Troubleshooting the Gigabit Ethernet SPAs

This chapter describes techniques that you can use to troubleshoot the operation of your Gigabit Ethernet SPAs.

It includes the following sections:

Overview

The first section provides information about basic interface troubleshooting. If you are having a problem with your SPA, use the steps in the *Performing Basic Interface Troubleshooting* section to begin your investigation of a possible interface configuration problem.

To perform more advanced troubleshooting, see the other sections in this chapter.

General Troubleshooting Information

This section describes general information for troubleshooting SIPs and SPAs. It includes the following sections:

Using debug Commands

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Caution Because debugging output is assigned high priority in the CPU process, it can render the system unusable. For this reason, use **debug** commands only to troubleshoot specific problems or during troubleshooting sessions with Cisco technical support staff. Moreover, it is best to use **debug** commands during periods of lower network traffic and fewer users. Debugging during these periods decreases the likelihood that increased **debug** command processing overhead will affect system use.

The **debug hw-module subslot** command is intended for use by Cisco technical support personnel.

For information about other **debug** commands supported on the Cisco ASR 1000 Series Routers, refer to the *Cisco IOS Debug Command Reference* and any related feature documents for the applicable Cisco IOS release.

Using show Commands

There are several **show** commands that you can use to monitor and troubleshoot the SIPs and SPAs on the Cisco ASR 1000 Series Routers. This chapter describes using the **show interfaces** command to perform troubleshooting of your SPA.

For more information about **show** commands to verify and monitor SIPs and SPAs, see *Troubleshooting the SIP* , *Configuring the Ethernet SPAs* , and the Cisco IOS technology area command reference books.

Performing Basic Interface Troubleshooting

You can perform most of the basic interface troubleshooting using the **show interfaces fastethernet**, **show interfaces gigabitethernet**, or **show interfaces tengigabitethernet** command and examining several areas of the output to determine how the interface is operating.

The following example shows an output of **show interfaces gigabitethernet** and **show interfaces tengigabitethernet** commands with some of the significant areas of the output in bold:

```
Router# show interfaces gigabitethernet 2/0/1
GigabitEthernet2/0/1 is down, line protocol is down
  Hardware is SPA-1X10GE-L-V2, 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
  Keepalive not supported
  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 03:18:49, output 03:18:44, 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
Router# show interfaces tengigabitethernet 0/0/0
```

```
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
```

To verify that your interface is operating properly, complete the following steps:

SUMMARY STEPS

1. From global configuration mode, enter the **show interfaces gigabitethernet**, **show interfaces tengigabitethernet**, or **show interfaces fastethernet** command.

2. Verify that the interface is up.

3. Verify that the line protocol is up.

4. Observe the CRC counter.

5. Observe the carrier signal counters.

DETAILED STEPS

Step 1 From global configuration mode, enter the **show interfaces gigabitethernet**, **show interfaces tengigabitethernet**, or **show interfaces fastethernet** command.

Example:

```
Router# show interfaces gigabitethernet 2/0/1
Router# show interfaces tengigabitethernet 7/0/0
Router# show interfaces fastethernet 3/0/0
```

Step 2 Verify that the interface is up.

Example:

```
Router# show interfaces gigabitethernet 2/0/1
GigabitEthernet2/0/1 is up
, line protocol is up
Router# show interfaces tengigabitethernet 7/0/0
TenGigabitEthernet7/0/0 is up,
line protocol is up (connected)
Router# show interfaces fastethernet 3/0/0
FastEthernet3/0/0 is up,
line protocol is up
```

Step 3 Verify that the line protocol is up.

Example:

```
Router# show interfaces gigabitethernet 2/0/1
GigabitEthernet2/0/1 is up, line protocol is up

Router# show interfaces tengigabitethernet 7/0/0
TenGigabitEthernet7/0/0 is up, line protocol is up (connected)
Router# show interfaces fastethernet 3/0/0
FastEthernet3/0/0 is up,
line protocol is up
```

Step 4 Observe the CRC counter.

Example:

```
0 input errors, 0 CRC, 0 frame, 130043940 overrun, 0 ignored
```

Step 5 Observe the carrier signal counters.

Example:

```
0 lost carrier, 0 no carrier
, 0 pause output
0 output buffer failures, 0 output buffers swapped out
```

For more information about the verification steps and possible responses to correct detected problems, see the following sections:

Verifying the Interface Is Up

In the output of the **show interfaces gigabitethernet, show interfaces tengigabitethernet**, or **show interfaces fastethernet** command, verify that the interface is up. If the interface is down, perform the following corrective actions:

- If the interface is *administratively down* , use the **no shutdown** interface configuration command to enable the interface.
- Be sure that the cable is fully connected.
- Verify that the cable is not bent or damaged. If the cable is bent or damaged, the signal will be degraded.
- Verify that a hardware failure has not occurred. Observe the LEDs to confirm the failure. See the other troubleshooting sections of this chapter, and refer to the Cisco ASR 1000 Series Aggregation Services Router Hardware Installation Guide . If the hardware has failed, replace the SPA as necessary.

- Check the autonegotiation status.

Verifying the Line Protocol Is Up

In the output of the **show interfaces gigabitethernet, show interfaces tengigabitethernet,** or **show interfaces fastethernet** command, verify that the line protocol is up. If the line protocol is down, the line protocol software processes have determined that the line is unusable.

Perform the following corrective actions:

- Replace the cable.
- Check the local and remote interface for misconfiguration.
- Verify that a hardware failure has not occurred. Observe the LEDs to confirm the failure. See the other troubleshooting sections of this chapter, and refer to the Cisco ASR 1000 Series Aggregation Services Router Hardware Installation Guide . If the hardware has failed, replace the SPA as necessary.

Verifying the CRC Counter

In the output of the **show interfaces gigabitethernet, show interfaces tengigabitethernet,** or **show interfaces fastethernet** command, observe the value of the CRC counter. Excessive noise will cause high CRC errors accompanied by a low number of collisions.

Perform the following corrective actions if you encounter high CRC errors:

- Check the cables for damage.
- Verify that the correct cables are being used for the SPA interface.

Verifying the Carrier Signal

In the output of the **show interfaces gigabitethernet, show interfaces tengigabitethernet,** or **show interfaces fastethernet** command, observe the value of the carrier signal counters. The lost carrier counter shows the number of times that the carrier was lost during transmission. The no carrier counter shows the number of times that the carrier was not present during transmission.

Carrier signal resets can occur when an interface is in loopback mode or shut down.

Perform the following corrective actions if you observe the carrier signal counter incrementing outside of these conditions:

- Check the interface for a malfunction.
- Check for a cable problem.

Understanding SPA Automatic Recovery

When Gigabit Ethernet SPAs encounter thresholds for certain types of errors and identify a fatal error, the SPAs initiate an automatic recovery process.

You do not need to take any action unless the error counters reach a certain threshold, and multiple attempts for automatic recovery by the SPA fail.

The Gigabit Ethernet SPAs might perform automatic recovery for the following types of errors:

- SPI4 TX/RX out of frame
- SPI4 TX train valid
- SPI4 TX DIP4
- SPI4 RX DIP2

When Automatic Recovery Occurs

If the SPI4 errors occur more than 25 times within 10 milliseconds, the SPA automatically deactivates and reactivates itself. Error messages are logged on the console indicating the source of the error and the status of the recovery.

If Automatic Recovery Fails

If the SPA attempts automatic recovery more than five times in an hour, then the SPA deactivates itself and remains deactivated.

To troubleshoot automatic recovery failure for a SPA, perform the following steps:

SUMMARY STEPS

1. Use the **show hw-module subslot** *slot*/*subslot* **oir** command to verify the status of the SPA. The status is shown as "failed" if the SPA has been powered off due to five consecutive failures.
2. If you verify that automatic recovery has failed, perform OIR of the SPA. For information about performing OIR, see the *Preparing for Online Insertion and Removal of a SPA* section.
3. If reseating the SPA after OIR does not resolve the problem, replace the SPA hardware.

DETAILED STEPS

Step 1 Use the **show hw-module subslot** *slot*/*subslot* **oir** command to verify the status of the SPA. The status is shown as "failed" if the SPA has been powered off due to five consecutive failures.

Step 2 If you verify that automatic recovery has failed, perform OIR of the SPA. For information about performing OIR, see the *Preparing for Online Insertion and Removal of a SPA* section.

Step 3 If reseating the SPA after OIR does not resolve the problem, replace the SPA hardware.

Using the Cisco IOS Event Tracer to Troubleshoot Problems

This feature is intended for use as a software diagnostic tool and should be configured only under the direction of a Cisco Technical Assistance Center (TAC) representative.

The Event Tracer feature provides a binary trace facility for troubleshooting Cisco IOS software. This feature gives Cisco service representatives additional insight into the operation of the Cisco IOS software and can be useful in helping to diagnose problems in the unlikely event of an operating system malfunction or, in the case of redundant systems, Route Processor switchover.

Event tracing works by reading informational messages from specific Cisco IOS software subsystem components that have been preprogrammed to work with event tracing, and by logging messages from those

components into system memory. Trace messages stored in memory can be displayed on the screen or saved to a file for later analysis.

The SPAs currently support the "spa" component to trace SPA OIR-related events.

For more information about using the Event Tracer feature, refer to the following URL:

http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/evnttrcr.html

Preparing for Online Insertion and Removal of a SPA

The Cisco ASR 1000 Series Routers support online insertion and removal (OIR) of the SIP, in addition to each of the SPAs. Therefore, you can remove a SIP with its SPAs still intact, or you can remove a SPA independently from the SIP, leaving the SIP installed in the router.

This means that a SIP can remain installed in the router with one SPA remaining active, while you remove another SPA from one of the SIP subslots. If you are not planning to immediately replace a SPA into the SIP, then be sure to install a blank filler plate in the subslot. The SIP should always be fully installed with either functional SPAs or blank filler plates.

For more information about activating and deactivating SPAs in preparation for OIR, see *Troubleshooting the SIP* section.