



## CHAPTER 22

# Configuring Generation 2 Switches and Modules

The Cisco MDS 9500 Series switches and Cisco MDS 9216A and Cisco MDS 9216i switches support a set of modules called Generation 2 modules. This chapter describes how to configure these modules, as well as Generation 2 Multilayer Fabric Switches.

This chapter includes the following sections:

- [About Generation 2 Modules and Switches](#)
- [Buffer Credit Allocation, page 22-7](#)
- [About Combining Generation 1 and Generation 2 Switching Modules, page 22-15](#)
- [Configuring Generation 2 Module Interface Shared Resources, page 22-18](#)
- [Displaying SFP Diagnostic Information, page 22-30](#)
- [Default Settings, page 22-31](#)

## About Generation 2 Modules and Switches

Table 22-1 identifies the modules supported by the Cisco MDS 9500 Series switches and Cisco MDS 9216A and Cisco MDS 9216i switches, as well as the Fabric switches:

**Table 22-1** Generation 2 Fibre Channel Modules and Fabric Switches

Part Number	Product Name/Description
<b>Module</b>	
DS-X9148	48-port 4-Gbps Fibre Channel switching module
DS-X9134	34-port 4-Gbps Fibre Channel switching module
DS-X9124	24-port 4-Gbps Fibre Channel switching module
DS-X9304-18K9	18-port 4-Gbps Fibre Channel switching module with 4 GigabitEthernet ports
DS-X9112	12-port 4-Gbps Fibre Channel switching module
DS-X9704	4-port 10-Gbps Fibre Channel switching module
DS-X9530-SF2-K9	Supervisor-2 module (Cisco MDS 9500 Series switches only)
<b>Switch</b>	
DS-C9134-K9	Cisco MDS 9134 Fabric switch 32-port 4-Gbps Fabric switch with 2 additional 10-Gbps ports

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**Table 22-1 Generation 2 Fibre Channel Modules and Fabric Switches (continued)**

Part Number	Product Name/Description
DS-C9124	Cisco MDS 9124 Fabric switch 24-port 4-Gbps Fabric switch
DS-C9222i-K9	Cisco MDS 9222i Multiservice Modular switch 18-port 4-Gbps switch with 4 GigabitEthernet IP storage services ports, and a modular expansion slot to host Cisco MDS 9000 Family Switching and Services Modules



**Note**

Generation 2 Fibre Channel switching modules are not supported on the Cisco MDS 9216 switch; however, they are supported by both the Supervisor-1 module and the Supervisor-2 module.

For detailed information about the installation and specifications for these modules and switches, refer to the hardware installation guide for your switch.

This section includes the following topics:

- [Port Groups](#)
- [Port Rate Modes, page 22-4](#)
- [Dynamic Bandwidth Management, page 22-6](#)
- [Out-of-Service Interfaces, page 22-7](#)
- [Buffer Pools, page 22-8](#)
- [Extended BB\\_Credits, page 22-15](#)

## Port Groups

Each module or switch can have one or more ports in port groups that share common resources (such as bandwidth and buffer credits). [Table 22-2](#) shows the port groups for the Generation 2 Fibre Channel switches and modules.

**Table 22-2 Bandwidth and Port Groups for Generation 2 FC Modules and Fabric Switches**

Part Number	Product Name/Description	Number of Ports Per Port Group	Bandwidth Per Port Group	Maximum Bandwidth Per Port
<b>Module</b>				
DS-X9148	Cisco 48-port 4-Gbps Fibre Channel module 48-port 4-Gbps Fibre Channel switching module <sup>1</sup>	12	12.8	4-Gbps

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**Table 22-2 Bandwidth and Port Groups for Generation 2 FC Modules and Fabric Switches**

Part Number	Product Name/ Description	Number of Ports Per Port Group	Bandwidth Per Port Group	Maximum Bandwidth Per Port
DS-X9124	Cisco 24-port 4-Gbps Fibre Channel module  24-port 4-Gbps Fibre Channel switching module	6	12.8	4
DS-X9304-18K9	Cisco 18-port Fibre Channel /4-port GigabitEthernet Multiservice (MSM-18/4) module  18-port 4-Gbps Fibre Channel switching module with 4 GigabitEthernet ports	6	12.8	4-Gbps
DS-X9112	Cisco 12-port 4-Gbps Fibre Channel module  12-port 4-Gbps Fibre Channel switching module	3	12.8	4-Gbps
DS-X9704	Cisco 4-port 10-Gbps Fibre Channel module  4-port 10-Gbps Fibre Channel switching module	1	10	10-Gbps
<b>Switches</b>				
DS-C9134-K9	Cisco MDS 9134 Fabric switch	4	16	4-Gbps
	32-port 4-Gbps Fabric switch  2-port 10-Gbps Fabric switch	1	10	10-Gbps

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**Table 22-2 Bandwidth and Port Groups for Generation 2 FC Modules and Fabric Switches**

Part Number	Product Name/ Description	Number of Ports Per Port Group	Bandwidth Per Port Group	Maximum Bandwidth Per Port
DS-C9124K9	Cisco MDS 9124 Fabric switch 24-port 4-Gbps	4	16	4-Gbps
DS-C9222i-K9	Cisco MDS 9222i Multiservice Modular switch 18-port 4-Gbps	6	12.8	4-Gbps

- By default, all ports in a 48-port 4-Gbps switching module operate in shared mode with administrative operating speed set to auto. All ports in a 48-port 4-Gbps switching module can operate in dedicated mode with a 1-Gbps operating speed. However, if you configure one or more ports to operate in 2-Gbps or 4-Gbps dedicated mode, some of the other ports in the module would have to operate in shared mode.



**Note**

Port groups are defined by the hardware and consist of sequential ports. For example, ports 1 through 12, ports 13 through 24, ports 25 through 36, and ports 37 through 48 are the port groups on the 48-port 4-Gbps Fibre Channel switching modules.

## Port Rate Modes

The *Port rate mode* configuration is used to determine the bandwidth allocation for ports in a port group. Two port rate modes are supported: [Dedicated Mode](#) and [Shared Mode](#). In Generation 1 modules, port rate mode is not configurable by users; rather, it is determined implicitly based on the port mode and linecard type. In Generation 2 modules, port rate mode is user-configured.

**Table 22-3 Port Rate Mode Support on Generation 2 Modules and Switches**

Part Number	Product Name/ Description	Supports Dedicated Rate Mode	Supports Shared Rate Mode
<b>Modules</b>			
DS-X9148	Cisco 48-port 4-Gbps Fibre Channel module 48-port 4-Gbps Fibre Channel switching module <sup>1</sup>	Yes	Yes
DS-X9124	Cisco 24-port 4-Gbps Fibre Channel module 24-port 4-Gbps Fibre Channel switching module	Yes	Yes

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**Table 22-3 Port Rate Mode Support on Generation 2 Modules and Switches (continued)**

Part Number	Product Name/ Description	Supports Dedicated Rate Mode	Supports Shared Rate Mode
DS-X9304-18K9	Cisco 18-port Fibre Channel /4-port GigabitEthernet Multiservice (MSM-18/4) module  18-port 4-Gbps Fibre Channel switching module with 4 GigabitEthernet ports	Yes	Yes
DS-X9112	12-port 4-Gbps Fibre Channel module  12-port 4-Gbps Fibre Channel switching module	Yes	No
DS-X9704	4-port 10-Gbps Fibre Channel module  4-port 10-Gbps Fibre Channel switching module	Yes	No
<b>Switches</b>			
DS-C9134-K9	Cisco MDS 9134 Fabric switch  32-port 4-Gbps Fabric switch	Yes	Yes
	2-port 10-Gbps Fabric switch	Yes	No
DS-C9124	Cisco MDS 9124 Fabric switch  24-port 4-Gbps Fabric switch <sup>2</sup>	Yes	No
DS-C9222i-K9	Cisco MDS 9222i Multiservice Modular switch  18-port 4-Gbps Fibre Channel switch with 4 GigabitEthernet IP storage services ports, and a modular expansion slot to host Cisco MDS 9000 Family Switching and Services Modules	Yes	Yes

1. By default, all ports in a 48-port 4-Gbps switching module operate in shared mode with administrative operating speed set to auto. All ports in a 48-port 4-Gbps switching module can operate in dedicated mode with a 1-Gbps operating speed. However, if you configure one or more ports to operate in 2-Gbps or 4-Gbps dedicated mode, some of the other ports in the module would have to operate in shared mode.

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- By default, all ports in a 24-port 4-Gbps switching module operate in shared mode with administrative operating speed set to auto. All ports in a 24-port 4-Gbps switching module can operate in dedicated mode with a 2-Gbps operating speed. However, if you configure one or more ports to operate in 4-Gbps dedicated mode, some of the other ports in the module would have to operate in shared mode


**Note**

Port rate modes are supported on all Generation 2 modules and fabric switches. Port rate modes are not supported on the Cisco Fabric Switch for HP c-Class BladeSystem, and the Cisco Fabric Switch for IBM BladeCenter.

## Dedicated Mode

When port rate mode is configured as dedicated, a port is allocated required fabric bandwidth and related resources to sustain line rate traffic at the maximum operating speed configured for the port. In this mode, ports do not use local buffering and all receive buffers are allocated from a global buffer pool (see the “[Buffer Pools](#)” section on page 22-8).

[Table 22-4](#) show the amount of bandwidth reserved for a configured port speed on 4-Gbps switching modules.

**Table 22-4 Bandwidth Reserved for the Port Speeds on 4-Gbps Switching Modules**

Configured Speed	Reserved Bandwidth
Auto	4 Gbps
4-Gbps	
Auto with 2-Gbps maximum	2 Gbps
2-Gbps	
1-Gbps	1 Gbps


**Note**

10-Gbps ports in auto mode only support auto speed mode at 10 Gbps.

## Shared Mode

When port rate mode is configured as shared, multiple ports within a port group share data paths to the switch fabric so that fabric bandwidth and related resources are shared. Often, the available bandwidth to the switch fabric may be less than the negotiated operating speed of a port. Ports in this mode use local buffering for the BB\_credit buffers.

All ports in switching modules where bandwidth is shared support 1-Gbps, 2-Gbps, or 4-Gbps traffic. However, it is possible to configure one or more ports in a port group to operate in dedicated mode with 1-Gbps, 2-Gbps or 4-Gbps operating speed.

## Dynamic Bandwidth Management

On port switching modules where bandwidth is shared, the bandwidth available to each port within a port group can be configured based on the port rate mode and speed configurations. Within a port group, some ports can be configured in dedicated mode while others operate in shared mode.

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Ports configured in dedicated mode are allocated the required bandwidth to sustain a line rate of traffic at the maximum configured operating speed, and ports configured in shared mode share the available remaining bandwidth within the port group. Fair allocation of bandwidth among a group of ports is determined, in part, by the rate mode and speed configurations. For example, if the set ports in a module are configured with the same rate mode and speed (such as 4 Gbps of shared bandwidth), then all the ports should have fair allocation of bandwidth and eventually, similar throughput. When you enable bandwidth fairness, you should notice a reduction in any disparity that may otherwise exist in similar configurations.

Bandwidth allocation among the shared mode ports is based on the operational speed of the ports. For example, if four ports operating at speeds 1 Gbps, 1 Gbps, 2 Gbps, and 4 Gbps share bandwidth of 8 Gbps, the ratio of allocation would be 1:1:2:4.

**Note**

If dedicated ports are not using all of their allocated bandwidth, the unused bandwidth is made available for use by all ports configured for shared bandwidth mode.

**Tip**

When migrating a host that supports up to 2-Gbps traffic (that is, not 4-Gbps with autosensing capabilities) to the 4-Gbps switching modules, use autosensing with a maximum bandwidth of 2-Gbps.

**Note**

If you configure an interface for autosensing speed with a maximum bandwidth of 2 Gbps and want to change to the default of 4 Gbps, ensure that there are enough shared resources available to support the configuration on the module.

## Out-of-Service Interfaces

On supported modules and fabric switches, you might need to allocate all the shared resources for one or more interfaces to another interface in the port group or module. You can take interfaces out of service to release shared resources that are needed for dedicated bandwidth. When an interface is taken out of service, all shared resources are released and made available to the other interface in the port group or module. These shared resources include bandwidth, rate mode, BB\_credits, and extended BB\_credits. All shared resource configurations are returned to their default values when the interface is brought back into service. Corresponding resources must be made available in order for the port to be successfully returned to service.

**Caution**

If you need to bring an interface back into service, you might disrupt traffic if you need to release shared resources from other interfaces in the same port group.

## Buffer Credit Allocation

This sections describe how buffer credits are allocated to switches and modules, and includes the following topics:

- [Buffer Pools](#)
- [BB\\_Credit Buffers for Switching Modules, page 22-9](#)
- [BB\\_Credit Buffers for Fabric Switches, page 22-14](#)

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## Buffer Pools

In the architecture of Generation 2 modules, receive buffers shared by a set of ports are called *buffer groups*. The receive buffer groups are organized into *global* and *local* buffer pools.

The receive buffers allocated from the global buffer pool to be shared by a port group are called a *global buffer pool*. Global receive buffer pools include the following buffer groups:

- Reserved internal buffers
- Allocated BB\_credit buffers for each Fibre Channel interface (user configured or assigned by default)
- Common unallocated buffer pool for BB\_credits, if any, to be used for additional BB\_credits as needed
- Performance buffers (only used on 12-port 4-Gbps and 4-port 10-Gbps switching modules)

Figure 22-1 shows the allocation of BB\_credit buffers on linecards (24-port and 48-port line cards).



### Note

In some modules, performance buffers are not supported.

**Figure 22-1 Receive Buffers for Fibre Channel Ports in a Global Buffer Pool**

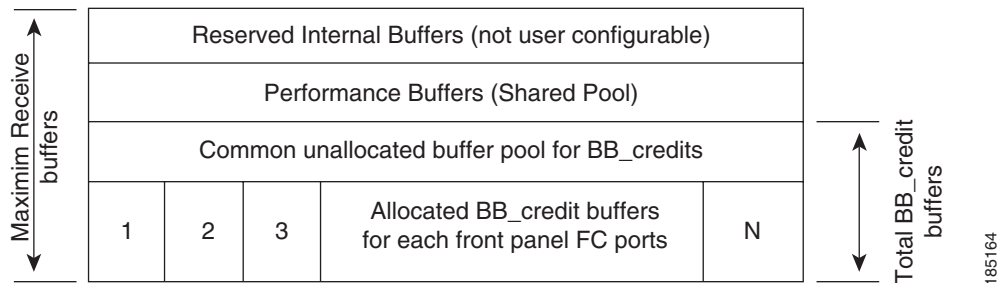
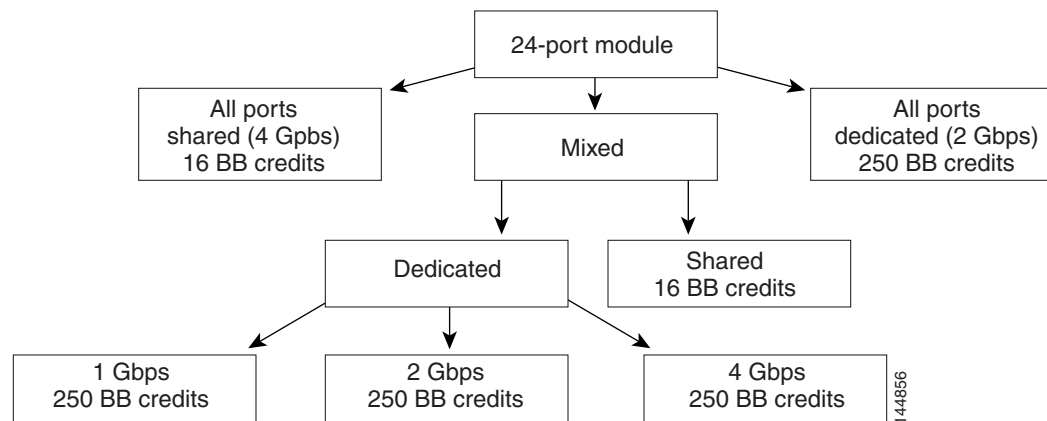


Figure 22-2 shows the default BB\_credit buffer allocation model for 24-port 4-Gbps switching modules. The minimum BB\_credits required to bring up a port is two buffers.

**Figure 22-2 BB\_Credit Buffer Allocation in 24-port 4-Gbps Switching Modules**



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**Note**

The default BB\_credit buffer allocation is the same for all port speeds.

## BB\_Credit Buffers for Switching Modules

This section describes how buffer credits are allocated to Cisco MDS 9000 switching modules, and includes the following topics:

- [48-port 4-Gbps Fibre Channel Module BB\\_Credit Buffers](#)
- [24-port 4-Gbps Fibre Channel Module BB\\_Credit Buffers, page 22-11](#)
- [18-Port Fibre Channel/4-Port GigabitEthernet Multiservice Module BB\\_Credit Buffers, page 22-12](#)
- [Figure 22-5 Example Speed and Rate Configuration on a 24-Port 4-Gbps Switching Module, page 22-12](#)
- [4-Port 10-Gbps Switching Module BB\\_Credit Buffers, page 22-13](#)

### 48-port 4-Gbps Fibre Channel Module BB\_Credit Buffers

Table 22-5 lists the BB\_credit buffer allocation for 48-port 4-Gbps Fibre Channel switching modules.

**Table 22-5 48-Port 4-Gbps Switching Module BB\_Credit Buffer Allocation Defaults**

BB_Credit Buffer Allocation Type	BB_Credit Buffers Per Module	BB_Credit Buffers Per Port Defaults			
		Dedicated Rate Mode 4-Gbps Speed		Shared Rate Mode 4-Gbps Speed	
		ISL <sup>1</sup>	Fx Port	ISL <sup>1</sup>	Fx Port
User configurable BB_credit buffers	6000	125	16	16	16

1. ISL = E port or TE port.

The following considerations apply to BB\_credit buffers on 48-port 4-Gbps Fibre Channel switching modules:

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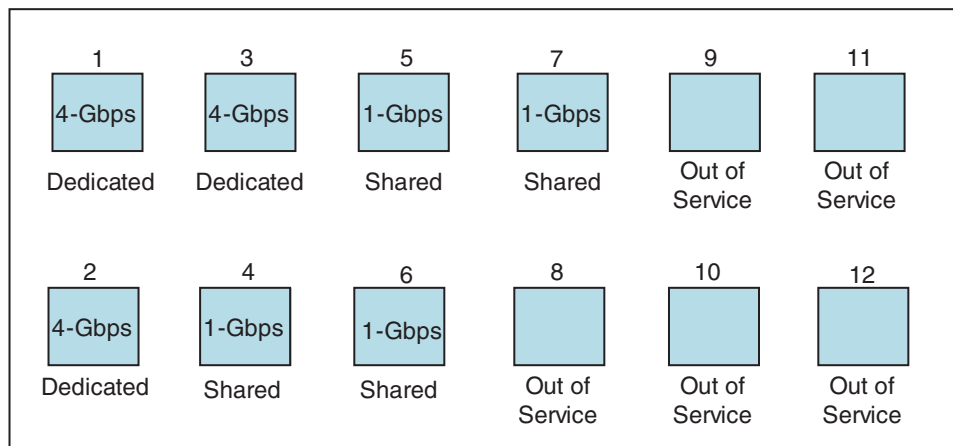
- BB\_credit buffers for ISL connections can be configured from a minimum of 2 buffers to a maximum of 250 buffers for dedicated rate mode or 16 buffers for shared rate mode.
- BB\_credit buffers for Fx port mode connections can be configured. The minimum is 2 buffers and the maximum of 250 buffers for dedicated rate mode or 16 buffers for shared rate mode.
- Performance buffers are not supported on this module.

Each port group on the 48-port 4-Gbps Fibre Channel switching module consists of 12 ports. The ports in shared rate mode have bandwidth oversubscription of 4:1 by default. However, some configurations of the shared ports in a port group can have maximum bandwidth oversubscription of 5:1 (considering that each port group has 12.8-Gbps bandwidth).

The following example configurations are supported by the 48-port 4-Gbps Fibre Channel switching modules:

- Twelve ports with shared rate mode and 4-Gbps speed (4:1 oversubscription) (default)
- One port with dedicated rate mode and 4-Gbps speed plus 11 ports with shared rate mode and 4-Gbps speed (5:1 oversubscription)
- One port with dedicated rate mode and 4-Gbps speed plus 11 ports with shared rate mode and 2-Gbps speed (2.5:1 oversubscription)
- Two ports with dedicated rate mode and 2-Gbps speed plus 10 ports with shared rate mode and 4-Gbps speed (5:1 oversubscription)
- Two ports with dedicated rate mode and 2-Gbps speed plus 10 ports with shared rate mode and 2-Gbps speed (2.5:1 oversubscription)
- Twelve ports with dedicated rate mode and 1-Gbps speed
- Three ports with dedicated rate mode and 4-Gbps speed plus four ports with shared rate mode and 1-Gbps speed plus five ports put out-of-service (see [Figure 22-3](#))

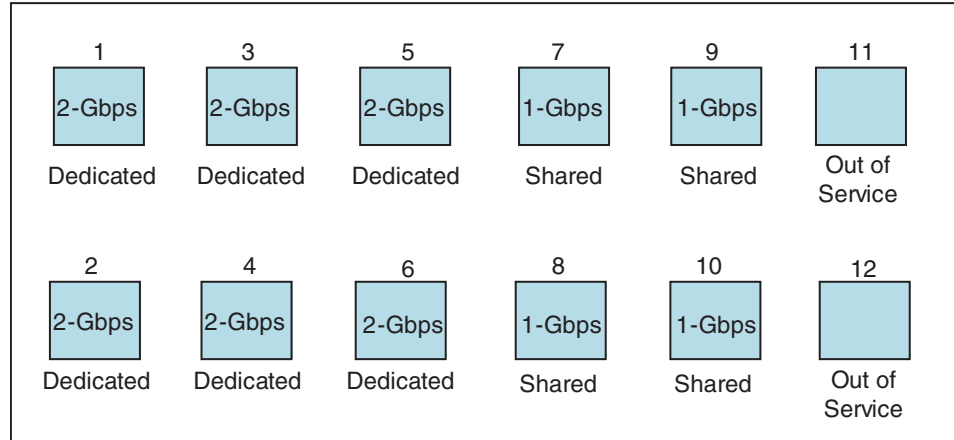
**Figure 22-3 Example Speed and Rate Configuration on a 48-Port 4-Gbps Switching Module**



- Six ports with dedicated rate mode and 2-Gbps speed plus four ports with shared rate mode and 1-Gbps speed plus two ports put out-of-service (see [Figure 22-4](#))

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**Figure 22-4 Example Speed and Rate Configuration on a 48-Port 4-Gbps Switching Module**



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## 24-port 4-Gbps Fibre Channel Module BB\_Credit Buffers

Table 22-7 lists the BB\_credit buffer allocation for 24-port 4-Gbps Fibre Channel switching modules.

**Table 22-6 24 Port 4-Gbps Switching Module BB\_Credit Buffer Allocation Defaults**

BB_Credit Buffer Allocation Type	BB_Credit Buffers Per Module	BB_Credit Buffers Per Port Defaults			
		Dedicated Rate Mode 4-Gbps Speed		Shared Rate Mode 4-Gbps Speed	
		ISL <sup>1</sup>	Fx Port	ISL <sup>1</sup>	Fx Port
User configurable BB_credit buffers	6000	250	16	16	16

1. ISL = E port or TE port.

The following considerations apply to BB\_credit buffers on 24-port 4-Gbps Fibre Channel switching modules:

- BB\_credit buffers for ISL connections can be configured from a minimum of 2 buffers to a maximum of 250 buffers for dedicated rate mode or 16 buffers for shared rate mode.
- BB\_credit buffers for Fx port mode connections can be configured. The minimum is 2 buffers and the maximum of 250 buffers for dedicated rate mode or 16 buffers for shared rate mode.
- Performance buffers are not supported on this module.

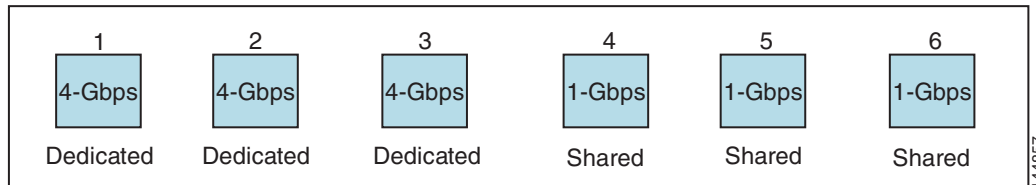
Each port group on the 24-port 4-Gbps Fibre Channel switching module consists of six ports. The ports in shared rate mode have bandwidth oversubscription of 2:1 by default. However, some configurations of the shared ports in a port group can have maximum bandwidth oversubscription of 4:1 (considering that each port group has 12.8-Gbps bandwidth). The following example configurations are supported by the 24-port 4-Gbps Fibre Channel switching modules:

- Six ports with shared rate mode and 4-Gbps speed (2:1 oversubscription) (default)
- Two ports with dedicated rate mode and 4-Gbps speed plus four ports with shared rate mode and 4-Gbps speed (with 4:1 oversubscription)
- One port with dedicated rate mode and 4-Gbps speed plus three ports with dedicated rate mode and 2-Gbps speed plus two ports with shared rate mode and 4-Gbps speed (4:1 oversubscription)

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- Six ports with dedicated rate mode and 2-Gbps speed
- Three ports with dedicated rate mode and 4-Gbps speed plus three ports with shared rate mode and 1-Gbps speed (see [Figure 22-5](#))

**Figure 22-5 Example Speed and Rate Configuration on a 24-Port 4-Gbps Switching Module**



## 18-Port Fibre Channel/4-Port GigabitEthernet Multiservice Module BB\_Credit Buffers

[Table 22-7](#) lists the BB\_credit buffer allocation for 18-port 4-Gbps multiservice modules.

**Table 22-7 18-Port 4-Gbps Multiservice Module BB\_Credit Buffer Allocation Defaults**

BB_Credit Buffer Allocation Type	BB_Credit Buffers Per Module	BB_Credit Buffers Per Port Defaults			
		Dedicated Rate Mode 4-Gbps Speed		Shared Rate Mode 4-Gbps Speed	
		ISL <sup>1</sup>	Fx Port	ISL <sup>1</sup>	Fx Port
User configurable BB_credit buffers	4509	250	16	16	16

1. ISL = E port or TE port.

The following considerations apply to BB\_credit buffers on 18-port 4-Gbps Fibre Channel switching modules:

- BB\_credit buffers for ISL connections can be configured from a minimum of 2 buffers to a maximum of 250 buffers for dedicated rate mode or 16 buffers for shared rate mode.
- BB\_credit buffers for Fx port mode connections can be configured. The minimum is 2 buffers and the maximum of 250 buffers for dedicated rate mode or 16 buffers for shared rate mode.
- Performance buffers are not supported on this module.

## 12-Port 4-Gbps Switching Module BB\_Credit Buffers

[Table 22-8](#) lists the BB\_credit buffer allocation for 12-port 4-Gbps switching modules.

**Table 22-8 12-Port 4-Gbps Switching Module BB\_Credit Buffer Allocation Defaults**

BB_Credit Buffer Allocation Type	BB_Credit Buffers Per Module	BB_Credit Buffers Per Port Defaults	
		Dedicated Rate Mode 4-Gbps Speed	
		ISL <sup>1</sup>	Fx Port
User configurable BB_credit buffers	5488	250	16
Performance buffers	512 (shared)	145	12

1. ISL = E port or TE port.

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The following considerations apply to BB\_credit buffers on 12-port 4-Gbps switching modules:

- BB\_credit buffers for ISL connections can be configured from a minimum of 2 buffers to a maximum of 250 buffers.
- BB\_credit buffers for Fx port mode connections can be configured from a minimum of 2 buffers to a maximum of 250 buffers.
- By default, 512 performance buffers are preallocated and are shared by all the ports. These buffers are configurable and the buffers are assigned to the port based on the availability of the buffers in the shared pool.
- There are 2488 extra buffers available as extended BB\_credit buffers after allocating all the default BB\_credit buffers for all the ports in ISL mode (5488 - (250 \* 12)).



**Note** Extended BB\_credits are allocated across all ports on the switch. That is, they are not allocated by port group.



**Note**

By default, the ports in the 12-port 4-Gbps switching modules come up in 4-Gbps dedicated rate mode but can be configured as 1-Gbps and 2-Gbps dedicated rate mode. Shared mode is not supported.

## 4-Port 10-Gbps Switching Module BB\_Credit Buffers

Table 22-9 lists the BB\_credit buffer allocation for 4-port 10-Gbps switching modules.

**Table 22-9 4-port 10-Gbps Switching Module BB\_Credit Buffer Allocation Defaults**

BB_Credit Buffer Allocation Type	BB_Credit Buffers Per Module	BB_Credit Buffers Per Port Defaults	
		Dedicated Rate Mode 4-Gbps Speed	
		ISL <sup>1</sup>	F port <sup>2</sup>
User configurable BB_credit buffers	5488	250	16
Performance buffers	512 (shared)	145	12

1. ISL = E port or TE port.
2. Ports on the 4-port 10-Gbps cannot operate in FL port mode.



**Note**

The ports in the 4-port 10-Gbps switching module only support 10-Gbps dedicated rate mode. FL port mode and shared rate mode are not supported.

The following considerations apply to BB\_credit buffers on 4-port 10-Gbps switching modules:

- BB\_credit buffers for ISL connections can be configured from a minimum of 2 buffers to a maximum of 250 buffers.
- BB\_credit buffers for Fx port mode connections can be configured from a minimum of 2 buffers to a maximum of 250 buffers.
- By default, 512 performance buffers are preallocated and are shared by all the ports. These buffers are configurable and the buffers are assigned to the port based on the availability of the buffers in the shared pool.

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- There are 4488 extra buffers available as extended BB\_credits after allocating all the default BB\_credit buffers for all the ports in ISL mode (5488 - (250 \* 4)).



**Note** Extended BB\_credits are allocated across all ports on the switch. That is, they are not allocated by port group.

## BB\_Credit Buffers for Fabric Switches

This section describes how buffer credits are allocated to Cisco MDS 9000 Fabric switches, and includes the following topics:

- [Cisco MDS 9134 Fabric Switch BB\\_Credit Buffers](#)
- [Cisco MDS 9124 Fabric Switch BB\\_Credit Buffers, page 22-14](#)
- [Cisco MDS 9222i Multiservice Modular Switch BB\\_Credit Buffers, page 22-15](#)

### Cisco MDS 9134 Fabric Switch BB\_Credit Buffers

Table 22-10 lists the BB\_credit buffer allocation for 32-port 4-Gbps Fibre Channel switches.

**Table 22-10 32-Port 4-Gbps Switching Module BB\_Credit Buffer Allocation Defaults**

BB_Credit Buffer Allocation Type	BB_Credit Buffers Per Port Group	BB_Credit Buffers Per Port Defaults	
		ISL <sup>1</sup>	Fx Port
User configurable BB_credit buffers	64	64	64

1. ISL = E port or TE port.

The following considerations apply to BB\_credit buffers on 32-port 4-Gbps switches:

- BB\_credit buffers for connections can be configured from a minimum of 2 buffers to a maximum of 250 buffers per port.
- BB\_credit buffers for Fx port mode connections can be configured from a minimum of 2 buffers to a maximum of 250 buffers.

### Cisco MDS 9124 Fabric Switch BB\_Credit Buffers

Table 22-11 lists the BB\_credit buffer allocation for 24-port 4-Gbps Fibre Channel switches.

**Table 22-11 24-Port 4-Gbps Switching Module BB\_Credit Buffer Allocation Defaults**

BB_Credit Buffer Allocation Type	BB_Credit Buffers Per Port Group	BB_Credit Buffers Per Port Defaults	
		ISL <sup>1</sup>	Fx Port
User configurable BB_credit buffers	64	16	16

1. ISL = E port or TE port.

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## Cisco MDS 9222i Multiservice Modular Switch BB\_Credit Buffers

Table 22-12 lists the BB\_credit buffer allocation for 18-port 4-Gbps Multiservice Modular switches.

**Table 22-12 18-Port 4-Gbps Switching Module BB\_Credit Buffer Allocation Defaults**

BB_Credit Buffer Allocation Type	BB_Credit Buffers Per Port Group	BB_Credit Buffers Per Port Defaults	
		ISL <sup>1</sup>	Fx Port
User configurable BB_credit buffers	4509	250	16

1. ISL = E port or TE port.

## Extended BB\_Credits



### Note

Extended BB\_credits are not supported on the Cisco MDS 9124 Fabric Switch, Cisco MDS 9134 Fabric Switch, Cisco MDS 9222i Fabric Switch, the Cisco Fabric Switch for HP c-Class BladeSystem, and the Cisco Fabric Switch for IBM BladeCenter.

To facilitate BB\_credits for long haul links, the extended BB\_credits feature allows the user to configure the receive buffers above the maximum value on all Generation 2 switching modules (see the “[Buffer Credit Allocation](#)” section on page 22-7). When necessary, you can reduce the buffers on one port and assign them to another port, exceeding the default maximum. The minimum extended BB\_credits per port is 256 and the maximum is 4095.

In general, the user can configure any port in a port group to dedicated mode. To do this, you must first release the buffers from the other ports before configuring larger extended BB\_credits for a port.



### Note

The ENTERPRISE\_PKG license is required to use extended BB\_credits on Generation 2 switching modules. Also, extended BB\_credits are not supported by ports in shared rate mode.

All ports on the Generation 2 switching modules support extended BB\_credits. There are no limitations for how many extended BB\_credits you can assign to a port (except for the maximum and minimum limits). If necessary, you can take interfaces out of service to make more extended BB\_credits available to other ports.

## About Combining Generation 1 and Generation 2 Switching Modules

You can combine Generation 1 and Generation 2 switching modules, with either Supervisor-1 modules or Supervisor-2 modules. However, combining switching modules and supervisor modules has the following port index limitations:

- Supervisor-1 modules only support a maximum of 252 port indexes, regardless of the type of switching modules.

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- Supervisor-2 modules support a maximum of 1020 port indexes when all switching modules in the chassis are Generation 2.
- Supervisor-2 modules only support a maximum of 252 port indexes when only Generation 1 switching modules, or a combination of Generation 1 and Generation 2 switching modules, are installed in the chassis.

## Port Indexes

Cisco MDS 9000 switches allocate index identifiers for the ports on the modules. These port indexes cannot be configured. You can combine Generation 1 and Generation 2 switching modules, with either Supervisor-1 modules or Supervisor-2 modules. However, combining switching modules and supervisor modules has the following port index limitations:

- Supervisor-1 modules only support a maximum of 252 port indexes, regardless of the type of switching modules.
- Supervisor-2 modules support a maximum of 1020 port indexes when all switching modules in the chassis are Generation 2.
- Supervisor-2 modules only support a maximum of 252 port indexes when only Generation 1 switching modules, or a combination of Generation 1 and Generation 2 switching modules, are installed in the chassis.



### Note

On a switch with the maximum limit of 252 port index maximum limit, any new module that exceeds the limit when installed does not power up.

Generation 1 switching modules have specific numbering requirements. If these requirements are not met, the module does not power up. The port index numbering requirements include the following:

- If port indexes in the range of 256 to 1020 are assign to operational ports, Generation 1 switching modules do not power up.
- A block of contiguous port indexes is available. If such a block of port indexes is not available, Generation 1 modules do not power up. [Table 22-13](#) shows the port index requirements for the Generation 1 modules.



### Note

If the switch has Supervisor-1 modules, the block of 32 contiguous port indexes must begin on the slot boundary. The slot boundary for slot 1 is 0, for slot 2 is 32, and so on. For Supervisor-2 modules, the contiguous block can start anywhere.

**Table 22-13 Port Index Requirements for Generation 1 Modules**

Generation 1 Module	Number of Port Indexes Required	
	Supervisor-1 Module	Supervisor-2 Module
16-port 2-Gbps Fibre Channel module	16	16
32-port 2-Gbps Fibre Channel module	32	32
8-port Gigabit Ethernet IP Storage Services module	32	32
4-port Gigabit Ethernet IP Storage Services module	32	16



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**Table 22-13 Port Index Requirements for Generation 1 Modules (continued)**

Generation 1 Module	Number of Port Indexes Required	
	Supervisor-1 Module	Supervisor-2 Module
32-port 2-Gbps Fibre Channel Storage Services Module (SSM).	32	32
14-port Fibre Channel/2-port Gigabit Ethernet Multiprotocol Services (MPS-14/2) module.	32	22

The allowed mix of Generation 1 and Generation 2 switching modules in a chassis is determined at run-time, either when booting up the switch or when installing the modules. In some cases, the sequence in which switching modules are inserted into the chassis determines if one or more modules is powered up. When a module does not power up because of a resource limitation, you can see the reason by viewing the module information in the Information pane.

For information on recovering a module powered-down because port indexes are not available, refer to the *Cisco MDS 9000 Family Troubleshooting Guide, Release 3.x*.

## PortChannels

PortChannels have the following restrictions:

- The maximum number of PortChannels allowed is 256 if all switching modules are Generation 2.
- The maximum number of PortChannels allowed is 128 if the switching modules are Generation 1 or both Generation 1 and Generation 2.
- You must reserve the resources on the Generation 2 switching module interfaces to be used in the PortChannel.



**Note**

The number of PortChannels allowed does not depend on the type of supervisor module.

When configuring PortChannels on switches with both Generation 1 and Generation 2 switching modules, configure the PortChannel and Generation 2 switching modules interfaces to auto with a maximum of 2 Gbps or configure the Generation 1 switching modules followed by the Generation 2 switching modules.



**Note**

Generation 1 switching module interfaces do not support auto speed with max 2Gbps. Also, Generation 2 switching module interfaces cannot be forcefully added to a PortChannel if sufficient resources are not available.

[Table 22-14](#) describes the results of adding a member to a PortChannel for various configurations.

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**Table 22-14 PortChannel Configuration and Addition Results**

PortChannel Members	Configured Speed		New Member Type	Addition Type	Result
	PortChannel	New Member			
No members	Any	Any	Generation 1 or Generation 2	Force	Pass
	Auto	Auto	Generation 1 or Generation 2	Normal or force	Pass
	Auto max 2000	Auto	Generation 1	Normal or force	Pass
	Auto max 2000	Auto	Generation 2	Normal	Fail
				Force	Pass
Generation 1 interfaces	Auto	Auto	Generation 2	Normal	Fail
				Force	Pass
	Auto max 2000	Auto	Generation 1	Normal or force	Pass
	Auto max 2000	Auto	Generation 2	Normal	Fail
				Force	Pass or fail <sup>1</sup>
Generation 2 interfaces	Auto	Auto	Generation 1	Normal or force	Fail
	Auto max 2000	Auto	Generation 1	Normal or force	Pass
	Auto max 2000	Auto	Generation 2	Normal	Fail
				Force	Pass
	Auto	Auto max 2000	Generation 2	Normal	Fail
			Force	Pass	

1. Is resources not available.

## Configuring Generation 2 Module Interface Shared Resources

This section describes how to configure Generation 2 module interface shared resources and contains the following sections:

- [Configuration Guidelines for 48-Port and 24-Port 4-Gbps Fibre Channel Switching Modules, page 22-19](#)
- [Configuration Guidelines for 12-Port 4-Gbps Switching Module Interfaces, page 22-20](#)
- [Configuration Guidelines for 4-Port 10-Gbps Switching Module Interfaces, page 22-20](#)
- [Configuring Port Speed, page 22-21](#)
- [Configuring Rate Mode, page 22-22](#)
- [Configuring Oversubscription Ratio Restrictions, page 22-23](#)
- [Configuring Bandwidth Fairness, page 22-26](#)

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- [Taking Interfaces Out of Service](#), page 22-28
- [Releasing Shared Resources in a Port Group](#), page 22-29

## Configuration Guidelines for 48-Port and 24-Port 4-Gbps Fibre Channel Switching Modules

The 48-port and 24-port 4-Gbps Fibre Channel switching modules support the following features:

- 1-Gbps, 2-Gbps, and 4-Gbps speed traffic
- Shared and dedicated rate mode
- ISL (E or TE) and Fx (F or FL) port modes
- Extended BB\_credits

### Migrating from Shared Mode to Dedicated Mode

To configure 48-port and 24-port 4-Gbps Fibre Channel switching modules when starting with the default configuration or when migrating from shared rate mode to dedicated rate mode, follow these guidelines:

1. Take unused interfaces out of service to release resources for other interfaces, if necessary.  
See the [“Taking Interfaces Out of Service”](#) section on page 22-28.
2. Configure the traffic speed to use (1 Gbps, 2 Gbps, 4 Gbps, or autosensing with a maximum of 2 Gbps or 4 Gbps).  
See the [“Configuring Port Speed”](#) section on page 22-21.
3. Configure the rate mode (dedicated or shared) to use.  
See the [“Configuring Rate Mode”](#) section on page 22-22.
4. Configure the port mode.  
See the [“About Interface Modes”](#) section on page 20-3.



---

**Note** ISL ports cannot operate in shared rate mode.

---

5. Configure the BB\_credits and extended BB\_credits, as necessary.  
See the [“Extended BB\\_Credits”](#) section on page 22-15.

### Migrating from Dedicated Mode to Shared Mode

To configure 48-port and 24-port 4-Gbps Fibre Channel switching modules migrating from dedicated rate mode to shared rate mode, follow these guidelines:

1. Take unused interfaces out of service to release resources for other interfaces, if necessary.  
See the [“Taking Interfaces Out of Service”](#) section on page 22-28.
2. Configure the BB\_credits and extended BB\_credits, as necessary.  
See the [“BB\\_Credit Buffers for Switching Modules”](#) section on page 22-9, [“BB\\_Credit Buffers for Fabric Switches”](#) section on page 22-14, and the [“Extended BB\\_Credits”](#) section on page 22-15.

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3. Configure the port mode.  
See the [“About Interface Modes” section on page 20-3](#).




---

**Note** ISL ports cannot operate in shared rate mode.

---

4. Configure the rate mode (dedicated or shared) to use.  
See the [“Configuring Rate Mode” section on page 22-22](#).
5. Configure the traffic speed (1 Gbps, 2 Gbps, 4 Gbps, or autosensing with a maximum of 2 Gbps or 4 Gbps) to use.  
See the [“Configuring Port Speed” section on page 22-21](#).

## Configuration Guidelines for 12-Port 4-Gbps Switching Module Interfaces

The 12-port 4-Gbps switching modules support the following features:

- 1-Gbps, 2-Gbps, and 4-Gbps speed traffic
- Only dedicated rate mode
- ISL (E or TE) and Fx (F or FL) port modes
- Extended BB\_credits
- Performance buffers

To configure 4-port 10-Gbps switching modules when starting with the default configuration, follow these guidelines:

1. Configure the traffic speed (1 Gbps, 2 Gbps, 4 Gbps, or autosensing with a maximum of 2 Gbps or 4 Gbps) to use.  
See the [“Configuring Port Speed” section on page 22-21](#).
2. Configure the port mode.  
See the [“About Interface Modes” section on page 20-3](#).
3. Configure the BB\_credits, performance buffers, and extended BB\_credits, as necessary.  
See the [“BB\\_Credit Buffers for Switching Modules” section on page 22-9](#), [“BB\\_Credit Buffers for Fabric Switches” section on page 22-14](#), and the [“Extended BB\\_Credits” section on page 22-15](#).




---

**Note** If you change the port bandwidth reservation parameters on a 48-port or 24-port module, the change affects only the changed port. No other ports in the port group are affected.

---

## Configuration Guidelines for 4-Port 10-Gbps Switching Module Interfaces

The 4-port 10-Gbps switching modules support the following features:

- Only 10-Gbps speed traffic
- Only dedicated rate mode
- ISL (E or TE) and F port modes
- Extended BB\_credits

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- Performance buffers

Use the following guidelines to configure 4-port 10-Gbps switching modules when starting with the default configuration:

1. Configure the port mode.

See the “[About Interface Modes](#)” section on page 20-3.

2. Configure the BB\_credits, performance buffers, and extended BB\_credits, as necessary.

See the “[BB\\_Credit Buffers for Switching Modules](#)” section on page 22-9, “[BB\\_Credit Buffers for Fabric Switches](#)” section on page 22-14, and the “[Extended BB\\_Credits](#)” section on page 22-15.

## Configuring Port Speed

The port speed on an interface, combined with the rate mode, determines the amount of shared resources available to the ports in the port group on a 48-port or 24-port 4-Gbps Fibre Channel switching module. Especially in the case of dedicated rate mode, the port group resources are reserved even though the bandwidth is not used. For example, if an interface is configured for autosensing (**auto**) and dedicated rate mode, then 4 Gbps of bandwidth is reserved even though the maximum operating speed is 2 Gbps. For the same interface, if autosensing with a maximum speed of 2 Gbps (**auto max 2000**) is configured, then only 2 Gbps of bandwidth is reserved and the unused 2 Gbps is shared with the other interface in the port group.



### Caution

Changing port speed and rate mode disrupts traffic on the port. Traffic on other ports in the port group is not affected.



### Note

The 4-port 10-Gbps switching module supports 10-Gbps traffic only.

To configure dedicated bandwidth on an interface using Fabric Manager, follow these steps

- Step 1** Select a switch from the Fabric pane, or select a group of switches (SAN, fabric, VSAN) from the Logical Domains pane.
- Step 2** Expand **Switches**, expand **Interfaces** and select **FC Physical** from the Physical Attributes pane. You see the **FC Physical > General** tab in the Interfaces pane.
- Step 3** Scroll until you see the row containing the switch and port you want to configure.
- Step 4** Select **auto**, **1Gb**, **4Gb**, or **autoMax2G** from the Speed Admin column (see [Figure 22-6](#)).

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**Figure 22-6** Speed Admin column in Port Configuration

Switch	Interface	Mode Admin	Mode Oper	Port VSAN	Dynamic VSAN	Description	Speed Admin	Speed Oper	Rate Mode	Status Service	Status Admin	Status Oper	FailureCause
sw-isola-220	fc9/7	FX	auto	300	n/a		auto	n/a	shared	in	up	down	linkFailure
sw-isola-220	fc9/34	FX	auto	300	n/a		auto	n/a	shared	in	up	down	linkFailure
sw-isola-220	fc13/12	FX	auto	300	n/a		auto	n/a	shared	in	up	down	linkFailure
sw-isola-220	fc9/33	FX	auto	300	n/a		1Gb	n/a	shared	in	up	down	linkFailure
sw-isola-220	fc9/1	FX	auto	300	n/a		2Gb	n/a	shared	in	up	down	linkFailure
							4Gb						
							autoMax2G						

The **auto** parameter enables autosensing on the interface. The **autoMax2G** parameter enables autosensing on the interface with a maximum speed of 2 Gbps.



**Note** If you change the port bandwidth reservation parameters on a 48-port or 24-port 4-Gbps Fibre Channel switching module, the change affects only the changed port. No other ports in the port group are affected.

**Step 5** Click the **Apply Changes** icon.

## Configuring Rate Mode

To configure the rate mode (dedicated or shared) on an interface on a 48-port or 24-port 4-Gbps Fibre Channel switching module using Fabric Manager, follow these steps:

- Step 1** Select a switch from the Fabric pane, or select a group of switches (SAN, fabric, VSAN) from the Logical Domains pane.
- Step 2** Expand **Switches > Interfaces** and then select **FC Physical** from the Physical Attributes pane. You see the **FC Physical > General** tab in the Interfaces pane.
- Step 3** Scroll until you see the row containing the switch and port you want to configure.
- Step 4** Select **dedicated** or **shared** from the Rate Mode column (see [Figure 22-7](#)).

**Figure 22-7** Rate Mode Port Configuration

Switch	Interface	Mode Admin	Mode Oper	Port VSAN	Dynamic VSAN	Description	Speed Admin	Speed Oper	Rate Mode	Status Service	Status Admin	Status Oper	FailureCause
sw-isola-220	fc9/7	FX	auto	300	n/a		auto	n/a	dedicated	in	up	down	linkFailure
sw-isola-220	fc9/34	FX	auto	300	n/a		auto	n/a	dedicated	in	up	down	linkFailure
sw-isola-220	fc13/12	FX	auto	300	n/a		auto	n/a	shared	in	up	down	linkFailure
sw-isola-220	fc9/33	FX	auto	300	n/a		auto	n/a	shared	in	up	down	linkFailure
sw-isola-220	fc9/1	FX	auto	300	n/a		auto	n/a	shared	in	up	down	linkFailure

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**Step 5** Click the **Apply Changes** icon.



**Caution**

Changing port speed and rate mode disrupts traffic on the port.

## Configuring Oversubscription Ratio Restrictions

The 48-port and 24-port 4-Gbps Fibre Channel switching modules support oversubscription on switches with shared rate mode configurations. [Table 22-15](#) describes the bandwidth allocation for oversubscribed interfaces configured in shared mode.

**Table 22-15** *Bandwidth Allocation for Oversubscribed Interfaces*

Switching Module Type	Configured Speed	Reserved Bandwidth (Gbps)		Maximum Bandwidth (Gbps)
		Ratios enabled	Ratios disabled	
48 ports	Auto 4 Gbps	0.8	0.09	4
	Auto (maximum is 2 Gbps) 2 Gbps	0.4	0.045	2
	1 Gbps	0.2	0.0225	1
24 ports	Auto 4 Gbps	1	0.27	4
	Auto (maximum is 2 Gbps) 2 Gbps	0.5	0.135	2
	1 Gbps	0.25	0.067	1

By default, all 48-port and 24-port 4-Gbps Fibre Channel switching modules have restrictions on oversubscription ratios enabled.

As of Cisco SAN-OS Release 3.1(1) and later, you can disable restrictions on oversubscription ratios. All ports in 48-port and 24-port modules can be configured to operate at 4 Gbps in shared mode—even if other ports in the port group are configured in dedicated mode—regardless of available bandwidth. However, when oversubscription ratio restrictions are enabled you may not have all shared ports operating at 4 Gbps. For example, oversubscription ratios are enabled, and you have configured three 4 Gbps dedicated ports in one port group, no other ports in the same port group can be configured to operate at 4 Gbps.

For dedicated ports, oversubscription ratio restrictions do not apply to the shared pool in port groups. So if oversubscription ratio restrictions are disabled, and you've configured three 4 Gbps dedicated ports in one port group, then you can configure all other ports in the same port group to operate at a shared rate of 4 Gbps.

When disabling restrictions on oversubscription ratios, all ports in shared mode on 48-port and 24-port 4-Gbps Fibre Channel switching modules must be shut down. When applying restrictions on oversubscription ratios, you must take shared ports out of service.

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#### Note

When restrictions on oversubscription ratios are disabled, the bandwidth allocation among the shared ports is proportionate to the configured speed. (If the configured speed is auto, then bandwidth is allocated assuming a speed of 4 Gbps.) For example, if you have three shared ports configured at 1, 2, and 4 Gbps, then the allocated bandwidth ratio is 1:2:4. In Cisco SAN-OS Release 3.0 and later (or when restrictions on oversubscription ratios are enabled), port bandwidths are allocated in equal proportions, regardless of port speed, so, the bandwidth allocation for the same three ports mentioned in the example would be 1:1:1.

## Disabling Restrictions on Oversubscription Ratios

Before disabling restrictions on oversubscription ratios, ensure that you have explicitly shut down shared ports. To disable restrictions on oversubscription ratios on multiple 48-port or 24-port 4-Gbps Fibre Channel switching modules using Device Manager, follow these steps:

**Step 1** Choose **Physical > Modules**.

You see the Module dialog box as shown in [Figure 22-8](#).

**Figure 22-8** Module Dialog Box

Module	Name	Model	Oper Status	Reset?	RateModeOversubsc...	BandwidthFairness...	Power Admin	Power Oper	StatusLastChangeTime	AdminStatus	OperStatus	Current
1	2x1GE IPS, 14x1/2Gbps FC Module	DS-X9302-14K9	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	2007/01/26-07:37:27	on	ok	25229.4W / 600.7A
3	1/2/4 Gbps FC Module	DS-X9148	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	2007/01/26-07:37:27	on	ok	184.8W / 4.4A
5	IP Storage Services Module	DS-X9308-SMP	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	2007/01/26-07:37:27	on	ok	200.34W / 4.77A
6	IP Storage Services Module	DS-X9304-SMP	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	2007/01/26-07:37:27	on	ok	160.02W / 3.81A
7	SupervisorFabric-2	DS-X9630-SF2-K9	in-standby	<input type="checkbox"/>	enabled	enable	enabled	Reset triggered due...	2007/01/26-07:39:13	on	ok	126.0W / 3.0A
8	SupervisorFabric-2	DS-X9630-SF2-K9	active	<input type="checkbox"/>	enabled	enable	enabled	Unknown	2007/01/25-20:59:57	on	ok	126.0W / 3.0A
11	1/2/4 Gbps FC Module	DS-X9124	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	2007/01/26-07:37:27	on	ok	168.0W / 4.0A
13	1/2 Gbps FC Module	DS-X9016	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	2007/01/26-07:37:27	on	ok	210.0W / 5.0A
14	Fabric card module	DS-13SLT-FAB1	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	2007/01/26-07:37:27	on	ok	84.0W / 2.0A
15	Fabric card module	DS-13SLT-FAB1	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	2007/01/26-07:37:27	on	ok	84.0W / 2.0A



#### Caution

This feature is only supported on 48-port and 24-port 4-Gbps Fibre Channel switching modules.

**Step 2** Select **disabled** from the RateModeOversubscriptionLimit drop-down list for each module for which you want to disable restrictions on oversubscription ratios.

**Step 3** Click **Apply** to save the changes.

To disable restrictions on oversubscription ratios on a single 48-port or 24-port 4-Gbps Fibre Channel switching module using Device Manager, follow these steps:

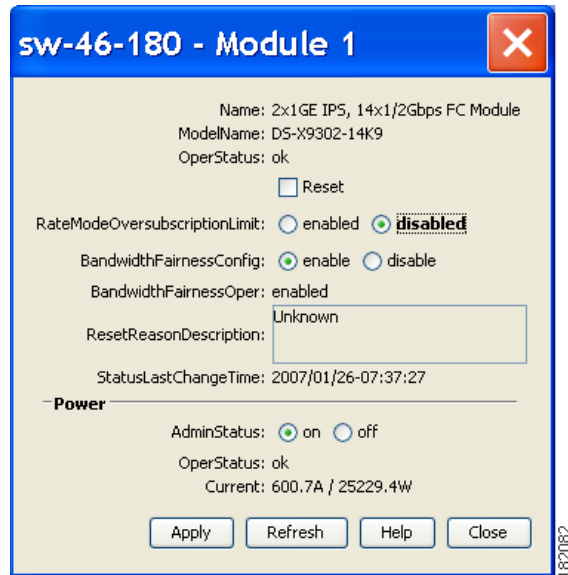
**Step 1** Right-click a module and select **Configure**.

You see the Module dialog box as shown in [Figure 22-9](#).



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**Figure 22-9** Module Dialog Box



- Step 2** Click the **disabled** radio button to disable restrictions on oversubscription ratios.
- Step 3** Click **Apply** to save the changes.

## Enabling Restrictions on Oversubscription Ratios



### Caution

You must enable restrictions on oversubscription ratios before you can downgrade modules to a previous release.

Before enabling restrictions on oversubscription ratios, ensure that you have explicitly configured shared ports to out-of-service mode. To enable restrictions on oversubscription ratios on multiple 48-port or 24-port 4-Gbps Fibre Channel switching modules using Device Manager, follow these steps:

- Step 1** Choose **Physical > Modules**.
- You see the Module dialog box as shown in [Figure 22-8](#).
- Step 2** Select **enabled** from the RateModeOversubscriptionLimit drop-down list for each module for which you want to enable restrictions on oversubscription ratios.
- Step 3** Click **Apply** to save the changes.

To enable restrictions on oversubscription ratios on a single 48-port or 24-port 4-Gbps Fibre Channel switching module using Device Manager, follow these steps:

- Step 1** Right-click a module and select **Configure**.
- You see the Module dialog box as shown in [Figure 22-9](#).

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- Step 2** Click the **enabled** radio button to enable restrictions on oversubscription ratios.
- Step 3** Click **Apply** to save the changes.

## Configuring Bandwidth Fairness

As of Cisco SAN-OS Release 3.1(2) and later, all 48-port and 24-port 4-Gbps Fibre Channel switching modules, as well as 18-port Fibre Channel/4-port GigabitEthernet Multiservice modules, have bandwidth fairness enabled by default, which improves fairness of bandwidth allocation among all ports and provides better throughput average to individual data streams. Bandwidth fairness can be configured per module.



### Caution

When you disable or enable bandwidth fairness, the change does not take effect until you reload the module.



### Note

This feature is only supported on the 48-port and 24-port 4-Gbps Fibre Channel switching modules, as well as the 18-port Fibre Channel/4-port GigabitEthernet Multiservice module.

## Enabling Bandwidth Fairness

To enable bandwidth fairness on multiple 48-port or 24-port 4-Gbps Fibre Channel switching modules using Device Manager, follow these steps:

- Step 1** Choose **Physical > Modules**.

You see the Module dialog box as shown in [Figure 22-10](#).

**Figure 22-10** Module Dialog Box

Module	Name	Model	Oper Status	Reset?	RateModeOversubsc...	BandwidthFairness...	Power Admin	Power Oper	Status	LastChangeTime	AdminStatus	OperStatus	Current
1	2x1GE IPS, 14x1/2Gbps FC Module	DS-X9302-14K9	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	25229.4W / 600.7A	2007/01/26-07:37:27	on	ok	
3	1/2/4 Gbps FC Module	DS-X9148	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	184.8W / 4.4A	2007/01/26-07:37:27	on	ok	
5	IP Storage Services Module	DS-X9308-SMIP	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	200.34W / 4.27A	2007/01/26-07:37:27	on	ok	
6	IP Storage Services Module	DS-X9304-SMIP	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	160.02W / 3.81A	2007/01/26-07:37:27	on	ok	
7	Supervisor/Fabric-2	DS-X9530-SF2-K9	ha-standby	<input type="checkbox"/>	enabled	enable	enabled	Reset triggered due ...	126.0W / 3.0A	2007/01/26-07:39:13	on	ok	
8	Supervisor/Fabric-2	DS-X9530-SF2-K9	active	<input type="checkbox"/>	enabled	enable	enabled	Unknown	126.0W / 3.0A	2007/01/25-20:59:57	on	ok	
11	1/2/4 Gbps FC Module	DS-X9124	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	168.0W / 4.0A	2007/01/26-07:37:27	on	ok	
13	1/2 Gbps FC Module	DS-X9016	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	210.0W / 5.0A	2007/01/26-07:37:27	on	ok	
14	Fabric card module	DS-13SLT-FAB1	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	84.0W / 2.0A	2007/01/26-07:37:27	on	ok	
15	Fabric card module	DS-13SLT-FAB1	ok	<input type="checkbox"/>	enabled	enable	enabled	Unknown	84.0W / 2.0A	2007/01/26-07:37:27	on	ok	

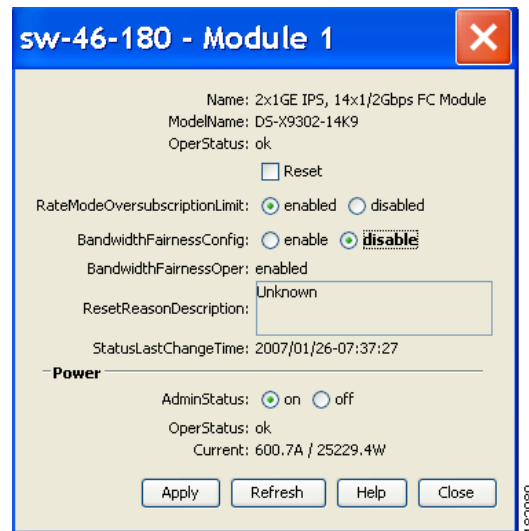
- Step 2** Select **enable** from the BandwidthFairnessConfig drop-down list for each module for which you want to enable bandwidth fairness.
- Step 3** Click **Apply** to save the changes.

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To enable bandwidth fairness on a single 48-port or 24-port 4-Gbps Fibre Channel switching module using Device Manager, follow these steps:

- Step 1** Right-click a module and select **Configure**.  
You see the Module dialog box as shown in [Figure 22-11](#).

**Figure 22-11** Module Dialog Box



- Step 2** Click the **enable** radio button to enable bandwidth fairness.  
**Step 3** Click **Apply** to save the changes.

## Disabling Bandwidth Fairness



### Note

If you disable bandwidth fairness, up to a 20 percent increase in internal bandwidth allocation is possible for each port group; however, bandwidth fairness is not guaranteed when there is a mix of shared and full-rate ports in the same port group.

To disable bandwidth fairness on multiple 48-port or 24-port 4-Gbps Fibre Channel switching modules using Device Manager, follow these steps:

- Step 1** Choose **Physical > Modules**.  
You see the Module dialog box as shown in [Figure 22-10](#).
- Step 2** Select **disable** from the BandwidthFairnessConfig drop-down list for each module for which you want to disable bandwidth fairness.
- Step 3** Click **Apply** to save the changes.

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To disable bandwidth fairness on a single 48-port or 24-port 4-Gbps Fibre Channel switching module using Device Manager, follow these steps:

- 
- Step 1** Right-click a module and select **Configure**.  
You see the Module dialog box as shown in [Figure 22-11](#).
  - Step 2** Click the **disable** radio button to disable bandwidth fairness.
  - Step 3** Click **Apply** to save the changes.
- 

## Upgrade or Downgrade Scenario

When you are upgrading from a release earlier than Cisco SAN-OS Release 3.1(2), all modules operate with bandwidth fairness disabled until the next module reload. After the upgrade, any new module that is inserted has bandwidth fairness enabled.

When you are downgrading to a release earlier than Cisco SAN-OS Release 3.1(2), all modules keep operating in the same bandwidth fairness configuration prior to the downgrade. After the downgrade, any new module that is inserted has bandwidth fairness disabled.

## Taking Interfaces Out of Service

You can take interfaces out of service on Generation 2 switching modules. When an interface is out of service, all the shared resources for the interface are released as well as the configuration associated with those resources.



### Note

The interface must be disabled before it can be taken out of service.



### Caution

Taking interfaces out of service releases all the shared resources to ensure that they are available to other interfaces. This causes the configuration in the shared resources to revert to default when the interface is brought back into service. Also, an interface cannot come back into service unless the default shared resources for the port are available. The operation to free up shared resources from another port is disruptive.



### Note

The interface cannot be a member of a PortChannel.

To take an interface out of service using Fabric Manager, follow these steps:

- 
- Step 1** Select a switch from the Fabric pane, or select a group of switches (SAN, fabric, VSAN) from the Logical Domains pane.
  - Step 2** Expand **Switches**, expand **Interfaces** and select **FC Physical** in the Physical Attributes pane.  
You see the **FC Physical > General** tab in the Information pane.
  - Step 3** Scroll down until you see the row containing the switch and port you want to configure.
  - Step 4** Scroll right (if necessary) until you see the **Status Service** column.

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**Step 5** Select **in** or **out** from the Status Service column.

**Step 6** Click the **Apply Changes** icon.

## Releasing Shared Resources in a Port Group

When you want to reconfigure the interfaces in a port group on a Generation 2 module, you can return the port group to the default configuration to avoid problems with allocating shared resources.



### Note

The interface cannot be a member of a PortChannel.



### Caution

Releasing shared resources disrupts traffic on the port. Traffic on other ports in the port group is not affected.

To release the shared resources for a port group using Fabric Manager, follow these steps:

- Step 1** Select a switch from the Fabric pane, or select a group of switches (SAN, fabric, VSAN) from the Logical Domains pane.
- Step 2** Expand **Switches > Interfaces** and then select **FC Physical** from the Physical Attributes pane. You see the **FC Physical > General** tab in the Information pane.
- Step 3** Scroll down until you see the row containing the switch and port you want to configure.
- Step 4** Scroll right (if necessary) until you see the **Status Service** column (see [Figure 22-12](#)).

**Figure 22-12** Status Service Column for FC Physical

The screenshot shows the Fabric Manager interface with the following table of data:

Switch	Interface	Mode Admin	Mode Oper	Port VSAN	Dynamic VSAN	Description	Speed Admin	Speed Oper	Rate Mode	Status Service	Status Admin	Status Oper	FailureCause	Was Enable
c-186	fc1/8	FX	FL	1	n/a		auto	1 Gb	shared	in	up	up	none	true
c-186	fc1/17	FX	F	1	1		auto	2 Gb	shared	in	up	up	none	true
c-186	fc1/7	FX	FL	1	n/a		auto	1 Gb	shared	in	up	up	none	true
c-186	fc1/12	FX	FL	1	n/a		auto	1 Gb	shared	in	up	up	none	true

**Step 5** Select the **out** status from the **Status Service** column.

**Step 6** Click the **Apply Changes** icon.

**Step 7** Select the **in** status from the **Status Service** column.

**Step 8** Click the **Apply Changes** icon.

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## Displaying SFP Diagnostic Information

To view diagnostic information for multiple ports using Device Manager, follow these steps:

- Step 1** Choose **Interface > FC All** and click the **Diagnostics** tab or hold down the **Control** key, and then click each port for which you want to view diagnostic information.
- Step 2** Right-click the selected ports, select **Configure**, and click the **Diagnostics** tab.
- You see the FC Interfaces dialog box shown in [Figure 22-13](#).

**Figure 22-13** FC Interfaces Dialog Box

Interface	Sensor	Value/Units	High Alarm	Low Alarm	High Warning	Low Warning
fc1/13	Voltage	3.2819 V	3.63	2.97	3.58	3.02
fc1/13	Current	7.118 mA	16	2	15	3
fc1/13	Temperature	29.347 C	95	-5	90	0
fc1/13	Rx Power	-2.873 dBm	1	0.05	0.794	0.063
fc1/13	Tx Power	-3.788 dBm	0.794	0.112	0.631	0.125
fc1/14	Voltage	3.2816 V	3.63	2.97	3.58	3.02
fc1/14	Current	7.336 mA	16	2	15	3
fc1/14	Temperature	29.375 C	95	-5	90	0
fc1/14	Rx Power	-3.089 dBm	1	0.05	0.794	0.063
fc1/14	Tx Power	-3.496 dBm	0.794	0.112	0.631	0.125
fc1/20	Voltage	3.2816 V	3.63	2.97	3.58	3.02
fc1/20	Current	5.548 mA	16	2	15	3
fc1/20	Temperature	29.406 C	95	-5	90	0
fc1/20	Rx Power	-3.269 dBm	1	0.05	0.794	0.063
fc1/20	Tx Power	-3.695 dBm	0.794	0.112	0.631	0.125
fc1/22	Voltage	3.2887 V	3.9	2.7	3.7	2.9
fc1/22	Current	8.08 mA	17	1	14	2
fc1/22	Temperature	27.671 C	95	-25	90	-20
fc1/22	Rx Power	-4.659 dBm	1.259	0.01	0.794	0.015
fc1/22	Tx Power	-4.236 dBm	0.631	0.067	0.631	0.079

- Step 3** Click **Refresh** to view the latest diagnostic information.

To view diagnostic information for a single port using Device Manager, follow these steps:

- Step 1** Right-click a port, select **Configure**, and click the **Diagnostics** tab.
- You see the port licensing options for the selected port shown in [Figure 22-14](#).

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**Figure 22-14** Diagnostics Tab for Selected Port

Interface, Sensor	Value/Units	High Alarm	Low Alarm	High Warning	Low Warning
fc1/13, Voltage	3.2819 V	3.63	2.97	3.58	3.02
fc1/13, Current	7.118 mA	16	2	15	3
fc1/13, Temperature	29.347 C	95	-5	90	0
fc1/13, Rx Power	-2.865 dBm	1	0.05	0.794	0.063
fc1/13, Tx Power	-3.798 dBm	0.794	0.112	0.631	0.125

**Step 2** Click **Refresh** to view the latest diagnostic information.

## Default Settings

Table 22-16 lists the default settings for Generation 2 interface parameters.

**Table 22-16** Default Generation 2 Interface Parameters

Parameter	Default			
	48-Port 4-Gbps Switching Module	24-Port 4-Gbps Switching Module	12-Port 4-Gbps Switching Module	4-Port 10-Gbps Switching Module
Speed mode	auto <sup>1</sup>	auto <sup>1</sup>	auto <sup>1</sup>	auto <sup>2</sup>
Rate mode	shared	shared	dedicated	dedicated
Port mode	Fx	Fx	auto <sup>3</sup>	auto <sup>4</sup>
BB_credit buffers	16	16	250	250
Performance buffers	–	–	145 <sup>5</sup>	145 <sup>5</sup>

1. Auto speed mode on the 4-Gbps switching modules negotiates 1, 2, and 4 Gbps.
2. The 4-port 10-Gbps switching module only supports 10-Gbps traffic.
3. Auto port mode on the 12-port 4-Gbps switching module interfaces can operate in E port mode, TE port mode, and Fx port mode.
4. Auto port mode on the 4-port 10-Gbps switching module interfaces can operate in E port mode, TE port mode, and F port mode.
5. Performance buffers are shared among all ports on the module.

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