



## Configuring SCSI Flow Services and Statistics

Storage Services Module (SSM) supports in SCSI flow services and SCSI flow statistics in Cisco MDS SAN-OS Release 2.0(2b) and later.

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### About SCSI Flow Services

A SCSI initiator/target combination is a SCSI flow. SCSI flow services provide enhanced features for SCSI flows, such as write acceleration and flow monitoring for statistics gathering on an SSM.

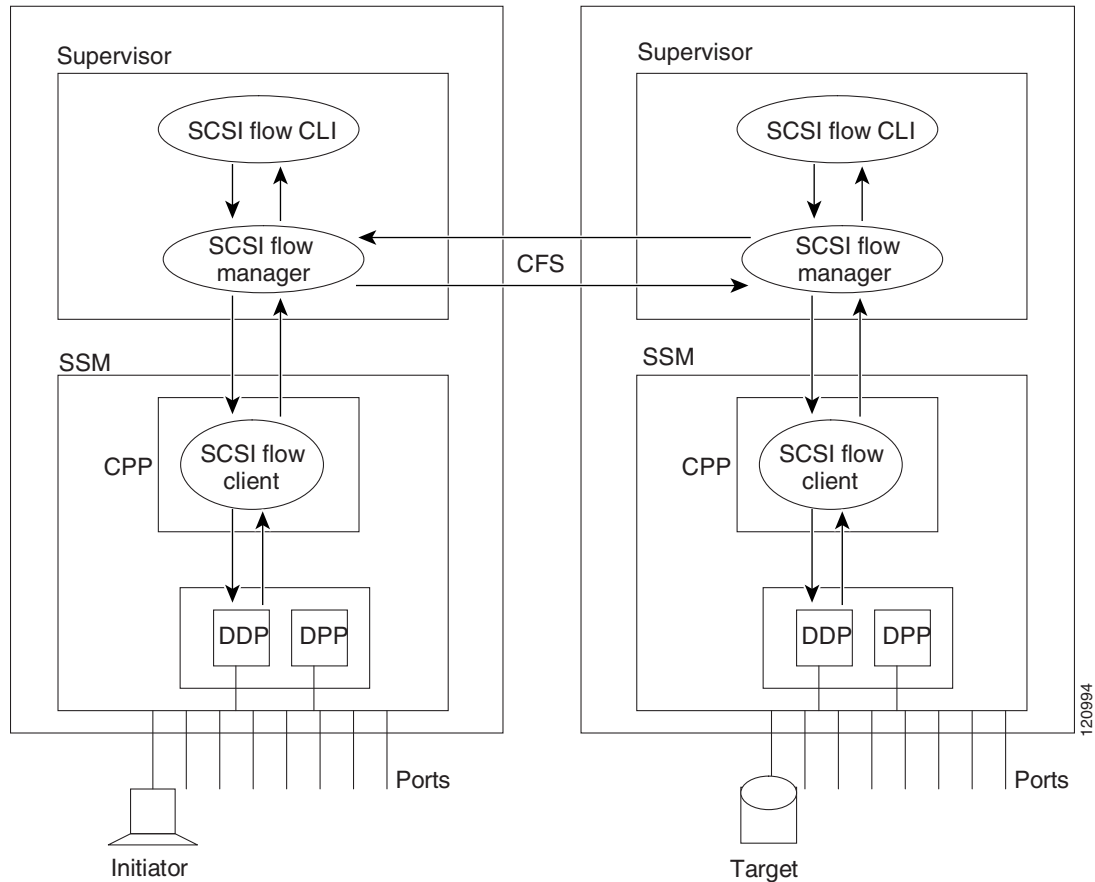
Functionally, the SCSI Flow Services functional architecture consists of the following components:

- SCSI flow manager (SFM) on the supervisor
- SCSI flow configuration CLI on the supervisor
- 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

[Figure 38-1](#) shows an example of the SCSI Flow Services functional architecture.

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**Figure 38-1 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 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.

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## 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.

## Configuring SCSI Flow Services

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.

## Enabling SCSI Flow Services

In Cisco MDS SAN-OS Releases 2.0(1b) through 2.1(1a), you can only enable SCSI flow services on the entire SSM. As of Cisco MDS SAN-OS Release 2.1(2), 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 which 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.

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To enable SCSI Flow Services, follow these steps:

	Command	Purpose
Step 1	switch# <b>config t</b> switch(config)#	Enters configuration mode.
Step 2	switch(config)# <b>ssm enable feature scsi-flow module 2</b>	Enables SCSI Flow Services on the SSM in slot 2.
	switch(config)# <b>no ssm enable feature scsi-flow module 2</b>	Disables SCSI Flow Services on the SSM in slot 2. The default is disabled.
	switch(config)# <b>no ssm enable feature scsi-flow force module 2</b>	Forces the switch to disable of SCSI Flow Services on the SSM in slot 2. The default is disabled.
Step 3	switch(config)# <b>ssm enable feature scsi-flow interface fc 2/5 - 8</b>	Enables SCSI Flow Services on the interface 5 through 8 on the SSM in slot 2.  <b>Note</b> Interfaces must be specified in multiples of four beginning at ports 1, 5, 9, 13, 17, 21, 25, and 29.
	switch(config)# <b>no ssm enable feature scsi-flow interface fc 2/5 - 8</b>	Disables SCSI Flow Services on the interface 5 through 8 on the SSM in slot 2. The default is disabled.
	switch(config)# <b>no ssm enable feature scsi-flow force interface fc 2/5 - 8</b>	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:

	Command	Purpose
Step 1	switch# <b>config t</b> switch(config)#	Enters configuration mode.
Step 2	switch(config)# <b>scsi-flow distribute</b>	Enables SCSI flow configuration distribution through CFS. The default is enabled.
	switch(config)# <b>no scsi-flow distribute</b>	Disables CFS distribution for SCSI flow configuration.

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## Configuring SCSI Flow Identifiers

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

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

## About SCSI Flow Statistics

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

- SCSI reads
  - Number of I/O s
  - 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

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- 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.

## Enabling SCSI Flow Statistics

To enable SCSI flow statistics monitoring, follow these steps:

	Command	Purpose
Step 1	switch# <b>config t</b> switch(config)#	Enters configuration mode.
Step 2	switch(config)# <b>scsi-flow flow-id 3 statistics</b>	Enables statistics monitoring on SCSI flow identifier 3.
	switch(config)# <b>no scsi-flow flow-id 3 statistics</b>	Disables statistics monitoring on SCSI flow identifier 3. The default is disabled.

## Clearing SCSI Flow Statistics

Use the **clear device-name statistics flow-id** command to clear SCSI flow statistics (for debugging purposes):

```
switch# clear scsi-flow statistics flow-id 3
```

## Displaying SCSI Flow Services Information

Use the **show scsi-flow** command to display information about SCSI Flow Services (see [Example 38-1](#) to [Example 38-5](#)).

### Example 38-1 Displays Applications Provisioned on an SSM

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

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**Example 38-2 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
```

**Example 38-3 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
```

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Configuration Status: success

**Example 38-4 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
```



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**Example 38-5 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
```

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## Default Settings

Table 38-1 lists the default settings for Intelligent Storage Services parameters.

**Table 38-1 Default Intelligent Storage Services Parameters**

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