



APPENDIX **A**

The External Optical Bypass Module

Revised: December 24, 2010, OL-21096-02

Introduction

The SCE 2000 platform External Optical Bypass module preserves the service provider GBE links in case of complete power failure of the SCE 2000 platform, or for implementing a maintenance window.

The SCE 2000 platform state-of-the-art Service Control platform is being deployed at ISPs, Cable and Wireless Tier1 provider networks, and is therefore required to comply with the carrier grade availability requirements of these mission critical networks.

The SCE 2000 platform already includes an internal Electrical Bypass module that puts the SCE 2000 platform into bypass state in case of a software or hardware failure at the platform main board, thereby preserving the GBE network link.

The External Optical Bypass module provides additional service protection by enabling automatic preservation of the network GBE link in two additional important scenarios:

- Complete loss of power in the SCE 2000 platform — The SCE 2000 platform includes redundant Power Supply Units and redundant power feeds, in both the DC and AC versions. However, in case either both PSUs fail, or both power feeds stop providing power to the SCE 2000 platform simultaneously, the network link will be preserved by the External Optical Bypass module.
- Maintenance window implementation — In certain situations the SCE 2000 platform should be pulled from the network for replacement, such as:
 - Hardware failure in the SCE 2000 platform.
 - Hardware upgrade on the SCE 2000 platform

In these cases, a maintenance window is implemented, during which the SCE 2000 platform is pulled from the network. It may be replaced by another SCE 2000 platform, either almost immediately, or after several hours or days. An External Optical Bypass module enables the implementation of such replacement while preserving normal operation of the network link.

The External Optical Bypass module is another important component in the Cisco overall carrier-grade solution for high-availability service provider networks

External Optical Bypass Functionality

The External Optical Bypass module is connected bump-in-the-wire in the GBE link. It is then connected to the SCE 2000 platform with two types of connections:

- GBE optical connections for data link traffic — GBE connections from the External Optical Bypass module to one pair of the GBE line ports.
- Power and Control connection — Connection to a dedicated connector on the SCE 2000 platform back panel, so the SCE 2000 platform can provide power to the External Optical Bypass module. (Note that the power connection also provides the logical control functionality.)

The External Optical Bypass module is normally inactive, (not in bypass), and simply transfers the two GBE signals to and from the SCE 2000 platform.

In case the SCE 2000 platform stops providing power to the External Optical Bypass module, or in case the power cable is disconnected from the optical bypass module, the External Optical Bypass module becomes active, bypassing the two GBE links to the SCE 2000 platform, and thus preserving network connectivity.

Figure A-3 illustrates the operation of the bypass module when it is inactive (not in bypass). The data traffic is simply transferred through the bypass module to the SCE 2000 platform.

Figure A-1 Operation of the Bypass Module When Inactive

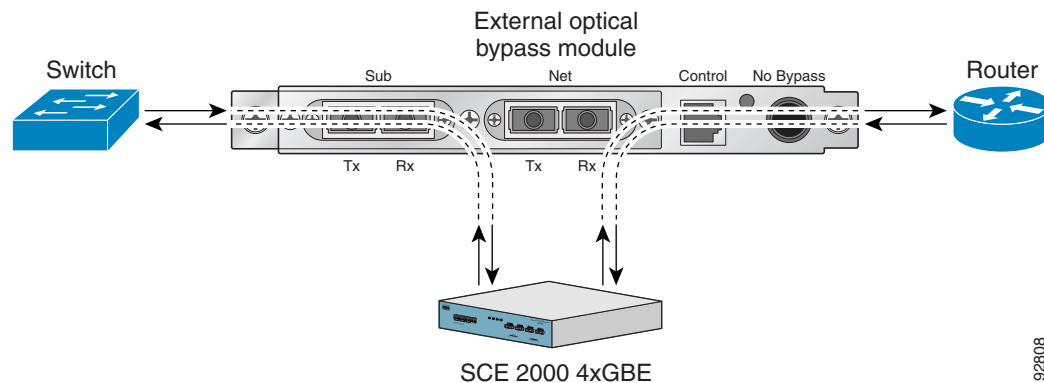
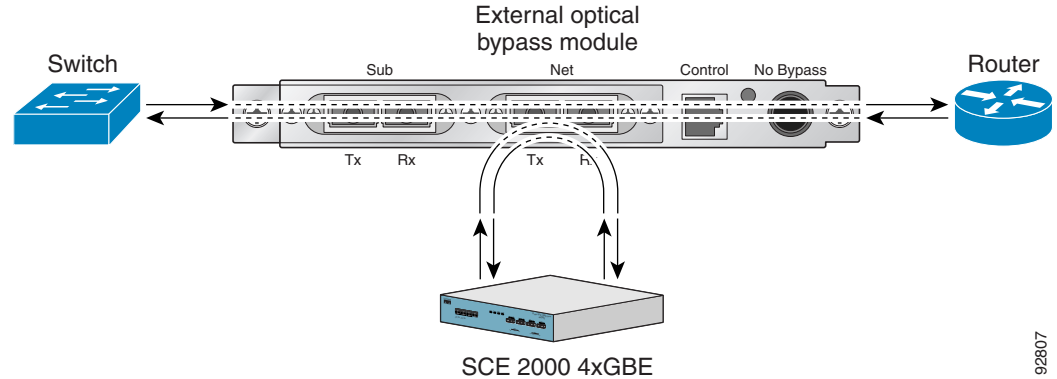


Figure A-4 illustrates the operation of the bypass module when it is active (in bypass). The data traffic flows through the bypass module, and the GBE link no longer includes the SCE 2000 platform. Note that when the bypass module is active, it puts the SCE 2000 platform into a loop connection, creating a shortcut between the SCE 2000 platform GBE interfaces.

Figure A-2 Operation of the Bypass Module When Active



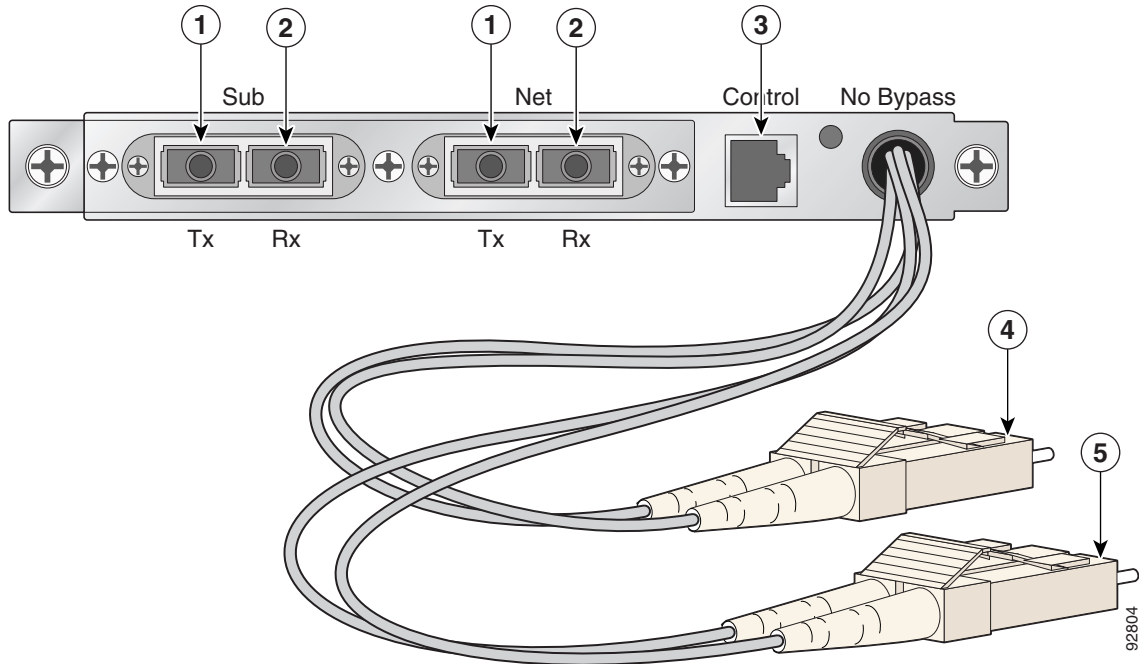
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The External Optical Bypass Module Front Panel

The front panel of the External Optical bypass module (Figure A-3) contains the following components:

- SUB Rx/Tx — GBE port that connects to the network element on the Subscriber side of the link.
- NET Rx/Tx — GBE port that connects to the network element on the Network side of the link.
- CONTROL — RJ-45 port that connects to the Bypass connector on the rear panel of the SCE 2000 platform. The SCE 2000 platform controls the External Optical Bypass module via this connection, by the presence or absence of electrical power.
- Pigtail fiber connectors — Four fiber cables that connect to the GBE link ports on the front panel of the SCE 2000 platform
 - NET Tx
 - NET Rx
 - SUB Tx
 - SUB Rx
- No Bypass LED:
 - ON = Bypass module is not active (GBE traffic flows through the SCE 2000 platform)
 - OFF = Bypass module is active (GBE traffic flows through the bypass module)

Figure A-3 External Optical Bypass Module



Installing the External Bypass Module

Installation of the External Optical Bypass module requires two main steps, which are described in detail in the following sections.

- [How to Install the Module in a Rack, page A-4](#)
- [How to Cable the External Optical Bypass Module, page A-5](#)

How to Install the Module in a Rack

The following procedure describes how to install the module in a 19" rack.

Note that, although each module is shipped with its own mounting panel, it is not necessary to install each module in a separate mounting panel. Up to three modules may be installed in one mounting panel.

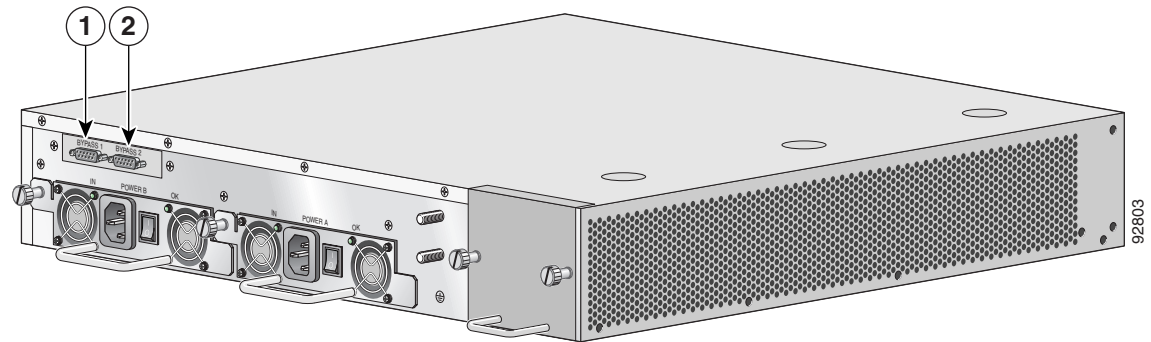
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- Step 1** Using the screws attached to the module, screw it into an empty position in the mounting panel.
- Step 2** Secure the module panel to the two front posts of the rack above the SCE 2000 platform. Leave at least 1.5 cm vertical clearance between the SCE 2000 platform and the module panel to provide space for the cables from the front panel of the module to the rear of the SCE 2000 platform.
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How to Cable the External Optical Bypass Module

The following procedure describes how to cable the External Optical Bypass module. Note the following:

- All connections to the External Optical Bypass module are on the front panel of the module (Figure A-4).
- If installing only one module, the connections are as follows:
 - Connect the fiber (steps 3 and 4) to the GBE-1 Line ports on the SCE 2000 platform.
 - Connect the control cable to the **Bypass 1** 9-pin D-Type connector on the rear panel of the SCE 2000 platform.
- If installing two modules, repeat the entire procedure for the second module, with the following changes:
 - Connect the fiber (steps 3 and 4) to the GBE-2 Line/Cascade ports on the SCE 2000 platform.
 - Connect the control cable to the Bypass 2 9-pin D-Type connector on the rear panel of the SCE 2000 platform.

Figure A-4 SCE 2000 Rear Panel Bypass Connectors

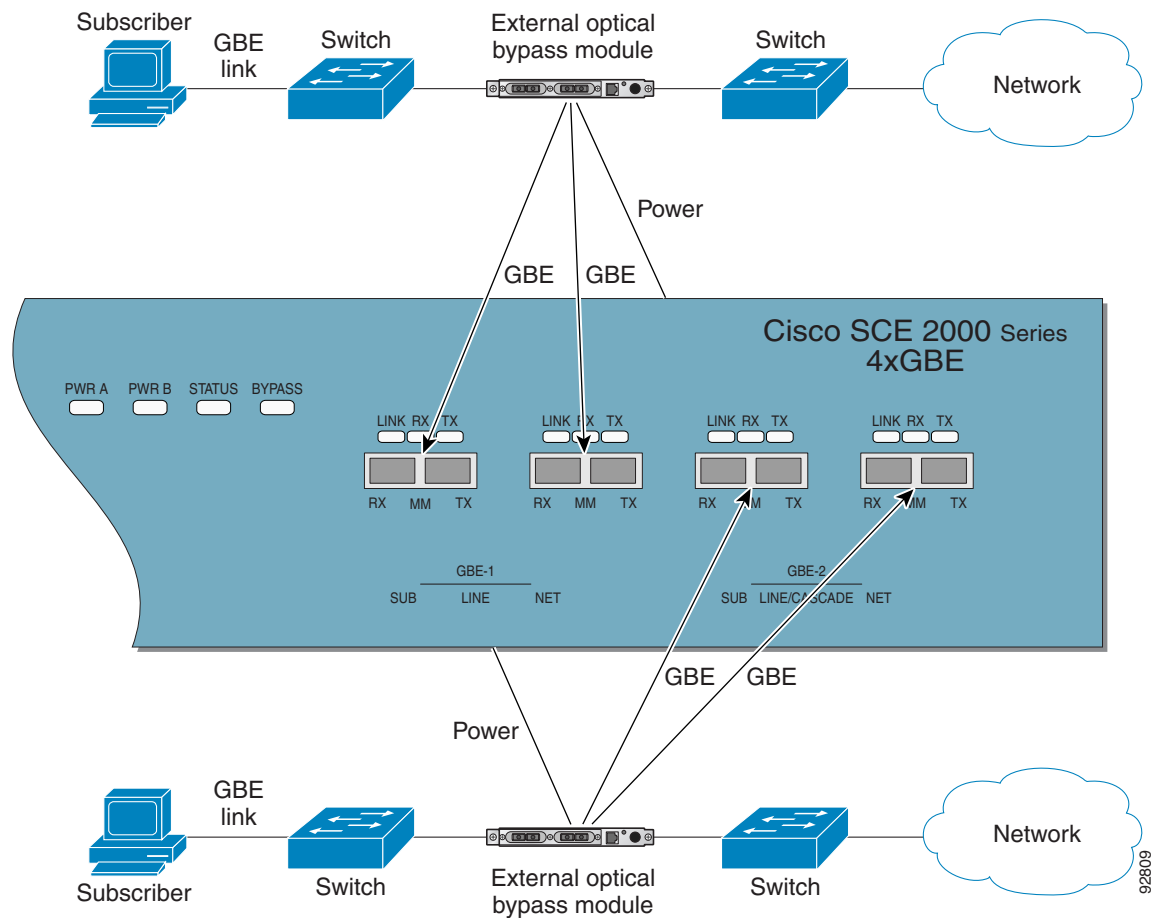


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- Step 1** Connect an optical cable (user supplied) between the GBE port on the Subscriber side network element and the **SUB** port on the External Optical Bypass module.
- Step 2** Connect an optical cable (user supplied) between the GBE port on the Network side network element and the **NET** port on the External Optical Bypass module.
- Verify that the links between the two network elements are active.
- Step 3** Connect the **SUB** cable of the fiber of the External Optical Bypass module to the **SUB** GBE port of the SCE 2000 platform.
- Rx<->Tx**
- Step 4** Connect the **NET** cable of the fiber of the External Optical Bypass module to the **NET** GBE port of the SCE 2000 platform.
- Rx<->Tx**

- Step 5** Power up the SCE 2000 platform, as explained in [Basic SCE 2000 Platform Operations, page 7-1](#). Verify that the relevant GBE interfaces of the SCE 2000 platform are now in sync, as the External Optical Bypass module is now active (in bypass), and is performing a loopback on these interfaces.
- Auto-Negotiation should be configured identically for the two SCE 2000 platform GBE interfaces and the GBE interfaces of the switch/router on either side of the External Optical Bypass module. It is recommended that the two GBE interfaces of the SCE 2000 platform, as well as the GBE interfaces of the switch/router on either side of the External Optical Bypass module, be configured to **Auto-Negotiation = OFF**
- Step 6** Connect the control cable (supplied in the kit) from the Bypass 9-pin D-Type connector on the rear panel of the SCE 2000 platform to the Control connector on the External Optical Bypass module.
- The SCE 2000 platform immediately starts providing power to the External Optical Bypass module, so the bypass module becomes inactive, and starts transferring the traffic to the SCE 2000 platform. The “No Bypass” LED should therefore be lit.

Figure A-5 displays the external optical bypass module connectivity.

Figure A-5 External Optical Bypass Module Connectivity



Specifications

Table A-1 lists the external bypass module specifications and Table A-2 lists the control cable pinouts.

Table A-1 Specifications

Item	Value
Optical Connectors	SC
Switching Speed	15 ms max
Operating Wavelength	<ul style="list-style-type: none"> • Multi Mode: 850 nm • Single Mode: 1310 nm
Operating Temperature	-10° C to +65° C (14° F to 149° F)
Storage Temperature	-30° C to +70° C (-22° F to 158° F)
Weight	12 oz (340 g)

Table A-2 Control Cable Pinouts

Function	Pin (D-type side)	Pin (RJ-45 side)
Bypass Present (common to 2)	1	1
Bypass Present (common to 1)	2	2
GND	3	3
GND	4	4
+5V	5	5
+5V	6	6
--	7-NC	7
--	8-NC	8
--	9-NC	--
Shield	Shield	Shield

