Troubleshooting Network Connections

This chapter provides troubleshooting information about connectivity of the physical interfaces in a network topology. This chapter includes:

Evaluating Component Connections and Configurations

Evaluate your optical network by determining how the network components are connected and configured.

To display the overall configuration of the optical connections, use the following EXEC commands:

Command	Purpose
show aps	Displays the APS (Automatic Protection Switching) status for the entire system.
show connect {edges | intermediate [sort-channel | interface *slot/subcard/0*]}	Displays the connections through the shelf.

To familiarize yourself with the configuration of the optical network prior to troubleshooting, use the following commands:

Step 1 Use the **show aps** command to display the configuration of APS and the status of the connections involved.

```
Switch# show aps

AR : APS Role, Wk: Working, Pr: Protection
AS : APS State, Ac: Active, St: Standby
IS : Interface State, Up: Up, Dn: Down
MPL: Minimum Protection Level, SD: Signal Degrade, SF: Signal Failure
     LOL: Loss of Light, - not currently protected

Interface         AR AS IS MPL Redundant Intf    Group Name
~~~~~~~~~~~~~~~~~ ~~ ~~ ~~ ~~~ ~~~~~~~~~~~~~~~~ ~~~~~~~~~~~~~~~~~~~
```

```
Wavepatch10/0/0   Wk St Dn     Wavepatch10/0/1   Wavepatch10/0/0
Wavepatch10/1/0   Wk St Up     Wavepatch10/1/1   Wavepatch10/1/0
Wavepatch10/2/0   Wk St Up     Wavepatch10/2/1   Wavepatch10/2/0
Wavepatch10/3/0   Wk St Up     Wavepatch10/3/1   Wavepatch10/3/0
Wavepatch10/0/1   Pr St Dn     Wavepatch10/0/0   Wavepatch10/0/0
Wavepatch10/1/1   Pr Ac Up LOL Wavepatch10/1/0   Wavepatch10/1/0
Wavepatch10/2/1   Pr Ac Up LOL Wavepatch10/2/0   Wavepatch10/2/0
Wavepatch10/3/1   Pr Ac Up LOL Wavepatch10/3/0   Wavepatch10/3/0
```

Step 2 Check the AR (APS Role). It shows the working and protection interfaces.

Step 3 Check the AS (APS State). It shows the active and standby interfaces.

Step 4 Check the IS (Interface State). It shows the status of the working and protection interfaces.

Step 5 Use the **show connect intermediate** command to display the connections configured from the mux/demux module through the system to the transponders.

```
Switch# show connect intermediate
client/       wave          wave            wdm
wave          client        patch   filter  trk  channel
------------  ------------  ------- ------  ----- -------
Trans2/0/0    Wave2/0       2/0/0*  0/0/0   0/0    1
                            2/0/1
Trans2/1/0    Wave2/1       2/1/0*  0/0/1   0/0    2
                            2/1/1
Trans2/2/0    Wave2/2       2/2/0*  0/0/2   0/0    3
```

Step 6 Use the **show connect edges** command to display the connections configured from the mux/demux module through the system to the transponders and the wavelength being used.

```
Switch# show connect edges
client/
client/
wave           wdm   channel
------------  -----  -------
Trans2/0/0     0/0      1
Trans2/1/0     0/0      2
Trans2/2/0     0/0      3
```

Troubleshooting APS

This section describes the troubleshooting processes for APS (Automatic Protection Switching). APS provides redundancy and protects against module failures and fiber cuts. For detailed APS configuration, refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference*.

Displaying APS Configuration

To troubleshoot the APS configuration on the processor card, use the following commands:

Command	Purpose
show aps	Displays summary APS status information for the entire system.
show aps group *group-name*	Displays detailed APS status information for a specific group.
show aps detail	Displays detailed APS configuration and status information for the entire system.
show aps interface {transparent ***slot*/*subslot*/*port*** **| wavepatch** ***slot*/*subslot*/*port*****}**	Displays the APS information for a specific interface.

Follow these steps to troubleshoot the APS configuration on the processor card:

Step 1 Use the **show aps** command to display the configuration of APS and the status connections involved. You can see the output of the **show aps** command in the "Evaluating Component Connections and Configurations" section on page 2-1.

Step 2 Use the **show aps interface wavepatch** command to display APS information for a wave interface connection.

```
Switch# show aps interface wavepatch 8/0/0

APS Group alpha :

 architecture.: 1+1, remote prov: 1+1
 span.........: end-to-end (network side splitter)
 direction....: prov: uni, current: uni, remote prov: uni
 revertive....: no
 created......: 13 hours, 54 minutes
 aps state....: associated (enabled)
 request timer: holddown: 5000 ms, max: 15000 ms, count 2
 search-up int: min: 2 secs, max: 32 secs
 switched chan: 0
 channel  ( 0): Wavepatch8/0/0 (STANDBY - UP)
              : channel  request: no-request
              : transmit request: no-request
              : receive  request: do-not-revert
 channel  ( 1): Wavepatch8/0/1 (ACTIVE - UP)
              : channel  request: no-request
              : switchover count: 1
              : last  switchover: 13 hours, 54 minutes
```

Step 3 Use the **show aps group** command to display APS information for a group named alpha.

```
Switch# show aps group alpha

APS Group alpha :

  architecture.: 1+1, remote prov: 1+1
  span.........: end-to-end (network side splitter)
  direction....: prov: uni, current: uni, remote prov: uni
  revertive....: no
  created......: 13 hours, 56 minutes
  aps state....: associated (enabled)
  request timer: holddown: 5000 ms, max: 15000 ms, count 2
  search-up int: min: 2 secs, max: 32 secs
  switched chan: 0
  channel  ( 0): Wavepatch2/0/1 (STANDBY - UP)
```

```
              : channel  request: no-request
              : transmit request: no-request
              : receive  request: do-not-revert
channel  ( 1): Wavepatch2/0/0 (ACTIVE - UP)
              : channel  request: no-request
              : switchover count: 0
              : last  switchover: never
```

If you determine that APS is not configured correctly, refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference*.

Debugging APS Configuration

The debug privileged EXEC commands can provide a wealth of information about the status of APS.

Caution Exercise care when using **debug** commands. Many of these commands are processor intensive and can cause serious network problems (such as degraded performance or loss of connectivity) if they are enabled on an already heavily loaded Cisco ONS 15540. When you finish using a **debug** command, remember to disable it with its specific **no debug** command (or use the **no debug all** command to turn off all debugging).

To isolate problems and troubleshoot APS configuration on the Cisco ONS 15540, use the following **debug** commands in privileged EXEC mode. Use the **no** form of these commands to disable debugging.

Command	Purpose
debug aps	Starts debugging aps.

If you determine that APS is not configured correctly, refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference*.

Forcing a Manual Switchover

A manual switchover from working to protection fiber can be done in cases where upgrading or servicing is being performed, or in cases where an automatic switchover has occurred.

In the case of splitter protection, once the cause of the problem has been corrected, the system does not automatically revert to using the original working signal. The switchover to the formerly failed signal must be done manually. This might be desirable if the link originally configured as working was preferred because of its link loss characteristics or because of its distance advantage. Some protocols, such as ESCON, can experience lower data throughput at increasing distances, so you may want to move the working signal back to the shorter path.

Refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference* for instructions on forcing a manual switchover.

Determining Protection Schemes in Network Topologies

Table 2-1 outlines the protection schemes used in the different network topologies. For details on the protection schemes, refer to the *Cisco ONS 15540 ESP Configuration and Command Reference.* For details on network topologies, refer to the *Cisco ONS 15540 ESP Planning Guide*.

Table 2-1 Protection Schemes in Network Topologies

Topology	Without Protection	With Protection
Point-to-point	See the "Troubleshooting Unprotected Point-to-Point Topology" section on page 5-5.	See the "Troubleshooting Point-to-Point Topology with Splitter Protection" section on page 5-7. See the "Troubleshooting Point-to-Point Topology with Line Card Protection" section on page 5-9.
Hubbed Ring	NA	See the "Troubleshooting Hubbed Ring Topology with Splitter Protection" section on page 5-11. See the "Troubleshooting Hubbed Ring Topology with Line Card Protection" section on page 5-14.
Meshed Ring	NA	See the "Troubleshooting Meshed Ring Topology with Splitter Protection" section on page 5-17. See the "Troubleshooting Meshed Ring Topology with Line Card Protection" section on page 5-20.

About OSC

The Cisco ONS 15540 supports an optional out-of-band management channel for communicating between systems on the network. Using a 33rd wavelength (channel 0), the OSC (optical supervisory channel) allows control and management traffic to be carried without the necessity of a separate Ethernet connection to each Cisco ONS 15540 in the network. The OSC always terminates on a neighboring node. By contrast, data channels may or may not be terminated on a given node, depending on whether channels on the mux/demux modules are treated as express (pass-through) channels or add/drop.

Note When the OSC is not present, Cisco ONS 15540 systems can be managed individually by separate Ethernet connections.

The OSC is implemented with a dedicated laser and detector on a mux/demux module. The OSC is a full duplex channel that can use a single ring for transmit and receive.

For more information about the OSC and managing the Cisco ONS 15540, refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference*.