



Configuring SCSI Flow Services and Statistics

This chapter describes the Intelligent Storage Services features, SCSI flow services, and SCSI flow statistics, which are supported on the Storage Services Module (SSM).

This chapter includes the following sections:

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SCSI Flow Services

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.

This section includes the following topics:

About SCSI Flow Services

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.
- 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.

**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 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.

SCSI Flow Services Configuration

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.

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.

About Intelligent Storage Services

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, or Cisco NX-OS 4.1.(1) include the following:

- SCSI flow services
- SCSI flow statistics

In Cisco MDS SAN-OS Release 2.1(1a) or later, or Cisco NX-OS 4.1(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.

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.



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

Enabling SCSI Flow Services

Procedure

	Command or Action	Purpose
Step 1	switch# config t Example: switch(config)#	Enters configuration mode.
Step 2	switch(config)# ssm enable feature scsi-flow module 2	Enables SCSI flow services on the SSM in slot 2.
Step 3	switch(config)# no ssm enable feature scsi-flow module 2	Disables SCSI flow services on the SSM in slot 2. The default is disabled.
Step 4	switch(config)# no ssm enable feature scsi-flow force module 2	Forces the switch to disable SCSI flow services on the SSM in slot 2. The default is disabled.

	Command or Action	Purpose
Step 5	switch(config)# ssm enable feature scsi-flow interface fc 2/5 - 8	Enables SCSI flow services on interface 5 through 8 on the SSM in slot 2. Note Interfaces must be specified in multiples of four beginning at ports 1, 5, 9, 13, 17, 21, 25, and 29.
Step 6	switch(config)# no ssm enable feature scsi-flow interface fc 2/5 - 8	Disables SCSI flow services on interface 5 through 8 on the SSM in slot 2. The default is disabled.
Step 7	switch(config)# no ssm enable feature scsi-flow force interface fc 2/5 - 8	Forces the switch to disable SCSI flow services on the interface 5 through 8 on the SSM in slot 2.

Enabling SCSI Flow Configuration Distribution

To enable SCSI flow configuration distribution using CFS, follow these steps:

Procedure

	Command or Action	Purpose
Step 1	switch# config t Example: switch (config) #	Enters configuration mode.
Step 2	switch(config)# scsi-flow distribute	Enables SCSI flow configuration distribution through CFS. The default is enabled.
Step 3	switch(config)# no scsi-flow distribute	Disables CFS distribution for SCSI flow configuration.

Configuring SCSI Flow Identifiers

A SCSI flow identifier is unique on a switch such as VSAN identifiers and is chosen by the user. To configure a SCSI flow identifier, follow these steps:

Procedure

	Command or Action	Purpose
Step 1	switch# config t Example: switch(config)#	Enters configuration mode.
Step 2	switch(config)# scsi-flow flow-id 3 initiator-vsan 2 initiator-pwwn 21:00:00:e0:8b:07:5f:aa target-vsan 4 target-pwwn 2a:20:00:05:30:00:77:e0	Configures SCSI flow identifier 3 using the pWWNs of the initiator and the target. The flow identifier range is 1 to 65535.
Step 3	switch(config)# no scsi-flow flow-id 3 initiator-vsan 2	Removes SCSI flow identifier 3.

SCSI Flow Statistics

This section includes the following topics:

About SCSI Flow Statistics

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
- 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.

Configuring SCSI Flow Statistics

This section includes the following topics:

Enabling SCSI Flow Statistics

Procedure

	Command or Action	Purpose
Step 1	switch# config t Example: switch(config)#	Enters configuration mode.
Step 2	switch(config)# scsi-flow flow-id 3 statistics	Enables statistics monitoring on SCSI flow identifier 3.

	Command or Action	Purpose
Step 3	<code>switch(config)# no scsi-flow flow-id 3 statistics</code>	Disables statistics monitoring on SCSI flow identifier 3. The default is disabled.

Clearing SCSI Flow Statistics

Displaying SCSI Flow Services Information

Use the `show scsi-flow` command to display information about SCSI flow services.

```
switch# show ssm provisioning
Module  Ports      Application      Provisioning Status
-----  -
      4      1-32          scsi-flow          success
```

The following example displays SCSI Flow Services Configuration for all SCSI Flow Identifiers:

```
switch# show scsi-flow
Flow Id: 3
Initiator VSAN: 101
Initiator WWN: 21:00:00:e0:8b:05:76:28
Target VSAN: 102
Target WWN: 21:00:00:20:37:38:7f:7d
Target LUN: ALL LUNS
Flow Verification Status:
-----
Initiator Verification Status: success
Target Verification Status: success
Initiator Linecard Status: success
Target Linecard Status: success
Feature Status:
-----
Write-Acceleration enabled
Write-Acceleration Buffers: 1024
Configuration Status: success
Statistics enabled
Configuration Status: success

Flow Id: 4
Initiator VSAN: 101
Initiator WWN: 21:00:00:e0:8b:05:76:28
Target VSAN: 102
Target WWN: 21:00:00:20:37:38:a7:89
Target LUN: ALL LUNS
Flow Verification Status:
-----
Initiator Verification Status: success
Target Verification Status: success
Initiator Linecard Status: success
Target Linecard Status: success
Feature Status:
-----
Write-Acceleration enabled
Write-Acceleration Buffers: 1024
Configuration Status: success
```

The following example displays SCSI Flow Services Configuration for a specific SCSI Flow Identifier:

```
switch# show scsi-flow flow-id 3
```

```

Flow Id: 3
Initiator VSAN: 101
Initiator WWN: 21:00:00:e0:8b:05:76:28
Target VSAN: 102
Target WWN: 21:00:00:20:37:38:7f:7d
Target LUN: ALL LUNs
Flow Verification Status:
-----
Initiator Verification Status:    success
Target Verification Status:      success
Initiator Linecard Status:       success
Target Linecard Status:         success
Feature Status:
-----
Write-Acceleration enabled
Write-Acceleration Buffers: 1024
Configuration Status: success
Statistics enabled
Configuration Status: success

```

The following example displays SCSI Flow Services Statistics for all SCSI Flow Identifiers:

```

switch# show scsi-flow statistics
Stats for flow-id 4 LUN=0x0000
-----
Read Stats
I/O Total count=2
I/O Timeout count=0
I/O Total block count=4
I/O Max block count=2
I/O Min response time=5247 usec
I/O Max response time=10160 usec
I/O Active Count=0
Write Stats
I/O Total count=199935
I/O Timeout count=0
I/O Total block count=12795840
I/O Max block count=64
I/O Min response time=492 usec
I/O Max response time=10056529 usec
I/O Active Count=16
Non Read-Write Stats
Test Unit Ready=4
Report LUN=38
Inquiry=50
Read Capacity=3
Mode Sense=0
Request Sense=0
Total Stats
Rx Frame Count=3792063
Rx Frame Byte Count=6549984752
Tx Frame Count=3792063
Tx Frame Byte Count=6549984752
Error Stats
SCSI Status Busy=0
SCSI Status Reservation Conflict=0
SCSI Status Task Set Full=0
SCSI Status ACA Active=0
Sense Key Not Ready=0
Sense Key Medium Error=0
Sense Key Hardware Error=0
Sense Key Illegal Request=0
Sense Key Unit Attention=28
Sense Key Data Protect=0
Sense Key Blank Check=0
Sense Key Copy Aborted=0
Sense Key Aborted Command=0
Sense Key Volume Overflow=0
Sense Key Miscompare=0

```

The following example displays SCSI Flow Services Statistics for a Specific SCSI Flow Identifier:

```

switch# show scsi-flow statistics flow-id 4

```



```

Stats for flow-id 4 LUN=0x0000
-----
Read Stats
I/O Total count=2
I/O Timeout count=0
I/O Total block count=4
I/O Max block count=2
I/O Min response time=5247 usec
I/O Max response time=10160 usec
I/O Active Count=0
Write Stats
I/O Total count=199935
I/O Timeout count=0
I/O Total block count=12795840
I/O Max block count=64
I/O Min response time=492 usec
I/O Max response time=10056529 usec
I/O Active Count=16
Non Read-Write Stats
Test Unit Ready=4
Report LUN=38
Inquiry=50
Read Capacity=3
Mode Sense=0
Request Sense=0
Total Stats
Rx Frame Count=3792063
Rx Frame Byte Count=6549984752
Tx Frame Count=3792063
Tx Frame Byte Count=6549984752
Error Stats
SCSI Status Busy=0
SCSI Status Reservation Conflict=0
SCSI Status Task Set Full=0
SCSI Status ACA Active=0
Sense Key Not Ready=0
Sense Key Medium Error=0
Sense Key Hardware Error=0
Sense Key Illegal Request=0
Sense Key Unit Attention=28
Sense Key Data Protect=0
Sense Key Blank Check=0
Sense Key Copy Aborted=0
Sense Key Aborted Command=0
Sense Key Volume Overflow=0
Sense Key Miscompare=0
    
```

Default Settings

Table 1: Default Intelligent Storage Services Parameters , on page 9 lists the default settings for SCSI flow services and SCSI flow statistics parameters.

Table 1: Default Intelligent Storage Services Parameters

Parameters	Default
SCSI flow services	Disabled
SCSI flow services distribution	Enabled
SCSI flow statistics	Disabled

