INDEX

F

Fibre Channel write acceleration
- default settings 4-2
- enabling 4-2
- estimating number of write buffers 4-1
- licensing 4-1
- modifying number of write buffers 4-2

I

Intelligent Storage Services
- disabling (procedure) 2-5
- disabling with force option 2-6
- SCSI flow services 2-1 to 2-4, ?? to 3-3
- SCSI flow statistics 2-1 to 2-4, ?? to 3-3

S

SCSI flow configuration clients
- description 2-3, 3-3

SCSI flow data path support
- description 2-3, 3-3

SCSI flow managers
- description 2-3, 3-3

SCSI flow services
- configuring (procedure) 2-5
- default settings 2-4, 3-3
- functional architecture (figure) 2-2
- SCSI flow configuration clients 2-3, 3-3
- SCSI flow data path support 2-3, 3-3
- SCSI flow managers 2-3, 3-3

SCSI flow statistics
- default settings 2-4, 3-3
- enabling 3-4

SCSI LUNs
- discovering targets 2-3, 3-3, 4-2

SSMs
- disabling Intelligent Storage Services (procedure) 2-5
- SCSI flow services 2-1 to 2-4, ?? to 3-3
- SCSI flow statistics 2-1 to 2-4, ?? to 3-3

Send documentation comments to dcnm-san-docfeedback@cisco.com

Send documentation comments to dcnm-san-docfeedback@cisco.com

New and Changed Information

The following new publications support both Cisco DCNM for LAN and DCNM for SAN, and address the new licensing model, the new installation process, and the new features of Cisco DCNM:

- *Cisco DCNM Installation and Licensing Guide*
- *Cisco DCNM Release Notes*

For a complete list of document titles, see the list of Related Documentation in the “Preface.”

To find additional information about Cisco MDS NX-OS Releases, see the *Cisco MDS 9000 Family Release Notes* available at the following Cisco Systems website:

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

Send documentation comments to dcnm-san-docfeedback@cisco.com

Send documentation comments to dcnm-san-docfeedback@cisco.com

Preface

This preface describes the audience, organization, and conventions of the *Intelligent Storage Services Configuration Guide, Cisco DCNM for SAN*. It also provides information on how to obtain related documentation.

Audience

This guide is for experienced network administrators who are responsible for configuring and maintaining the Cisco MDS 9000 Family of multilayer directors and fabric switches.

Organization

This document is organized as follows:

Chapter	Title	Description
Chapter 1	Intelligent Storage Services Overview	Provides an overview of the Intelligent Storage Services supported by the Cisco MDS 9000 NX-OS software.
Chapter 2	Configuring SCSI Flow Services	Describes the SCSI flow services, the Intelligent Storage Services.
Chapter 3	Configuring SCSI Flow Statistics	Describes the SCSI flow statistics, the Intelligent Storage Services.
Chapter 4	Configuring Fibre Channel Write Acceleration	Describes Fibre Channel Write Acceleration support and configuration.

Document Conventions

Command descriptions use these conventions:

boldface font	Commands and keywords are in boldface.
italic font	Arguments for which you supply values are in italics.

Send documentation comments to dcnm-san-docfeedback@cisco.com

[ ]	Elements in square brackets are optional.
[x | y | z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.

Screen examples use these conventions:

`screen font`	Terminal sessions and information the switch displays are in screen font.
`boldface screen font`	Information you must enter is in boldface screen font.
italic screen font	Arguments for which you supply values are in italic screen font.
`< >`	Nonprinting characters, such as passwords, are in angle brackets.
`[ ]`	Default responses to system prompts are in square brackets.
`!, #`	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:

Note Means reader *take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Related Documentation

The documentation set for the Cisco MDS 9000 Family includes the following documents. To find a document online, use the Cisco MDS NX-OS Documentation Locator at:

http://www.cisco.com/en/US/docs/storage/san_switches/mds9000/roadmaps/doclocater.htm

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*
- *Release Notes for Cisco MDS 9000 Family DCNM for SAN*

Regulatory Compliance and Safety Information

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

Send documentation comments to dcnm-san-docfeedback@cisco.com

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 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 Release 4.1(x) and SAN-OS 3(x) 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

- *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*

Send documentation comments to dcnm-san-docfeedback@cisco.com

Cisco DCNM

- *Cisco DCNM Fundamentals Configuration Guide, Release 6.x*
- *Cisco DCNM Installation and Licensing Guide, Release 6.x*

Cisco DCNM for SAN

- *System Management Configuration Guide, Cisco DCNM for SAN*
- *Interfaces Configuration Guide, Cisco DCNM for SAN*
- *Fabric Configuration Guide, Cisco DCNM for SAN*
- *Quality of Service Configuration Guide, Cisco DCNM for SAN*
- *Security Configuration Guide, Cisco DCNM for SAN*
- *IP Services Configuration Guide, Cisco DCNM for SAN*
- *Intelligent Storage Services Configuration Guide, Cisco DCNM for SAN*
- *High Availability and Redundancy Configuration Guide, Cisco DCNM for SAN*
- *Inter-VSAN Routing Configuration Guide, Cisco DCNM for SAN*
- *SMI-S and Web Services Programming Guide, Cisco DCNM for SAN*

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 DCNM Troubleshooting Guide*
- *Cisco NX-OS System Messages Reference*
- *Cisco MDS 9000 Family NX-OS Troubleshooting Guide*
- *Cisco MDS 9000 Family NX-OS MIB Quick Reference*
- *Cisco DCNM for SAN Database Schema Reference*

Send documentation comments to dcnm-san-docfeedback@cisco.com

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

Subscribe to the *What's New in Cisco Product Documentation* as an RSS feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service. Cisco currently supports RSS Version 2.0.

Send documentation comments to dcnm-san-docfeedback@cisco.com

Send documentation comments to dcnm-san-docfeedback@cisco.com

CHAPTER 1

Intelligent Storage Services Overview

The Cisco MDS 9000 NX-OS software supports intelligent storage services that enable efficient storage area network administration. Intelligent storage services are features that are available on the Storage Services Module (SSM) such as the Small Computer System Interface (SCSI) flow services, SCSI flow statistics, and Fibre Channel Write Acceleration (FC-WA).

These features identify the SCSI I/O flow for a specified initiator-target pair. This information is used by the FC-WA feature to gather advanced I/O statistics for a specified initiator-target pair. The FC-WA feature decreases the latency of an I/O over long distances. The advanced I/O statistics that are collected can be used to evaluate the storage performance for the initiator-target pair.

Intelligent Storage Services are features supported on the Storage Services Module (SSM). Intelligent Storage Services supported in Cisco MDS SAN-OS Release 2.0(2b) and later.

In Cisco MDS SAN-OS Release 2.1(1a) or later, or Cisco NX-OS 5.0 (1), you can provision a subset of the ports for an SSM feature. The port range must be a multiple of four (for example fc4/1 through fc4-12).You can enable SCSI flow services either on the entire SSM or on groups of four interfaces.

This chapter includes the following sections:

- SCSI, page 1-1
- Fibre Channel Write Acceleration, page 1-2

SCSI

The Small Computer System Interface (SCSI) feature offers a better utilization of the storage network resources and eliminate the need for separate parallel WAN and MAN infrastructure. Users can connect hosts to storage networks on existing IP networks. Since this feature utilizes the TCP/IP for data transfer, the data is existing IP- based host connections such as Ethernet.

The chapters in this guide describe the following features:

- SCSI Flow Services—A SCSI flow service used by a SCSI initiator and a target. The SCSI flow services provide enhanced features for SCSI flows, such as Write Acceleration and flow monitoring for statistics gathering on an SSM.
- SCSI Flow Statistics—These are the statistics that can be collected for any combination of a SCSI initiator and a target. Statistics that be collected include SCSI reads, SCSI writes, SCSI commands, and error statistics.

For information on configuring SCSI flow services, see Chapter 2, “Configuring SCSI Flow Services.”

For information on configuring SCSI flow statistics, seeChapter 3, “Configuring SCSI Flow Statistics.”

Send documentation comments to dcnm-san-docfeedback@cisco.com

Fibre Channel Write Acceleration

Fibre Channel Write Acceleration (FC-WA) minimizes application latency or reduces transactions per second over long distances. For synchronous data replication, FC-WA increases the distance of replication or reduces effective latency to improve performance. To take advantage of this feature, both the initiator and target devices must be directly attached to an SSM.

For information on configuring Fibre Channel Write Acceleration, see Chapter 4, “Configuring Fibre Channel Write Acceleration.”

CHAPTER 2

Configuring SCSI Flow Services

This chapter describes SCSI flow services which is supported on the Storage Services Module (SSM).

This chapter includes the following sections:

- Information About SCSI Flow Services, page 2-1
- Licensing Requirements for SCSI Flow Services, page 2-3
- Guidelines and Limitations, page 2-4
- Default Settings, page 2-4
- Configuring SCSI Flow Services, page 2-4
- Verifying SCSI Flow Services, page 2-6
- Filed Description for SCSI Flow Services, page 2-6

Information About SCSI Flow Services

This section includes the following topics:

- SCSI Flow Services Overview, page 2-1
- SCSI Flow Specification Attributes, page 2-2
- SCSI Flow Manager, page 2-3
- SCSI Flow Configuration Client, page 2-3
- SCSI Flow Data Path Support, page 2-3

SCSI Flow Services Overview

An SCSI initiator and target combination is an SCSI flow. SCSI flow services provide enhanced features for SCSI flows, such as Write Acceleration and flow monitoring for statistics obtained on an SSM.

The SCSI flow services functional architecture consists of the following components:

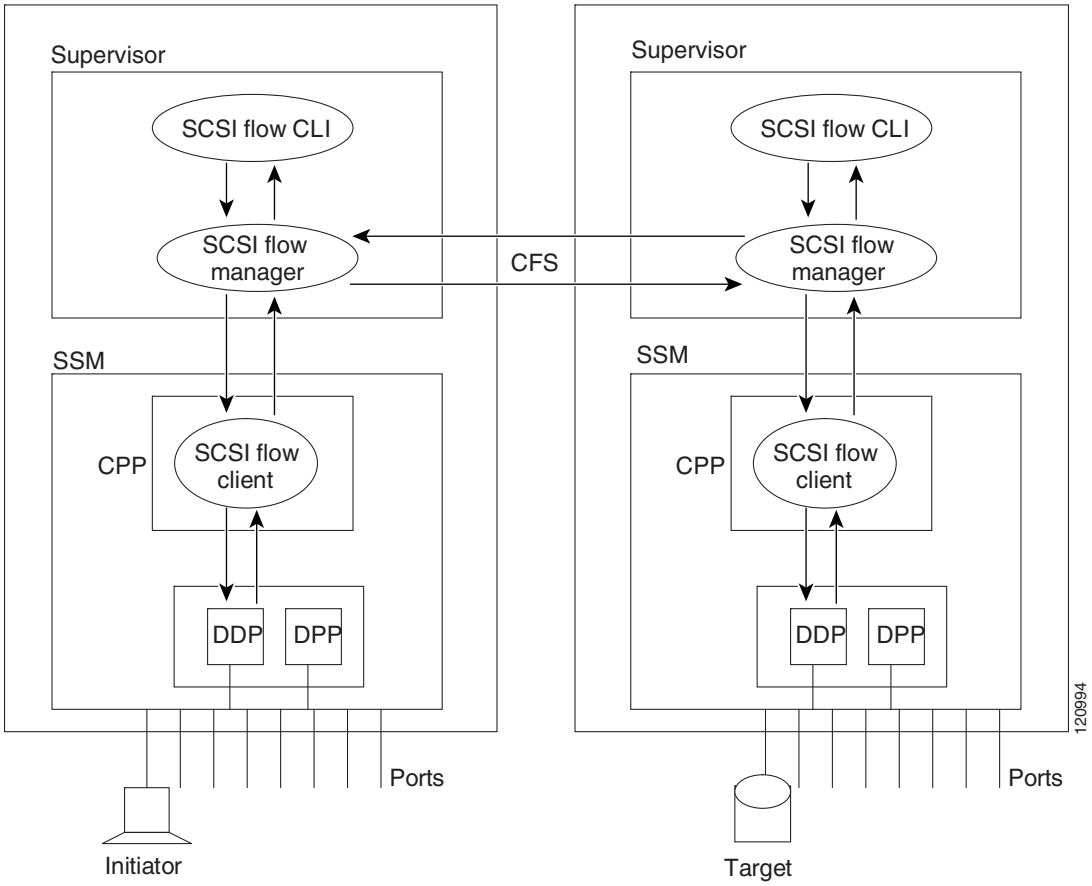
- SCSI flow manager (SFM) on the supervisor—The SFM resides on a supervisor module and handles the configuration of SCSI flows, validating them and relaying configuration information to the appropriate SSM. It also handles any dynamic changes to the status of the SCSI flow due to external events and registers changes that occur due to various operations.

Send documentation comments to dcnm-san-docfeedback@cisco.com

- SCSI flow configuration CLI on the supervisor—The SFCC resides on the CPP of the SSM. It receives flow configuration requests from the SFM, programs the DPP corresponding to the initiator and target port interfaces, and responds to the SFM with the status of the configuration request.
- SCSI flow configuration client on the Control Path Processor (CPP) of an SSM.
- SCSI flow feature set support on the Data Path Processor (DPP) of an SSM—The DPP on the SSM examines all the messages between the initiator and target and provides SCSI flow features, such as Fibre Channel Write Acceleration and statistics monitoring.

Figure 2-1 shows an example of the SCSI flow services functional architecture.

Figure 2-1 SCSI Flow Services Functional Architecture



Note The SCSI target and initiator must be connected to different SSMs on different switches.

Note For statistics monitoring, the target device is not required to be connected to an SSM.

SCSI Flow Specification Attributes

A SCSI flow specification consists of the following attributes:

Send documentation comments to dcnm-san-docfeedback@cisco.com

- SCSI flow identifier
- VSAN identifier
- SCSI initiator port WWN
- SCSI target port WWN
- Flow feature set consisting of Fibre Channel Write Acceleration and statistics monitoring.

SCSI Flow Manager

The SCSI flow manager (SFM) resides on a supervisor module and handles the configuration of SCSI flows, validating them and relaying configuration information to the appropriate SSM. It also handles any dynamic changes to the status of the SCSI flow due to external events. The SFM registers events resulting from operations, such as port up or down, VSAN suspension, and zoning that affects the SCSI flow status, and updates the flow status and configuration accordingly.

The SFM on the initiator communicates to its peer on the target side using Cisco Fabric Services (CFS). Peer communication allows the initiator SFM to validate target parameters and program information on the target side.

SCSI Flow Configuration Client

A SCSI flow configuration client (SFCC) resides on the CPP of the SSM. It receives flow configuration requests from the SFM, programs the DPP corresponding to the initiator and target port interfaces, and responds to the SFM with the status of the configuration request.

SCSI Flow Data Path Support

The DPP on the SSM examines all the messages between the initiator and target and provides SCSI flow features such as Fibre Channel Write Acceleration and statistics monitoring.

Note For statistics monitoring, the target device is not required to be connected to an SSM.

Licensing Requirements for SCSI Flow Services

The following table shows the licensing requirements for SCSI Flow Services:

License	License Description
ENTERPRISE_PKG	SCSI flow statistics requires license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the NX-OS licensing scheme, see the *Cisco NX-OS Licensing Guide*.
FM_SERVER_PKG	Traffic Analyzer for SCSI flow statistics requires an Enterprise Services license. For a complete explanation of the NX-OS licensing scheme and how to obtain and apply licenses, see the *Cisco NX-OS Licensing Guide.*

Send documentation comments to dcnm-san-docfeedback@cisco.com

Guidelines and Limitations

The SCSI flow specification is a distributed configuration because the SCSI initiator and the target might be physically connected to SSMs on two different switches located across the fabric. The configuration does not require information to identify either the switch name or the SSM slot location for either the initiator or the target. The manual SCSI flow configuration is performed only at the initiator side. This simplifies the configuration process. The initiator switch sends the configuration to the SFM on the target switch using CFS. No SCSI flow configuration is necessary on the target switch.

Default Settings

Table 2-1 lists the default settings for SCSI flow services parameters.

Table 2-1 Default SCSI Flow Services Parameters

Parameters	Default
SCSI flow services	Disabled
SCSI flow services distribution	Enabled

Configuring SCSI Flow Services

This section includes the following topics:

- Enabling Intelligent Storage Services, page 2-4
- Configuring Fibre Channel Using DCNM-SAN, page 2-5
- Disabling Intelligent Storage Services, page 2-5

Restrictions <Optional>

Enabling SCSI flow services on interfaces has the following restrictions:

- The fewest number of interfaces that you can enable is four. You can specify fc1 through fc4, but not fc1 through fc2.
- The first interface in the group must be 1, 5, 9, 13, 17, 21, 25, or 29. You can specify fc5 through fc8, but not fc7 through fc10.
- The groups of four interfaces do not need to be consecutive. You can specify fc1 through fc8 and fc17 through fc20.

Enabling Intelligent Storage Services

Restrictions <Optional>

The port range must be a multiple of four (for example fc4/1 through fc4-12).

Send documentation comments to dcnm-san-docfeedback@cisco.com

Detailed Steps

To configure the values to associate with the fast, medium, and slow migration rates, follow these steps:

Step 1 Expand **End Devices** and then select **SSM Features** in the Physical Attributes pane.

You see the Intelligent Storage Services configuration in the Information pane.

Step 2 Click the **SSM** tab.

You see the set of configured services in the Information pane.

Step 3 Click **Create Row** to enable a new service on an SSM.

You see the Create SSM dialog box.

Step 4 Select the switch and SSM card you want to configure.

Step 5 (Optional) Uncheck the **Use All Ports on Module** check box if you want to provision a subset of the ports on the card to use this service.

Step 6 Select the port range you want to provision for using this service (starting port and ending port).

Step 7 Select the feature you want to enable on these ports from the drop-down list of services.

Step 8 Set the PartnerImageURI field if you are enabling a third-party application that requires an image loaded onto the SSM.

Step 9 Click **Create** to create this row and enable this service.

Configuring Fibre Channel Using DCNM-SAN

Detailed Steps

To configure a Fibre Channel using DCNM-SAN, follow these steps:

Step 1 Expand **End Devices** and then select **SSM Features** in the Physical Attributes pane.

You see the Intelligent Storage Services configuration, showing the FCWA tab in the Information pane.

Step 2 Click **Create Row** in the Information pane to create a SCSI flow or click a row in the FCWA table to modify an existing SCSI flow.

You see the FC Write Acceleration dialog box.

Step 3 Select the initiator and target WWNs and VSAN IDs and check the **WriteAcc** check box to enable Fibre Channel Write Acceleration on this SCSI flow.

Step 4 (Optional) Enable SCSI flow statistics on this SCSI flow by checking the **Enable Statistics** check box.

Step 5 (Optional) Change the BufCount value to set the number of 2K buffers used by the SCSI target.

Step 6 Click **Create** to create this SCSI flow.

Disabling Intelligent Storage Services

Detailed Steps

To disable Intelligent Storage Services in DCNM-SAN for an SSM and free up a group of ports that use these services, follow these steps:

Send documentation comments to dcnm-san-docfeedback@cisco.com

Step 1 Expand **End Devices** and then select **SSM Features** in the Physical Attributes pane.

You see the Intelligent Storage Services configuration in the Information pane.

Step 2 Click the **SSM** tab.

You see the set of configured services in the Information pane.

Step 3 Select the row in the table that you want to disable.

Step 4 (Optional) Check the **Reboot Module on Delete** check box if you want to force the card to reboot after disabling the service. This is equivalent to the CLI **force** option.

Step 5 Click **Delete Row**. The ports that were provisioned for this service become available for provisioning in another service.

Note If **Reboot Module on Delete** was checked, then the SSM module reboots.

Verifying SCSI Flow Services

To display SCSI Flow Services configuration information, perform one of the following tasks:

Command	Purpose
show scsi-flow	Displays the SCSI flow services configuration for all specific SCSI flow identifiers.
show ssm provisioning	Displays provisioned applications on an SSM.
show scsi-flow flow-id 3	Displays the SCSI flow services configuration for a specific SCSI flow identifiers.

For detailed information about the fields in the output from these commands, refer to the *Cisco DC-OS Command Reference*.

Filed Description for SCSI Flow Services

This section includes the following topics:

- SSM
- Virtual Initiator

Send documentation comments to dcnm-san-docfeedback@cisco.com

SSM

Field	Description
StartPort, EndPort, Feature	A table containing feature related information for interfaces. This table gives a list of interfaces that are assigned to different features. The interfaces supported are of the type Fibre Channel.
PartnerImageURI	A collection of objects related to SSM Feature to interface mapping.

Virtual Initiator

Field	Description
Processor Id	The DPP ID.
Control	If false, it's the data path. If true, it's the control path.

Send documentation comments to dcnm-san-docfeedback@cisco.com

CHAPTER 3

Configuring SCSI Flow Statistics

This chapter describes the SCSI flow statistics feature which is supported on the Storage Services Module (SSM).

This chapter includes the following sections:

- Information About SCSI Flow Statistics, page 3-1
- Licensing Requirements for SCSI Flow Statistics, page 3-3
- Default Settings, page 3-3
- Configuring SCSI Flow Statistics, page 3-4
- Verifying SCSI Flow Statistics, page 3-5
- Field Descriptions for SCSI Flow Statistics, page 3-5

Information About SCSI Flow Statistics

This section includes the following topics:

- SCSI Flow Statistics Overview, page 3-1
- SCSI Flow Specification Attributes, page 3-2
- SCSI Flow Manager, page 3-3
- SCSI Flow Configuration Client, page 3-3
- SCSI Flow Data Path Support, page 3-3

SCSI Flow Statistics Overview

The statistics that can be collected for SCSI flows include the following:

- SCSI reads
  - Number of I/Os
  - Number of I/O blocks
  - Maximum I/O blocks
  - Minimum I/O response time
  - Maximum I/O response time

Send documentation comments to dcnm-san-docfeedback@cisco.com

- SCSI writes
  - Number of I/Os
  - Number of I/O blocks
  - Maximum I/O blocks
  - Minimum I/O response time
  - Maximum I/O response time
- Other SCSI commands (not read or write)
  - Test unit ready
  - Report LUN
  - Inquiry
  - Read capacity
  - Mode sense
  - Request sense
- Errors
  - Number of timeouts
  - Number of I/O failures
  - Number of various SCSI status events
  - Number of various SCSI sense key errors or events

To take advantage of this feature, only the initiator must be directly attached to an SSM.

Note The SCSI flow statistics feature requires the Enterprise Package license installed only on the initiator switches.

Note For SCSI flow statistics, the initiator must connect to an SSM on a Cisco MDS switch while the target can connect to any other switch in the fabric. The SCSI flow initiator and target cannot connect to the same switch.

SCSI Flow Specification Attributes

A SCSI flow specification consists of the following attributes:

- SCSI flow identifier
- VSAN identifier
- SCSI initiator port WWN
- SCSI target port WWN
- Flow feature set consisting of Fibre Channel Write Acceleration and statistics monitoring.

Send documentation comments to dcnm-san-docfeedback@cisco.com

SCSI Flow Manager

The SCSI flow manager (SFM) resides on a supervisor module and handles the configuration of SCSI flows, validating them and relaying configuration information to the appropriate SSM. It also handles any dynamic changes to the status of the SCSI flow due to external events. The SFM registers events resulting from operations, such as port up or down, VSAN suspension, and zoning that affects the SCSI flow status, and updates the flow status and configuration accordingly.

The SFM on the initiator communicates to its peer on the target side using Cisco Fabric Services (CFS). Peer communication allows the initiator SFM to validate target parameters and program information on the target side.

SCSI Flow Configuration Client

A SCSI flow configuration client (SFCC) resides on the CPP of the SSM. It receives flow configuration requests from the SFM, programs the DPP corresponding to the initiator and target port interfaces, and responds to the SFM with the status of the configuration request.

SCSI Flow Data Path Support

The DPP on the SSM examines all the messages between the initiator and target and provides SCSI flow features such as Fibre Channel Write Acceleration and statistics monitoring.

Licensing Requirements for SCSI Flow Statistics

The following table shows the licensing requirements for SCSI Flow Statistics:

License	License Requirement
ENTERPRISE_PKG	SCSI flow statistics requires license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the NX-OS licensing scheme, see the *Cisco NX-OS Licensing Guide*.
FM_SERVER_PKG	Traffic Analyzer for SCSI flow statistics requires an Enterprise Services license. For a complete explanation of the NX-OS licensing scheme and how to obtain and apply licenses, see the *Cisco NX-OS Licensing Guide.*

Default Settings

Table 3-1 lists the default settings for SCSI flow statistics parameters.

Table 3-1 Default SCSI Flow Statistics Parameters

Parameters	Default
SCSI flow statistics	Disabled

Send documentation comments to dcnm-san-docfeedback@cisco.com

Configuring SCSI Flow Statistics

This section includes the following topics:

- Enabling SCSI Flow Statistics, page 3-4
- Clearing SCSI Flow Statistics, page 3-4

Enabling SCSI Flow Statistics

Detailed Steps

To enable SCSI flow statistics monitoring using DCNM-SAN, follow these steps:

Step 1 Expand **End Devices** and then select **SSM Features** in the Physical Attributes pane.

You see the FCWA tab in the Information pane.

Step 2 Click **Create Row** in the Information pane to create a SCSI flow or click a row in the FCWA table to modify an existing SCSI flow.

You see the FC Write Acceleration dialog box.

Step 3 Select the initiator and target WWNs and VSAN IDs and check the **Enable Statistics** check box to enable SCSI flow statistics on this SCSI flow.

Step 4 (Optional) Enable Fibre Channel Write Acceleration on this SCSI flow at this time by checking the **WriteAcc** check box.

Step 5 Click **Create** to create this SCSI flow.

Clearing SCSI Flow Statistics

Clears SCSI flow statistics counters for SCSI flow ID.

Detailed Steps

To clear SCSI flow statistics using DCNM-SAN, follow these steps:

Step 1 Expand End Devices and then select SSM Features.

Step 2 Check the Stats Clear check box to clear SCSI flow statistics.

Step 3 Click the Apply Changes icon to clear the SCSI flow statistics.

Send documentation comments to dcnm-san-docfeedback@cisco.com

Verifying SCSI Flow Statistics

To display SCSI Flow Statistics configuration information, perform one of the following tasks:

Command	Purpose
show scsi-flow statistics	Displays the SCSI Flow Statistics for all SCSI flow identifiers.
show scsi-flow statistics flow-id 4	Displays the SCSI Flow Statistics for a specific SCSI flow identifier.

For detailed information about the fields in the output from these commands, refer to the *Cisco DC-OS Command Reference*.

Field Descriptions for SCSI Flow Statistics

SSM

Field	Description
StartPort, EndPort, Feature	A table containing feature related information for interfaces. This table gives a list of interfaces that are assigned to different features. The interfaces supported are of the type Fibre Channel.
PartnerImageURI	A collection of objects related to SSM Feature to interface mapping.

Virtual Initiator

Field	Description
Processor Id	The DPP ID.
Control	If false, it's the data path. If true, it's the control path.

Send documentation comments to dcnm-san-docfeedback@cisco.com

Send documentation comments to dcnm-san-docfeedback@cisco.com

CHAPTER 4

Configuring Fibre Channel Write Acceleration

This chapter describes the Fibre Channel Write Acceleration (FC-WA) feature, including how to enable the feature on Cisco NX-OS.

This chapter includes the following sections:

- Information About Fibre Channel Write Acceleration, page 4-1
- Licensing Requirements for Fibre Channel Write Acceleration, page 4-2
- Default Settings, page 4-2
- Configuring Fibre Channel Write Acceleration, page 4-2
- Verifying Fibre Channel Write Acceleration, page 4-3
- Filed Description for Fibre Channel Write Acceleration

Information About Fibre Channel Write Acceleration

Fibre Channel Write Acceleration minimizes application latency or reduces transactions per second over long distances. For synchronous data replication, Fibre Channel Write Acceleration increases the distance of replication or reduces effective latency to improve performance. With this feature you can also configure the buffer count and change the number of 2-KB buffers reserved on the target side DPP for a SCSI flow.

To take advantage of this feature, both the initiator and target devices must be directly attached to an SSM.

The Fibre Channel Write Acceleration feature also allows the configuration of the buffer count. You can change the number of 2-KB buffers reserved on the target side DPP for a SCSI flow.

You can estimate the number of buffers to configure using the following formula:

(Number of concurrent SCSI writes * size of SCSI writes in bytes) / FCP data frame size in bytes

For example, HDS TrueCopy between HDS 9970s uses 1-KB FCP data frames. You perform an initial synchronization for a 16-LUN TrueCopy group with 15 tracks, or 768-KB per LUN, which requires approximately 16*(768*1024)/1024 or 12248 write buffers.

Note The Fibre Channel Write Acceleration feature requires the Enterprise Package license installed on both the initiator and target switches.

Send documentation comments to dcnm-san-docfeedback@cisco.com

Note The initiator and target cannot connect to the same Cisco MDS switch. Fibre Channel Write Acceleration requires that the initiator and target must each connect to an SSM module installed on different Cisco MDS switches.

Note Fibre Channel Write Acceleration can only be provisioned on the entire SSM, not a group of interfaces on the SSM.

Licensing Requirements for Fibre Channel Write Acceleration

The following table shows the licensing requirements for Fibre Channel Write Acceleration:

License	License Description
ENTERPRISE_PKG	Fibre Channel Write Acceleration requires license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the NX-OS licensing scheme, see the *Cisco NX-OS Licensing Guide*.

Default Settings

Table 4-1 lists the default settings for Fibre Channel Write Acceleration parameters.

Table 4-1 Default Fibre Channel Write Acceleration Parameters

Parameters	Default
Fibre Channel Write Acceleration	Disabled
Fibre Channel Write Acceleration buffers	1024

Configuring Fibre Channel Write Acceleration

This section includes the following topics:

- Enabling Fibre Channel Write Acceleration, page 4-2

Enabling Fibre Channel Write Acceleration

Detailed Steps

To enable Fibre Channel Write Acceleration, and optionally modify the number of Write Acceleration buffers using the DCNM-SAN, follow these steps:

Step 1 Expand **End Devices** and then select **SSM Features** from the Physical Attributes pane.

You see the Intelligent Storage Services configuration, showing the FCWA tab in the Information pane.

Send documentation comments to dcnm-san-docfeedback@cisco.com

Step 2 Click **Create Row** in the Information pane to create a SCSI flow or click a row in the FCWA table to modify an existing SCSI flow.

You see the FC Write Acceleration dialog box.

Step 3 Select the initiator and target WWNs and VSAN IDs and check the **WriteAcc** check box to enable Fibre Channel Write Acceleration on this SCSI flow.

Step 4 (Optional) Enable SCSI flow statistics on this SCSI flow at this time by checking the **Enable Statistics** check box.

Step 5 (Optional) Set the BufCount value to the number of 2K buffers used by the SCSI target.

Step 6 Click **Create** to create this SCSI flow with Fibre Channel Write Acceleration.

Verifying Fibre Channel Write Acceleration

To display Fibre Channel Acceleration configuration information, perform one of the following tasks:

Command	Purpose
show scsi flow	Displays Fibre Channel Write Acceleration configuration for all SCSI flow identifiers.
show scsi-flow flow-id 3	Displays Fibre Channel Write Acceleration configuration for a specific SCSI flow identifiers.

For detailed information about the fields in the output from these commands, refer to the *Cisco DC-OS Command Reference*.

Filed Description for Fibre Channel Write Acceleration

This section includes the following topics:

- FCWA
- SSM
- Virtual Initiator
- FCWA Config Status

FCWA

Field	Description
Flow Id	Represents the flow identifier.
Init WWN	Represents the pWWN of the initiator in the flow.
Init VSAN	The VSAN ID of the initiator on which the flow is configured.
Target WWN	Represents the pWWN of the target in the flow.
TargetVSAN	The VSAN ID of the target on which the flow is configured.

Send documentation comments to dcnm-san-docfeedback@cisco.com

Field	Description
WriteAcc	Specifies if write-acceleration feature is enabled for this flow. If set to true it is enabled. If set to false, it is disabled.
BufCount	It specifies the number of buffers to be used for write-acceleration.
Stats Enable	Specifies if the statistics gathering needs to be enabled for this flow. If set to true, then it is enabled. If it is set to false, then it is disabled.
Stats Clear	Assists in clearing the statistics for this flow.
Init Verification	The verification status of the initiator device corresponding to the SCSI flow.
Init Module	The status of the linecard where the SCSI flow initiator device is located.
Target Verification	The verification status of the target device corresponding to the SCSI flow.
Target Module	The status of the linecard where the SCSI flow target device is located.

SSM

Field	Description
StartPort, EndPort, Feature	A table containing feature related information for interfaces. This table gives a list of interfaces that are assigned to different features. The interfaces supported are of the type Fibre Channel.
PartnerImageURI	A collection of objects related to SSM Feature to interface mapping.

Virtual Initiator

Field	Description
Processor Id	The DPP ID.
Control	If false, it's the data path. If true, it's the control path.

FCWA Config Status

Field	Description
Overall	The configuration status for write-acceleration feature for this flow.
Initiator	The initiator configuration status for write-acceleration feature for this flow.
Target	The target configuration status for write-acceleration feature for this flow.

Send documentation comments to dcnm-san-docfeedback@cisco.com

Send documentation comments to dcnm-san-docfeedback@cisco.com