



# CHAPTER 11

## Overview of the Ethernet SPAs

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This chapter provides an overview of the release history, and feature and Management Information Base (MIB) support for the Fast Ethernet and Gigabit Ethernet SPAs on the Cisco 7600 series router.

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## Release History

Release	Modification
12.2 (33) SRD	<ul style="list-style-type: none"><li>• Added Support for SPA-8X1FE-TX-V2 and SPA-4X1FE-TX-V2 on SIP400</li></ul>
12.2(33)SRC	<ul style="list-style-type: none"><li>• Added SFP-GE-T Support</li><li>• Added SPA-1X10GE-L-V2 support to the SIP-400</li></ul>
12.2(33)SRB1	<p>The Any Transport over MPLS over GRE (AToMoGRE) feature was introduced on the Cisco 7600 SIP-400 on the Cisco 7600 series router.</p> <p>The Backup Interface for Flexible UNI feature was introduced on the Cisco 7600 SIP-400 for Gigabit Ethernet SPAs.</p>

12.2(33)SRA	<p>Support for the following SPAs was introduced on the Cisco 7600 SIP-200 on the Cisco 7600 series router:</p> <ul style="list-style-type: none"> <li>• 4-Port Fast Ethernet SPA</li> <li>• 8-Port Fast Ethernet SPA</li> </ul> <p>The Multipoint Bridging feature was introduced on the Cisco 7600 SIP-400 on the Cisco 7600 series router.</p> <p>The Scalable EoMPLS feature was increased from 4 K to 12 K on the Cisco 7600 SIP-400 on the Cisco 7600 series router.</p> <p>Support for Ethernet Connectivity Fault Management and Ethernet Operations, Administration, and Maintenance was introduced.</p>
12.2(18)SXF	<p>Support for the following SPAs was introduced on the Cisco 7600 SIP-600 on the Cisco 7600 series router and Catalyst 6500 series switch:</p> <ul style="list-style-type: none"> <li>• 1-Port 10-Gigabit Ethernet SPA</li> <li>• 5-Port Gigabit Ethernet SPA</li> <li>• 10-Port Gigabit Ethernet SPA</li> </ul> <p>Support for the following SPA was introduced on the Cisco 7600 SIP-400 on the Cisco 7600 series router and Catalyst 6500 series switch:</p> <ul style="list-style-type: none"> <li>• 2-Port Gigabit Ethernet SPA</li> </ul>

## Supported Features

The following is a list of some of the significant hardware and software features supported by the Fast Ethernet and Gigabit Ethernet SPAs on the Cisco 7600 series router:

- Autonegotiation
- Full-duplex operation
- 802.1Q VLAN termination
- Jumbo frames support (9216 bytes)
- Support for command-line interface (CLI)-controlled OIR
- 802.3x flow control
- Up to 4000 VLANs per SPA
- Up to 5000 MAC accounting entries per SPA using Fugu hardware (source MAC accounting for the ingress direction and destination MAC accounting for the egress direction)
- 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
- Per-port byte counters for good bytes and dropped bytes
- Multiprotocol Label Switching (MPLS)
- Any Transport over MPLS over GRE (AToMoGRE)
- Ethernet over Multiprotocol Label Switching (EoMPLS)

- Quality of service (QoS)
- Hot Standby Router Protocol (HSRP)
- Virtual Router Redundancy Protocol (VRRP)
- User-set speed
- Hierarchical Virtual Private LAN Service (H-VPLS) (Gigabit Ethernet SPAs only)
- Multipoint Bridging (Gigabit Ethernet SPAs only)
- Connectivity Fault Management (CFM)
- IP Subscriber Awareness over Ethernet
- Generic SPA features such as FPD, LEDs, voltage margining, environment monitoring
- ETHERLIKE-MIB
- IP QoS parity between SIP-200 and SIP-400 FE SPAs
- MAC address filtering
- Multicast feature parity between SIP-200 and SIP-400 SPAs
- IPv6 support
- Legacy protocols (IPX, CLNS)
- Address Resolution Protocol (ARP)/RARP

## Restrictions

**Note**

For other SIP-specific features and restrictions see also [Chapter 3, “Overview of the SIPs and SSC.”](#)

Starting from the 12.2(33)SRD release SPA-8X1FE-TX-V2 and SPA-4X1FE-TX-V2 are supported on SIP-400

The following restrictions apply to Cisco IOS Release 12.2(18)SXF:

- EtherChannel is not supported on Fast Ethernet SPAs or the 2-Port Gigabit Ethernet SPA on the Cisco 7600 SIP-400.

## Supported MIBs

The following MIBs are supported by the Fast Ethernet and Gigabit Ethernet SPAs on the Cisco 7600 series router:

- ENTITY-MIB (RFC 2737)
- CISCO-ENTITY-ASSET-MIB
- CISCO-ENTITY-FRU-CONTROL-MIB
- CISCO-ENTITY-ALARM-MIB
- CISCO-ENTITY-SENSOR-MIB
- IF-MIB
- ETHERLIKE-MIB (RFC 2665)

- Remote Monitoring (RMON)-MIB (RFC 1757)
- CISCO-CLASS-BASED-QOS-MIB
- MPLS-related MIBs
- 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](mailto: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>

## SPA Architecture

This section provides an overview of the architecture of the Fast Ethernet and Gigabit Ethernet SPAs and describes the path of a packet in the ingress and egress directions. Some of these areas of the architecture are referenced in the SPA software and can be helpful to understand when troubleshooting or interpreting some of the SPA CLI and **show** command output.

Every incoming and outgoing packet on the Fast Ethernet SPAs goes through the physical port (PHY RJ45), the Media Access Controller (MAC), and a Layer 2 Filtering/Accounting ASIC. Every incoming and outgoing packet on the Gigabit Ethernet SPAs goes through the physical (PHY) SFP optics, the Media Access Controller (MAC), and a Layer 2 Filtering/Accounting ASIC.

## Path of a Packet in the Ingress Direction

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

1. For Fast Ethernet SPAs, each of the ports receives incoming frames from one of the RJ45 interface connectors. For Gigabit Ethernet SPAs, the SFP optics receive incoming frames on a per-port basis from one of the optical fiber interface connectors.
2. For Fast Ethernet SPAs, the PHY device processes the frame and sends it over a serial interface to the MAC device. For Gigabit Ethernet SPAs, the SFP PHY device processes the frame and sends it over a serial interface to the MAC device.
3. The MAC device receives the frame, strips the CRCs, and sends the packet via 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.

## Path of a Packet in the Egress Direction

The following steps describe the path of an egress packet from the SIP through the Fast Ethernet and 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 via the SPI 4.2 bus to the MAC device.
3. For Fast Ethernet SPAs, the MAC device forwards the packets to the PHY RJ45 interface, which transmits the packet. For Gigabit Ethernet SPAs, the MAC device forwards the packets to the PHY laser-optic interface, which transmits the packet.

## Displaying the SPA Hardware Type

To verify the SPA hardware type that is installed in your Cisco 7600 series router, you can use the **show interfaces** command.

Table 11-1 shows the hardware description that appears in the **show** command output for each type of Fast Ethernet and Gigabit Ethernet SPA that is supported on the Cisco 7600 series router.

**Table 11-1 SPA Hardware Descriptions in show Commands**

SPA	Description in show interfaces Command
4-Port Fast Ethernet SPA	Hardware is FastEthernet SPA
8-Port Fast Ethernet SPA	Hardware is FastEthernet SPA
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
10-Port Gigabit Ethernet SPA	Hardware is GigEther SPA

## Example of the show interfaces Command

The following example shows output from the **show interfaces fastethernet** command on a Cisco 7600 series router with a 4-Port Fast Ethernet SPA installed in slot 3:

```
Router# show interfaces fastethernet3/2/3
FastEthernet3/2/3 is up, line protocol is up
  Hardware is FastEthernet SPA, address is 000e.d623.e840 (bia 000e.d623.e840)
  Internet address is 33.1.0.2/16
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
     reliability 255/255, txload 59/255, rxload 83/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full-duplex, 100Mb/s
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:11, output 00:00:08, output hang never
  Last clearing of "show interface" counters 3d00h
  Input queue: 0/75/626373350/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
```

```

Output queue: 0/40 (size/max)
5 minute input rate 32658000 bits/sec, 68032 packets/sec
5 minute output rate 23333000 bits/sec, 48614 packets/sec
  17792456686 packets input, 1067548381456 bytes, 0 no buffer
  Received 0 broadcasts (0 IP multicasts)
  0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 130043940 overrun, 0 ignored
  0 watchdog
  0 input packets with dribble condition detected
12719598014 packets output, 763177809958 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 output buffer failures, 0 output buffers swapped out

```

The following example shows output from the **show interfaces gigabitethernet** command on a Cisco 7600 series router with a 2-Port Gigabit Ethernet SPA installed in slot 2:

```

Router# show interfaces gigabitethernet 2/0/1
GigabitEthernet2/0/1 is down, line protocol is down
  Hardware is GigEther SPA, address is 000a.f330.2e40 (bia 000a.f330.2e40)
  Internet address is 2.2.2.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Full-duplex, 1000Mb/s, link type is force-up, media type is SX
  output flow-control is on, input flow-control is on
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 03:19:34, output 03:19:29, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    1703 packets input, 638959 bytes, 0 no buffer
    Received 23 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 1670 multicast, 0 pause input
    1715 packets output, 656528 bytes, 0 underruns
    0 output errors, 0 collisions, 4 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

```

The following example shows output from the **show interfaces tengigabitethernet** command on a Cisco 7600 series router with a 1-Port 10-Gigabit Ethernet SPA installed in slot 7:

```

Router# show interfaces tengigabitethernet7/0/0
TenGigabitEthernet7/0/0 is up, line protocol is up (connected)
  Hardware is TenGigEther SPA, address is 0000.0c00.0102 (bia 000f.342f.c340)
  Internet address is 15.1.1.2/24
  MTU 1500 bytes, BW 10000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full-duplex, 10Gb/s
  input flow-control is on, output flow-control is on
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:10, output hang never
  Last clearing of "show interface" counters 20:24:30

```

```
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue: 0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
L2 Switched: ucast: 0 pkt, 0 bytes - mcast: 0 pkt, 0 bytes
L3 in Switched: ucast: 0 pkt, 0 bytes - mcast: 0 pkt, 0 bytes mcast
L3 out Switched: ucast: 0 pkt, 0 bytes mcast: 0 pkt, 0 bytes
237450882 packets input, 15340005588 bytes, 0 no buffer
Received 25 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
0 input packets with dribble condition detected
1676 packets output, 198290 bytes, 0 underruns
0 output errors, 0 collisions, 4 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
```

■ **Displaying the SPA Hardware Type**