C H A P T E R 6

Cabling the Line Ports and Completing the Installation

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Introduction

This chapter provides instructions for cabling the Cisco SCE8000 10 Gigabit Ethernet ports for single, cascaded, and MGSCP topologies. In a cascade topology, this includes the cascade ports as well as the line ports.

The 10 Gigabit Ethernet ports are located on the 10G SPA modules, which are installed in the SCE8000-SIP module in slot 3 of the Cisco SCE8000 chassis.

Note When installing a cascaded system, it is extremely important to follow the sequence of procedures outlined in the "Cascaded Systems" section on page 6-15.

Note When installing an External Optical Bypass module, the Cisco SCE8000 line ports are connected to the module. See the "Cabling the 10GBE Line Interface Ports: Using the External Optical Bypass Module" section on page 6-12 for complete instructions.

Connecting the Line Ports to the Network

Single Link: Inline Topology

In the inline topology, the Cisco SCE8000 resides physically on the 10 GBE (Ten Gigabit Ethernet) link between the subscribers and the network. The subscribers are usually connected through either a BRAS (in DSL access), a PDSN (in wireless access), a CMTS (in the Cable access), or a switch or router aggregator (in other topologies). The network is a router or Layer 3 switch network element connecting the Cisco SCE8000 toward the core of the network.

Guidelines for single link inline topologies:

- If only two SPA modules are installed (only two SPA modules are required for a single link), they must be installed in bays 0 and 1 of the SPA jacket card.
- Inline topologies require both Receive and Transmit fibers.
- To maintain link continuity at all times, an optical bypass module should be installed.

Single link inline connectivity

- Port 3/0/0: Link 0, Subscribers side
- Port 3/1/0: Link 0, Network side

Single Link: Receive-only Topology

In this topology, an optical splitter unit resides physically on the 10 GBE link that the Cisco SCE8000 should monitor. The optical splitter unit is connected to the Cisco SCE8000 Rx links only. For each link monitored, there are two Rx connections to the Cisco SCE8000, one for each direction of traffic flow in the link. The traffic passes through the optical splitter, which allows the Cisco SCE8000 to monitor traffic without affecting the normal optic and data path between subscriber and network.

Note Receive-only topologies can also be implemented using a switch. Such a switch must support SPAN functionality that includes separation between ingress and egress traffic and multiple SPAN-ports destinations.

Guidelines for single link receive-only topologies:

- If only two SPA modules are installed (only two SPA modules are required for a single link), they must be installed in bays 0 and 1 of the SPA jacket card.
- Receive-only topologies use only Receive fibers.

Single link receive-only connectivity:

- Port 3/0/0: Link 0, Split of optic signal transmitted by subscribers side
- Port 3/1/0: Link 0, Split of optic signal transmitted by network side

Dual Link: Single Cisco SCE8000 Topologies

In this topology, one Cisco SCE8000 is connected to two full duplex, 10GBE links. The Cisco SCE8000 may be either inline, to support both monitoring and traffic control functionality, or receive-only for traffic monitoring functionality only.

Guidelines for dual link topologies:

- SPA modules 0 and 1 are connected to the first link (Link 0).
- SPA modules 2 and 3 are connected to the second link (Link 1).
- Dual link inline topologies require both Receive and Transmit fibers.
- Dual link receive-only topologies use only Receive fibers.
- To maintain link continuity at all times on both links when using the inline topology, two optical bypass modules should be installed.

Dual link connectivity:

- Port 3/0/0: Link 0, Subscribers side
- Port 3/1/0: Link 0, Network side
- Port 3/2/0: Link 1, Subscribers side
- Port 3/3/0: Link 1, Network side

Note Receive-only topologies can be implemented using either an optical splitter or a switch. If a switch is used, it must support SPAN functionality that includes separation between ingress and egress traffic and multiple SPAN-ports destinations.

Dual Link: Two Cisco SCE8000s Topology

In this topology, two Cisco SCE8000s are connected to two full duplex, 10 GBE links, providing full redundancy through cascading the two Cisco SCE8000s. The Cisco SCE8000s must be inline.

Note When installing a cascaded system, it is extremely important to follow the sequence of procedures outlined in the "Cascaded Systems" section on page 6-15.

When two Cisco SCE8000s are used, the ports 3/0/0 and 3/1/0 in each Cisco SCE8000 are connected to the links, whereas ports 3/2/0 and 3/3/0 are the cascade ports that are used for communicating between the two Cisco SCE8000s as follows:

Cisco SCE8000 #1

- Port 3/0/0: Link 0, Subscribers side
- Port 3/1/0: Link 0, Network side
- Port 3/2/0: Cascade, connect to Port 3/3/0 in Cisco SCE8000 #2
- Port 3/3/0: Cascade, connect to Port 3/2/0 in Cisco SCE8000 #2

Cisco SCE8000 #2

- Port 3/0/0: Link 1, Subscribers side

- Port 3/1/0: Link 1, Network side

- Port 3/2/0: Cascade, connect to Port 3/3/0 in Cisco SCE8000 #1

- Port 3/3/0: Cascade, connect to Port 3/2/0 in Cisco SCE8000 #1

Inline topologies require connecting both Receive and Transmit fibers to the Cisco SCE8000. Cascade ports always require both Receive and Transmit fibers to be connected.

To maintain link continuity at all times, it is recommended to install two optical bypass modules, and the traffic ports should be connected to these bypass modules.

Multi-Gigabit Service Control Platforms (MGSCP) Topologies

In this topology, multiple Cisco SCE 8000 platforms are connected to a Cisco 7600 Series router used as a load-balancer ("dispatcher") between the platforms. Traffic enters the router, is distributed between the Cisco SCE8000 platforms by the router EtherChannel, and returns to the router to be forwarded to its original destination.

General guidelines for MGSCP topologies:

- Because there are two links per Cisco SCE8000 platform, the minimum number of platforms required is half the number of links used.

- Each link corresponds to one port on the EtherChannel (EC) on the Cisco 7600 Series router. Each EC supports a maximum of eight active ports. Therefore, if all eight EC ports are configured, four Cisco SCE8000 platforms are required.

- For N+1 redundancy, two additional ports (connected to the standby platform) must be configured as standby ports on both ECs.

  Therefore, for N+1 redundancy, one router and five Cisco SCE8000 platforms are used to support eight links.

- If two Cisco 7600 Series routers are used (for network redundancy), one link on each Cisco SCE8000 platform is connected to each router. This requires twice the number of Cisco SCE8000 platforms, one platform for each link.

  - A minimum of eight Cisco SCE8000 platforms are required to support eight ports.

  - For N+1 redundancy, nine Cisco SCE8000 platforms are used to support eight active links.

When cabling to the EC, follow these guidelines:

- Cisco SCE platform ports MUST be connected to the EC ports in the same order on both sides.

- EC ports should be sorted in an ascending order by their physical interface numbers.

- In a topology with two Cisco 7600 Series routers, the order of connection to the EC ports must be the same on both routers. For both routers to send the traffic of a given subscriber to the same SCE platform, the SCE platforms must be connected to both routers in exactly the same order (one SCE platform connected to the first link on both routers, another SCE platform connected to the second link on both routers, and so on).

- See the "MGSCP Connectivity Examples" section on page 6-4 for specific examples explaining how to connect the Cisco SCE8000 ports to the EC ports in various topologies.

- See the "Dual Link: Single Cisco SCE8000 Topologies" section on page 6-2 and the "Single Link: Inline Topology" section on page 6-2 for further information on specific cabling schemes.

MGSCP Connectivity Examples

The First Step-Ordering the EC Ports

This section explains how to order the EC ports and assign them to links. This example is the basis for all following examples.

1. Sort the EC ports in an ascending order by their physical interface numbers. Take the following EC interfaces as an example:

   - EC1 (subscriber side): 0/1, 0/2, 1/3, 1/5
   - EC2 (network side): 2/2, 3/1, 3/2, 3/4

2. Order the ports in subscriber/network pairs according to their order in the ECs (the first port in EC1 (subscriber side) is paired with the first port in EC2 (network side) and so on):

   - Link 1. S=0/1, N=2/2
   - Link 2. S=0/2, N=3/1
   - Link 3. S=1/3, N=3/2
   - Link 4. S=1/5, N=3/4

Single Router MGSCP Connectivity

Four links require two Cisco SCE8000 platforms. Connect the ordered pairs, each pair of EC ports to a pair of Subscriber/Network ports in a Cisco SCE8000 platform:

- Cisco SCE8000 #1: Links 1 and 2
- Cisco SCE8000 #2: Links 3 and 4

The actual connections might look like this:

- S=0/1, Cisco SCE8000 #1 3/0/0
- N=2/2, Cisco SCE8000 #1 3/1/0
- S=0/2, Cisco SCE8000 #1 3/2/0
- N=3/1, Cisco SCE8000 #1 3/3/0
- S=1/3, Cisco SCE8000 #2 3/0/0
- N=3/2, Cisco SCE8000 #2 3/1/0
- S=1/5, Cisco SCE8000 #2 3/2/0
- N=3/4, Cisco SCE8000 #2 3/3/0

Single Router with N+1 Redundancy MGSCP Connectivity

To achieve N+1 redundancy, add one extra SCE platform as the standby platform. Also, add two more ports on each EC to be used as standby ports. In this case, use three SCE platforms, two on the traffic links and one for redundancy, which would be connected to the standby ports.

If you add ports 0/3 and 2/3 on EC1 and 2/4 and 4/4 on EC2, the ECs would look like this:

- EC1: 0/1, 0/2, 0/3, 1/3, 1/5, 2/3
- EC2: 2/2, 2/4, 3/1, 3/2, 3/4, 4/4

The standby ports must be the two highest-numbered ports:

- EC1 standby ports: 1/5, 2/3
- EC2 standby ports: 3/4, 4/4

The traffic ports would be assigned to the links as follows:

- Link 1. S=0/1, N=2/2
- Link 2. S=0/2, N=2/4
- Link 3. S=0/3, N=3/1
- Link 4. S=1/3, N=3/2

The standby ports would be assigned to the links as follows:

- Link 5 (standby). S=1/5, N=3/4
- Link 6 (standby). S= 2/3, N=4/4

If Cisco SCE8000 #3 is the redundant platform, Links 5 and 6 would be connected to it and the actual connections might look like this:

- S=0/1, Cisco SCE8000 #1 3/0/0
- N=2/2, Cisco SCE8000 #1 3/1/0
- S=0/2, Cisco SCE8000 #1 3/2/0
- N=2/4, Cisco SCE8000 #1 3/3/0
- S=0/3, Cisco SCE8000 #2 3/0/0
- N=3/1, Cisco SCE8000 #2 3/1/0
- S=1/3, Cisco SCE8000 #2 3/2/0
- N=3/2, Cisco SCE8000 #2 3/3/0
- S=1/5, Cisco SCE8000 #3 3/0/0
- N=3/4, Cisco SCE8000 #3 3/1/0
- S=2/3, Cisco SCE8000 #3 3/2/0
- N=4/4, Cisco SCE8000 #3 3/3/0

Dual Routers MGSCP Connectivity

Four links on each router would require four Cisco SCE8000 platforms. For the sake of simplicity, we assume that the EC ports are the same on both routers.

Connect the ordered pairs, each pair of EC ports to a pair of Subscriber/Network ports in a Cisco SCE8000 platform:

- Cisco SCE8000 #1: Link 1 on both routers
- Cisco SCE8000 #2: Link 2 on both routers
- Cisco SCE8000 #3: Link 3 on both routers
- Cisco SCE8000 #4: Link 4 on both routers

The actual connections might look like this:

- Router 1: S=0/1, Cisco SCE8000 #1 3/0/0
- Router 2: S=0/1, Cisco SCE8000 #1 3/2/0
- Router 1: N=2/2, Cisco SCE8000 #1 3/1/0
- Router 2: N=2/2, Cisco SCE8000 #1 3/3/0
- Router 1: S=0/2, Cisco SCE8000 #2 3/0/0
- Router 2: S=0/2, Cisco SCE8000 #2 3/2/0
- Router 1: N=3/1, Cisco SCE8000 #2 3/1/0
- Router 2: N=3/1, Cisco SCE8000 #2 3/3/0
- Router 1: S=1/3, Cisco SCE8000 #3 3/0/0
- Router 2: S=1/3, Cisco SCE8000 #3 3/2/0
- Router 1: N=3/2, Cisco SCE8000 #3 3/1/0
- Router 2: N=3/2, Cisco SCE8000 #3 3/3/0
- Router 1: S=1/5, Cisco SCE8000 #4 3/0/0
- Router 1: S=1/5, Cisco SCE8000 #4 3/2/0
- Router 1: N=3/4, Cisco SCE8000 #4 3/1/0
- Router 1: N=3/4, Cisco SCE8000 #4 3/3/0

Dual Routers with N+1 Redundancy MGSCP Connectivity

To achieve N+1 redundancy, add one extra SCE platform as the standby platform. Also, add another port on each EC to be used as standby ports. In this case, use five SCE platforms, four on the traffic links and one for redundancy, which would be connected to the standby ports.

Again, for the sake of simplicity, assume that the EC ports are the same on both routers.

If you add ports 0/3 on EC1 and 2/4 on EC2, the ECs would look like this:

- EC1: 0/1, 0/2, 0/3, 1/3, 1/5
- EC2: 2/2, 2/4, 3/1, 3/2, 3/4

The standby ports must be the highest-numbered ports:

- EC1 standby port: 1/5
- EC2 standby port: 3/4

The traffic ports would be assigned to the links as follows:

- Link 1. S=0/1, N=2/2
- Link 2. S=0/2, N=2/4
- Link 3. S=0/3, N=3/1
- Link 4. S=1/3, N=3/2

The standby ports would be assigned to the links as follows:

- Link 5 (standby). S=1/5, N=3/4

If Cisco SCE8000 #5 is the redundant platform, Link 5 from both routers is connected to it and the actual connections might look like this:

- Router 1: S=0/1, Cisco SCE8000 #1 3/0/0
- Router 2: S=0/1, Cisco SCE8000 #1 3/2/0
- Router 1: N=2/2, Cisco SCE8000 #1 3/1/0
- Router 2: N=2/2, Cisco SCE8000 #1 3/3/0
- Router 1: S=0/2, Cisco SCE8000 #2 3/0/0
- Router 2: S=0/2, Cisco SCE8000 #2 3/2/0
- Router 1: N=2/4, Cisco SCE8000 #2 3/1/0
- Router 2: N=2/4, Cisco SCE8000 #2 3/3/0
- Router 1: S=0/3, Cisco SCE8000 #3 3/0/0
- Router 2: S=0/3, Cisco SCE8000 #3 3/2/0
- Router 1: N=3/1, Cisco SCE8000 #3 3/1/0
- Router 2: N=3/1, Cisco SCE8000 #3 3/3/0
- Router 1: S=1/3, Cisco SCE8000 #4 3/0/0
- Router 2: S=1/3, Cisco SCE8000 #4 3/2/0
- Router 1: N=3/2, Cisco SCE8000 #4 3/1/0
- Router 2: N=3/2, Cisco SCE8000 #4 3/3/0
- Router 1: S=1/5, Cisco SCE8000 #5 3/0/0
- Router 2: S=1/5, Cisco SCE8000 #5 3/2/0
- Router 1: N=3/4, Cisco SCE8000 #5 3/1/0
- Router 2: N=3/4, Cisco SCE8000 #5 3/3/0

The Optical Bypass Module

The external optical bypass module is an optional component that provides additional protection by enabling automatic preservation of the network 10GBE link. For more information about the external bypass module, see "The Cisco SCE8000 Optical Bypass" section on page 2-8.

There are two installation options for the optical bypass module:

- Chassis mount—The optical bypass module may be installed in the panel in slot 4 of the Cisco SCE8000 chassis. This panel hosts up to two optical bypass modules.
- External mounting panel—The optical bypass module may be installed in a panel that is mounted in a 19" rack. This panel can host up to four optical bypass modules.

Note Make sure to use the correct type of optical bypass module (single-mode or multi-mode) according to the transceivers and cabling that are used for the subscriber and network links.

Note Because the optic bypass module will directly connect the subscriber and network side optic paths when bypassing the Cisco SCE8000, the subscriber and network optic links must be of the same type (single-mode or multi-mode) and wavelength.

Warning **Invisible laser radiation may be emitted from disconnected fibers or connectors. Avoid exposure to radiation and do not stare into open aperture.**
Statement 1056

Optical Bypass Module Connectivity

Single Link Topology

A single link requires only one bypass module.

- Subscriber side network element <->Port A on the bypass module.
- Cisco SCE8000 port 3/0/0 <->Port C on the bypass module.
- Network side network element <->Port B on the bypass module.
- Cisco SCE8000 port 3/1/0 <->Port D on the bypass module.
- CTRL <->left-hand 'Optical Bypass' port on Cisco SCE8000-SCM-E module.

Dual Link Topology

A dual link requires two bypass modules.

- Subscriber side network element <->Port A on bypass module 1.

- Cisco SCE8000 port 3/0/0 <->Port C on bypass module 1.

- Network side network element <->Port B on bypass module 1.

- Cisco SCE8000 port 3/1/0 <->Port D on bypass module 1.

- CTRL on bypass module #1 <->left-hand 'Optical Bypass' port on Cisco SCE8000-SCM-E module.

- Subscriber side network element <->Port A on bypass module 2.

- Cisco SCE8000 port 3/2/0 <->Port C on bypass module 2.

- Network side network element <->Port B on bypass module 2.

- Cisco SCE8000 port 3/3/0 <->Port D on bypass module 2.

- CTRL on bypass module 2 <->right-hand 'Optical Bypass' port on Cisco SCE8000-SCM-E module.

Cabling the 10GBE Line Interface Ports

Note   When installing an External Optical Bypass module, the Cisco SCE8000 line ports are connected to the module. See the Cabling the 10GBE Line Interface Ports: Using the External Optical Bypass Module, page 6-14 for complete instructions.

Warning   **Class 1 laser. Avoid exposure to radiation and do not stare into open aperture.**
Statement 1008

- XFP Module Cabling and Connection Equipment, page 6-11
- Optical Device Maintenance, page 6-12
- How to Cable the 10GBE Line Interface Ports, page 6-13
- Cabling the 10GBE Line Interface Ports: Using the External Optical Bypass Module, page 6-14

XFP Module Cabling and Connection Equipment

Table 6-1 and Table 6-2 provide cabling specifications for the XFP modules that can be installed on the 10 Gigabit Ethernet SPA. All XFP ports have LC-type connectors.

Table 6-1   XFP Transceiver Port Cabling Specifications

XFP Product Number	Nominal Wavelength (nm)	Cable Type	Core Size (microns)	Maximum Cabling Distance
XFP-10GLR-OC192SR	1310	SMF	G.652	• 10 km (6.2 miles) 10-Gigabit Ethernet • 2 km (1.24 miles) OC-192/STM-64 SR1
XFP-10GER-OC192IR	1550	SMF	G.652	40 km (24.86 miles)
XFP-10GZR-OC192IR	1550	SMF	G.652	80 km (10 miles)
XFP-10G-MM-SR	850	MMF	G.652	26 m to 300 m (85.3 to 984.3 feet)

Optical Device Maintenance

Table 6-2　　　*XFP Transceiver Optical Transmit and Receive Specifications*

XFP Product Number	Transceiver Operating Mode	Transmit Power (dBm)		Receive Power (dBm)		Transmit Wavelength (nm)	Receive Wavelength (nm)
		Min	Max	Min	Max		
XFP-10GLR-OC192SR	10GBASE-LR, 1310-nm SMF (10.3125-Gbps line rate)	-8.2	+0.5	-14.4	+0.5	1260 to 1355	1260 to 1565
XFP-10GER-OC192IR	10GBASE-ER, 1550-nm SMF (10.3125-Gbps line rate)	-4.7	+4.0	-15.8	-1.0	1530 to 1565	1260 to 1565
XFP-10GZR-OC192IR	10GBASE-ZR, 1550-nm SMF (10.3125-Gbps line rate)	0	+4.0	-24	-7	1530 to 1565	1260 to 1565
XFP-10G-MM-SR	10GBASE-SR, 850-nm MMF (10.3125-Gbps line rate)		-1.0 -3.8 OMA[1]		-1.0 -11.1 OMA	840 to 860	840 to 860

1. At 840nm and a spectral width of 0.29nm

Any contamination of the fiber connection can cause failure of the component or failure of the whole system. A particle that partially or completely blocks the core generates strong back reflections, which can cause instability in the laser system. Inspection, cleaning, and reinspection are critical steps to take before making fiber-optic connections.

How to Cable the 10GBE Line Interface Ports

Step 1 Take the appropriate fiber optic cable (see XFP Module Cabling and Connection Equipment, page 6-11) and plug it into the appropriate port on the 10GBE interface on the SPA module in slot #3 of the Cisco SCE8000. (See Figure 6-1.)

Make sure to push on the connector until you hear a click, which indicates that the connector is fully inserted and secured in the receptacle. Always make sure that you insert the connector completely into the socket.

Figure 6-1 **Cabling the 10GBE Interface**
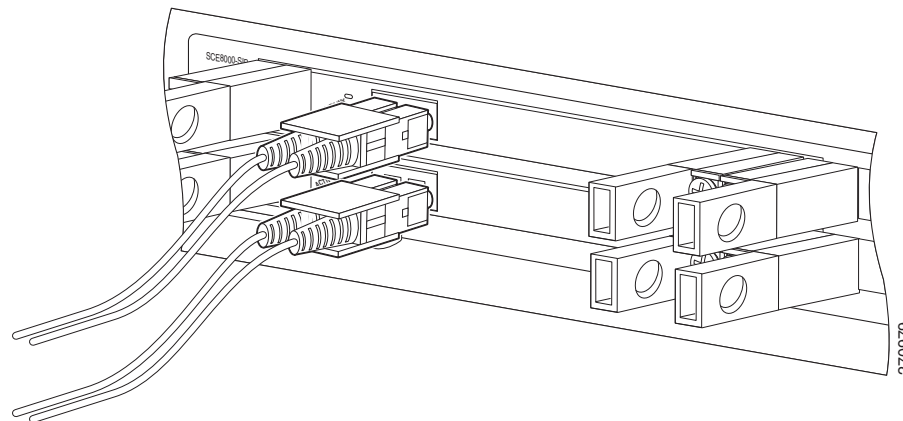
Step 2 Verify that the link LED is green.

If the link LED does not light, try removing the network cable plug and reinserting it firmly into the module socket.

Cabling the 10GBE Line Interface Ports: Using the External Optical Bypass Module

See Optical Bypass Module Connectivity, page 6-9 for specific connectivity (Figure 6-2).

Figure 6-2   External Optical Bypass Module Line Interfaces
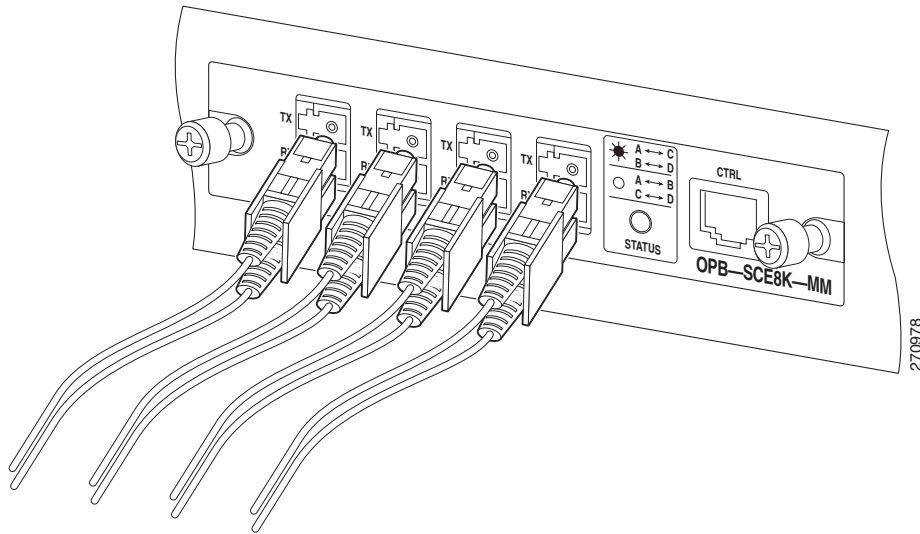
Step 1   Take the appropriate fiber optic cable (see XFP Module Cabling and Connection Equipment, page 6-11) and plug it into the appropriate port (A or B) on the external bypass module.

Step 2   Using a cable with LC connectors on both ends, plug one end into the appropriate port (C or D) on the external bypass module and the other end into the appropriate 10 GBE interface in slot 3 of the Cisco SCE8000 chassis.
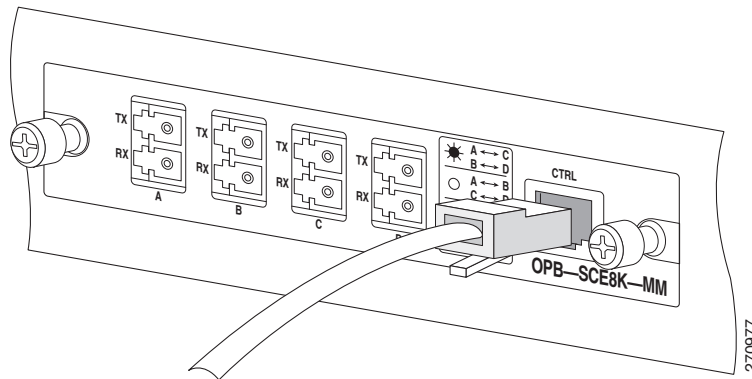
Step 3 Using the control cable provided, which has RJ11 connectors on both ends, plug one end into the CTRL interface on the external bypass module (see Figure 6-3) and plug the other end into the External Bypass interface on the SCE8000-SCM-E in slot 1 of the Cisco SCE8000 chassis (see item 1 in Figure 6-4). If using only one external bypass module, use External Bypass port 1. If using two external bypass modules, use both External Bypass ports on the SCE8000-SCM-E in slot 1.

Step 4 Complete the installation and powering up of the Cisco SCE8000.

By its nature, the optic bypass module does not connect the link to the SCE8000-SIP module until the entire Cisco SCE8000 system is fully functional. It is necessary to bring the Cisco SCE8000 to fully operational and non-bypassed status to confirm correct functioning of the link through the optic bypass module to the SCE8000-SIP module.

Step 5 Verify link connectivity by checking that the link LED on the 10 GBE interface is green, or by using the Cisco SCE8000 command line.

Figure 6-3 *Cabling the CTLR Interface on the External Bypass Module*

Figure 6-4 *Cabling the SCE8000-SCM-E Module*
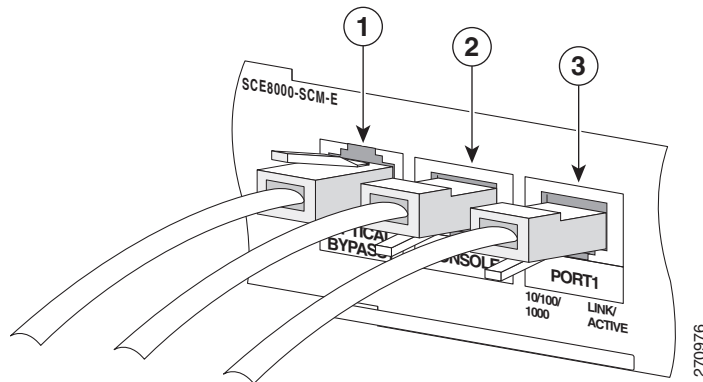
Testing Connectivity: Examining Link LEDs and Counters

If the Cisco SCE8000 platform has been powered up, verify that connectivity has been established on all links. If the Cisco SCE8000 platform is not powered up, perform this step after starting the Cisco SCE8000 platform.

- Examining the LEDs, page 6-16
- How to View the Ten Gigabit Ethernet Port Status, page 6-16
- How to View the Ten Gigabit Ethernet Counters, page 6-16
- How to View the User Log Counters, page 6-17

Examining the LEDs

The 10 GBE Link LED should be green, verifying that an active connection exists.

How to View the Ten Gigabit Ethernet Port Status

Step 1   At the **SCE>** prompt, enter **show interface TenGigabitEthernet 3/**baynumber**/0**.

This displays the port link status.

The following example displays a system response:

```
SCE# show interface TenGigabitEthernet 3/1/0
Actual Status:
Link is on
Bandwidth: 10000000Kbps
Burst-size: 500000bytes
```

How to View the Ten Gigabit Ethernet Counters

In an inline topology, you can monitor traffic via the platform counters for both the Rx and Tx connections. The counters increase as packets flow through the Cisco SCE8000 for both Rx and Tx.

However, in receive-only topologies, the counters for the Tx do not increment, as the Cisco SCE8000 is only monitoring traffic, and not re-transmitting it.

Step 1   At the **SCE>** prompt, enter **show interface TenGigabitEthernet 3/**baynumber**/0 counters**.

This displays the TenGigabitEthernet counters. This command enables you to verify that traffic is taking place. The counters increase together with real-time packet flow through the Cisco SCE8000.

Remember, in bump-in-the-wire topology, both the Rx and Tx counters apply as traffic monitors. For receive-only topologies, using an external splitter, only the Rx counters apply.

The following example shows the counters of the first Ten Gigabit Ethernet interface:

```
SCE> show interface TenGigabitEthernet 3/0/0 counters
In total octets: 100
In good unicast packets: 90
In good multicast packets: 0
In good broadcast packets: 10
In packets discarded: 0
In packets with CRC/Alignment error: 0
In undersized packets: 0
In oversized packets: 0
Out total octets: 93*2^32+1022342538
Out unicast packets: 858086051
Out non unicast packets: 0
Out packets discarded: 0
```

How to View the User Log Counters

You should view the user log for errors that occurred during the installation process.

Step 1   At the **SCE>** prompt, enter **show logger device User-File-Log counters** and press **Enter**.

```
SCE# show logger device user-file-log counters
Logger device User-File-Log counters:
Total info messages: 1
Total warning messages: 0
Total error messages: 0
Total fatal messages: 0
```

If there are "Total error messages" or "Total fatal messages", use the **show logger device User-File-Log** command to display details about the errors.

How to Install a Service Control Application

The Service Control solution requires that the Service Control application be installed on the SCE platform. This is a pqi file that is installed and configured using the Cisco Service Control Application for Broadband (SCA BB) console.

For an explanation of how to install the pqi file, see Installing the Application and Protocol Pack on the SCE Platform in *Cisco Service Control Product Installation Guide*.

For information on initial configuration of the application, see Initial SCA BB Configuration in *Cisco Service Control Product Installation Guide*.

For complete instructions on how to install and configure the SCA BB application, see the *Cisco Service Control Application for Broadband User Guide*.

Cascaded Systems

- How to Install a Cascaded System, page 6-19
- CLI Commands for Cascaded Systems, page 6-20

How to Install a Cascaded System

This section outlines the installation procedures for a redundant solution with two cascaded Cisco SCE8000 platforms. See *Cisco SCE8000 CLI Command Reference* for details of the CLI commands.

When working with two Cisco SCE8000 platforms with split-flow and redundancy, it is extremely important to follow this installation procedure.

Step 1 Install both Cisco SCE8000 platforms, power them up, and perform the initial system configuration. (See Chapter 4, "Installing the Cisco SCE8000 Chassis" and Chapter 5, "Connecting the Management Interfaces" and the "Starting the Cisco SCE8000 Platform" section on page 7-1.)

To maintain link continuity at all times, including during the reload sequence and power failure events, it is recommended to install optical bypass modules.

Step 2 Connect both Cisco SCE8000 platforms to the management station. (See Connecting the Management Interfaces, page 5-5.)

Step 3 Connect the cascade ports. (See Dual Link: Two Cisco SCE8000s Topology, page 6-3.)

The cascade ports must be either be connected directly in Layer 1 (dark fibers), or using the following procedure to connect through a switch.

- Connect port 3/2/0 from box A and port 3/3/0 from box B to a single switch. Configure them both on the same access VLAN, which is used only by the interfaces connected to these ports. No other interfaces in the switch should reside on that VLAN.
- Connect port 3/3/0 from box A and port 3/2/0 of box B to a switch on a different VLAN. Again, the access ports should be configured as access ports on this VLAN, which are used only by the interfaces connected to these ports. No other interfaces in the switch reside on the VLAN.

Step 4 Set topology configurations for each Cisco SCE8000 platform via the connection-mode options. (See How to Configure the Connection Mode, page 6-21.)

Step 5 Make sure that the Cisco SCE8000 platforms have synchronized and the active Cisco SCE8000 platform was selected.

Use the **show interface linecard 0 connection-mode** command.

Step 6 If you want to start with bypass, change the link mode to your required mode in both Cisco SCE8000 platforms on both links. The bypass mode is applied only to the active Cisco SCE8000 platform. (See How to Set the Link Mode, page 6-21.)

Step 7 Ensure that the link mode complies with what you required. (See Monitoring a Cascaded System, page 6-22.)

Use the **show interface linecard 0 link mode** command.

Step 8 Connect the traffic port of Cisco SCE8000 platform 1. This causes a momentary down time until the network elements from both sides of the Cisco SCE8000 platform auto-negotiate with it and starts working (when working inline). (See Dual Link: Two Cisco SCE8000s Topology, page 6-3.)

Step 9   Connect the traffic port of Cisco SCE8000 platform 2. This causes a momentary down time until the network elements from both sides of the Cisco SCE8000 platform auto-negotiate with it and starts working (when working inline). (See Dual Link: Two Cisco SCE8000s Topology, page 6-3.)

Step 10   When full control is needed, change the link mode on both Cisco SCE8000 platforms on both links to 'forwarding'. It is recommended to first configure the active Cisco SCE8000 platform and then the standby. (See How to Set the Link Mode, page 6-21.)

CLI Commands for Cascaded Systems

This section presents CLI commands relevant to the configuration and monitoring of a redundant system.

Topology-Related Parameters for Redundant Topologies

All four of the topology-related parameters are required when configuring a redundant topology.

- **Connection mode**—Redundancy is achieved by cascading two SCE platforms. Therefore the connection mode for both SCE platforms is:

    – Inline-cascade

- **sce-id**—In cascaded topologies, defines which link is connected to this SCE platform.

    The sce-id parameter, which identifies the SCE platform, replaces the physically-connected-link parameter, which identified the link. This change was required with the introduction of the Cisco SCE8000 GBE platform, which supports multiple links.

    In the Cisco SCE8000 10GBE, the number assigned to the sce-id parameter (0 or 1) is defined as the of number of the physically connected link.

✎
Note   For backward compatibility, the physically-connected-links parameter is still recognized.

- **Priority**—For each of the cascaded SCE platforms, this parameter defines whether it is the primary or secondary device.

- **On-failure**—For each of the cascaded SCE platforms, this parameter determines whether the system cuts the traffic or bypasses it via an external optical bypass module when the SCE platform either has failed or is booting.

    If either the *bypass* or *external-bypass* option is configured, the optical bypass module must be properly installed. If an optical bypass device is not detected, the command is executed but a warning is issued. The system then enters warning mode until either the command is changed, or the presence of an optical bypass device is detected.

How to Configure the Connection Mode

Use the following command to configure the connection mode, including the following parameters:

- inline
- sce-id (or physically connected links)
- behavior upon failure of the SCE platform
- primary/secondary

Step 1   From the **SCE(config if)#** prompt, enter **connection-mode** *inline-cascade* **physically-connected-links** *(link-0|link-1)* **priority** *(primary|secondary)* **on-failure** *(external-bypass|bypass|cutoff)* and press **Enter**.

EXAMPLE 1

Use the following command to configure the primary SCE platform in a two-SCE platform inline topology. Link 1 is connected to this SCE platform. If a failure occurs, the behavior of the SCE platform is bypass.

```
SCE(config if)# connection-mode inline-cascade physically-connected-links link-1 priority
primary on-failure bypass
```

EXAMPLE 2

Use the following command to configure the SCE platform that might be cascaded with the SCE platform in Example 1. This SCE platform would be the secondary SCE platform. Because Link 1 was connected to the primary, Link 0 would be connected to this SCE platform. The connection mode would be the same as the first. If a failure occurs, the behavior of the SCE platform is also bypass.

```
SCE(config if)# connection-mode inline-cascade physically-connected-links link-0 priority
secondary on-failure bypass
```

How to Set the Link Mode

The SCE platform has an internal hardware card used to maintain the links even when the SCE platform fails. This hardware card has three possible modes of operation:

- bypass
- forwarding
- cutoff

Normally, the link mode is selected by the SCE platform software according to the configured connection-mode. However, the **link mode** command can be used to enforce a specific desired mode. This may be useful when debugging the network, or in cases where we would like the SCE platform just to forward the traffic. (This is only relevant to inline topologies even though the configuration is available also when in receive-only mode.)

The following link mode options are available:

- **Forwarding**—Forwards traffic on the specified link to the SCE platform for processing.

- **Bypass**—Stops all forwarding of traffic on the specified link to the SCE platform. Traffic still flows on the link, but is not processed in any way by the SCE platform.

  This does not affect the redundancy states.

- **Cutoff**—Completely cuts off flow of traffic through the specified link.

Note the following recommendations and restrictions:

- Link mode is relevant only to inline topologies.

- It is recommended that in cascaded topologies, both SCE platforms be configured for the same link mode, otherwise the service is unpredictable.

- The default link mode is forwarding. When other link modes are selected, active service control is not available and any service control configuration is not applicable.

From the **SCE(config if)#** prompt, enter **link mode [forwarding|bypass|cutoff]** and press **Enter**.

Monitoring a Cascaded System

Use the following commands to monitor a cascaded system. They provide information about the connection status and link configuration.

How to View the Current Connection Mode

From the **SCE>** prompt, enter **show interface linecard 0 connection-mode** and press **Enter**.

How to View the SCE-ID

From the **SCE>** prompt, enter **show interface linecard 0 sce-id** and press **Enter**.

How to View the Current Link Mode

From the **SCE>** prompt, enter **show interface linecard 0 link mode** and press **Enter**.

How to View the Current Redundancy Status of the SCE Platform

From the **SCE>** prompt, enter **show interface linecard 0 cascade redundancy-status** and press **Enter**.

How to View Information about the Peer SCE Platform

From the **SCE>** prompt, enter **show interface linecard 0 cascade peer-sce-information** and press**Enter**.

How to View Information about the Cascade Connections

From the **SCE>** prompt, enter **show interface linecard 0 cascade connection-status** and press **Enter**.

How to View the Current Link Mappings

From the **SCE>** prompt, enter **show interface linecard 0 physically-connected-links** and press **Enter**.