



Troubleshooting 10-GE Transponder Module Problems

This chapter describes how to troubleshoot 10-GE transponder module problems. This document contains the following sections:

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6.1 Overview

The 10-GE transponder module on the Cisco ONS 15540 ESPx implements the 10GBASE-LR IEEE 802.3ae standard. It supports connections to a Cisco ONS 15530 1310-nm 10-Gbps uplink card acting as a downlink and connections to a native 10GBASE-LR or a 10GBASE-ER IEEE 802.3ae MAC implementation. The 10-GE transponder module has one short reach 1310-nm laser on the client side and an ITU DWDM 1550-nm laser at the trunk side.

The 10-Gbps line card motherboard has two half-sized subslots that can accommodate two 10-GE transponder modules. There are two types of 10-Gbps line card motherboards, splitter and nonsplitter.

[Figure 6-1](#) shows the architecture of the 10-GE transponder module.

Figure 6-1 10-GE Transponder Module Architecture

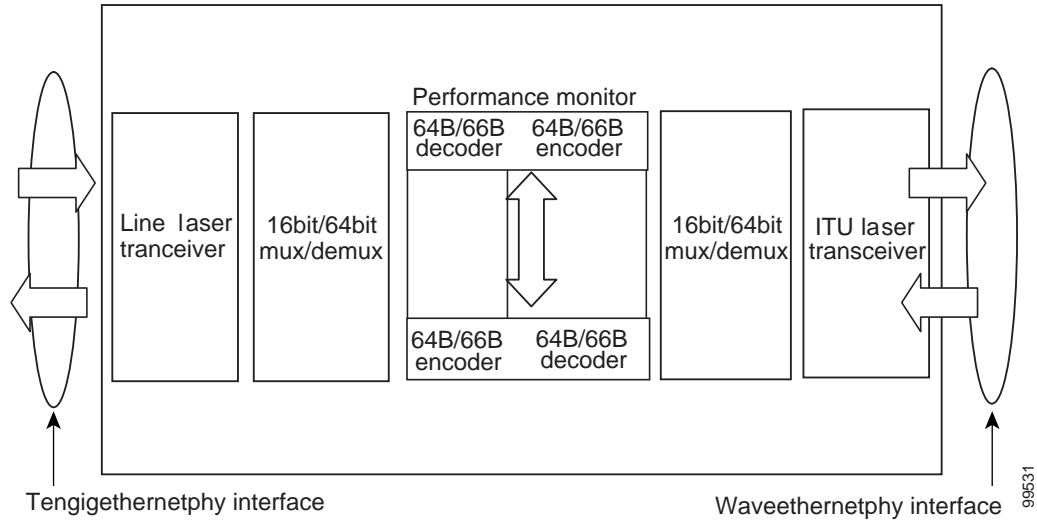
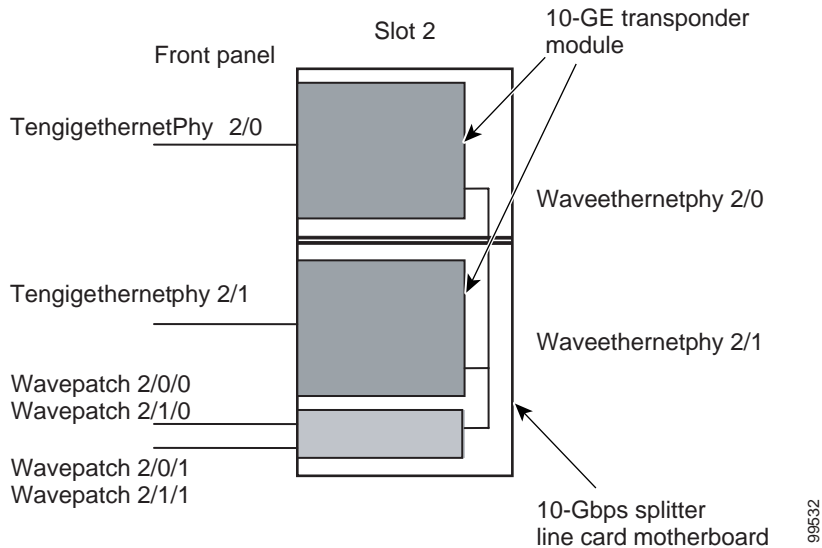


Figure 6-2 shows an example of the interfaces for the 10-GE transponder module and the splitter 10-Gbps line card motherboard.

Figure 6-2 10-GE Transponder Module and 10-Gbps Splitter Line Card Motherboard Interfaces

**Note**

The 10-Gbps nonsplitter line card motherboard has only two wavepatch interfaces, wavepatch *slot/0/0* and wavepatch *slot/1/0*.

6.2 Initial Troubleshooting Checklist

Follow this initial checklist before proceeding with the troubleshooting procedures:

- Check that the receive signal power level on the trunk side is between -22 dBm and -8 dBm.
- Check that the receive signal power level on the client side is between -13.23 dBm and 0.5 dBm.
- Ensure that all optical connectors are clean. Refer to the [Cisco ONS 15540 ESPx Cleaning Procedures for Fiber Optic Connections](#) document.
- Ensure that the MTP connectors are firmly connected to the mux/demux module and to the 10-Gbps line card motherboard.
- If you are using the cross connect drawer, ensure that the MU connectors are firmly connected.
- Issue **show interfaces** commands to ensure that the tengigetheretnphy, waveethernetphy, and wavepatch interfaces are administratively up, that there are no errors on the interfaces, and that the ITU laser is powered up.
- Issue the **show connect** command to verify the status of the cross connections to the aggregation cards.
- Check that the LEDs on the cards show the proper state.
- Issue the **show facility-alarm status** command to display the alarms on the interfaces.
- Check that the 10-GE transponder modules are patched to the correct mux/demux module ports. Issue the **show patch** command to verify that there are no frequency mismatches.

6.3 Cabling the 10-GE Transponder Module

Correctly connecting the 10-GE transponder module is very important to avoid problems. You can connect the 10-GE transponder module to a mux/demux module either directly using an MTP-to-MTP cable or through the cross connect drawer using an MTP-to-4-MU cable.

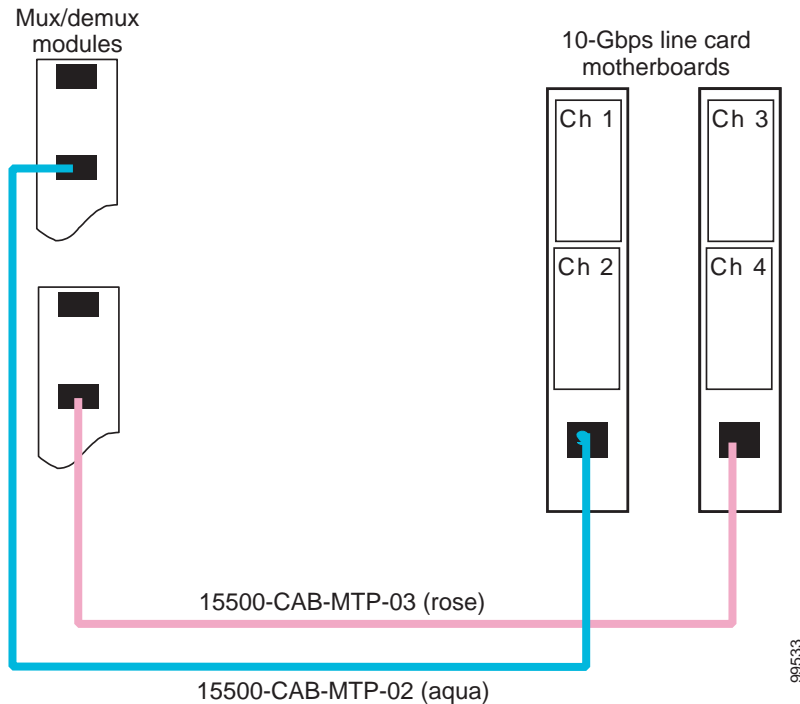
Unlike the 2.5-Gbps line card motherboard, which can accommodate four 2.5-Gbps transponder modules, the 10-Gbps line card motherboard accommodates only two 10-GE transponder modules. To support the 10-Gbps line card motherboards, there are two versions of each type of cable, one for the first two channels (lower channels) in the band and one for the last two channels (higher channels) in the band.

6.3.1 Direct Cabling Using MTP-to-MTP Cables

The MTP-to-MTP cables for the 10-Gbps line card motherboard are the 15500-CAB-MTP-02 (aqua) and the 15500-CAB-MTP-03 (rose) cables. Use the aqua colored cable to directly connect the lower channel 10-GE transponder modules to the mux/demux module. Use the rose colored cable to directly connect a higher channel 10-GE transponder module to the mux/demux module.

[Figure 6-3](#) shows the aqua colored cable connecting a lower channel 10-GE transponder module (for example, channels 1/2, 5/6, 9/10, 13/14, 17/18, 21/22, 25/26, or 29/30) and the rose colored cable connecting a higher channel 10-GE transponder module (for example, channels 3/4, 7/8, 11/12, 15/16, 19/20, 23/24, 27/28, or 31/32).

Figure 6-3 MTP-to-MTP Cabling Example

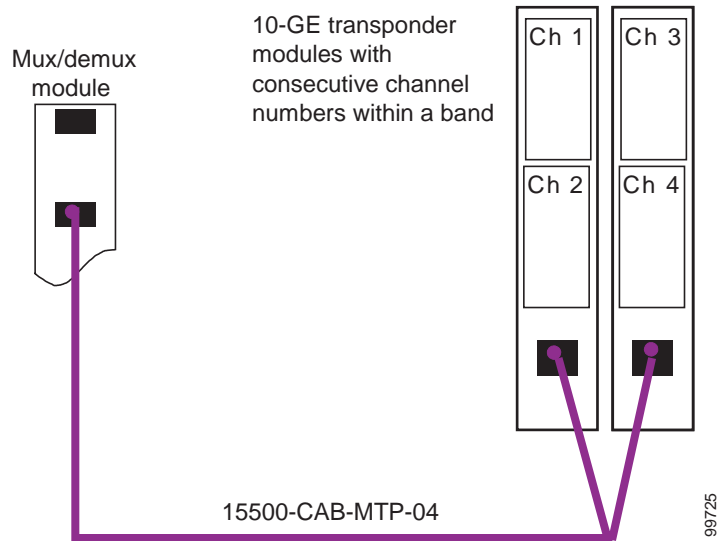
**Note**

The 10-GE transponder modules must be in increasing order in the 10-Gbps line card motherboard for these connections to function correctly. Be sure that the modules supporting the first channel in the channel pair is in the top subslot and the module supporting the second channel in the channel pair is in the bottom subslot.

6.3.2 Direct Cabling Using MTP-to-2-MTP Cables

The MTP-to-2-MTP cable can be used to directly connect two 10-Gbps line card motherboards to a mux/demux module. Use this cable when you want to connect two 10-Gbps line card motherboards, containing four transponder modules supporting consecutive channels in the band, to a mux/demux module. Figure 6-5 shows an example of how you can connect two 10-Gbps line card motherboard to one mux/demux module with an MTP-to-2-MTP cable.

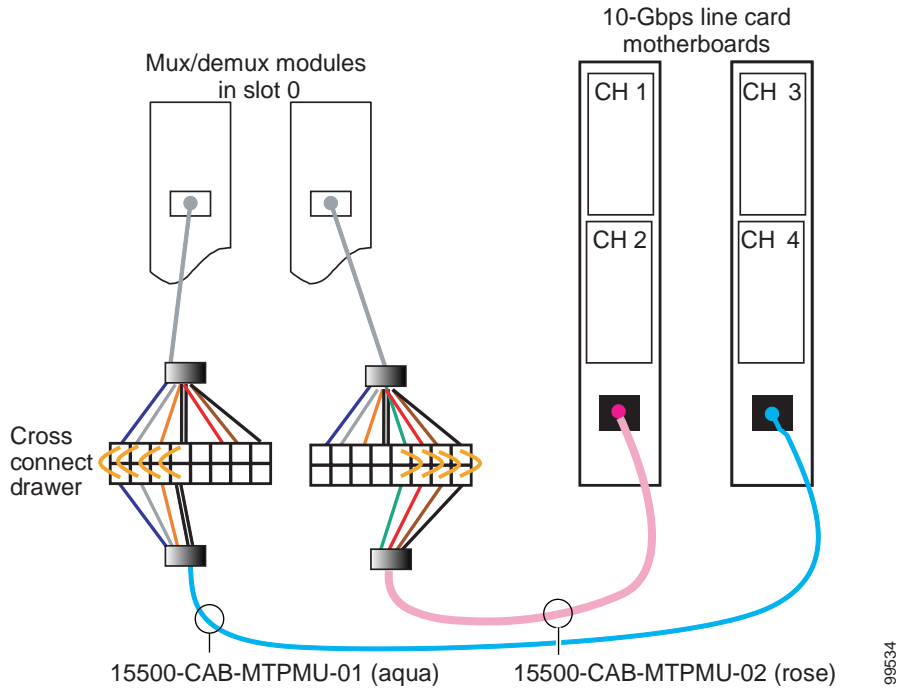
Figure 6-4 MTP-to-2-MTP Cabling Example



6.3.3 Cross Connect Drawer Cabling Using MTP-to-4-MU Cables

The MTP-to-4-MU cables for the 10-Gbps line card motherboard are the 15500-CAB-MTPMU-1 (aqua) and the 15500-CAB-MTPMU-2 (rose) cables. [Figure 6-5](#) shows an example of how you can connect the 10-Gbps line card motherboard to the cross connect drawer.

Figure 6-5 Connecting 10-Gbps Line Card Motherboard to the Cross Connect Drawer



6.4 Troubleshooting 10-GE Transponder Module Interface Problems

This section contains troubleshooting procedures for 10-GE transponder module interface problems.

You can use the 10-GE transponder module on the Cisco ONS 15540 ESPx to connect to native IEEE 802.3ae 10-GE interfaces on the Catalyst 6500, the Catalyst 7600, or the Cisco Gigabit Switch Routers. You can also connect to a 1310-nm 10-Gbps uplink card on a Cisco ONS 15530. The CDL channel should be disabled on the `tengigethernetphy` interfaces on the 10-GE transponder module while connecting to the native IEEE 802.3ae interfaces and then enabled while connecting to the 10-Gbps uplink card (see [Figure 6-6](#) and [Figure 6-7](#)).

Figure 6-6 Connecting to Native IEEE 802.3ae 10-GE Interfaces

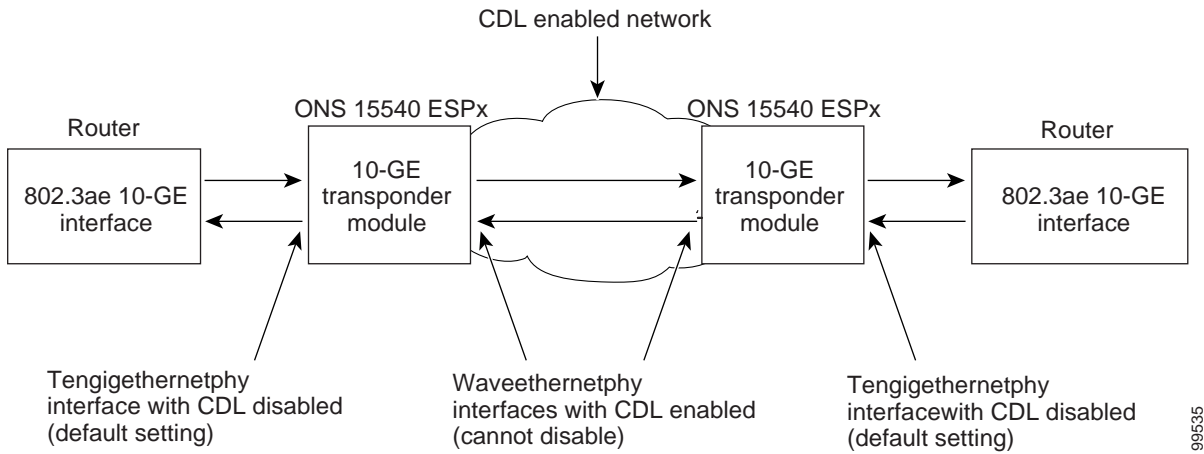
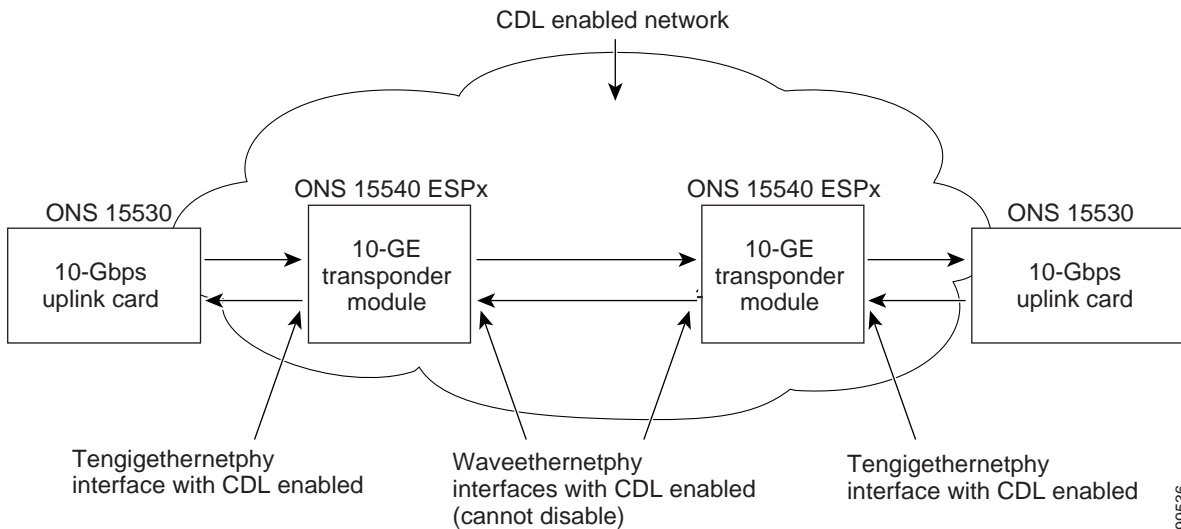


Figure 6-7 Connecting to Cisco ONS 15530 Systems



Make sure the tengigethernetphy and waveethernetphy interfaces are not administratively shut down and that the laser is turned on. Use the **no shutdown** and **no laser shutdown** commands in interface configuration mode to enable the interface and turn on the laser before troubleshooting any problems.

6.4.1 Tengigethernetphy Interface Down and Shows Loss of Lock

Symptom A tengigethernetphy interface is down and signal quality status shows Loss of Lock.

Table 6-1 describes the potential causes of the symptom and the solutions.

Table 6-1 *Waveethernetphy Interface Down and Shows Loss of Lock*

Possible Problem	Solution
The optical connectors connecting the 10-GE transponder module and the client equipment are dirty.	Refer to the Cisco ONS 15540 ESPx Cleaning Procedures for Fiber Optic Connections document.
The client signal power is too low or too high.	Check the signal power received from the client equipment. Ensure that it is between -13.23 dBm and 0.5 dBm. If not, adjust the attenuation as follows: <ul style="list-style-type: none"> Using an SC-to-SC single mode fiber with a 5 dB attenuator, connect the Tx of the 10-GE transponder module to the Rx of the client equipment. Check that the interface comes up with a good signal quality. Verify that the client Tx and Rx LEDs are on.
The remote peer is not transmitting a signal.	Ensure that the remote peer signal is enabled and is transmitting light.

6.4.2 Waveethernetphy Interface Down and Shows Loss of Lock

Symptom A waveethernetphy interface is down and signal quality status shows Loss of Lock.

[Table 6-2](#) describes the potential causes of the symptom and the solutions.

Table 6-2 *Waveethernetphy Interface Down and Shows Loss of Lock*

Possible Problem	Solution
The patch cables are incorrectly connected to the mux/demux module.	Check the patch error status in the show patch command output. If it shows a mismatch, correct the patch on the 10-GE transponder module to the correct ports on the mux/demux module.
The optical connectors connecting the mux/demux modules and the line card motherboards are dirty.	Refer to the Cisco ONS 15540 ESPx Cleaning Procedures for Fiber Optic Connections document.
The ITU signal power is too low or too high.	Check the signal power received from the mux/demux module. Ensure that it is between -22 dBm and -6 dBm. If not, adjust the attenuation.
The trunk fiber is broken.	Check the signal power received from the trunk. If it is below -22 dBm, check for trunk fiber breaks.
The remote peer is not transmitting a signal.	Ensure that the remote peer signal is enabled and is transmitting light.

6.4.3 Waveethernetphy Interface Down and Shows Loss of Sync

Symptom A waveethernetphy interface is down and signal quality status shows Loss of Sync.

[Table 6-3](#) describes the potential causes of the symptom and the solutions.

Table 6-3 Waveethernetphy Interface Down and Shows Loss of Sync

Possible Problem	Solution
The optical connectors are dirty.	Refer to the Cisco ONS 15540 ESPx Cleaning Procedures for Fiber Optic Connections document.
The ITU signal power is too low.	Check the signal power received from the mux/demux module. Ensure that it is between -22 dBm and -6 dBm. If not, adjust the attenuation.

6.4.4 Ethernetdcc Interface Down

Symptom The ethernetdcc interface is down and pings across the interface fail.

[Table 6-4](#) describes the potential causes of the symptom and the solutions.

Table 6-4 Ethernetdcc Interface Down

Possible Problem	Solution
The local ethernetdcc interface is administratively shut down.	Use the show interfaces command to determine the administrative status of the local ethernetdcc interface. If it is administratively shut down, use the no shutdown command to bring it up.
The remote peer ethernetdcc interface is administratively shut down.	Use the show interfaces command to determine the administrative status of the remote ethernetdcc interface. If it is administratively shut down, use the no shutdown command to bring it up.

6.4.5 Tengigethernetphy Interface Shows CVRD Errors

Symptom A tengigethernetphy interface shows code violation and running disparity (CVRD) errors.



Note

Errors on the tengigethernetphy interface propagate to the remote waveethernetphy interface.

[Table 6-5](#) describes the potential causes of the symptom and the solutions.

Table 6-5 *Tengigethermetphy Interface Shows CVRD Errors*

Possible Problem	Solution
The optical connectors connecting the 10-GE transponder module and the client equipment are dirty.	Refer to the Cisco ONS 15540 ESPx Cleaning Procedures for Fiber Optic Connections document.
The client signal power is too low or too high.	Check the signal power received from the client equipment. Ensure that it is between -13.23 dBm and 0.5 dBm. If not, adjust the attenuation as follows: <ul style="list-style-type: none"> Using an SC-to-SC single mode fiber with a 5 dB attenuator, connect the Tx of the 10-GE transponder module to the Rx of the client equipment. Check that the interface comes up with a good signal quality. Verify that the client Tx and Rx LEDs are on.

6.4.6 Waveethernetphy Interface Shows CVRD Errors

Symptom A waveethernetphy interface shows CVRD errors.

Table 6-6 describes the potential cause of the symptom and the solution.

Table 6-6 *Waveethernetphy Interface Shows CVRD Errors*

Possible Problem	Solution
The optical connectors connecting the mux/demux modules and the line card motherboards are dirty.	Refer to the Cisco ONS 15540 ESPx Cleaning Procedures for Fiber Optic Connections document.

6.5 Troubleshooting 10-GE Transponder Module Problems Using Loopbacks

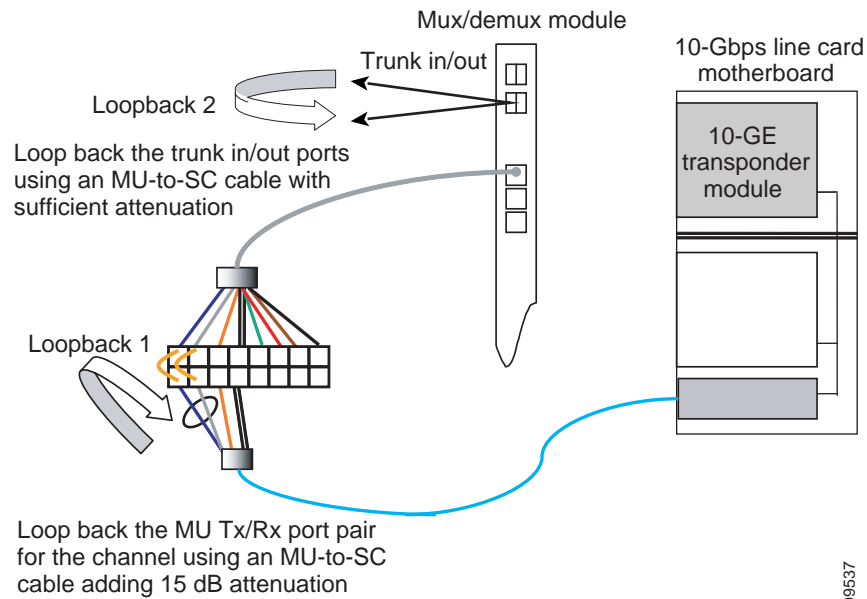
This section describes how to perform fault isolation on 10-GE transponder modules using the following types of loopbacks:

- Physical fiber loopbacks
- Client signal software loopbacks
- Trunk software loopbacks

6.5.1 Physical Fiber Loopbacks

You can use physical fiber loopbacks at various places to check the connectivity and isolate a bad or dirty fiber. Using an SC-to-MU cable with a 15 dB attenuator, you can set up a loopback in the cross connect drawer for the MU pair of the channel being verified. This ensures that the connectivity between the 10-GE transponder module through the 10-Gbps line card motherboard onto the MTP-to-4-MU fiber is good (see Loopback 1 in the example in Figure 6-8). You can also loop back the multiplexed trunk fiber coming out of the trunk port in/out interfaces of the mux/demux module. This loopback verifies the connectivity from the 10-GE transponder module through the cross connect drawer and the mux/demux module (see Loopback 2 in the example in Figure 6-8).

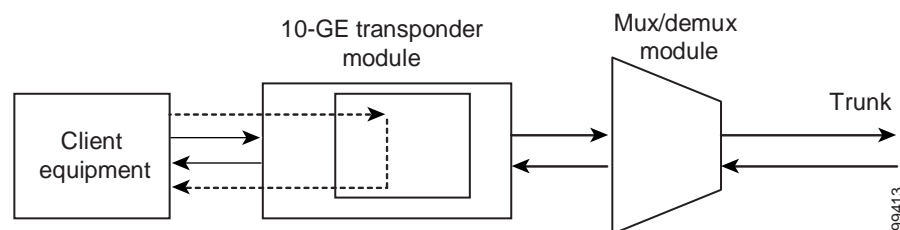
Figure 6-8 Physical Fiber Loopback Examples



6.5.2 Client Signal Software Loopbacks

A client signal software loopback verifies the functioning between the client equipment and the 10-GE transponder module (see Figure 6-9).

Figure 6-9 Client Signal Loopback Example on a 10-GE Transponder Module



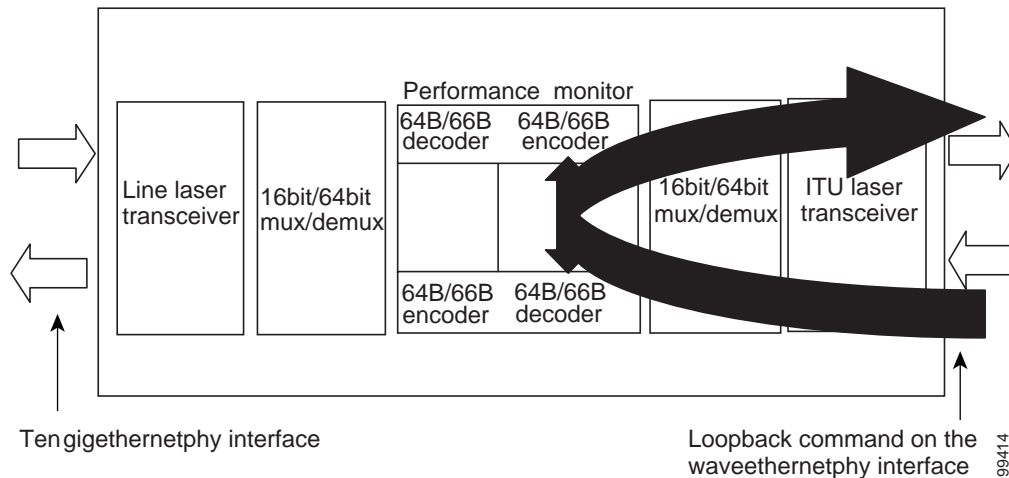
Procedure: Create a Client Software Loopback

-
- Step 1 Issue a **loopback** command on the tengigethernetphy interface.
 - Step 2 Check that the signal reaches the local client equipment.
 - Step 3 If the signal does not reach the local client equipment, check the trunk fiber and the interfaces along the signal path. If the fiber is intact, contact Cisco Systems technical support.
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6.5.3 Trunk Software Loopbacks

A trunk software loopback verifies the functioning of the 10-GE transponder module on the trunk side (see Figure 6-10). With this feature, you can verify the communication between two 10-GE transponder modules.

Figure 6-10 Trunk Side Loopback Example on a 10-GE Transponder Module



Procedure: Create a Trunk Software Loopback

-
- Step 1 Issue a **loopback** command on the waveethernetphy interface.
 - Step 2 Check that the signal reaches the system at the far end.
 - Step 3 If the signal does not reach the far end, check the trunk fiber and the interfaces along the signal path. If the fiber is intact, contact Cisco Systems technical support.
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