS 9100 Series Switch

The system and kickstart image that you use for an MDS 9100 series switch depends on which switch you use, as shown in [Table 8](#).

Table 8 Software Images for MDS 9100 Series Switches

Cisco MDS 9100 Series Switch Type	Naming Convention
MDS 9134, MDS 9124, Cisco MDs 4-Gbps Fabric Switch for HP c-Class BladeSystem, Cisco MDS 4-Gbps Fabric Switch for IBM BladeCenter	Filename begins with m9100-s2ek9
MDS 9148, Cisco MDS 8Gb Fabric Switch for HP c-Class BladeSystem	Filename begins with m9100-s3ek9

Selecting the Correct Software Image for an MDS 9200 Series Switch

The system and kickstart image that you use for an MDS 9200 series switch depends on which switch you use, as shown in [Table 9](#).

Table 9 Software Images for MDS 9200 Series Switches

Cisco MDS 9200 Series Switch Type	Naming Convention
MDS 9222i	Filename begins with m9200-s2ek9

Selecting the Correct Software Image for an MDS 9500 Series Switch

The system and kickstart image that you use for an MDS 9500 Series are for switches with a Supervisor-2 module, as shown in [Table 10](#). Cisco NX-OS Release 5.x and Release 4.x do not support the Supervisor-1 module.

Table 10 Software Images for Supervisor Type

Cisco MDS 9500 Series Switch Type	Supervisor Module Type	Naming Convention
MDS 9513, 9509, and 9506	Supervisor-2 module Supervisor-2A module	Filename begins with m9500-sf2ek9

Use the **show module** command to display the type of supervisor module in the switch. The following is sample output from the **show module** command on a Supervisor-2 module:

```
switch# show module
Mod  Ports  Module-Type                Model                Status
---  -
...
...
7    0      Supervisor/Fabric-2        DS-X9530-SF2-K9     active *
8    0      Supervisor/Fabric-2        DS-X9530-SF2-K9     ha-standby
```

NPE Software Images

No payload encryption (NPE) images are available with some releases of Cisco MDS NX-OS Release 5.2(x) software. The NPE images are intended for countries who have import restrictions on products that encrypt payload data.

To differentiate an NPE image from the standard software image, the letters npe are included in the image name as follows:

- m9500-sf2ek9-kickstart-mz-npe.5.2.2.bin
- m9500-sf2ek9-mz-npe.5.2.2.bin

When downloading software, ensure that you select the correct software images for your Cisco MDS 9000 Series switch. Nondisruptive software upgrades or downgrades between NPE images and non-NPE images are not supported.

Upgrading Your Cisco MDS NX-OS Software Image

This section lists the guidelines recommended for upgrading your Cisco MDS NX-OS software image and includes the following topics:

- [Upgrading Guidelines Specific to NX-OS Release 5.2\(8\)](#), page 15
- [General Upgrading Guidelines](#), page 17
- [Nondisruptive Upgrade Paths](#), page 17
- [FICON Supported Releases and Upgrade Paths](#), page 19



Note

Before you begin the upgrade process, review the list of chassis and modules that Cisco MDS NX-OS Release 5.2(8) supports. See the [“MDS 9000 Chassis and Module Support”](#) section on page 8.

For detailed instructions for performing a software upgrade using Cisco DCNM, see the *Cisco DCNM Release Notes, Release 5.2*, which is available from the following website:

http://www.cisco.com/en/US/products/ps10495/prod_release_notes_list.html

Upgrading Guidelines Specific to NX-OS Release 5.2(8)

Follow these guidelines when upgrading to Cisco MDS NX-OS Release 5.2(8):

- Follow the upgrade path to NX-OS Release 5.2(8) that is specified in [Table 11](#).
- Upgrade to NX-OS Release 5.2(x) before you install any Generation 4 module in an MDS 9500 Series switch. Generation 4 modules include the FCoE module and the 32-port and 48-port 8-Gbps Advanced Fibre Channel modules. NX-OS Release 5.2(x) is needed for the switch to recognize the new hardware.
- Perform a full switch reload on an MDS 9509 or MDS 9506 switch after you install NX-OS Release 5.2(1) and install any Generation 4 module, including the FCoE module. The switch reload is required for the new hardware to come up. Once you perform the switch reload, the fabric mode changes to support the Generation 4 hardware. Because of the changed fabric mode, you cannot subsequently perform a nondisruptive software downgrade from NX-OS Release 5.2(1). For additional information, see the [“Downgrading Guidelines Specific to NX-OS Release 5.2\(8\)”](#) section on page 20.

- Ensure that you have a Supervisor-2A module (DS-X9530-SF2A-K9) installed in a MDS 9500 Series switch if you plan to use the Cisco MDS 9000 8-port 10-Gbps Fibre Channel over Ethernet (FCoE) (DS-X9708-K9).
- We recommend that you delete any SPAN configuration, Fibre Channel tunnel, or tunnel-ID map configuration from your switch before you start the upgrade to NX-OS Release 5.2(1). You can save the SPAN destination and SPAN target configuration and then reconfigure the SPAN session following the upgrade. All SPAN destination and SPAN target ports are reinitialized after the upgrade. To gather information about SPAN sessions and delete them, use the following commands in this order:
 - **show incompatibility systems bootflash: *image_name*** to display any incompatible configurations
 - **show span session** to check the current configuration for a SPAN session
 - **no span session *session-number*** to delete a SPAN session
 - **show running-config | include fc-tunnel** to check the current Fibre Channel tunnel configuration
 - **no interface fc-tunnel *y*** to delete a Fibre Channel tunnel on the switch that is the source for the Fibre Channel tunnel
 - **show interface brief | include SD** to check the current configuration for a SPAN destination port configuration
 - **show interface brief | include ST** to check the current configuration for a SPAN target port configuration
 - **no fc-tunnel tunnel-map *z* interface *x/y*** to remove an Fibre Channel tunnel map
 - **no switchport mode sd** to negate the SPAN destination port mode for the SPAN destination port
 - **no switchport mode st** to negate the SPAN target port mode for the SPAN target port
- If you are using IVR non-NAT mode, migrate to IVR-NAT mode before you upgrade to NX-OS Release 5.2(1). IVR non-NAT mode is deprecated in NX-OS Release 5.2(1).



Note In dual SAN fabrics, IVR traffic can use one fabric while the other fabric is migrating. Only IVR traffic is disrupted during the migration. Regular traffic within the VSAN is not disrupted during the migration.

To migrate to IVR-NAT mode, follow these steps:

1. Stop or divert all applications on servers that depend on IVR.
 - If CFS distribution is not enabled for IVR, then perform steps 2 through 4 on all switches where IVR is enabled.
 - If CFS distribution is enabled for IVR, then enter the **ivr commit** command following step 2, step 3, and step 4 to distribute the changes to other switches.
2. Deactivate the IVR zone set by entering the **no ivr zoneset activate** command.
3. Enable IVR NAT by entering the **ivr nat** command.
4. Activate the IVR zone set by entering the **ivr zoneset activate** command.
5. Start or reestablish all application that were stopped in step 1.

The network can now run in IVR-NAT mode.

General Upgrading Guidelines

Follow these general guidelines before performing a software upgrade:

- Review the nondisruptive upgrade path to Release 5.2(8) in [Table 11](#).
- Install and configure dual supervisor modules before the upgrade.
- Issue the **show install all impact upgrade-image** CLI command to determine if your upgrade will be nondisruptive.
- Be aware that some features impact whether an upgrade is disruptive or nondisruptive:
 - **Fibre Channel Ports:** Fibre Channel ports can be nondisruptively upgraded without affecting traffic on the ports. See [Table 11](#) for the nondisruptive upgrade path for all NX-OS and SAN-OS releases.
 - **Gigabit Ethernet Ports:** Traffic on Gigabit Ethernet ports is disrupted during an upgrade or downgrade. This includes IPS modules and the Gigabit Ethernet ports on the MSM-18/4 module and the MDS 9222i switch. Those nodes that are members of VSANs traversing an FCIP ISL are impacted, and a fabric reconfiguration occurs. iSCSI initiators connected to the Gigabit Ethernet ports lose connectivity to iSCSI targets while the upgrade is in progress.
 - **FICON:** If you have FICON enabled, the upgrade path is different. See the [“FICON Supported Releases and Upgrade Paths”](#) section on page 19.



Note

In addition to these guidelines, you may want to review the information in the [“Limitations and Restrictions”](#) section prior to a software upgrade to determine if a feature may possibly behave differently following the upgrade.

Nondisruptive Upgrade Paths

Use [Table 11](#) to determine your nondisruptive upgrade path to Cisco MDS NX-OS Release 5.2(8). Find the image release number you are currently using in the “Current Release” column of the table and follow the steps in the order specified to perform the upgrade.



Note

The software upgrade information in [Table 11](#) applies only to Fibre Channel switching traffic. Upgrading system software disrupts IP traffic and intelligent services traffic.



Note

Before upgrading to Cisco MDS NX-OS Release 5.2(8) on a Cisco MDS 9509 or 9506 switch, see [Table 14](#) for specific guidelines.



Caution

Upgrading to Cisco NX-OS Release 5.2(8) without first upgrading to Release 5.0(x) is not recommended and is not supported, and might result in configuration loss. If you are upgrading to Cisco NX-OS Release 5.2(8) from any release other than Release 5.2(6b), Release 5.2(6a), Release 5.2(6), Release 5.2(2d), Release 5.2(2a), Release 5.2(2), or Release 5.2(1), the only supported upgrade path to Release 5.2(8) is from Release 5.0(x).

Table 11 Nondisruptive Upgrade Path to Cisco MDS NX-OS Release 5.2(8)

Current Release	Nondisruptive Upgrade Path and Ordered Upgrade Steps
NX-OS:	
Release 5.2(1), 5.2(2), 5.2(2a), 5.2(2d), 5.2(6), 5.2(6a), 5.2(6b)	Upgrade directly to NX-OS Release 5.2(8).
All 5.0(x) releases	Upgrade directly to NX-OS Release 5.2(8).
All 4.2(x) releases and 4.1(x) releases	<ol style="list-style-type: none"> 1. Upgrade to NX-OS Release 5.0(8a). 2. Upgrade to NX-OS Release 5.2(8).
SAN-OS:	
Release 3.3(2), 3.3(3), 3.3(4x), and 3.3(5x).	<ol style="list-style-type: none"> 1. Upgrade to NX-OS Release 4.2(9). 2. Upgrade to NX-OS Release 5.0(8a). 3. Upgrade to NX-OS Release 5.2(8).
Release 3.3(1c), all 3.2(x), 3.1(x), and 3.0(x) releases)	<ol style="list-style-type: none"> 1. Upgrade to SAN-OS Release 3.3(5b). 2. Upgrade to NX-OS Release 4.2(9). 3. Upgrade to NX-OS Release 5.0(8a). 4. Upgrade to NX-OS Release 5.2(8).
Release 2.1(3), 2.1(2e), 2.1(2d), and 2.1(2b)	<ol style="list-style-type: none"> 1. Upgrade to SAN-OS Release 3.3(1c). 2. Upgrade to SAN-OS Release 3.3(5b). 3. Upgrade to NX-OS Release 4.2(9). 4. Upgrade to NX-OS Release 5.0(8a). 5. Upgrade to NX-OS Release 5.2(8).
Release 2.1(2), 2.1(1b), 2.1(1a), and 2.0(x)	<ol style="list-style-type: none"> 1. Upgrade to SAN-OS Release 2.1(2b), 2.1(2d), 2.1(2e), or 2.1(3) 2. Upgrade to SAN-OS Release 3.3(1c). 3. Upgrade to SAN-OS Release 3.3(5b). 4. Upgrade to NX-OS Release 4.2(9). 5. Upgrade to NX-OS Release 5.0(8a). 6. Upgrade to NX-OS Release 5.2(8).
Release 1.x	<ol style="list-style-type: none"> 1. Upgrade to SAN-OS Release 1.3(4a). 2. Upgrade to SAN-OS Release 2.1(2b). 3. Upgrade to SAN-OS Release 3.3(1c). 4. Upgrade to SAN-OS Release 3.3(5b). 5. Upgrade to NX-OS Release 4.2(9). 6. Upgrade to NX-OS Release 5.0(8a). 7. Upgrade to NX-OS Release 5.2(8).

FICON Supported Releases and Upgrade Paths

Cisco MDS NX-OS Release 5.2(8) is not a FICON-certified release.

Table 12 lists the SAN-OS and NX-OS releases that are certified for FICON. Refer to the specific release notes for FICON upgrade path information.

Table 12 FICON Supported Releases

FICON Supported Releases	
NX-OS	Release 5.2(2)
	Release 4.2(7b)
	Release 4.2(1b)
	Release 4.1(1c)
SAN-OS	Release 3.3(1c)
	Release 3.2(2c)
	Release 3.0(3b)
	Release 3.0(3)
	Release 3.0(2)
	Release 2.0(2b)

Use Table 13 to determine the nondisruptive upgrade path for FICON-certified releases. Find the image release number you are currently using in the Current Release with FICON Enabled column of the table and follow the recommended path.

Table 13 FICON Nondisruptive Upgrade Path

Current Release with FICON Enabled	Upgrade Path
NX-OS Release 4.2(7b)	You can nondisruptively upgrade directly to NX-OS Release 5.2(2).
NX-OS Release 4.2(1b)	You can nondisruptively upgrade directly to NX-OS Release 4.2(7b).
NX-OS Release 4.1(1c)	You can nondisruptively upgrade directly to NX-OS Release 4.2(1b).
SAN-OS Release 3.3(1c)	You can nondisruptively upgrade directly to NX-OS Release 4.2(1b).
SAN-OS Release 3.2(2c), 3.0(3b), 3.0(3), and 3.0(2).	First upgrade to SAN-OS Release 3.3(1c), and then upgrade to NX-OS Release 4.2(1b).

Downgrading Your Cisco MDS SAN-OS Software Image

This section lists the guidelines recommended for downgrading your Cisco MDS SAN-OS software image and includes the following topics:

- [Downgrading Guidelines Specific to NX-OS Release 5.2\(8\)](#), page 20
- [General Downgrading Guidelines](#), page 21
- [NX-OS Release 5.2\(x\) and Release 5.0\(x\) Software Downgrade and Upgrade Matrix for Cisco MDS 9509 and 9506 Switches](#), page 22

Downgrading Guidelines Specific to NX-OS Release 5.2(8)

The following guidelines apply to a downgrade from Cisco MDS NX-OS Release 5.2(8):

- Cisco NX-OS Release 5.2(8) and later releases support IDLE as a fill word for the **switchport fill-pattern** command. Releases earlier than Release 5.2(8) supported only the ARBFF fill word. As a result, when you downgrade from Cisco NX-OS Release 5.2(8) or a later release to an earlier release that does not support the IDLE fill word, the following syntax error occurs:

```
Syntax error while parsing 'switchport fill-pattern IDLE speed 8000'
```

The syntax error message is harmless and can be ignored.

- You cannot nondisruptively downgrade from NX-OS Release 5.2(8) to NX-OS Release 5.0(x) if you installed NX-OS Release 5.2(8) on an MDS 9509 or MDS 9506 switch and you installed a Generation 4 module in the switch and performed a full switch reload. The reason for this restriction is the change in fabric mode that occurs following the switch reload with the Generation 4 hardware installed. The downgrade will be disruptive, even if you remove the Generation 4 module prior to starting the downgrade.

If you do not install Generation 4 hardware or perform a full switch reload following the installation of NX-OS Release 5.2(8) on an MDS 9509 or MDS 9506 switch, you can nondisruptively downgrade to NX-OS Release 5.0(x).

- If you have the Storage Media Encryption (SME) application configured on your system, you must delete signature clusters when downgrading from Cisco NX-OS Release 5.2(8) to Release 5.2(1).
- Following an ISSD from Cisco NX-OS Release 5.2(8) to an earlier Release 5.2(x) or to Release 5.0(x) on a Cisco MDS 9000 switch that is configured with IVR or FCR, reload the modules with the ELS trap entry. In the case of FCR, reload the module with the FCR device logged in. For IVR, all modules should be reloaded.
- We recommend that you delete any SPAN configuration, Fibre Channel tunnel, or tunnel-ID map configuration from your switch before you downgrade from NX-OS Release 5.2(8) to a lower version. If any SPAN session, SPAN destination, SPAN target, or Fibre Channel tunnel interface is configured, the installer should detect it and prompt you to delete these configurations.

To gather information about SPAN sessions and delete them, use the following commands in this order:

- **show incompatibility systems bootflash: *image_name*** to display any incompatible configurations
- **show span session** to check the current configuration for a SPAN session
- **no span session *session-number*** to delete a SPAN session
- **show running-config | include fc-tunnel** to check the current Fibre Channel tunnel configuration
- **no interface fc-tunnel *y*** to delete a Fibre Channel tunnel on the switch that is the source for the Fibre Channel tunnel
- **show interface brief | include SD** to check the current configuration for a SPAN destination port configuration
- **show interface brief | include ST** to check the current configuration for a SPAN target port configuration
- **no fc-tunnel tunnel-map *z* interface *x/y*** to remove an Fibre Channel tunnel map
- **no switchport mode sd** to negate the SPAN destination port mode for the SPAN destination port

- **no switchport mode st** to negate the SPAN target port mode for the SPAN target port

General Downgrading Guidelines

Follow these general guidelines before you perform a software downgrade:

- Issue the system **no acl-adjacency-sharing** execute command to disable ACL adjacency usage on Generation 2 and Generation 1 modules. If this command fails, reduce the number of zones, IVR zones, TE ports, or a combination of these in the system and issue the command again.
- Disable all features not supported by the downgrade release. Use the **show incompatibility system downgrade-image** command to determine what you need to disable.
- Use the **show install all impact downgrade-image** command to determine if your downgrade will be nondisruptive.
- Be aware that some features impact whether a downgrade is disruptive or nondisruptive:
 - **FCoE:** Fibre Channel over Ethernet requires Cisco NX-OS Release 5.2(x). A downgrade from Release 5.2(x) disrupts and stops all FCoE traffic.
 - **Fibre Channel Ports:** Fibre Channel ports can be nondisruptively downgraded without affecting traffic on the ports. See [Table 15](#) for the nondisruptive downgrade path for all SAN-OS releases.
 - **Gigabit Ethernet Ports:** Traffic on Gigabit Ethernet ports is disrupted during a downgrade. This includes IPS modules and the Gigabit Ethernet ports on the MSM-18/4 module, and the MDS 9222i switch. Those nodes that are members of VSANs traversing an FCIP ISL are impacted, and a fabric reconfiguration occurs. iSCSI initiators connected to the Gigabit Ethernet ports lose connectivity to iSCSI targets while the downgrade is in progress.
 - **FICON:** If you have FICON enabled, the downgrade path is different. See the [“FICON Downgrade Paths”](#) section on page 24.

NX-OS Release 5.2(x) and Release 5.0(x) Software Downgrade and Upgrade Matrix for Cisco MDS 9509 and 9506 Switches

See the compatibility information in [Table 14](#) to determine if a downgrade to, or upgrade from Release 5.0(x) software is disruptive or nondisruptive on a Cisco MDS 9509 or 9506 switch.

Table 14 *NX-OS Release 5.2(x) and Release 5.0(x) Downgrade and Upgrade Matrix*

Downgrade Path on a Cisco MDS 9509 or 9506 Switch			
Current Release	Desired Release	Expected Behavior	Observed Behavior
5.2(8)	5.2(5b), 5.2(6a), 5.2(6), 5.2(2d), 5.2(2a), or 5.2(1)	Nondisruptive	Nondisruptive
5.2(2d)	5.2(2a) or 5.2(1)	Nondisruptive	Nondisruptive
5.2(x)	5.0(7) or 5.0(8)	Disruptive	Disruptive
5.0(7) or 5.0(8)	5.0(1a), 5.0(1b), or 5.0(4)	Disruptive	Nondisruptive The user is expected to explicitly reload the switch using the reload command.
5.0(7) or 5.0(8)	4.2(x) or 4.1(x)	Disruptive	Disruptive
5.0(4)	5.0(1a)	Nondisruptive	Nondisruptive
5.0(1a), 5.0(1b), or 5.0(4)	4.2(x) or 4.1(x)	Nondisruptive	Nondisruptive

Upgrade Path on a Cisco MDS 9509 or 9506 Switch			
Current Release	Desired Release	Expected Behavior	Observed Behavior
5.2(1), 5.2(2a), 5.2(2d), 5.2(6), 5.2(6a), 5.2(6b)	5.2(8)	Nondisruptive	Nondisruptive
5.2(1) or 5.2(2a)	5.2(2d)	Nondisruptive	Nondisruptive
5.0(7) or 5.0(8)	5.2(x)	Nondisruptive Support for Generation 4 modules is available.	Nondisruptive Support for Generation 4 modules is available.
5.0(1a), 5.0(1b), or 5.0(4)	5.2(x)	Nondisruptive Support for Generation 4 modules is not available.	Nondisruptive Support for Generation 4 modules is not available.

Use [Table 15](#) to determine the nondisruptive downgrade path from Cisco NX-OS Release 5.2(8). Find the NX-OS or SAN-OS image that you want to downgrade to in the To SAN-OS Release column of the table and follow the steps in the order specified to perform the downgrade.



Note

The software downgrade information in [Table 15](#) applies only to Fibre Channel switching traffic. Downgrading system software disrupts IP and intelligent services traffic.

Table 15 *Nondisruptive Downgrade Path from NX-OS Release 5.2(8)*

To NX-OS or SAN-OS Release	Nondisruptive Downgrade Path and Ordered Downgrade Steps
NX-OS:	
Release 5.2(1), 5.2(2), 5.2(2a), 5.2(2d), 5.2(6), 5.2(6a), and 5.2(6b)	Downgrade directly from NX-OS Release 5.2(8).
All 5.0(x) releases	Downgrade directly from NX-OS Release 5.2(8) ^{1, 2, 3}
All 4.2(x) and 4.1(x) releases	<ol style="list-style-type: none"> 1. Downgrade to NX-OS Release 5.0(8a). 2. Downgrade to NX-OS Release 4.2(x) or 4.1(x).
SAN-OS:	
All 3.3(x) releases	<ol style="list-style-type: none"> 1. Downgrade to NX-OS Release 5.0(8a). 2. Downgrade to NX-OS Release 4.2(x) or Release 4.1(x). 3. Downgrade to SAN-OS Release 3.3(x).
All 3.2(x), 3.1(x), 3.0(x) releases, and all 2.1(x) releases.	<ol style="list-style-type: none"> 1. Downgrade to NX-OS Release 5.0(8a). 2. Downgrade to NX-OS Release 4.2(x) or Release 4.1(x). 3. Downgrade to SAN-OS Release 3.3(x). 4. Downgrade to SAN-OS Release 3.2(x), Release 3.1(x), Release 3.0(x), or Release 2.1(x).
All 2.0(x) releases.	<ol style="list-style-type: none"> 1. Downgrade to NX-OS Release 5.0(8a). 2. Downgrade to NX-OS Release 4.2(x) or Release 4.1(x). 3. Downgrade to SAN-OS Release 3.3(x). 4. Downgrade to SAN-OS Release 2.1(2x). 5. Downgrade to SAN-OS Release 2.0(x).
Release 1.x	<ol style="list-style-type: none"> 1. Downgrade to NX-OS Release 5.0(8a). 2. Downgrade to NX-OS Release 4.2(x) or Release 4.1(x). 3. Downgrade to SAN-OS Release 3.3(x). 4. Downgrade to SAN-OS Release 2.1(2b). 5. Downgrade to SAN-OS Release 1.3(4a). 6. Downgrade to SAN-OS Release 1.x.

1. Before downgrading to NX-OS Release 5.0(8) or Release 5.0(7) on an MDS 9509 or MDS 9506 switch, see [“NX-OS Release 5.2\(x\) and Release 5.0\(x\) Software Downgrade and Upgrade Matrix for Cisco MDS 9509 and 9506 Switches”](#) section on page 22.
2. If you install a Generation 4 module in an MDS 9509 or MDS 9506 switch and perform a full switch reload following the installation of NX-OS Release 5.2(8), you cannot nondisruptively download from NX-OS Release 5.2(8) to NX-OS 5.0(x).
3. A downgrade from NX-OS Release 5.2(8) to a release other than Release 5.2(1), 5.2(2), 5.2(2a), 5.2(2d), 5.2(6), 5.2(6a), or 5.2(6b) disrupts and stops all FCoE traffic because FCoE requires Cisco NX-OS Release 5.2(x).

FICON Downgrade Paths

Table 16 lists the downgrade paths for FICON releases. Find the image release number that you want to downgrade to in the [To Release with FICON Enabled](#) column of the table and follow the recommended downgrade path.

Table 16 FICON Downgrade Path

To Release with FICON Enabled	Downgrade Path
NX-OS Release 4.2(7b)	You can nondisruptively downgrade directly from NX-OS Release 5.2(2)
NX-OS Release 4.2(1b)	You can nondisruptively downgrade directly from NX-OS Release 4.2(7b).
NX-OS Release 4.1(1c)	You can nondisruptively downgrade directly from NX-OS Release 4.2(1b).
SAN-OS 3.3(1c)	You can nondisruptively downgrade directly from NX-OS Release 4.1(1c).
SAN-OS 3.2(2c)	First downgrade to SAN-OS Release 3.3(1c) and then downgrade to Release 3.2(2c).
SAN-OS 3.0(3b)	First downgrade to SAN-OS Release 3.3(1c) and then downgrade to Release 3.0(3b).
SAN-OS 3.0(2)	First downgrade to SAN-OS Release 3.3(1c) and then downgrade to Release 3.0(2).

New Features in Cisco MDS NX-OS Release 5.2

This section lists the new software and hardware features in Cisco MDS NX-OS Release 5.2. It includes the following topics:

- [New Features in Cisco MDS NX-OS Release 5.2\(8\)](#), page 24
- [New Features in Cisco MDS NX-OS Release 5.2\(6b\)](#), page 25
- [New Features in Cisco MDS NX-OS Release 5.2\(6a\)](#), page 25
- [New Features in Cisco MDS NX-OS Release 5.2\(6\)](#), page 25
- [New Features in Cisco MDS NX-OS Release 5.2\(2d\)](#), page 26
- [New Features in Cisco MDS NX-OS Release 5.2\(2d\)](#), page 26
- [New Features in Cisco MDS NX-OS Release 5.2\(2\)](#), page 26
- [New Features in Cisco MDS NX-OS Release 5.2\(1\)](#), page 27
- [New Hardware in Cisco MDS NX-OS Release 5.2\(1\)](#), page 28

Product information about Cisco MDS 9000 NX-OS software is available at this link:

<http://www.cisco.com/en/US/products/ps5989/index.html>

New Features in Cisco MDS NX-OS Release 5.2(8)

Cisco MDS NX-OS Release 5.2(8) is a maintenance release that includes bug fixes. It does not include new features.

New Features in Cisco MDS NX-OS Release 5.2(6b)

Cisco MDS NX-OS Release 5.2(6b) is a maintenance release that includes bug fixes. It does not include new features.

New Features in Cisco MDS NX-OS Release 5.2(6a)

Cisco MDS NX-OS Release 5.2(6a) is a maintenance release that includes bug fixes and a scalability improvement for the following feature:

- Cisco I/O Accelerator

Starting with Cisco MDS NX-OS Release 5.2(6a), the number of supported I/O Accelerator (IOA) flows has increased to 1000.

New Features in Cisco MDS NX-OS Release 5.2(6)

Cisco MDS NX-OS Release 5.2(6) includes the new features described in the following sections:

- [Smart Zoning, page 25](#)
- [Storage Media Encryption Features, page 25](#)

Smart Zoning

Cisco Smart Zoning simplifies the process of zoning to reduce the burden on administrators while simultaneously provisioning zone-related hardware resources on Cisco Fibre Channel switching modules more efficiently.

For additional information on how to implement and configure Smart Zoning, see the [Cisco MDS 9000 Fabric Configuration Guide](#).

Storage Media Encryption Features

Cisco NX-OS Release 5.2(6) includes the following enhancements to Cisco Storage Media Encryption (SME) Disk:

- SME Disk now supports greater than 2 TB LUNs for both signature and non-signature mode.
- SME Disk signature mode allows snapshots of a crypto LUN across key change operations.
- SME Disk signature mode automatically recognizes snapshots that are exposed to the host, based on the media signature.
- SME Disk now supports Master Key Rekey (MKR) on a cluster for both signature and non-signature mode.

These enhancements require Cisco NX-OS Release 5.2(6) and Cisco DCNM Release 6.1(1a). For more information on these feature enhancements, see the [Cisco MDS 9000 Family NX-OS Storage Media Encryption Configuration Guide](#).

New Features in Cisco MDS NX-OS Release 5.2(2d)

Cisco MDS NX-OS Release 5.2(2d) is a maintenance release that includes bug fixes. It does not include any new features.

New Features in Cisco MDS NX-OS Release 5.2(2a)

Cisco MDS NX-OS Release 5.2(2a) is a maintenance release that includes bug fixes and the following feature enhancement:

- Port Monitor

Port monitoring has been enhanced with several ASIC counters that monitor and report internal packet drops.

Additional information about this feature enhancement is available in the [Cisco MDS 9000 Series Interfaces Configuration Guide](#).

New Features in Cisco MDS NX-OS Release 5.2(2)

Cisco MDS NX-OS Release 5.2(2) is a FICON-certified version of Cisco MDS NX-OS Release 5.2(1), that also includes new features and bug fixes. In addition to these features, Cisco MDS NX-OS Release 5.2(2) supports all the new software features and new hardware that were introduced in Cisco MDS NX-OS Release 5.2(1).

Cisco MDS NX-OS Release 5.2(2) supports the following software features:

- FICON Certification

Cisco MDS NX-OS Release 5.2(2) is a FICON-certified release that supports these features:

- Nondisruptive software upgrades to and downgrades from Cisco NX-OS Release 4.2(7b), which is the previous FICON-certified release.
- FICON FCIP on the Cisco MDS 9000 SSN-16 module, including FICON Tape Acceleration and XRC Acceleration.
- FICON Tape Acceleration for ESCON through Optica PRIZM.
- FICON support on the Cisco MDS 9000 32-port 8-Gbps Advanced Fibre Channel Switching module, the Cisco MDS 9000 48-port 8-Gbps Advanced Fibre Channel Switching module, and the Cisco MDS 9513 Switching Fabric 3 module (DS-13SLT-FAB3).

- Availability of Cisco MDS NX-OS Release 5.2 on Cisco MDS 9100 Series Fabric Switches

Cisco MDS NX-OS Release 5.2(2) supports the following switches (which are not supported by Cisco MDS NX-OS Release 5.2(1)):

- Cisco MDS 9134 Fabric Switch
- Cisco MDS 9124 Fabric Switch
- Cisco MDS 4-Gbps Fabric Switch for HP c-Class BladeSystem
- Cisco MDS 4-Gbps Fabric Switch for IBM BladeCenter

- Port Group Monitoring

Port group monitoring and SNMP are available on the Cisco MDS 9000 32-port 8-Gbps Advanced Fibre Channel Switching module and the Cisco MDS 9000 48-port 8-Gbps Advanced Fibre Channel Switching module.

- Availability of IVR on the Cisco MDS 9148 Switch
Cisco MDS NX-OS Release 5.2(2) supports Inter-VSAN Routing (IVR) on the Cisco MS 9148 multilayer fabric switch.
- IOA with NPV
Cisco MDS NX-OS Release 5.2(2) supports configuring IOA with NPV.

New Features in Cisco MDS NX-OS Release 5.2(1)

Cisco MDS NX-OS Release 5.2(1) supports the following software features:

- Software support for the MDS 9000 8-port 10-Gbps Fibre Channel over Ethernet (FCoE) module
The MDS 9000 8-port 10-Gbps Fibre Channel over Ethernet (FCoE) module is a multihop-capable FCoE module for the core data center. This full line-rate FCoE module for the MDS 9500 Series Director switches allows you to extend FCoE benefits beyond the access Layer into the data center core. FCoE supports I/O consolidation by preserving all Fibre Channel constructs, and maintaining the same latency, security, and traffic management attributes of Fibre Channel. In addition, FCoE extends Fibre Channel SAN connectivity to Cisco Nexus 7000 switches that are FCoE capable.
- Software support for Cisco MDS 9000 Family 8-Gbps Advanced Fibre Channel Switching Modules
Cisco NX-OS Release 5.2(1) includes software support for the 32-port and the 48-port 8-Gbps Advanced Fibre Channel switching modules that can be used in the MDS 9500 Series Directors. The MDS 9513 Multilayer Director can be upgraded with the new Generation 4 Fabric-3 module to increase bandwidth to 256 Gbps per slot. In addition, the 8-Gbps Advance Fibre Channel switching module support speeds of 10 Gbps on the MDS 9513 with the Fabric-3 module installed. The upgrade from the Fabric-2 module to the Fabric-3 module is nondisruptive.
Cisco MDS 9000 8-Gbps Advanced Fibre Channel switching modules support Cisco FlexSpeed technology that enables ports to be configured as either 1-, 2-, 4-, or 8-Gbps, or 10-Gbps Fibre Channel interfaces.
Cisco MDS 9000 8-Gbps Advanced Fibre Channel switching modules support Arbitrated Local Switching to locally switch traffic at line rate 8-Gbps in a fair manner across all ports on the module through central arbitration.
- Storage Media Encryption for Disk
The Storage Media Encryption (SME) solution, which currently protects data at rest on heterogeneous tape drives and virtual tape libraries (VTLs), has been enhanced to encrypt data on disk arrays in a SAN environment using secure IEEE-standard Advanced Encryption Standard (AES) algorithms.
SME Disk requires the Storage Media Encryption Package license.
See the *Cisco MDS 9000 Family Storage Media Encryption Configuration Guide* for more information on configuring and deploying SME Disk.
- Cisco Data Center Network Manager for SAN
Cisco Fabric Manager and Cisco Data Center Network Manager have merged into a unified product that can now manage and monitor both SAN and LAN environments. As a part of this merger, Cisco Fabric Manager has been rebranded as Cisco DCNM for SAN.

As a part of NX-OS Release 5.2(1), Cisco DCNM for SAN introduces server-based licenses that allow you to purchase a pool of Cisco DCNM for SAN licenses instead of a switch-based Fabric Manager Server (FMS) license. The installed base of existing FMS licenses are grandfathered into Cisco DCNM for SAN, which means that you do not have to purchase a new license to use Cisco DCNM for SAN if you have an existing FMS license.

There are many new features in Cisco DCNM for SAN, including:

- Summary and host dashboards
- VMware topology and performance
- Performance forecasting charts
- External SMI-S 1.4 agent
- FCoE provisioning and management

Detailed information about Cisco DCNM features is available in the [Cisco DCNM Release Notes, Release 5.2](#), and in the feature configuration guides for Cisco DCNM for SAN.

For additional information about Cisco MDS NX-OS Release 5.2(1), see the [Cisco MDS 9000 Family Release Notes for Cisco MDS NX-OS Release 5.2\(1\)](#).

New Hardware in Cisco MDS NX-OS Release 5.2(1)

Cisco MDS NX-OS Release 5.2(1) supports the following new Generation 4 hardware devices:

- Cisco MDS 9000 8-port 10-Gbps Fibre Channel over Ethernet (FCoE) module (DS-X9708-K9)
- Cisco MDS 9000 32-port 8-Gbps Advanced Fibre Channel Switching module (DS-X9232-256K9)
- Cisco MDS 9000 48-port 8-Gbps Advanced Fibre Channel Switching module (DS-X9248-256K9)
- Cisco MDS 9513 Switching Fabric 3 module (DS-13SLT-FAB3)

See the [Cisco MDS 9500 Series Hardware Installation Guide](#) for descriptions of, and specifications for the new Generation 4 modules. This guide also provides instructions for migrating to the new Fabric 3 module and guidelines for installing the new 8-Gbps Advanced Fibre Channel switching modules.

Licensed Cisco NX-OS Software Packages

Most Cisco MDS 9000 family software features are included in the standard package. However, some features are logically grouped into add-on packages that must be licensed separately, such as the Cisco MDS 9000 Enterprise package, SAN Extension over IP package, Mainframe package, Storage Services Enabler (SSE) package, Storage Media Encryption package, and Data Mobility Manager package. On-demand ports activation licenses are also available for the Cisco MDS Blade Switch Series and 4-Gbps Cisco MDS 9100 Series Multilayer Fabric switches.



Note

A license is not required to use the Cisco MDS 9000 8-port 10-Gbps Fibre Channel over Ethernet (FCoE) module (DS-X9708-K9).

Enterprise Package

The standard software package that is bundled at no charge with the Cisco MDS 9000 Family switches includes the base set of features that Cisco believes are required by most customers for building a SAN. The Cisco MDS 9000 family also has a set of advanced features that are recommended for all enterprise SANs. These features are bundled together in the Cisco MDS 9000 Enterprise package. Refer to the Cisco MDS 9000 Enterprise package fact sheet for more information.

SAN Extension over IP Package

The Cisco MDS 9000 SAN Extension over IP package allows the customer to use FCIP to extend SANs over wide distances on IP networks using the Cisco MDS 9000 family IP storage services. Refer to the Cisco MDS 9000 SAN Extension over IP package fact sheet for more information.

Mainframe Package

The Cisco MDS 9000 Mainframe package uses the FICON protocol and allows control unit port management for in-band management from IBM S/390 and z/900 processors. FICON VSAN support is provided to help ensure true hardware-based separation of FICON and open systems. Switch cascading, fabric binding, and intermixing are also included in this package. Refer to the Cisco MDS 9000 Mainframe package fact sheet for more information.

Storage Media Encryption Package

The Cisco MDS 9000 Storage Media Encryption package enables encryption of data at rest on heterogeneous tape devices, virtual tape libraries, and disk arrays as a transparent fabric service. Cisco SME is completely integrated with Cisco MDS 9000 Family switches and the Cisco DCNM for SAN application, enabling highly available encryption services to be deployed without rewiring or reconfiguring SANs, and allowing them to be managed easily without installing additional management software. Refer to the Cisco MDS 9000 Storage Media Encryption package fact sheet for more information. The Storage Media Encryption package is for use only with Cisco MDS 9000 Family switches.

Data Mobility Manager Package

The Cisco MDS 9000 Data Mobility Manager package enables data migration between heterogeneous disk arrays without introducing a virtualization layer or rewiring or reconfiguring SANs. Cisco DMM allows concurrent migration between multiple LUNs of unequal size. Rate-adjusted migration, data verification, dual Fibre Channel fabric support, and management using Cisco DCNM for SAN provide a complete solution that greatly simplifies and eliminates most downtime associated with data migration. Refer to the Cisco MDS 9000 Data Mobility Manager package fact sheet for more information. The Data Mobility Manager package is for use only with Cisco MDS 9000 Family switches.

Storage Services Enabler Package

The Cisco MDS 9000 SSE package allows network-based storage applications and services to run on the Cisco MDS 9000 family SSMs, Cisco MDS 9000 18/4-Port Multiservice Module (MSM-18/4), and Cisco MDS 9222i. Intelligent fabric applications simplify complex IT storage environments and help organizations gain control of capital and operating costs by providing consistent and automated storage management. Refer to the Cisco MDS 9000 SSE package fact sheet for more information.

On-Demand Port Activation License

On-demand ports allow customers to benefit from Cisco NX-OS Software features while initially purchasing only a small number of activated ports on 8-Gbps or 4-Gbps Cisco MDS 9100 Series Multilayer Fabric switches. As needed, customers can expand switch connectivity by licensing additional ports.

I/O Accelerator Package

The Cisco I/O Accelerator (IOA) package activates IOA on the Cisco MDS 9222i fabric switch, the Cisco MDS 9000 18/4 Multiservice Module (MSM-18/4), and on the SSN-16 module. The IOA package is licensed per service engine and is tied to the chassis. The number of licenses required is equal to the number of service engines on which the intelligent fabric application is used. The SSN-16 requires a separate license for each engine on which you want to run IOA. Each SSN-16 engine that you configure for IOA checks out a license from the pool managed at the chassis level. SSN-16 IOA licenses are available as single licenses.

XRC Acceleration License

The Cisco Extended Remote Copy (XRC) acceleration license activates FICON XRC acceleration on the Cisco MDS 9222i switch and on the MSM-18/4 in the Cisco MDS 9500 Series directors. One license per chassis is required. You must install the Mainframe Package and the SAN Extension over FCIP Package before you install the XRC acceleration license. The Mainframe Package enables the underlying FICON support, and the FCIP license or licenses enable the underlying FCIP support.

Deprecated Features

Cisco MDS NX-OS Release 5.2 no longer supports the features listed in the following sections:

- [Zoning Features, page 30](#)
- [SNIA Common Information Model, page 31](#)
- [IVR Non-NAT Mode, page 31](#)

Zoning Features

LUN zoning, read-only zones, and broadcast zones are no longer supported. These features affect the following hardware:

- Cisco MDS 9000 8-port 10-Gbps Fibre Channel over Ethernet (FCoE) module
- Cisco MDS 9000 48-port 8-Gbps Advanced Fibre Channel Switching module
- Cisco MDS 9000 32-port 8-Gbps Advanced Fibre Channel Switching module

You cannot bring up these modules if these features are already configured. You should completely remove all configurations that include these features before you attempt to bring up these modules. In addition, you cannot configure these features after you bring up these modules.

SNIA Common Information Model

SNIA Common Information Model (CIM or cimserver) commands are no longer supported. CIM is supported in Cisco DCNM-SAN Release 5.2. The SMI-S agent that is installed on the Cisco DCNM-SAN server allows external application to access fabric and switch profiles as specified in SNIA CIM. For additional information, see the [Cisco DCNM Release Notes, Release 5.2](#).

IVR Non-NAT Mode

IVR non-NAT mode is not supported in Cisco NX-OS Release 5.2(x). If you have IVR non-NAT mode configured, see the [“Upgrading Guidelines Specific to NX-OS Release 5.2\(8\)” section on page 15](#) for instructions on how to migrate to IVR NAT mode before upgrading to Cisco NX-OS Release 5.2(8).

Limitations and Restrictions

This section lists the limitations and restrictions. The following limitations are described:

- [SME Quorum, page 32](#)
- [OUI Mismatch for SME Tape Targets, page 32](#)
- [FCIP Performance Drop, page 32](#)
- [FCoE Module, page 32](#)
- [IPv6, page 33](#)
- [User Roles, page 33](#)
- [Schedule Job Configurations, page 33](#)
- [Maximum Number of Zones Supported in Interop Mode 4, page 33](#)
- [InterVSAN Routing, page 33](#)
- [Java Web Start, page 34](#)
- [VRRP Availability, page 34](#)
- [Using a RSA Version 1 Key for SSH Following an Upgrade, page 34](#)
- [CFS Cannot Distribute All Call Home Information, page 35](#)
- [Availability of F Port Trunking and F Port Channels, page 35](#)
- [Reserved VSAN Range and Isolated VSAN Range Guidelines, page 36](#)
- [Applying Zone Configurations to VSAN 1, page 36](#)
- [Running Storage Applications on the MSM-18/4, page 36](#)

- [RSPAN Traffic Not Supported on CTS Ports on 8-Gbps Switching Modules, page 36](#)
- [I/O Accelerator Feature Limitations, page 37](#)
- [Support for FCIP Compression Modes, page 37](#)
- [Saving Copies of the Running Kickstart and System Images, page 37](#)
- [Configuring Buffer Credits on a Generation 2 or Generation 3 Module, page 37](#)
- [Features Not Supported on the Cisco MDS 9148 Switch, page 38](#)
- [PPRC Not Supported with FCIP Write Acceleration, page 38](#)
- [Configuring a Persistent FCID in an IVR Configuration with Brocade Switches, page 38](#)

SME Quorum

You cannot change the quorum or the SME master node during a master key rekey. If a change occurs during the smart card portion of the operation, the master key rekey operation will fail and must be repeated from the beginning.

OUI Mismatch for SME Tape Targets

If Cisco DCNM does not discover all expected tape targets, check the sme.log to identify an OUI mismatch. Look for a message like the following:

```
2012.04.09 21:15:50 WARN [SME] skipped target 50:06:0b:00:00:b8:e4:b0 due to explicit
type mismatch. Expect: 240 found: 228. If this is an error update your OUI definitions
```

To correct this issue, manually add the OUI definitions to the server.properties file. The format is as follows:

```
# 0xhhhhhh vendor_name devicetypes h(host)|d(disk)|t(tape)|s(switch)|g(gateway)|m(cisco
mds)
# for example: newOUIs=0x00E069 JNI h|d; 0x000ded Cisco m;\
# 0x006069 Brocade s;
newOUIs=
```

FCIP Performance Drop

FCIP performance can drop in a topology where the round-trip time (RTT) delay is configured at 80 ms, IPsec is enabled, and write acceleration (WA) is not used.

FCoE Module

- In Cisco MDS NX-OS Release 5.2(x), you cannot install a FCoE module in a switch that is running DMM, SME, or IOA.
- Link traps for FCoE devices are sent only when a VFC interface flaps.

IPv6

The management port on Cisco MDS switches supports one user-configured IPv6 address, but does not support auto-configuration of an IPv6 address.

User Roles

In SAN-OS Release 3.3(x) and earlier, when a user belongs to a role which has a VSAN policy set to Deny and the role allows access to a specific set of VSANs (for example, 1 through 10), the user is restricted from performing the **configuration**, **clear**, **execute**, and **debug** commands which had a VSAN parameter outside this specified set. Beginning with NX-OS Release 4.1(1b), these users are still prevented from performing **configuration**, **clear**, **execute**, and **debug** commands as before, however, they are allowed to perform **show** commands for all VSANs. The ability to execute the **show** command addresses the following:

- In a network environment, users often need to view information in other VSANs even though they do not have permission to modify configurations in those VSANs.
- This behavior makes Cisco MDS 9000 Series switches consistent with other Cisco products, such as Cisco Nexus 7000 Series switches, that exhibit the same behavior for those roles (when they apply to the VLAN policy).

Schedule Job Configurations

As of MDS NX-OS Release 4.1(1b) and later, the scheduler job configurations need to be entered in a single line with a semicolon(;) as the delimiter.

Job configuration files created with SAN-OS Release 3.3(1c) and earlier, are not supported. However, you can edit the job configuration file and add the delimiter to support Cisco NX-OS Release 4.1(3a).

Maximum Number of Zones Supported in Interop Mode 4

In interop mode 4, the maximum number of zones that is supported in an active zone set is 2047, due to limitations in the connected vendor switch.

When IVR is used in interop mode 4, the maximum number of zones supported, including IVR zones, in the active zone set is 2047.

InterVSAN Routing

When using InterVSAN Routing (IVR), it is recommended to enable Cisco Fabric Services (CFS) on all IVR-enabled switches. Failure to do so may cause mismatched active zone sets if an error occurs during zone set activation.

Java Web Start

When using Java Web Start, it is recommended that you do not use an HTML cache or proxy server. You can use the Java Web Start Preferences panel to view or edit the proxy configuration. To do this, launch the Application Manager, either by clicking the desktop icon (Microsoft Windows), or type `./javaws` in the Java Web Start installation directory (Solaris Operating Environment and Linux), and then select **Edit> Preferences**.

If you fail to change these settings, you may encounter installation issues regarding a version mismatch. If this occurs, you should clear your Java cache and retry.

VRRP Availability

The Virtual Router Redundancy Protocol (VRRP) is not available on the Gigabit Ethernet interfaces on the MSM-18/4 module or module 1 of the MDS 9222i switch, even though it is visible on these modules. The feature is not implemented in the current release.

Using a RSA Version 1 Key for SSH Following an Upgrade

For security reasons, NX-OS Release 4.2(1b) does not support RSA version 1 keys. As a result, if you upgrade to NX-OS Release 4.2(1b) from an earlier version that did support RSA version 1 keys, and you had configured an RSA version 1 key for SSH, then you will not be able to log in through SSH following the upgrade.

If you have an RSA version 1 key configured for SSH, before upgrading to NX-OS Release 4.1(3a), follow these steps:

-
- Step 1** Disable SSH.
 - Step 2** Create RSA version 2 DSA keys.
 - Step 3** Enable SSH.
 - Step 4** Delete any RSA version 1 keys on any remote SSH clients and replace the version 1 keys with the new version 2 keys from the switch.

Proceed with the upgrade to NX-OS Release 4.2(1b).

If you upgrade before disabling SSH and creating RSA version 2 keys, follow these steps:

-
- Step 1** Open a Telnet session and log in through the console.
 - Step 2** Issue the **no feature ssh** command to disable SSH.
 - Step 3** Issue the **ssh key rsa 1024** command to create RSA version 2 keys.
 - Step 4** Issue the **feature ssh** command to enable SSH.
-

CFS Cannot Distribute All Call Home Information

In MDS NX-OS Release 4.2(1b), CFS cannot distribute the following Call Home commands that can be configured with the **destination-profile** command:

- **destination-profile** *profile_name* **transport-method**
- **destination-profile** *profile_name* **http**

The output of the **show running-config callhome** command shows configured Call Home commands:

```
switch# show running-config callhome
> version 4.1(3)
> callhome
> email-contact abc@cisco.com <mailto:abc@cisco.com>
> phone-contact +14087994089
> streetaddress yxyxyx
> distribute
> destination-profile testProfile
> destination-profile testProfile format XML
> no destination-profile testProfile transport-method email
> destination-profile testProfile transport-method http
> destination-profile testProfile http https://xyz.abc.com
> destination-profile testProfile alert-group all
> transport email smtp-server 64.104.140.134 port 25 use-vrf management
> transport email from abc@cisco.com <mailto:abc@cisco.com>
> enable
> commit
```

When you attempt to apply these commands in the ASCII configuration, the following commands fail:

```
> no destination-profile testProfile transport-method email
> destination-profile testProfile transport-method http
> destination-profile testProfile http https://xyz.abc.com
```

To work around this issue, issue these commands after the **commit** command.

Availability of F Port Trunking and F Port Channels

Trunking F ports and trunking F port channels are not supported on the following MDS 9000 components:

- DS-C9134-K9, Cisco MDS 9134 Multilayer Fabric Switch, if NPIV is enabled and the switch is used as the NPV core switch
- DS-C9124-K9, Cisco MDS 9124 Multilayer Fabric Switch, if NPIV is enabled and the switch is used as the NPV core switch

Trunking F ports, trunking F port channels and regular F port channels are not supported on the following MDS 9000 components:

- DS-X9016, Cisco MDS 9000 2-Gbps16-Port Fibre Channel Switching Module
- DS-X9032, Cisco MDS 9000 2-Gbps 32-Port Fibre Channel Switching Module
- DS-X9032-14K9, Cisco MDS 9000 14/2-Port Multiprotocol Services Module (MPS-14/2)

For configuration information, refer to the “Configuring Trunking” section in the *Cisco MDS 9000 NX-OS Interfaces Configuration Guide*.

Reserved VSAN Range and Isolated VSAN Range Guidelines

On an NPV switch with a trunking configuration on any interface, or on a regular switch where the **feature fport_channel_trunk** command has been issued to enable the Trunking F port channels feature, follow these configuration guidelines for reserved VSANs and the isolated VSAN:

- If trunk mode is on for any of the interfaces or NP port channel is up, the reserved VSANs are 3040 to 4078, and they are not available for user configuration.
- The Exchange Virtual Fabric Protocol (EVFP) isolated VSAN is 4079, and it is not available for user configuration.

The following VSAN IDs are assigned in the Fibre Channel Framing and Signaling (FC-FS) interface standard:

VF_ID Value	Value Description
00h	Do not use as a Virtual Fabric Identifier.
001h ... EFFh	Available as a Virtual Fabric Identifier.
F00h ... FEEh	Reserved.
FEFh	Control VF-ID (see Fibre Channel Link Services (FC-LS) and Fibre Channel Switch Fabric Generation 4 (FC-SW-4) standards).
FF0h ... FFEh	Vendor specific.
FFFh	Do not use as a Virtual Fabric Identifier.
FEFh = 4079	

Applying Zone Configurations to VSAN 1

In the setup script, you can configure system default values for the default-zone to be permit or deny, and you can configure default values for the zone distribution method and for the zone mode.

These default settings are applied when a new VSAN is created. However, the settings will not take effect on VSAN 1, because it exists prior to running the setup script. Therefore, when you need those settings for VSAN 1, you must explicitly issue the following commands:

- **zone default-zone permit** *vsan 1*
- **zoneset distribute full** *vsan 1*
- **zone mode enhanced** *vsan 1*

Running Storage Applications on the MSM-18/4

The Cisco MDS 9000 18/4-Port Multiservice Module (MSM-18/4) does not support multiple, concurrent storage applications. Only one application, such as SME or DMM, can run on the MSM-18/4 at a time.

RSPAN Traffic Not Supported on CTS Ports on 8-Gbps Switching Modules

An inter-switch link (ISL) that is enabled for Cisco TrustSec (CTS) encryption must be brought up in non-CTS mode to support remote SPAN (RSPAN) traffic on the following modules:

- DS-X9248-96K9: Cisco MDS 9000 48-Port 8-Gbps Fibre Channel Switching Module
- DS-X9224-96K9: Cisco MDS 9000 24-Port 8-Gbps Fibre Channel Switching Module
- DS-X9248-48K9: Cisco MDS 9000 4/44-Port Host-Optimized 8-Gbps Fibre Channel Switching Module

If the ISL link is brought up with CTS enabled, random packet drops of both RSPAN traffic and normal traffic will occur on the receiver port switch.

I/O Accelerator Feature Limitations

IOA does not support the following NX-OS features:

- F port trunking
- F port channeling
- IOA cannot be configured on flows in topologies that have devices with NPV and NPIV enabled. For example, IOA is not supported in a topology where a host logs in from a NPV edge switch and IOA is deployed on a NPV core switch for this host.

Support for FCIP Compression Modes

In Cisco NX-OS Release 4.2(1b) and later, FCIP compression mode 1 and compression mode 3 are not supported on the Cisco MSM-18/4 module and on the SSN-16 module.

Saving Copies of the Running Kickstart and System Images

After you upgrade to MDS NX-OS Release 4.2(1b), you are not allowed to delete, rename, move, or overwrite the kickstart and system images that are in the current system bootvar settings on an active or standby MDS Supervisor-2 module on any Cisco MDS 9500 Series switch. This restriction does not apply to the integrated supervisor module on the MDS 9200 and MDS 9100 series switches.

Configuring Buffer Credits on a Generation 2 or Generation 3 Module

When you configure port mode to auto or E on a Generation 2 module, one of the ports will not come up for the following configuration:

- Port Mode: auto or E for all of the ports
- Rate Mode: dedicated
- Buffer Credits: default value

When you configure port mode to auto or E on a Generation 3 module, one or two of the ports will not come up for the following configuration:

- Port Mode: auto or E for the first half of the ports, the second half of the ports, or for all of the ports
- Rate Mode: dedicated
- Buffer Credits: default value

When you configure port mode to auto or E for all ports in the global buffer pool, you need to reconfigure buffer credits on one or more of the ports. The total number of buffer credits configured for all the ports in the global buffer pool should be reduced by 64.

Features Not Supported on the Cisco MDS 9148 Switch

The Cisco MDS 9148 Multilayer Fabric Switch does not support the following NX-OS features:

- Remote Span
- Translative loop support
- FCC - no generation, quench reaction only
- FC-Redirect
- DMM
- SME
- IOA
- FCoE

In addition, the following features have these limits:

- VSANs - 31 maximum
- SPAN - 1 session maximum

PPRC Not Supported with FCIP Write Acceleration

IBM Peer to Peer Remote Copy (PPRC) is not supported with FCIP Write Acceleration.

Configuring a Persistent FCID in an IVR Configuration with Brocade Switches

The following information is relevant if you have a fabric that consists of Cisco MDS 9000 switches and Brocade switches, and the Cisco MDS switches are running either NX-OS Release 4.x or Release 5.x and Brocade is running FOS higher than 6.x. In an IVR configuration, when IVR NAT is enabled on a Cisco MDS 9000 switch, the device in the native VSAN should be configured with a persistent FCID. Assuming the FCID is 0xAABBCC, AA should be configured with the virtual IVR domain ID of the VSAN that contains the ISLs and BB should be configured in the following range:

- 1 through 64 if the Brocade switch is operating in native interop mode.
- 1 through 30 if the Brocade switch is operating in McData Fabric mode or McData Open Fabric Mode.

This configuration ensures that the devices connected to the Cisco MDS 9000 switch can be seen in the name server database on the Brocade switch.

Caveats

This section lists the open and resolved caveats for this release. Use [Table 17](#) to determine the status of a particular caveat. In the table, “O” indicates an open caveat and “R” indicates a resolved caveat.

Table 17 **Open Caveats and Resolved Caveats Reference**

DDTS Number	NX-OS Software Release (Open or Resolved)	NX-OS Software Release (Open or Resolved)
	5.2(6b)	5.2(8)
Severity 2		
CSCtn72391	O	O
CSCtq88900	O	O
CSCtr10877	O	O
CSCtx92067	—	R
CSCty59570	O	R
CSCty68838	O	R
CSCub40203	—	R
CSCub47799	O	O
CSCub58778	O	R
CSCub65651	O	R
CSCuc17564	O	R
CSCuc34454	R	R
CSCuc35483	O	R
CSCuc62769	O	R
CSCuc63272	O	R
CSCuc84790	O	R
CSCuc91171	O	R
CSCud12362	O	R
CSCud62557	R	O
CSCuf31077	O	O
CSCum30306	O	O
CSCum82608	O	O
CSCuu76450	O	O
Severity 3		
CSCtr50223	O	O
CSCtt46972	O	R
CSCtx41288	O	R
CSCty82821	O	O
CSCtz44601	O	R
CSCua61011	O	O
CSCua98554	—	R
CSCub52174	O	R
CSCub57007	O	R

Table 17 *Open Caveats and Resolved Caveats Reference (continued)*

DDTS Number	NX-OS Software Release (Open or Resolved)	NX-OS Software Release (Open or Resolved)
	5.2(6b)	5.2(8)
CSCub83043	O	R
CSCuc03438	O	R
CSCuc14052	O	R
CSCuc17269	R	R
CSCuc17458	O	R
CSCuc55348	O	R
CSCuc71618	O	R
CSCuc79417	O	R
CSCuc83658	O	R
CSCud05214	O	R
CSCud14600	R	R
CSCud32085	O	R
CSCud49969	—	O
CSCud72991	R	O
CSCul22781	O	O
CSCuw06365	O	O
Severity 4		
CSCtz09820	O	R
CSCtz19169	O	O
CSCtz40700	O	O
CSCtz40745	O	O
CSCua09712	O	O
CSCua50422	—	R
CSCub82340	O	R
CSCuc98499	O	R
CSCue48324	—	O
Severity 5		
CSCts46166	O	R
CSCtz84847	O	O
CSCub92848	O	R
Severity 6		
CSCty47599	O	O
CSCtz91659	O	R
CSCua22667	O	R

Table 17 Open Caveats and Resolved Caveats Reference (continued)

DDTS Number	NX-OS Software Release (Open or Resolved)	NX-OS Software Release (Open or Resolved)
	5.2(6b)	5.2(8)
CSCuc09003	O	R
CSCuh27347	O	O

Resolved Caveats

- CSCtx92067

Symptoms: The SANTap DDP process failed and the following messages appeared:

```
%PORT-5-IF_DOWN_SOFTWARE_FAILURE: %$VSAN 4094%$ Interface isapi4/1/1 is down (Port software failure)
%PORT-5-IF_DOWN_SOFTWARE_FAILURE: %$VSAN 4094%$ Interface isapi4/1/2 is down (Port software failure)
%PORT-5-IF_DOWN_SOFTWARE_FAILURE: %$VSAN 4094%$ Interface isapi4/1/3 is down (Port software failure)
%PORT-5-IF_DOWN_SOFTWARE_FAILURE: %$VSAN 4094%$ Interface isapi4/1/4 is down (Port software failure)
%SANTAP-SLOT4-2-ISAPI_CRIT_PROCESS_CRASH: DPP status: ISAPI_DPP_CONNECT_STATUS_NOT_OK. SANTAP aborting. SANTAP VM Size: 22816kB
%RM-SLOT4-2-RM_VICPP_RECREATE_ERROR: All the fast path resources are down VICPP connectivity lost
%PROC_MGR-SLOT4-2-ERR_MSG: ERROR: PID 1495 (ps_stap) killed with signal (6)
%RM-SLOT4-2-CPP_CATASTROPHIC_ERROR: ERROR: Component (Partner Software) caused critical error. Service Module will be reloaded
%IPS_SB_MGR-SLOT4-2-PORT_SOFTWARE_FAILURE: Port software failure, module 4 port 1
%IPS_SB_MGR-SLOT4-2-PORT_SOFTWARE_FAILURE: Port software failure, module 4 port 2
%IPS_SB_MGR-SLOT4-2-PORT_SOFTWARE_FAILURE: Port software failure, module 4 port 3
%IPS_SB_MGR-SLOT4-2-PORT_SOFTWARE_FAILURE: Port software failure, module 4 port 4
%MODULE-2-MOD_DIAG_FAIL: Module 4 (serial: JAF1504BMNN) reported failure on ports 4/1-4/22 (0x0) due to ISAPI experienced an error in device 41 (device error 0x0)
```

Workaround: This issue is resolved.

- CSCty59570

Symptom: After replacing a smart card that reached the maximum number of shares (16), the new smart card gets stuck in the initializing state.

Workaround: This issue is resolved.

- CSCty68838

Symptom: Periodic FCIP port flaps might occur when Tape Acceleration and IP compression are enabled and the MTU is configured at 9000. This situation might lead to a failure or an IPS core.

This symptom might be seen when the following configuration is applied to an FCIP tunnel:

- Tape Acceleration (TA) is enabled.
- Write Acceleration (required for TA) is enabled.
- IP compression is enabled.
- The MTU size is 9000.

Workaround: This issue is resolved.

- CSCub40203

Symptom: Hosts in a RecoverPoint SANTap environment lose access to storage. The host PLOGI/PRLIs time out.

This symptom might be seen when the hosts are being replicated by RecoverPoint/SANTap.

Workaround: This issue is resolved.
- CSCub58778

Symptom: While trying to download Device Manager using a switch IP address, the URL displays an “http error 403” message for switches with a single supervisor, including the Cisco MDS 9222i switch, the Cisco MDS 9148 switch, and the Cisco MDS 9134 switch.

This symptom might be seen on a Cisco MDS 9000 switch that is either running Cisco NX-OS Release 5.2(6) or that was upgraded from a release where this issue was not present.

Workaround: This issue is resolved.
- CSCub65651

Symptom: If a Director class switch that is part of a fabric is upgraded to Cisco NX-OS Release 5.2(2d), the FCNS database in some of the switches in the fabric might get out of sync.

This symptom might be seen when IVR devices are present in the fabric and these devices are not local to the switch being upgraded.

Workaround: This issue is resolved.
- CSCuc17564

Symptom: A host cannot discover a target through IVR.

This symptom might be seen in IVR non-NAT mode. There is a domain overlap conflict between two VSANs that are participating in IVR. The fcdomain was reconfigured and a disruptive fcdomain restart occurred.

Workaround: This issue is resolved.
- CSCuc34454

Symptom: Backups or recalls to a Fibre Channel attached SCSI tape or disk device might experience failures with Cisco MDS 9200 or 9500 series switches that are configured for IO Acceleration (IOA).

This symptom might be seen when more than 2090 bytes of the Fibre Channel frame data field are used when IOA writes or reads data.

Workaround: This issue is resolved.
- CSCuc35483

Symptom: Activation of a zone set in a VSAN in interop mode 1, fails with the following error messages:

```
%ZONE-2-ZS_CHANGE_ACTIVATION_FAILED_RESN_DOM: %$VSAN <vsan>%$ Activation failed
: reason Invalid zonset format domain <dom>
%ZONE-2-ZS_CHANGE_SFC_FAILED: %$VSAN <vsan>%$ SFC failed : domain <dom> returns
INVALID_ZSET_FORMAT
```

The failure occurs only if the following conditions exist:

 - Zone set activation occurs from a Cisco MDS 9000 switch.
 - The switch is running Cisco NX-OS Release 5.2(6) or Release 5.2(6a).
 - The VSAN in question is running in interop mode 1.

- McData switches are present in the VSAN that is in interop mode 1.

Workaround: This issue is resolved.

- CSCuc62769

Symptom: In some cases, the system does not take the corrective action of shutting down a faulty fabric module. The system health loopback tests might fail, and the **show hardware internal statistics device fabric errors** command might show serdes errors with the SER substring.

This issue affects fabric 3 modules, and occurs when there is bad hardware. The bad hardware causes errors after a supervisor switchover and the fabric side receives serial link errors, but the channel status is still in sync on both sides.

Workaround: This issue is resolved.

- CSCuc63272

Symptom: Detecting a faulty supervisor to the fabric takes over an hour. During this time, modules are treated as failed and are reset, which causes a service interruption.

This symptom only occurs for the specific failure case of the active supervisor with a faulty link to the fabric.

Workaround: This issue is resolved.

- CSCuc84790

Symptom: Following an upgrade to NX-OS Release 5.2(6) or Release 5.2(6a), FCIP interfaces are down and the following message appears:

```
fcip1 is down (Tunnel port src interface unbound)
```

The licenses for all SAN_EXTN_OVER_IP packages in the grace period might be unnecessarily checked out. The inter-VSAN routing (IVR) process is using those licenses.

```
switch# show ivr
```

```
License status
```

```
-----
```

```
IVR is running based on the following license(s)
```

```
SAN_EXTN_OVER_IP
SAN_EXTN_OVER_IP_IPS2
SAN_EXTN_OVER_IP_IPS4
SAN_EXTN_OVER_IP_9216i
SAN_EXTN_OVER_IP_18_4
SAN_EXTN_OVER_IP_SSN16
```

Conditions: This symptom might be seen when IVR is running over FCIP.

Workaround: This issue is resolved.

- CSCuc91171

Symptom: Cisco NX-OS software fails to save the running configuration and the following error message appears:

```
Service "fcns" failed to save its configuration
```

This symptom only occurs after the configuration has been saved many times (approximately 500 times). Because saving the running configuration is part of an upgrade, this issue can impact upgrades from an affected software release.

Workaround: This issue is resolved.

- CSCuc17269

Symptom: The management port is inaccessible after a supervisor switchover.

Workaround: This issue is resolved.

- CSCud12362

Symptom: The MSM-18/4 module fails with the following message:

```
%RM-SLOT1-2-CPP_CATASTROPHIC_ERROR: ERROR: Component (Partner Software) caused
critical error. Service Module will be reloaded
```

If the supervisor module in the Cisco MDS 9222i switch experiences this issue, the failure causes the whole system to reload.

This issue can occur in SANTap environments when the WAN is slow. Under these conditions, the DPP software might fail which causes the CPP software to reset the module.

Workaround: This issue is resolved.

- CSCtt46972

Symptom: A Cisco MDS 9000 Series switch is not able to display the source and destination of queued frames in human readable format.

This issue applies to troubleshooting the Cisco MDS 9000 32-port 8-Gbps Advanced Fibre Channel Switching Module (DS-X9232-256K9), the Cisco MDS 9000 48-port 8-Gbps Advanced Fibre Channel Switching Module (DS-X9248-256K9), and the Cisco MDS 9148 48-Port Multilayer Fabric Switch (DS-C9148-K9).

Workaround: This issue is resolved.

- CSCtx41288

Symptom: The label for a smart card is not detected correctly.

Workaround: This issue is resolved.

- CSCtz44601

Symptom: A username cannot be deleted.

Workaround: This issue is resolved.

- CSCua98554

Symptom: After entering the **clear zone ?** command, not all options appear. Only smart-zoning commands appear.

Workaround: This issue is resolved.

- CSCub52174

Symptom: The following syslog message should display a reason as to why the FCID allocation failed:

```
%FLOGI-1-MSG_FLOGI_REJECT_FCID_ERROR: %$VSAN x%$ [VSAN 10, Interface fcx/y: mode[F]]
FLOGI rejected - FCID allocation failed.
```

Workaround: This issue is resolved.

- CSCub57007

Symptom: Smart zoning guidelines are needed in the Cisco MDS 9000 Release Notes for Cisco MDS NX-OS Release 5.2(6).

Workaround: This issue is resolved.

- CSCub83043

Symptom: The IOA **tune lrtp-retx-timeout** command is not reinitialized after an IOA failure.

This symptom can occur if the **tune lrtp-retx-timeout** command is set to a nondefault value and there is an IOA port software failure. The default for the **tune lrtp-retx-timeout** command is 2500 ms. Any configured value that is different than the default is not reinitialized properly after a failure.

Workaround: This issue is resolved.

- CSCuc03438

Symptom: The first SSH login password fails.

This issue applies only to SSH logins on Cisco MDS 9100 and 9200 Series switches, and includes CLI and SNMP logins.

Workaround: This issue is resolved.

- CSCuc14052

Symptom: When querying snmpgetnext for those entities, the correct interface index is not retrieved.

In MIB CISCO-FC-FE-MIB:

```
fcIfNonLipF8Out
fcIfTimeOutDiscards
fcIfOutDiscards
fcIfCreditloss
```

```
mbinzer@mbinzer-w510:~> snmpgetnext -v 2c -c public blackgrass
.1.3.6.1.4.1.9.9.289.1.2.1.1.34 1.3.6.1.4.1.9.9.289.1.2.1.1.35
1.3.6.1.4.1.9.9.289.1.2.1.1.36 1.3.6.1.4.1.9.9.289.1.2.1.1.37
1.3.6.1.4.1.9.9.289.1.2.1.1.38
SNMPv2-SMI::enterprises.9.9.289.1.2.1.1.34.16777216 = Counter32: 0
SNMPv2-SMI::enterprises.9.9.289.1.2.1.1.35.16777216 = Counter64: 0
SNMPv2-SMI::enterprises.9.9.289.1.2.1.1.36.0 = Counter64: 0
SNMPv2-SMI::enterprises.9.9.289.1.2.1.1.37.0 = Counter64: 0
SNMPv2-SMI::enterprises.9.9.289.1.2.1.1.38.0 = Counter64: 0
```

16777216 is the interface fc 1/1 and it should be used on all queries.

This symptom might be seen in later releases than Cisco NX-OS Release 4.2(7), and in Cisco NX-OS Release 5.0(4), Release 5.2(2) and Release 5.2(6)

Workaround: This issue is resolved.

- CSCuc17458

Symptom: The active zone set for a VSAN that is in enhanced mode and configured as Interop mode 1 was deactivated after ISSU from Cisco NX-OS Release 4.2(3) to Release 5.0(7).

Workaround: This issue is resolved.

- CSCuc17269

Symptom: The management port is inaccessible after a supervisor switchover.

Workaround: This issue is resolved.

- CSCuc55348

Symptom: If the QoS attribute is configured with a priority of medium or high in a zone, an “attribute not present” error appears when you try to remove the QoS attribute using Cisco DCNM.

Workaround: This issue is resolved.

- CSCuc71618

Symptom: Zoned Fibre Channel attached devices are unable to communicate when the ACLTCAM space for zoning reaches its maximum allowed size.

This symptom occurs only on the Generation 4 Cisco MDS 9000 32-port 8-Gbps Advanced Fibre Channel Switching Module (DS-X9232-256K9) and the Cisco MDS 9000 48-port 8-Gbps Advanced Fibre Channel Switching Module (DS-X9248-256K9). The symptom occurs in the presence of another ACLTCAM problem that happens repeatedly. When the initial ACLTCAM problem occurs, the ACLTCAM entries are not properly freed up for reuse. Eventually, the ACLTCAM reaches its maximum size and further entries cannot be programmed.

Workaround: This issue is resolved.

- CSCuc79417

Symptom: The **install all** command does not do sufficient error checking to prevent npe/non-npe image mismatches. No warnings or other messages are provided and the installation can fail.

This symptom occurs when either the system and the kickstart image are not of the same (npe/non-npe) type or when the current running image is npe/non-npe and a new image to be installed does not match.

Workaround: This issue is resolved.

- CSCuc83658

Symptom: When FICON Tape Read Acceleration is enabled on a Cisco MDS 9500 Series switch or a Cisco MDS 9222i switch, certain restore applications might experience a failure to read data on the tape if the application performs large block reads against smaller blocked data.

This symptom might be seen when an application performs large block reads against smaller blocked data.

Workaround: This issue is resolved.

- CSCud05214

Symptom: Fibre Channel interface counters display large values.

This symptom occurs when the interface is in use, and it is triggered by clearing the interface counters when traffic is flowing.

Workaround: This issue is resolved.

- CSCud14600

Symptom: The Cisco MDS 9000 16-Port Storage Services Node (SSN-16) has continuous port software failures

Workaround: This issue is resolved.

- CSCud32085

Symptom: SME Disk discovery is unable to find any disks presented to hosts from the storage shelf.

This symptom might be seen when DCNM is running and an SME cluster is already created and functional. The HP C7000 blade enclosure is in a port-channel trunk. The core switch is NPIV enabled and dual Cisco MDS 8-Gb Fabric Switches for the HP c-Class Blade System are in NPV mode. Any disk discovery that involves the storage shelf and HP C7000 Blades fails to discover the disks.

The symptom occurs in the Cisco DCNM Add Disk Group section when the Cisco DCNM web client is used to configure SME.

Workaround: This issue is resolved.

- CSCtz09820

Symptom: In Generation 4 modules, the following errors might be observed. They are not a cause for concern to the normal operation of the hardware. These errors are logged in the onboard persistent log and can be viewed by entering the **show logging onboard exception-log** command after attaching to the module.

```
TBIRD_FWD_EBM_0_SER_PARITY_XXX : Informational
TBIRD_FWD_EBM_0_PACK0_EPR_DROP : Informational
TBIRD_FWD_EBM_1_PACK3_MISS_SOF : Informational
TBIRD_FWD_EBM_1_PACK0_MISS_EOP : Informational
TBIRD_FWD_EBM_1_PACK0_SF_TOO_SMALL : Informational
```

These errors are reported when there are internal correctable conditions encountered during operation, and the corrective action is taken. They do not necessarily indicate a problem with the switch or module.

The following error can occur in cases of corrupted frames in the ingress path (due to a bad cable or SFP). It does not necessarily indicate a problem with the switch hardware.

```
THE_IPA_IPA0_INTR_FLD_ERR_FROM_MEM : Warning
```

Workaround: This issue is resolved.

- CSCua50422

Symptom: Call Home indicates a successful transmission of a message when no message from a profile is sent.

Workaround: This issue is resolved.

- CSCub82340

Symptom: A Cisco MDS 9000 switch displays the following message:

```
%PORT-5-IF_DOWN_LINK_FAILURE: %$VSAN <vs>%$ Interface <int> is down (Link
failure Link reset)
```

This message is not descriptive as to why the link failed because a Link Reset (LR) by itself does not inactivate a link to a down state.

This symptom occurs when an F port is congested and the Cisco MDS 9000 switch issues a Link Reset to do buffer-to-buffer credit recovery.

Workaround: This issue is resolved.

- CSCuc98499

Symptom: The **show hardware fabric-mode** command might not show the proper fabric mode on a switch running Cisco NX-OS Release 5.2(6) or Release 5.2(6a) if Supervisor-2 modules are installed. The output is correct when Supervisor-2A modules are installed.

On a Cisco MDS 9513 switch, the following message might be displayed:

```
Fabric mode supports only one configuration of Gen3 linecards - 4/44
host-optimized 8G FC linecard.
```

On a Cisco MDS 9506 switch and Cisco MDS 9509 switch, the following message might be displayed:

```
Fabric mode does not support FCoE, Gen4 and above linecards.
```

If either of these messages appear, the fabric mode might still be in database (DB) mode if the switch has Supervisor-2 modules.

This symptom occurs when Supervisor-2 modules (not Supervisor-2A modules) are installed and in the case of a Cisco MDS 9513 switch, either a Fabric 2 or Fabric 3 module is installed.

Workaround: This issue is resolved.

- CSCts46166

Symptom: A hidden TFTP server is accessible on the mgmt0 interface;

This symptom might be seen when the IP address is configured on the mgmt0 interface.

Workaround: This issue is resolved.

- CSCub92848

Symptom: Configuring the LDAP search map in the output of the **show ldap-server groups** command incorrectly shows “Serach map” which should be “Search map.”

This symptom might be seen when configuring LDAP on a Cisco MDS 9000 switch.

Workaround: This issue is resolved.

- CSCtz91659

Symptom: The **show tech port-channel** command should include additional outputs.

Workaround: This issue is resolved.

- CSCua22667

Symptom: Inband frames that are dropped at the supervisor module are not included in some debugging commands.

Workaround: This issue is resolved.

- CSCuc09003

Symptom: A CLI command is needed to allow a user to enable or disable sending RSCNs to edge devices when the switch management configuration changes because the FC-MI specification changed.

By default, Cisco NX-OS software will not send RSCNs when the switch management configuration changes. The **rsen permit type nport event switch-config** command is a new command to change this behavior is:

Workaround: This issue is resolved.

Open Caveats

- CSCtn72391

Symptom: Following a switch reload or a software upgrade, the startup configuration occasionally does not display feature FCIP.

Workaround: Once the switch is completely up, copy the running configuration to the startup configuration by entering the **copy running-config startup-config** command.

- CSCtr10877

Symptom: Following an ISL flap that isolates some switches in the fabric (and the corresponding FCR peers) and then later merges them again, some FCR peers might get out of sync with the SSM switch FCR peer (that is, the FCR peer that owns a configuration) during the peer discovery phase. Consequently, some application flows might not come online, or might even get deleted.

Workaround: Enter the following supervisor commands on the problematic FCR peer, which will trigger this FCR peer to resync with the rest of the fabric, and force it to come out of the error state:

```
switch# test fc-redirect config sync-with-fabric
switch# test fc-redirect config sync-with-fabric all-peers
```


If more than one peer is affected by this issue, then additional steps are needed. If the application flows do not come online, then the application CLI commands need to be checked to verify that the flows did not get deleted. If they did, then the flows need to be recreated again through the application CLI commands or Cisco DCNM-SAN interface.

- CSCud62557

Symptom: A Cisco MDS 9000 16-Port Storage Services Node (SSN-16) periodically goes into a state where it is constantly logs the following messages:

```
2012 Dec 10 14:04:47 Be800rc01f01-new %MODULE-4-MOD_WARNING: Module 6 (serial:
JAE1223KQKC) reported warning on ports 6/61-6/61 (Fibre Channel Virtual) due to Skyline ni module experienced an error in device 60 (device
error 0xc3c0020e)
```

Workaround: None.

- CSCuf31077

Symptom: Ports on the 24-port, 48-port, or 4/44-port 8-Gbps Fibre Channel switching modules go into a suspended state and packets cannot egress or ingress on the port. This issue can occur on Cisco MDS 9500 Series Directors and Cisco MDS 92221 switches when any of the following modules are installed:

- 24-port 8-Gbps Fibre Channel switching module (DS-X9224-96K9)
- 48-port 8-Gbps Fibre Channel switching module (DS-X9248-96K9)
- 4/44-port Host Optimized 8-Gbps Fibre Channel switching module (DS-X9248-48K9)

Conditions: This issue occurs after a nondisruptive upgrade to Cisco NX-OS Release 5.2(6x) or Release 5.2(8), and a link flap occurs on the ports.

Workaround: To work around this issue, do one of the following:

1. To temporarily recover a port in this state, enter the **shut** command followed by the **no shut** command on the port. A port that is recovered in this way can fail again.
2. To permanently work around this issue, reload the affected 24-port, 48-port, or 4/44-port 8-Gbps Fibre Channel switching module. If the switch contains primarily these modules, then reload the entire switch. Following the reload, the issue will not reoccur.
3. Downgrade or upgrade the Cisco NX-OS software to a release that is not affected by this bug. If a port is in this suspended state at the time of the upgrade or downgrade, the upgrade or downgrade does not automatically recover the port. Enter the **shut** command followed by the **no shut** command on the port after the upgrade or downgrade is complete to recover the port.

Further Problem Description: The main indications of a port exhibiting this issue are the following:

- The interface is up, there is an F port, there are zero frames per second in and out, there are output discards, and all B2B credits are remaining.
- Logging onboard shows small numbers of OFFLINE and TIMEOUT drops that are incrementing.

- CSCtq88900

Symptom: In an SME or IOA deployment, if the number of H->T flows that are added exceeds 512, then subsequent disruptive platform events can leave an FCR unable to process interprocess (MTS) messages at a rate fast enough to support the scaled configuration. This situation can cause an MTS-buffers full condition in the FCR, which can result in unpredictable behavior. Some of the resulting errors may be unrecoverable, and may require a disruptive restart of the flows.

Workaround: Use CFS regions if a large number (greater than 512) of application flows need to be configured. CFS regions segment the FCR peer topology into manageable proportions.

- CSCtr50223

Symptom: On the MDS 9513 switch, when an MSM-18/4 module boots up, it sends a request to the supervisor module to mount the modflash on the MSM-18/4 module. If there is a timeout or error in response, the following syslog message displays:

```
2011 Jul 14 01:18:13 sw-dc5-br2-12 %LC_MNT_MGR-SLOT3-2-LC_MNT_MGR_ERROR: SUP mount
failed. MTS receive timeout
2011 Jul 14 01:19:06 sw-dc5-br2-12 %PROC_MGR-SLOT3-2-ERR_MSG: ERROR: PID 1144
(lc_mnt_mgr) exited abnormally, exit status (0xa)
2011 Jul 14 01:19:06 sw-dc5-br2-12 %MODULE-2-MOD_MINORSWFAIL: Module 3 (serial:
JAE1141ZB43) reported a failure in service lc_mnt_mgr
```

This issue might be seen when the supervisor module is unusually busy and cannot process the mount request from the MSM-18/4 module, or the actual mount command on the supervisor takes a long time.

Workaround: Reload the MSM-18/4 module in the same slot/module where the modflash mount failed. A request will be sent to the supervisor to mount the modflash.

- CSCty82821

Symptom: After creating an SME cluster, adding disks to a disk group, changing some disk states, and starting master key rekey, the key creation date is invalid.

Workaround: None.

- CSCua61011

Symptom: After creating an SME cluster in advanced mode, adding 500 disks to the disk group, exporting the keys, and importing the keys again, there is no scroll option in the import manage key window.

Workaround: None.

- CSCud49969

Symptom: If you enter the **isapi health-check** command after attaching the Cisco MDS 9000 18/4-Port Multiservice Module (MSM-18/4), the following error appears:

```
Memory Status: ERROR
```

Conditions: This symptom might be seen after attaching the MSM-18/4 module and entering the **isapi health-check** command. The output shows “Memory Status: ERROR.”

Workaround: None.

- CSCud72991

Symptom: A port drops all packets originating from the supervisor module. The packets are dropped as TIMEOUT drops. The port is up and has all of its allotted Tx B2B credits, but the input and output rate is 0 frames per second.

Workaround: Enter the **shut** command followed by the **no shut** command on the port to recover it.

- CSCtz19169

Symptom: After the primary KMC fails over to the secondary, KMC performance suffers. The system attempts to reacquire connectivity to the primary KMC for each operation, and the system waits for that attempt to time out before using the secondary KMC. Waiting for the timeout creates a significant delay for failed over operations, particularly when scaled.

This symptom occurs when the primary KMC fails (because of loss of connectivity).

- Workaround:** Restore connectivity to the primary KMC.
- CSCtz40700

Symptom: When a trunk link fails, the 1.3.6.1.4.1.9.9.289.1.3 trap has an incorrect link failure reason of “gracefully down.”

This symptom might be seen only when a link failure occurs on a E, TE, or TF port.

Workaround: Ignore the link down reason because the link down trap is valid.
 - CSCtz40745

Symptom: A “VSAN down” trap is sent for VSAN 4094 when a trunk port goes down because the VSAN is not configured on the trunk.

This symptom might be seen only when a link down occurs on a E, TE, or TF port.

Workaround: Ignore the trap.
 - CSCua09712

Symptom: Communication errors that occur during master key rekey are not handled gracefully.

Workaround: None.
 - CSCtz84847

Symptom: When creating a cluster, key management servers are not listed in the drop-down list.

Workaround: Manually enter the IP address of the server.
 - CSCty47599

Symptom: For a failed master key rekey, the master key shares were generated and updated in the CKMC.

Workaround: None.
 - CSCuh27347

Symptom: During an In Service Software Upgrade (ISSU) or In Service Software Downgrade (ISSD), ports that are administratively up and also in the not-connected state get reinitialized.

Condition: This issue affects all Cisco MDS dual-supervisor systems.

Workaround: If starting an ISSU/ISSD from an affected version of Cisco MDS NX-OS software, ensure that all ports that are administratively up, but not connected, are shut down during the ISSU/ISSD.

More Information: This might cause the Cisco MDs Generation 3 Fibre Channel switching modules to drop all outbound traffic with the OFFLINE and TIMEOUT errors. For more information, see [CSCuf31077](#).
 - CSCum30306

Symptom: The security service crashes when configuring an SSH authentication key.

Configuring SSH keys multiple times within 10 minutes results in a HAP reset that resets the active supervisor.

Condition: This issue intermittently occurs when configuring an SSH authentication key.

Workaround: To avoid the supervisor reset, do not configure more than 2 SSH keys per 10 minutes.
 - CSCum82608

Symptom: The full zoneset database in one or more VSANs may be empty after a supervisor switchover.

Conditions: This issue only occurs after the supervisors fail over or a user-initiated switch over occurs (but not an in service switchover situation, ie ISSU/ISSD). The precondition is created before the switchover by activating zone changes (such as adding or removing zones from a zoneset) and is more likely to occur on systems with very large zone configurations.

The symptom described here can occur if zones are modified while a switch is running any NX-OS release 5.2(2) to 5.2(8c) (inclusive), and 6.2(1) to 6.2(5) (inclusive).

Workaround: To recover from this condition follow these steps:

1.

[i] If the full zoneset db for the affected VSAN contains multiple zonesets (ie, inactive zonesets) follow these steps:

- a. add dummy zone to any zoneset in the full zoneset db for the vsan on a **neighbouring** switch, and then
- b. if zoning mode is basic distribute the change or if the zoning mode is enhanced commit the change, and then
- c. the dummy zone may be removed now and the zoneset redistributed/recommitted.

[ii] If the full zoneset db for the affected VSAN contains only a single zoneset (ie, no inactive zonesets) follow these steps:

- a. copy the active zoneset db to the full zoneset db on the **affected** switch (it is only necessary to copy zonesets for VSANs that have empty databases), For example:

```
switch# zone copy active-zoneset full-zoneset vsan 1-4093
```

2. In both cases, save the config on the **affected** switch after step 1, For example:

```
switch# copy running start
```

To recover from condition 2 (isolated ISL) contact Cisco TAC for assistance.

- CSCul22781

Symptom: After a supervisor switchover, a subsequent ISL flap results in one or more VSAN becoming isolated on the ISL.

Conditions: These issues only occur in situations after the supervisors fail over or a user-initiated switch over occurs (but not an in service switchover situation, ie ISSU/ISSD). The preconditions are created before the switchover by activating zone changes (such as adding or removing zones from a zoneset) and is more likely to occur on systems with very large zone configurations.

The symptoms described here can occur if zones are modified while a switch is running any NX-OS release 5.2(2) to 5.2(8c) (inclusive), and 6.2(1) to 6.2(5) (inclusive).

- CSCue48324

Symptom: Users remotely authenticated by RADIUS or TACACS+ cannot login to the system after ISSU. Also, the aaa group configuration has a deadtime greater than the maximum of 1440 minutes, for example:

```
switch# show running-config tacacs+
aaa group server tacacs+ TACACS_GROUP
deadtime 269688784
```

Conditions: This issue only occurs for RADIUS or TACACS+ server groups.

Workaround: To recover after this issue has occurred:

1. Use a local account to login then reestablish a connection to the aaa servers with the one of the following commands:

```
test aaa server tacacs+ a.b.c.d
test aaa server radius a.b.c.d
```

This must be done for all server addresses in the affected group.

2. Reconfigure the deadtime of the server group to a value within the range of 0 to 1440. After the deadtime is within range, it can be removed with the no deadtime command.

To prevent this issue before an upgrade, initialise the deadtime and save the config, then remove it and save the config again. For example, for TACACS+:

```
switch# conf t
(config)# tacacs-server deadtime 1
(config)# aaa group server tacacs tacacsgroup
(config)# deadtime 1
(config)# end
switch# copy run start
```

```
switch# conf t
(config)# no tacacs-server deadtime 1
(config)# aaa group server tacacs tacacsgroup
(config)# no deadtime 1
(config)# end
switch# copy run start
```

- CSCuw06365

Symptom: An ISL does not initialize quickly across a DWDM connection. The link can take minutes, hours or even days to connect. Once connected, it is stable.

Conditions: This issue only applies to DS-X9248-256K9 and DS-X9232-256K9 modules when connecting an ISL over a Tellabs 7100 DWDM path.

Workaround: None.

- CSCuu76450

Symptom: MDS fabric switch running in NPV mode fails to generate port-monitor alerts.

Conditions: Applies to all MDS fabric switches running in NPV mode using port-monitor.

Applies to all versions prior to NX-OS 6.2(13).

Will occur only in the following conditions:

- After one or more upstream NP or TNP ports goes down and then back up.
- For each (T)NP port that flaps, one F port at the end of the range of ports will no longer be scanned for port-monitor counter events. For example, if the (T)NP port fc1/1 flaps then the last F port being used(ex. fc1/48) will no longer be scanned for port-monitor counter events.

Workaround: There are two workarounds, one temporary and one permanent:

1 - Contact the TAC and they can assist with killing the port-monitor process. Once the port-monitor process restarts, all ports will be once again scanned.

This is only temporary in the sense that if an upstream (T)NP port flaps again the problem will recur.

2 - Move the (T)NP ports to the end of the ports on the switch. For example, if there are four (T)NP uplinks on a MDS 9148 or MDS 9148S, then move them to fc1/45-fc1/48. Once this has been done the problem will not recur.

Related Documentation

The documentation set for NX-OS for the Cisco MDS 9000 Family includes the following documents. To find a document online, access the following web site:

http://www.cisco.com/en/US/products/ps5989/tsd_products_support_series_home.html

The documentation set for Cisco Fabric Manager appears in the *Cisco Fabric Manager Release Notes for Release 4.2(1)*, which is available from the following website:

http://www.cisco.com/en/US/products/ps10495/prod_release_notes_list.html

Release Notes

- *Cisco MDS 9000 Family Release Notes for Cisco MDS NX-OS Releases*
- *Cisco MDS 9000 Family Release Notes for MDS SAN-OS Releases*
- *Cisco MDS 9000 Family Release Notes for Storage Services Interface Images*
- *Cisco MDS 9000 Family Release Notes for Cisco MDS 9000 EPLD Images*

Regulatory Compliance and Safety Information

- *Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family*

Compatibility Information

- *Cisco Data Center Interoperability Support Matrix*
- *Cisco MDS 9000 NX-OS Hardware and Software Compatibility Information and Feature Lists*
- *Cisco MDS NX-OS Release Compatibility Matrix for Storage Service Interface Images*
- *Cisco MDS 9000 Family Switch-to-Switch Interoperability Configuration Guide*
- *Cisco MDS NX-OS Release Compatibility Matrix for IBM SAN Volume Controller Software for Cisco MDS 9000*
- *Cisco MDS SAN-OS Release Compatibility Matrix for VERITAS Storage Foundation for Networks Software*

Hardware Installation

- *Cisco MDS 9500 Series Hardware Installation Guide*
- *Cisco MDS 9500 Series Supervisor-2A Tech Note*
- *Cisco MDS 9200 Series Hardware Installation Guide*
- *Cisco MDS 9100 Series Hardware Installation Guide*
- *Cisco MDS 9124 and Cisco MDS 9134 Multilayer Fabric Switch Quick Start Guide*

Software Installation and Upgrade

- *Cisco MDS 9000 NX-OS Software Upgrade and Downgrade Guide*
- *Cisco MDS 9000 Family Storage Services Interface Image Install and Upgrade Guide*
- *Cisco MDS 9000 Family Storage Services Module Software Installation and Upgrade Guide*

Cisco NX-OS Configuration Guides

- *Cisco MDS 9000 Family NX-OS Licensing Guide*
- *Cisco MDS 9000 Family NX-OS Fundamentals Configuration Guide*
- *Cisco MDS 9000 Family NX-OS System Management Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Interfaces Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Fabric Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Quality of Service Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Security Configuration Guide*
- *Cisco MDS 9000 Family NX-OS IP Services Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Intelligent Storage Services Configuration Guide*
- *Cisco MDS 9000 Family NX-OS High Availability and Redundancy Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Inter-VSAN Routing Configuration Guide*

Command-Line Interface

- *Cisco MDS 9000 Family Command Reference*

Intelligent Storage Networking Services Configuration Guides

- *Cisco MDS 9000 I/O Acceleration Configuration Guide*
- *Cisco MDS 9000 Family SANTap Deployment Guide*
- *Cisco MDS 9000 Family Data Mobility Manager Configuration Guide*
- *Cisco MDS 9000 Family Storage Media Encryption Configuration Guide*
- *Cisco MDS 9000 Family Secure Erase Configuration Guide*
- *Cisco MDS 9000 Family Cookbook for Cisco MDS SAN-OS*

Troubleshooting and Reference

- *Cisco NX-OS System Messages Reference*
- *Cisco MDS 9000 Family NX-OS Troubleshooting Guide*
- *Cisco MDS 9000 Family NX-OS MIB Quick Reference*
- *Cisco MDS 9000 Family NX-OS SMI-S Programming Reference*

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

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