



Gigabit Ethernet SPA Overview

This chapter provides an overview of the release history, supported features, Management Information Base (MIB) support, and architecture for the Gigabit Ethernet SPAs on the Cisco 10000 series router.

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Release History

Release	Modification
12.2(33)SB	Introduced support for the following SPAs in Cisco 10000 SIP-600, on the Cisco 10000 series router: <ul style="list-style-type: none">• 1-port 10-Gigabit Ethernet SPA• 2-port Gigabit Ethernet SPA• 5-port Gigabit Ethernet SPA
12.2(33)SB2	Introduced support for the following SPA in Cisco 10000 SIP-600, on the Cisco 10000 series router: <ul style="list-style-type: none">• 8-port Gigabit Ethernet SPA

Supported Features

Some of the significant hardware and software features supported by the Gigabit Ethernet SPAs on the Cisco 10000 series router include:

- Autonegotiation
- Speed negotiation
- Duplex negotiation

- Full-duplex operation
- IEEE 802.1Q VLAN termination
- Up to 4000 VLANs per port and 8000 VLANs per SPA
- Jumbo frames support (9000 bytes)
- Support for command-line interface (CLI)-controlled OIR
- 802.3x flow control
- DSLAM Quality of Service (QoS)
- 802.3ad link bundling
- 802.1Q and QinQ for SIP oversubscription
- QinQ push/pop/swap functions
- QinQ configuration supports 448 outer VLAN tags
- 802.1p for SIP oversubscription
- Maximum transmission unit (MTU) up to 9180 bytes
- Up to 5000 MAC Accounting Entries for a SPA (source MAC Accounting on the ingress and Destination MAC Accounting on the egress)
- Power monitoring and diagnostics of SFP and XFP modules
- Support for Course Wave Division Multiplexing (CWDM) and Dense Wave Division Multiplexing (DWDM) modules
- Ingress traffic classification based on IP Differentiated Services Code Point (DSCP) or IP precedence values, MPLS experimental (EXP) bits, VLAN 802.1Q priority bits, and IPv6 traffic-class bits
- Ingress IPv6 traffic classification based on IPv6 traffic-class bits
- Per-port byte and packet counters for policy drops, oversubscription drops, CRC error drops, packet sizes, unicast, multicast, and broadcast packets
- Per-VLAN byte and packet counters for policy drops, oversubscription drops, unicast, multicast, and broadcast packets
- Virtual Router Redundancy Protocol (VRRP)
- IP Subscriber Awareness over Ethernet

SPA Restrictions

In Cisco IOS Releases 12.2(33)SB and later releases including Cisco IOS Releases 12.2(33)XNE, the Gigabit Ethernet SPAs have the following restrictions:

- EtherChannel bundles are not supported on the 1-port 10-Gigabit Ethernet SPA.
- When used as an uplink interface, the 1-port 10-Gigabit Ethernet SPA supports from 1 to 10 VLANs with priority queues and class based weighted-fair queues, based on QoS configuration and test scenarios. When QoS is applied at multiple VLAN 10-Gigabit Ethernet interfaces other than the main 10-Gigabit Ethernet interface, unexpected drops with nonpriority class queues may occur.
- As an access interface, the 1-port 10-Gigabit Ethernet SPA does not support oversubscription at the VLAN level when using QoS Model F. For more information on QoS models, see the “QoS Models” section in the *Cisco 10000 Series Router Quality of Service Configuration Guide*.
- The following features are not supported:

- IEEE 802.1 Q-in-Q VLAN tag switching
- Bridge protocol data units (BPDU) filtering

Supported MIBs

The following MIBs are supported by the Gigabit Ethernet SPAs on the Cisco 10000 series router:

- ENTITY-MIB (RFC 2737)
- CISCO-ENTITY-ASSET-MIB
- CISCO-ENTITY-FRU-CONTROL-MIB
- CISCO-ENTITY-ALARM-MIB
- CISCO-ENTITY-EXT-MIB
- CISCO-ENTITY-SENSOR-MIB
- IF-MIB
- ETHERLIKE-MIB (RFC 2665)
- Remote Monitoring (RMON)-MIB (RFC 1757)
- CISCO-CLASS-BASED-QOS-MIB
- CISCO-ENTITY-BITS-CLOCK
- Ethernet MIB/RMON

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

<http://tools.cisco.com/ITDIT/MIBS/servlet/index>

If Cisco MIB Locator does not support the MIB information that you need, you can also obtain a list of supported MIBs and download MIBs from the Cisco MIBs page at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

To access Cisco MIB Locator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

<http://www.cisco.com/register>

Packet Flow

This section describes the path of a packet in the ingress and egress directions through the Gigabit Ethernet SPAs. Each incoming and outgoing packet on the Gigabit Ethernet SPAs goes through the physical port (PHY) SFP optics, Media Access Controller (MAC), and ASIC devices.

Path of a Packet in the Ingress Direction

The following steps describe the path of an ingress packet through the Gigabit Ethernet SPAs:

1. The PHY SFP optics device receives incoming frames on a per-port basis from one of the laser optic interface connectors.
2. The PHY laser optics device processes the frame and sends it over the XAUI path to the MAC device.
3. The MAC device receives the frame, strips the CRCs, and sends the packet through the SPI 4.2 bus to the ASIC.
4. The ASIC takes the packet from the MAC devices and classifies the Ethernet information. CAM lookups based on etype, port, VLAN, and source and destination address information determine whether the packet is dropped or forwarded to the SPA interface. If the packet is forwarded to the SPA interface, an 8-byte SHIM header that is used for additional downstream packet processing is prepended to the packet.

Packet Path in the Egress Direction

The following steps describe the path of an egress packet from the SIP through the Gigabit Ethernet SPAs:

1. The packet is sent to the ASIC using the SPI 4.2 bus. The packets are received with Layer 2 and Layer 3 headers in addition to the packet data.
2. The ASIC uses port number, destination MAC address, destination address type, and VLAN ID to perform parallel CAM lookups. If the packet is forwarded, it is forwarded through the SPI 4.2 bus to the MAC device.
3. The MAC device forwards the packet to the PHY laser-optic interface, which transmits the packet.

Showing the SPA Hardware Type

To verify the SPA hardware type that is installed in your Cisco 10000 series router, you can use the **show interfaces** command. For more information about these commands, see [Chapter 12, “SIP and SPA Commands.”](#)

[Table 5-1](#) shows the hardware description that appears in the **show** command output for each type of Gigabit Ethernet SPA that is supported on the Cisco 10000 series router.

Table 5-1 SPA Hardware Descriptions in show Commands

SPA	Description in show interfaces Command
1-port 10-Gigabit Ethernet SPA	Hardware is TenGigEther SPA
2-port Gigabit Ethernet SPA	Hardware is GigEther SPA
5-port Gigabit Ethernet SPA	Hardware is GigEther SPA
8-port Gigabit Ethernet SPA	Hardware is GigEther SPA

show interfaces Command

The following example shows output from the **show interfaces tengigabitethernet** command on a 1-port 10-Gigabit Ethernet SPA in slot 7, SPA subslot 0. The second line of the output identifies the type of SPA and its MAC address.

```
Router# show interfaces tengigabitethernet 7/0/0

Router#show interfaces tengigabitethernet 7/3/0
TenGigabitEthernet7/3/0 is up, line protocol is up
  Hardware is TenGigEther SPA, address is 0001.6380.d2cc (bia 0001.6380.d2cc)
  MTU 1500 bytes, BW 10000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 10000Mbps, link type is force-up, media type is 10GBase-LR
  output flow-control is unsupported, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Interface TenGigabitEthernet7/3/0 queueing strategy: PXF Class-based
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 0 multicast, 0 pause input
    2241 packets output, 134460 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier, 0 PAUSE output
    0 output buffer failures, 0 output buffers swapped out
Router#
```

■ Showing the SPA Hardware Type