



CHAPTER 2

Procedures and Provisioning



Note

The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN," refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This chapter provides TL1 procedures and provisioning for the Cisco ONS 15454, ONS 15327, ONS 15310-CL and ONS 15600.

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2.1 Setting up TL1 Communication

The period during which a user is logged into the node is called a session. There are three options you can use to open a session (login):


- Cisco Transport Controller (CTC)
- Telnet
- Craft interface

The TL1 password (PID) is masked when accessing a TL1 session using any of these options. When you logout of any of these options, you are closing a session. The ONS 15454, ONS 15327 and ONS 15310-CL allow a maximum of 20 (19 telnet sessions and one craft session) concurrent TL1 sessions using any one or any combination of the options listed above. The ONS 15600 supports a maximum of 20 (18 telnet sessions and 2 serial connections) concurrent TL1 sessions on the Customer Access Panel (CAP). For information on issuing commands to multiple nodes, see the [“2.3 TL1 Gateway” section on page 2-26](#).

2.1.1 Open a TL1 session

Use the following procedures to open a TL1 session via the CTC, telnet, or craft interface. In the procedures the Activate and Cancel User commands are shown in their input format. For more information about these and other commands and messages, refer to the *Cisco ONS SONET TL1 Command Guide*.

Open a TL1 Session Through CTC

-
- Step 1** From the PC connected to the ONS node, start Netscape or Internet Explorer.
- Step 2** Enter the IP address of the node you want to communicate with in the Netscape or Internet Explorer Web address (URL) field.
- Step 3** Log into the CTC. The IP address at the title bar should match the IP address of the node you entered in [Step 2](#).
- Step 4** Once logged into the CTC, there are two ways to open a TL1 session:
- Click **Tools > Open TL1 Connection**, or
 - Click on the **Open TL1 Connection** button  on the toolbar.
- Step 5** From the Select Node dialog box choose the node you want to communicate with.
- Step 6** Click **OK**.
- A TL1 interface window opens. There are three sub-windows in the TL1 interface window: Request History, Message Log/Summary Log, and TL1 request. Type commands in the TL1 request window. You will see responses in the Message log window. The Request History window allows you to recall previous commands by double-clicking on them.
- Step 7** Verify that the Connect button is selected (grayed out).
- Step 8** Type the Activate User command in the TL1 request window to open a TL1 session:
ACT-USER:[<TID>]:<UID>:<CTAG>::<PID>; and press **Enter**.



Note You must press Enter after the semicolon in each TL1 command, or the command will not be issued.

- Step 9** Type the Cancel User command in the TL1 request window or press the **Disconnect** button to close a TL1 session:
CANC-USER:[<TID>]:<USERID>:<CTAG>; and press **Enter**.
-

Open a TL1 Session Through Telnet

To communicate with the ONS NE using TL1 commands using a telnet session over a craft interface or a LAN connection, you can choose from several ports.

- Port number 3083 is a Telnet port that uses the telnet protocol and associated telnet escape sequences.
- Port number 2361 is an alternative telnet port.
- Port number 3082 is a raw TCP/IP port; it will not echo and it will not prompt the user.

Step 1 At the DOS prompt, type **cmd** and press **Enter**. (The same steps can also be done from a UNIX prompt).

Step 2 At the DOS command prompt type:

TELNET <NODE IP ADDRESS OR NODE NAME> <PORT NUMBER> and press **Enter**.

The Node IP address or Node Name refers to the IP address or Node Name of the node you want to communicate with. Port number is the port (2361, 3082, or 3083) where TL1 commands are understood. If the connection is successful, a screen opens with a prompt.

Step 3 Type the Activate User command to open a TL1 session:

ACT-USER:[<TID>]:<UID>:<CTAG>::<PID>;



Note When the semicolon is typed, the command is issued immediately.

Step 4 Type the Cancel User command to close a TL1 session:

CANC-USER:[<TID>]:<USERID>:<CTAG>;

Open a TL1 Session Through Craft Interface

ONS 15454, ONS 15327 and ONS 15310-CL

The TCC2/TCC2P, XTC and 15310-CL-CTX cards have two built-in interface ports for accessing the ONS 15454, ONS 15327 and ONS 15310-CL respectively. With one RJ-45 LAN connection you can access the system using a standard browser interface. In the browser interface, you can perform local and remote Operations, Administration, Maintenance, and Provisioning (OAM&P) functions and open a VT100 emulation window to enter TL1 commands. If a browser is not available, you can access the system using a nine-pin RS-232 port. The RS-232 port supports VT100 emulation such that TL1 commands can be entered directly without a browser.

Step 1 Connect the serial cable to the RS-232 port on the active TCC2/TCC2P, XTC or 15310-CL-CTX card.

Step 2 Configure the terminal emulation software (Hyperterminal):

- Terminal emulation = vt100
- Bits per second = 9600
- Parity = None
- Stop BITS = 1
- Flow control = None

Step 3 Press **Enter**. An angle bracket prompt (>) appears.

Step 4 At the > prompt, type the Activate User command to open a TL1 session:

ACT-USER:[<TID>]:<UID>:<CTAG>::<PID>;



Note When the semicolon is typed, the TL1 command is issued immediately.

Step 5 Type the Cancel User command to close a TL1 session:

CANC-USER:[<TID>]:<USERID>:<CTAG>;

ONS 15600

The TSC card has one RJ-45 port of the faceplate. The RJ-45 port allows you to access the system using a standard web browser. You must use the RJ-45 port on the active TSC. While using the web browser, you can perform local and remote Operations, Administration, Maintenance and Provisioning (OAM&P) functions.

If a browser is not available, you can access the system using one of the two RS-232 ports on the Customer Access Panel (CAP). Each RS-232 port supports VT100 emulation so that you can enter TL1 commands directly without using a web browser. Each RS-232 port supports its own TL1 session.

Because the CAP RS-232 port is set up as a DTE interface, you must use a 3-pair swapping null modem adapter so that the TXD/RXC, DSR/DTR, and CTS/RTS pins are swapped when connecting to the serial ports. The null modem adapter connects the CAP RS-232 port (male configuration) and the serial cable (female configuration). [Table 2-1](#) lists the null modem adapter pin assignments.

Table 2-1 Null Modem Adapter Pin Assignments

TSC Signal	From Pin at TSC (DTE)	To Pin at Second DTE
NC ¹	1	NC
RXD	2	3
TXD	3	2
DTR	4	6
GND	5	5
DSR	6	4
RTS	7	8
CTS	8	7
NC	9	NC

1. NC is Not Connected.

Step 1 Attach a 3-pair swapping null modem adapter to the RS-232 port on the CAP.

Step 2 Connect a serial cable to the null modem adapter, and to the serial port on your PC or workstation.

Step 3 Complete one of the following:

- If you are using a PC, configure the terminal emulation software (Hyperterminal):
 - Terminal emulation = vt100

- Bits per second = 9600
- Parity = None
- Stop BITS = 1
- Flow control = None
- If you are using a UNIX workstation, connect from X-windows or the terminal using the tip command:
tip -9600 /dev/ttyb (or ttya depending on where serial cable is connected)

Step 4 Press **Enter**. A > prompt appears.

Step 5 At the > prompt, type the Activate User command to open a TL1 session:

ACT-USER:[<TID>]:<UID>:<CTAG>::<PID>;



Note When the semicolon is typed, the TL1 command is executed immediately.

Step 6 Type the Cancel User command to close a TL1 session:

CANC-USER:[<TID>]:<USERID>:<CTAG>;

2.2 Test Access



Note Test access applies to the ONS 15454, ONS 15327 and ONS 15600. Test access does not apply to the ONS 15310-CL.



Note Refer to the *Cisco ONS SONET TL1 Command Guide* for complete command and autonomous message information.

The test access (TACC) feature allows a third-party Broadband Remote Test Unit (BRTU) to create non-intrusive test access points (TAPs) to monitor the circuits on the ONS 15454, ONS 15327 and ONS 15600 for errors. The test access feature also allows the circuit to be split (intrusive), so that the transmission paths can be tested for bit errors via the use of various bit test patterns. The two BRTUs supported by the ONS 15454, ONS 15327 and ONS 15600 are the Hekimian/Spirent BRTU-93 (6750) and the TTC/Acterna Centest 650.

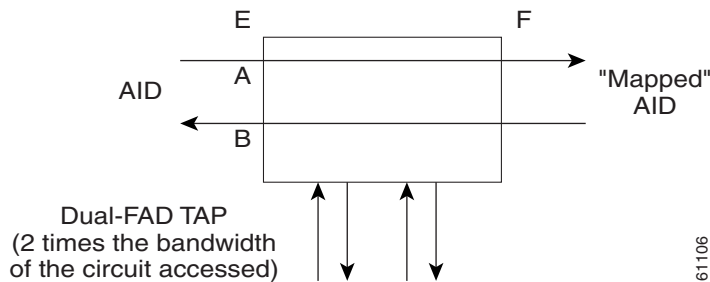
The test access functionality provides TL1 commands for creating and deleting TAPs, connecting or disconnecting TAPs to circuit cross-connects and changing the mode of test access on the ONS 15454, ONS 15327 and ONS 15600. You can view test access information in CTC; in node view click the **Maintenance > Test Access** tabs.

Refer to Telcordia document GR-834-CORE, *Network Maintenance: Access and Testing* and GR-1402-CORE, *Network Maintenance: Access Testing - DS3 HCDS TSC/RTU and DTAU Functional Requirements* for more information about Test Access.

A TAP provides the capability of connecting the circuit under test to a BRTU. This connection initially provides in-service monitoring capability to permit the tester to determine that the circuit under test is idle. The monitor connection should not disturb the circuit under test. The access point and remote test

unit (RTU) also provide the capability of splitting a circuit under test. A split consists of breaking the transmission path of the circuit under test. This is done out of service. The two sides of the access point are called the Equipment (E) and Facility (F) directions. For a 4-wire or 6-wire circuit, the transmission pairs within the access point are defined as the A and B pairs. The circuit under test should be wired into the access point so the direction of transmission on the A pair is from E to F, and the transmission direction for the B pair is from F to E (Figure 2-1).

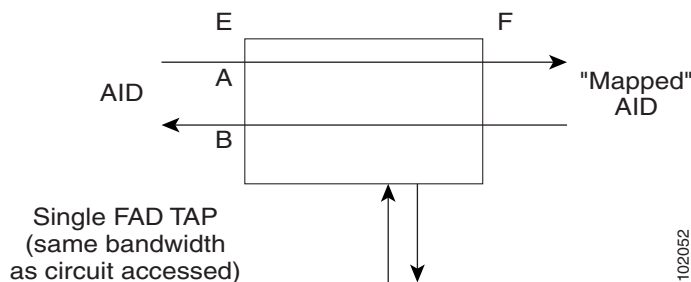
Figure 2-1 *Circuit With No Access Dual FAD TAP*



A dual FAD (facility access digroup) TAP uses twice the bandwidth of the circuit under test. This can be specified by the TAPTYPE parameter as shown in ED-<MOD2> command syntax in the [“2.2.2 TAP Creation and Deletion”](#) section on page 2-7. The values are SINGLE/DUAL. It defaults to DUAL.

A single FAD TAP uses half the bandwidth as that of the dual FAD, for example, it will use the same bandwidth as the circuit accessed for the TAP creation. This can be specified by the TAPTYPE parameter as shown in the [“2.2.2 TAP Creation and Deletion”](#) section on page 2-7. The values are SINGLE/DUAL. The MONEF, SPLTAB and SPLTEF modes are not supported by single FAD TAPs (Figure 2-2).

Figure 2-2 *Circuit With No Access Single FAD TAP*



2.2.1 Test Access Terminology

BRTU—Broadband remote test unit

DFAD—Dual facility access digroup

FAD—Facility access digroup

FAP—Facility access path

LOOPE—Split/loop access on A and B paths equipment side

LOOPF—Split/loop access on A and B paths facility side

MONE—Monitor access with signal detector on A path

MONF—Monitor access with signal detector on B path

MONEF—Monitor access with signal detector on A and B paths

QRS—Quasi-random signal (bit test pattern)

SPLTA—Split access on A path with signal detector from equipment, QRS on facility side

SPLTB—Split access on B path with signal detector from equipment, QRS on equipment side

SPLTAB—Split access on A and B paths for testing in both equipment and facility directions

SPLTE—Split access on A and B paths with signal detector from equipment, QRS on equipment side

SPLTF—Split access on A and B paths with signal detector from equipment, QRS on facility side

SPLTEF—Split access on A and B paths for testing in both equipment and facility directions

TACC—Test access

TAP—Test access path/point

Path Naming Conventions:

E—Equipment test access point direction

F—Facility test access point direction

A—Transmission path (the direction of transmission on the A pair is from E to F)

B—Transmission path (the transmission direction for the B pair is from F to E)

2.2.2 TAP Creation and Deletion

TL1 supports commands to create, delete, connect, change, retrieve, and disconnect TAPs.

2.2.2.1 ED-<rr>

The edit command (ED-<rr>) is used to change an existing port, STS, or VT to a TAP.

Input Format:

ED- (T1, T3, STS1, STS3c, STS6c, STS9c, STS12c, STS24c, STS48c, STS192c, VT1, DS1):[<TID>]:<AID>:<CTAG>[:TACC=<TACC>][TAPTYPE=<TAPTYPE>];

Edit an existing port, STS, or VT and change it to a TAP so it can be used when requesting TACC connections. Includes a new optical parameter TACC=n that defines the port, STS, or VT as a TAP with a selected unique TAP number. This TAP number will be used when requesting test access connections to circuit cross-connections under test. The TAP creation will fail if there is a cross-connection already on the port, STS, or VT.



Note

- This command generates a REPT DBCHG message.
- The alarms and conditions on test access paths can be retrieved by the RTRV-ALM-ALL or RTRV-ALM-<MOD2> commands
- The TAP is a persistent object. It will exist after the user has logged out of the TL1 session.

The following list applies to TAP numbers:

- The TAP number is an integer within the range of 1–999. When TACC=0 is specified, the TAP is deleted (if already present).
- The TAP number is unique across T1/T3/STS/VT/DS1 TAPs in the system.

- The TAP number is not editable.

2.2.2.2 ED-T1

When the ED-T1 command is issued with a specified TACC value for a given T1 port/facility, a dual facility access group (DFAD) is created by using the specified port/facility and the consecutive port/facility.

The command in example [Example 2-1](#) creates a DFAD on FAC-1-1 and FAC-1-2.

Example 2-1 *ED-T1::FAC-1-1:12::TACC=1;*

```
DV9-99 1970-01-02 03:16:11
M 12 COMPLD
;
```



Note

These ports/facilities cannot be used for the creation of cross-connects until the TAP is deleted.

2.2.2.3 ED-T3

When the ED-T3 command is issued with a specified TACC value for a given T3 port/facility, a DFAD is created by using the specified port/facility and the consecutive port/facility.

The command in [Example 2-2](#) creates a T3 DFAD on FAC-2-1 and FAC-2-2.

Example 2-2 *ED-T3::FAC-2-1:12::TACC=2;*

```
DV9-99 1970-01-02 03:16:11
M 12 COMPLD
;
```



Note

These ports/facilities cannot be used for the creation of cross-connects until the TAP is deleted.

2.2.2.4 ED-DS1

When the ED-DS1 command is issued with a specified TACC value for a given DS1 facility on a DS3XM, a DFAD is created by using the specified facility and the consecutive port/facility.

The command in [Example 2-3](#) creates DFAD on DS1-2-1-1 and DS1-2-1-2.

Example 2-3 *ED-DS1::DS1-2-1-1:12::TACC=3;*

```
DV9-99 1970-01-02 03:16:11
M 12 COMPLD
;
```



Note

These ports/facilities cannot be used for the creation of cross-connects until the TAP is deleted.

2.2.2.5 ED-STSn

When the ED-STSn command is issued for a TACC it assigns the STS for the first two-way test access connection and STS+1 as the second 2-way connection. For STS3c, STS9c, STS12c, STS24c, and STS48c the next consecutive STS of same width is chosen. The TAP creation will fail if either of the consecutive STSs are not available.

The command in [Example 2-4](#) creates a TAP on STS-5-1 and STS-5-2.

Example 2-4 *ED-STSn::STS-5-1:12::TACC=4*

```
DV9-99 1970-01-02 03:16:11
M 12 COMPLD
;
```

**Note**

These STSs cannot be used for the creation of cross-connects until the TAP is deleted.

The command in [Example 2-5](#) creates an STS24C dual TAP on STS-6-1 and STS-6-25.

Example 2-5 *ED-STSn::STS-6-1:12::TACC=5:*

```
DV9-99 1970-01-02 03:16:11
M 12 COMPLD
;
```

**Note**

These STSs cannot be used for the creation of cross-connects until the TAP is deleted.

2.2.2.6 ED-VT1

When the ED-VT1 command is issued for a TACC, a VT TAP is created. The specified VT AID is taken as the first VT connection, the second VT connection is made by incrementing the VT group and keeping the VT number the same.

The command in [Example 2-6](#) creates a VT TAP on VT1-1-1-1-1 and VT1-1-1-2-1.

Example 2-6 *ED-VT1-1-1-1-1:12::TACC=6;*

```
DV9-99 1970-01-02 03:16:11
M 12 COMPLD
;
```

**Note**

These VTs cannot be used for the creation of cross-connects until the TAP is deleted.

2.2.3 Connect Test Access Points

The CONN-TACC command (CONN-TACC-<rr>) is used to make a connection between the TAP and the circuit or cross-connect under test.

Input Format: CONN-TACC-(T1, T3, STS1, STS3C, STS6C, STS9C, STS12C, STS24C, STS48C, STS192c, VT1, DS1):[<TID>]:<AID>:<CTAG>::<TAP>:MD=<MD>;

Connect the port/STS/VT defined by <AID> to the port/STS/VT defined by the <TAP> number. The mode of test access to the circuit/cross-connect is specified by <MD>. The modes can be either of monitor (non-intrusive), split or loop (intrusive) modes. The various modes are described in the [“2.2.9 Test Access Mode Definitions” section on page 2-16](#).



Note

The connection is maintained only for the duration of the TL1 session (non-persistent).



Note

The TAP number is displayed at the output if the CONN-TACC command completes successfully.

Error Codes Supported:

RTBY—Requested TAP busy

RTEN—Requested TAP does not exist

SCAT—Circuit is already connected to another TAP

SRCN—Requested condition already exists

IIAC—Invalid access identifier (AID)

EANS—Access not supported

SRAC—Requested access configuration is invalid

The command in [Example 2-7](#) creates a connection between TAP with number one and the port/facility FAC-1-3 with access mode as MONE. The various modes are described in the [“2.2.9 Test Access Mode Definitions” section on page 2-16](#).

Example 2-7 CONN-TACC-T1::FAC-1-3:12::1:MD=MONE;

```
DV9-99 1970-01-02 02:51:54
M 12 COMPLD
1
;
```

2.2.4 Change Access Mode

The CHG-ACCMD command (CHG-ACCMD-<rr>) is used to change the access mode.

Input Format: CHG-ACCMD-(T1, T3, STS1, STS3C, STS6C, STS9C, STS12C, STS24C, STS48C, STS192c, VT1, DS1):[<TID>]:<TAP>:<CTAG>::<MD>;

Change the type of test access. This might be a change from monitoring the data to inserting data into the STS. This command can only be applied to an existing TAP connection. If a TAP connection does not exist, a RTEN error is returned.

Error codes supported:

SRCN—Requested condition already exists

SRAC—Requested access configuration is invalid

RTEN—Requested TAP does not exist

The command in [Example 2-8](#) changes the access mode of TAP 1 to LOOPE.

Example 2-8 *CHG-ACCMD-T1::1:12::LOOPE;*

```
DV9-9 1970-01-02 02:59:43
M 12 COMPLD
;
```



Note

The access mode cannot be changed if the TAP is not connected.



Note

This command generates a REPT DBCHG message.

2.2.5 Retrieve Test Access Point Information

2.2.5.1 RTRV-<rr>



Note

A generic ALL AID would behave similarly to an ALL AID such as, SLOT-ALL or FAC-1-ALL for all the RTRV-rr commands that support a generic ALL AID.

The RTRV-<rr> command retrieves TAP information.

Input Format: RTRV-(T1, T3, STS1, STS3C, STS6C, STS9C, STS12C, STS24C, STS48C, STS192c, VT1, DS1):[<TID>]:<AID>:<CTAG>;

This command is modified to include the return of a TAP number if the requested <AID> is defined as a TAP. An optional TACC=<TAPNUMBER> will appear in the output list if the requested <AID> is defined as a TAP.

Example 2-9 *RTRV-T1::FAC-1-1:12;*

```
dv9-99 1970-01-02 02:49:16
M 12 COMPLD
"FAC-1-1::LINECDE=AMI,FMT=D4,LBO=0-131,TACC=1,TAPTYPE=DUAL:OOS"
;
```

Parameter definitions:

- <TID> the node name which is optional
- <TAP> number from 1–999 identifying the TAP. Returned by the CONN-TACC command. If a TAP is 0, the TAP is deleted. <TAP> is an integer
- <CTAG> required identifier or number limited to six ASCII characters that correlates a response with a command

- <AID> can be a TL1 identifier such as STS-<slot>-<starting sts> VT-<slot>-<sts>-<group>-<vt>. For T1 and T3 the facility <AIDs> are used.
- <MD> defines the monitor or split mode: MONE, MONF, MONEF, SPLTE, SPLTF, LOOPE, LOOPF, SPLTA, SPLTB, SPLTEF (SPLTE, SPLTF, LOOPE, and LOOPF require an external QRS input signal)
- <TACC> specific block should be set to TACC=n where n is the desired TAP number. <TACC> marks the STS or VT as used for test access

2.2.5.2 RTRV-TACC

RTRV-TACC:[<TID>]:<TAP>:<CTAG>;

This command can also be used to retrieve details associated with a TAP. The TAP is identified by the TAP number. The ALL input TAP value means that the command will return all the configured TACCs in the NE.

Example 2-10 RTRV-TACC:CISCO:241:CTAG;

```
TID-000 1998-06-20 14:30:00
M 001 COMPLD
"241:STS-2-1-1,STS-2-2,MONE,STS-12-1-1,STS-13-1-1"
;
```

Parameter Definitions:

- <TAP> the assigned number for the AID being used as a TAP. TAP is an integer.
- <TACC_AIDA> the A path of the TAP, for example, the first STS/VT path of the TAP
- <TACC_AIDB> the B path of the TAP, for example, the second STS/VT pat of the TAP. For a single FADTAP this path will be empty.
- <MD> the test access mode. It identifies the mode of access between the TAP and the circuit connected to the TAP. MD is optional.
- <CrossConnectId1> the E path of the cross-connect. CrossConnectId1 is optional.
- <CrossConnectId2> the F path of the cross-connect. CrossConnectId2 is optional.

2.2.6 Disconnect Test Access Points

TAPs can be disconnected in the following ways:

- Issue the DISC-TACC command
- Delete or modify accessed connection
- Drop the TL1 session for any reason, including logout or a dropped telnet session
- Switch or reset a TCC2/TCC2P or XTC

The DISC-TACC command disconnects the <TAP> and puts the connection back to its original state (no access). To issue the DISC-TACC command, follow the input format and examples shown below:

Input Format: DISC-TACC:[<TID>]:<TAP>:<CTAG>;

The command in [Example 2-11](#) disconnects TAP 1 from the circuit/cross-connect under test.

Example 2-11 *DISC-TACC::1:12;*

```
DV9-99 1970-01-02 02:59:43
M 12 COMPLD
;
```



Note

This command generates a REPT DBCHG message.

Error codes supported:

SADC—Already disconnected

SRTN—Unable to release TAP

2.2.7 Delete Test Access Points

The command in [Example 2-12](#) deletes a TAP.

Example 2-12 *ED-<STS_PATH>:[<[TID]>]:<AID>:<CTAG>:::TACC=0;;*



Note

The TACC number must be set to zero in order to delete a TAP.

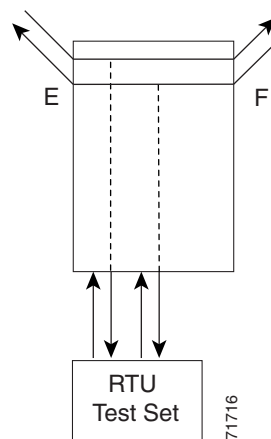


Note

If a TAP is not removed the STS bandwidth will be stranded.

2.2.8 Test Access Configurations

Figure 2-3 *Single Node View (Node 1)*



Example 2-13 *ED-STS1::STS-1-1:90::TACC=1;*

This command changes STS1 and STS2 on Slot 1 to a TAP. The <CTAG> is 90. Sets the TAP number to 1.

Example 2-14 *CONN-TACC-STS1::<AID for E or F depending on MD>:91::TAP-1:MONE*

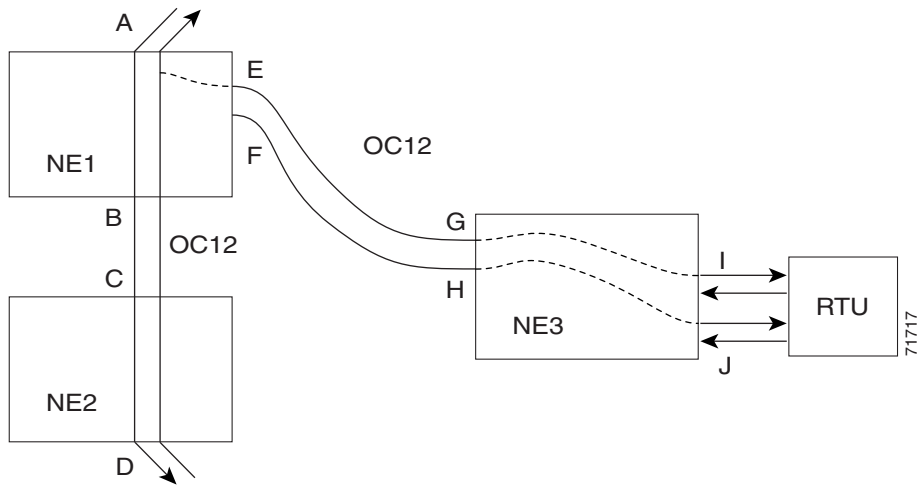
This command connects the <AID> to the TACC defined by TAP 1 on the E side. <CTAG> is 91.

**Note**

The connection made in the CONN-TACC command can use MONE to connect to the F side <AID>. The <AID> provided designates the E side and the other automatically becomes the F side. For example, if an <AID F> is supplied to a MONE connection the top line would be connected to the side of the path, or what is shown in the diagram as the F side. When a CONN-TACC is set up, these designations cannot change until a DISC-TACC or another CONN-TACC command is issued. The connection is based on the <AID> supplied.

**Note**

In the [Figure 2-3](#) configuration there might be a single DS-3 port wired-up but configured as 14 dual FADs (28 VTs).

Figure 2-4 *Multinode View (MONE Example)*

On NE3:

Example 2-15 *ENT-CRS-STS1::<AID I-G>:100::2WAY; A connection, not a TAP. CTAG is 100.*
ENT-CRS-STS1::<AID J-H>:101::2WAY; Second connection, not a TAP.

On NE1:

Assuming the path from A to B is already entered; the A and B points in the diagram refer to entry and exit points on the node or different cards. The E/F designators refer to the two 2-way connections from NE3.

Example 2-16 *ED-ST51::STS-1-1:TACC=4; Creates TAP with STS-1-1 and STS-1-2 through NE1. TAP number assigned is 4.*

Example 2-17 *CONN-TACC-ST51::<AID A or B>:102::4:<MD> Connects TAP 4 to the circuit.*

**Note**

The I and J connections above are TAPs in [Figure 2-3](#), but normal connections in the [Figure 2-4](#) configuration.

2.2.9 Test Access Mode Definitions

The following diagrams show what the different test access modes <MD> refer to. [Figure 2-5](#) shows a circuit with no access (dual FAD TAP) and [Figure 2-6](#) shows a circuit with no access (single FAD TAP), followed by all the modes. The QRS can be generated by an outside source, for example, the empty connection of the BRTU.

MONE, MONF, and MONEF access modes are non-service effecting and can be applied to an IS (in service) port state.

LOOPE, LOOPF, SPLTE, SPLTF, SPLTEF, SPLTA, SPLTB, and SPLTAB access modes are intrusive and can be applied only to a circuit/port that is in the OOS_MT (out of service, maintenance) port state. The NE will change the state of the circuit under test to OOS_MT during the period of TACC and restore it to the original state when the connection between the TAP and the circuit is dropped.

Figure 2-5 *Circuit With No Access (Dual FAD TAP)*

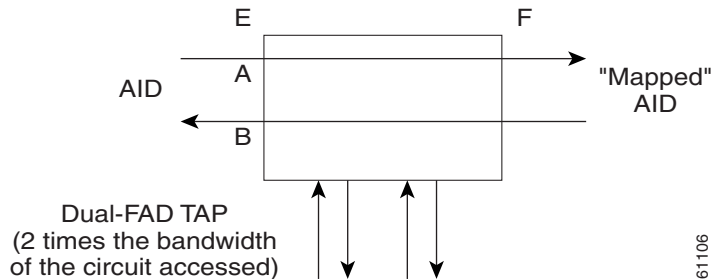
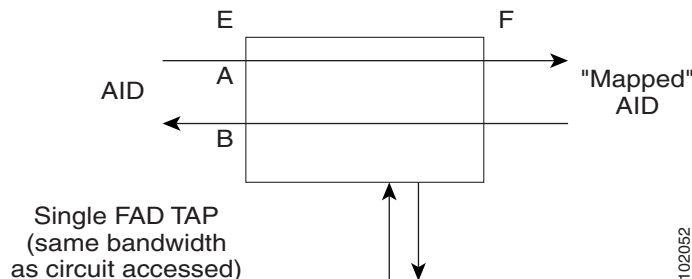


Figure 2-6 *Circuit With No Access (Single FAD TAP)*



2.2.9.1 MONE

Monitor E (MONE) indicates a monitor connection provided from the facility access digroup (FAD) to the A transmission path of the accessed circuit (Figure 2-7 and Figure 2-8). This is a non-intrusive mode.

Figure 2-7 MONE Access Single TAP

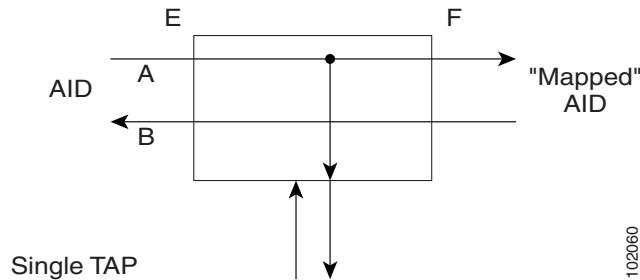
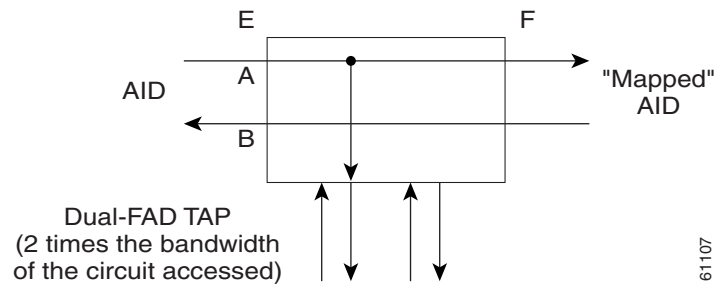


Figure 2-8 MONE Access Dual TAP



2.2.9.2 MONF

Monitor F (MONF) indicates that the FAD is providing a monitor connection to the B transmission path of the accessed circuit (Figure 2-9 and Figure 2-10). This is a non-intrusive mode.

Figure 2-9 MONF Access Single TAP

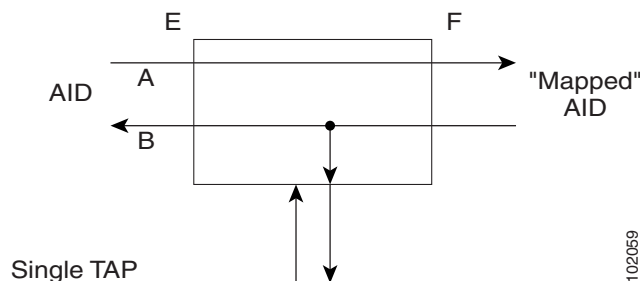
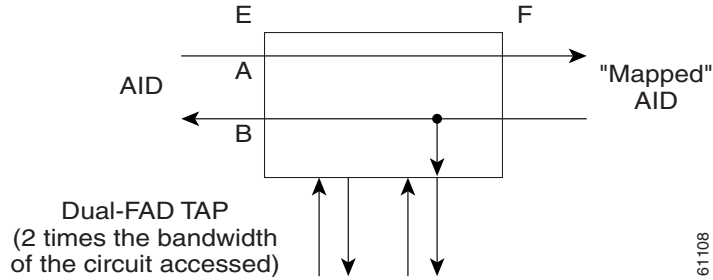


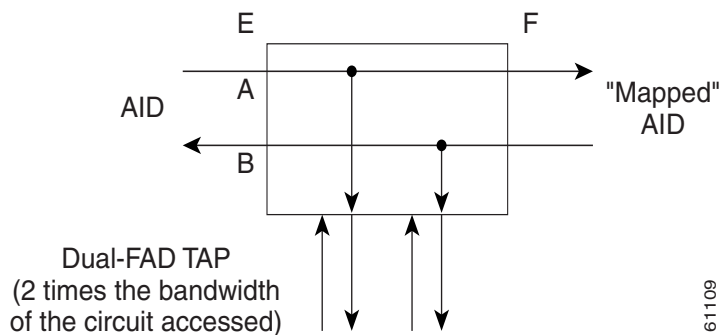
Figure 2-10 *MONF Access Dual TAP***Note**

The MONE and SPLTA modes are applicable to unidirectional circuits from E to F. The MONF and SPLTB modes are applicable to unidirectional circuits from F to E.

2.2.9.3 MONEF

Monitor EF (MONEF) is a monitor connection provided from the FAD1 (odd pair) to a DFAD, to the A transmission path and from FAD2 (even pair) of the same DFAD, to the B transmission path of the accessed circuit. This is a non-intrusive mode ([Figure 2-11](#)).

MONEF for T3 (DS3 HCDS) indicates that the odd pair of a FAP is providing a monitor connection to the A transmission path and from the even pair of a facility access path (FAP) to the B transmission path of the accessed circuit.

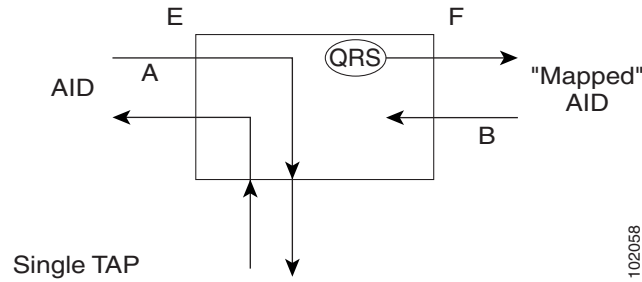
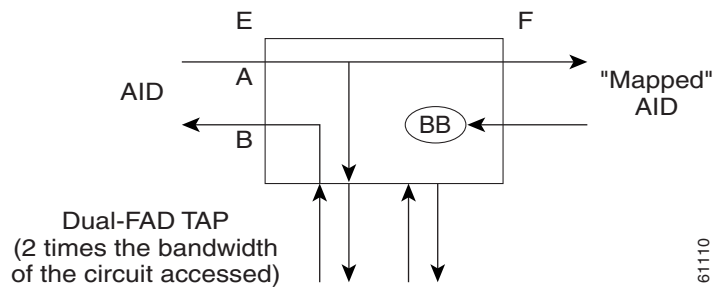
Figure 2-11 *MONEF Access Dual TAP*

2.2.9.4 SPLTE

Split E (SPLTE) splits both the A and B paths and connects the E side of the accessed circuit to the FAD ([Figure 2-12](#) and [Figure 2-13](#)).

**Note**

QRS is not supported on the ONS 15454, ONS 15327, and ONS 15310-CL. The connection will remain as is. The ONS 15600 inserts AIS instead of QRS.

Figure 2-12 *SPLTE Access Single TAP***Figure 2-13** *SPLTE Access Dual TAP*

2.2.9.5 SPLTF

Split F (SPLTF) splits both the A and B paths and connects the F side of the accessed circuit to the FAD (Figure 2-14 and Figure 2-15).



Note

QRS is not supported on the ONS 15454, ONS 15327, and ONS 15310-CL. The connection will remain as is. The ONS 15600 inserts AIS instead of QRS.

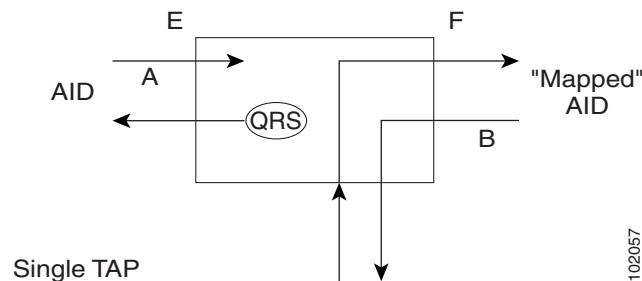
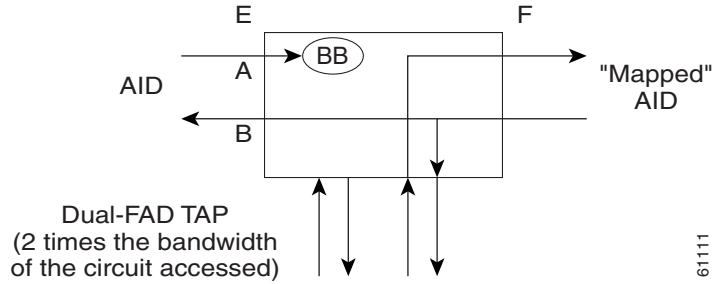
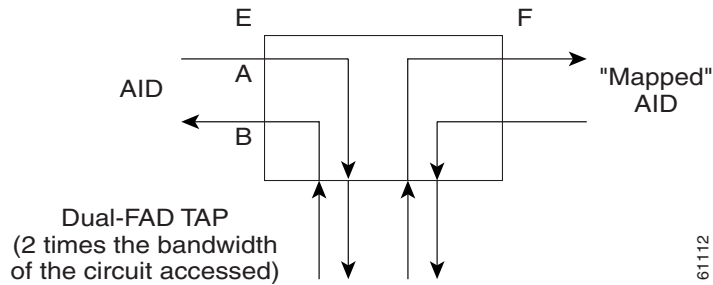
Figure 2-14 *SPLTF Access Single TAP*

Figure 2-15 *SPLTF Access Dual TAP*

2.2.9.6 SPLTEF

Split EF (SPLTEF) for T1 (DS1 HCDS) splits both the A and B paths, connects the E side of the accessed circuit to FAD1 and the dual facility access digroup (DFAD) pair, and connects the F side to the FAD2 of the same DFAD pair ([Figure 2-16](#)).

SPLTEF for T3 (DS3 HCDS) splits both the A and B paths and connects the E side of the accessed circuit to the odd pair of the FAP and the F side to the even pair of the FAP.

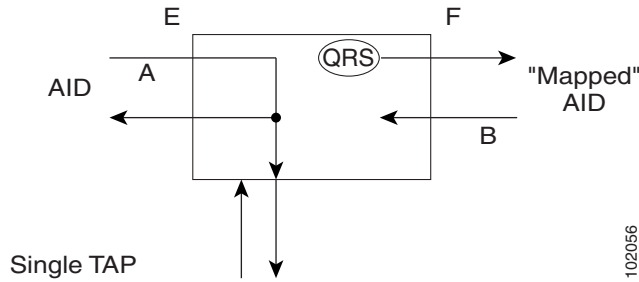
Figure 2-16 *SPLTEF Access Dual TAP*

2.2.9.7 LOOPE

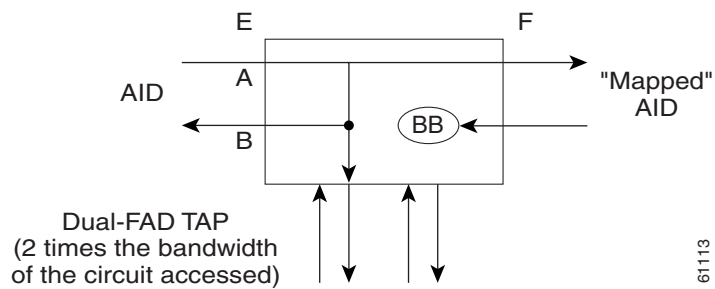
Loop E (LOOPE) splits both the A and B paths, connects the incoming line from the E direction to the outgoing line in the E direction, and connects this looped configuration to the FAD ([Figure 2-17](#) and [Figure 2-18](#)). Loop E and F modes are basically identical to the SPLT E and F modes except that the outgoing signal is the incoming signal and not the signal from the remote test unit (RTU).


Note

QRS is not supported on the ONS 15454, ONS 15327, and ONS 15310-CL. The connection will remain as is. The ONS 15600 inserts AIS instead of QRS.

Figure 2-17 LOOPE Access Single TAP

102056

Figure 2-18 LOOPE Access Dual TAP

61113

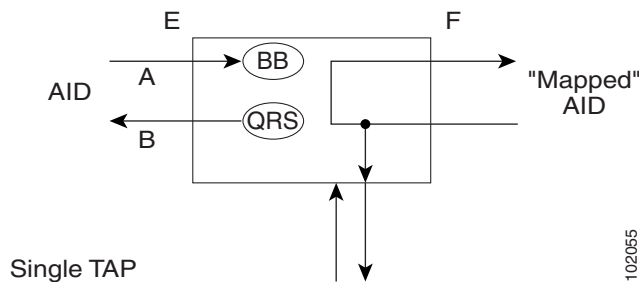
2.2.9.8 LOOPF

Loop F (LOOPF) splits both the A and B paths, connects the incoming line from the F direction to the outgoing line in the F direction and connects this looped configuration to the FAD ([Figure 2-19](#) and [Figure 2-20](#)).

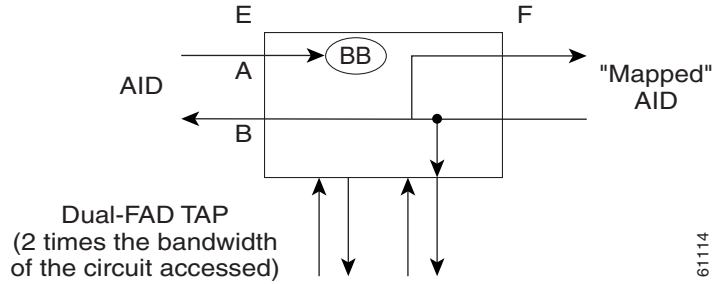


Note

QRS is not supported on the ONS 15454, ONS 15327, and ONS 15310-CL. The connection will remain as is. The ONS 15600 inserts AIS instead of QRS.

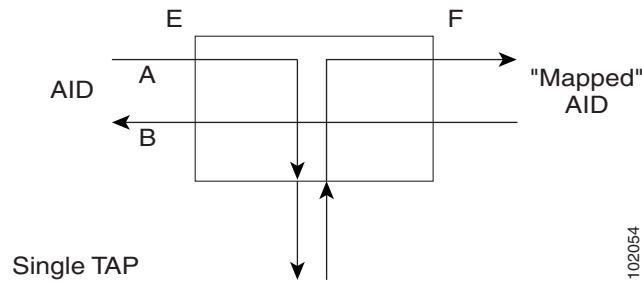
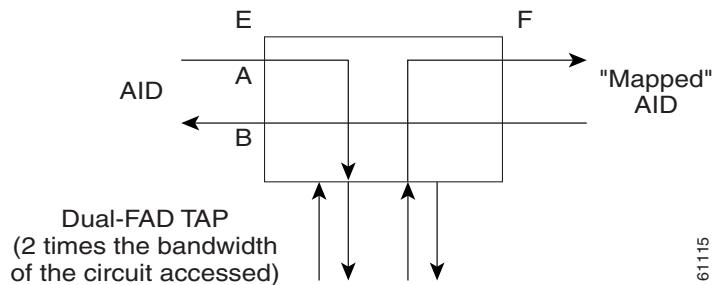
Figure 2-19 LOOPF Access Single TAP

102055

Figure 2-20 *LOOPF Access Dual TAP*

2.2.9.9 SPLTA

Split A (SPLTA) indicates that a connection is provided from both the E and F sides of the A transmission path of the circuit under test to the FAD and split the A transmission path (Figure 2-21 and Figure 2-22). These modes are similar to the Split E and F modes, except the signals are sent to the RTU, not the NE signal configuration.

Figure 2-21 *SPLTA Access Single TAP***Figure 2-22** *SPLTA Access Dual TAP*

2.2.9.10 SPLTB

Split B (SPLTB) indicates that a connection is provided from both the E and F sides of the B transmission path of the circuit under test to the FAD and split the B transmission path (Figure 2-23 and Figure 2-24).

Figure 2-23 *SPLTB Access Single TAP*

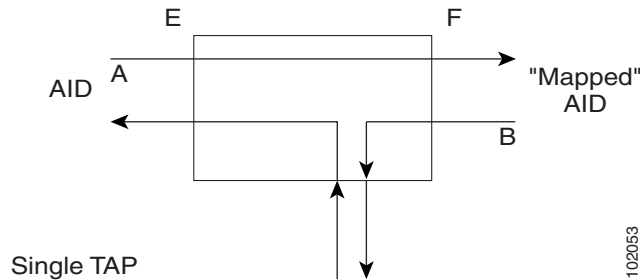
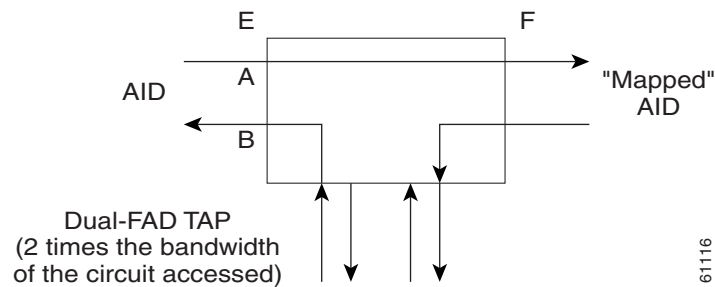


Figure 2-24 *SPLTB Access Dual TAP*



2.2.10 Unmapped AID Test Access Point Connections

The ONS 15454, ONS 15327 and ONS 15600 support connections to unmapped AIDs (unmapped circuits). The TAPs can be connected to an unmapped AID, for example, an AID that does not have a cross-connect on it. The access modes supported are: MONE, SPLTE, and LOOPE.

[Example 2-18](#) creates a TAP on STS-5-1 and STS-5-2.

Example 2-18 *ED-ST51::STS-5-1:12::TACC=1;*

```
DV9-99 1970-01-02 03:16:11
M 12 COMPLD
;
```

[Example 2-19](#) creates an unmapped AID connection with the MONE access mode.

Example 2-19 *CONN-TACC-STS1::STS-5-3:12::1:MD=MONE;*

```
DV9-99 1970-01-02 02:51:54
M 12 COMPLD
1
;
```



Note

STS-5-3 does not have a cross-connect on it. STS-5-3 becomes unusable until the connection is disconnected by the DISC-TACC command.



Note

The <AID> provided in the CONN-TACC command designates the E side and the other automatically becomes the F side.



Note

In the case of all 1-way circuits (1-way, UPSR_HEAD, UPSR_DROP, UPSR_DC, UPSR_EN): If the <AID> specified is the source AID, the direction is designated as From E in the above table. If the <AID> specified is the destination AID or the drop side, the direction is designated as From F in the above table.

Examples:

The following examples ([Example 2-20](#) through [Example 2-24](#)) assume an STS TAP is already created with TAP number = 1.

2.2.10.1 1-Way Circuit

Example 2-20 *ENT-CRS-STS1::STS-5-1,STS-5-2:12::1WAY;*
DV9-99 1970-07-01 20:29:06
M 12 COMPLD;

Example 2-21 *CONN-TACC-STS1::STS-5-1:12::1:MD=MONF;*
DV9-99 1970-01-01 20:29:47
M 12 DENY
EANS
STS-5-1
*/*INCORRECT TAP MODE*/*

The <AID> specified in the above CONN-TACC command is the source AID for the 1-way circuit. In this case only MONE and SPLTA modes are allowed because there is no B path in the case of a 1-way circuit (see [Table 2-2 on page 2-25](#)).

Example 2-22 *CONN-TACC-ST51::ST5-5-1:12::1:MD=MONE;
DV9-99 1970-01-01 20:30:09
M 12 COMPLD*

Example 2-23 *DISC-TACC::1:12;
DV9-99 1970-01-01 20:30:20
M 12 COMPLD
;*

However if the <AID> specified is the destination AID as shown below, the modes allowed are MONF and SPLTB.

Example 2-24 *CONN-TACC-ST51::ST5-5-2:12::1:MD=MONF;
DV9-99 1970-01-01 20:30:32
M 12 COMPLD*



Note

- The same examples apply for UPSR_HEAD, UPSR_DROP, UPSR_DC and UPSR_EN which are all 1-way circuits.
- The connections are made only to the working path irrespective of which path is currently active.

2.2.10.2 2-Way Circuits

For 2-way circuits all the modes are allowed as shown in [Table 2-2](#) and the same applies for UPSR_UPSR and path protection circuit types. In the case of UPSR_UPSR and path protection circuits the working path is connected irrespective of which path is currently active.

2.2.10.3 Unmapped AID

As explained in the “[2.2.10 Unmapped AID Test Access Point Connections](#)” section on [page 2-23](#), connections can be made to an <AID> without a cross-connect on it. The modes supported are MONE, SPLTE and LOOPE as shown in [Table 2-2](#).

Table 2-2 *Modes Supported by Circuit Type*

	MONE	MONF	MONEF	SPLTE	SPLTF	SPLTEF	LOOPE	LOOPF	SPLTA	SPLTB
1-way (from E)	X	—	—	—	—	—	—	—	X	—
1-way (from F)	—	X	—	—	—	—	—	—	—	X
2-way	X	X	X	X	X	X	X	X	X	X
Path Protection	X	X	X	X	X	X	X	X	X	X
UPSR_HEAD (from E)	X	—	—	—	—	—	—	—	X	—
UPSR_HEAD (from F)	—	X	—	—	—	—	—	—	—	X
UPSR_DROP UPSR_DC UPSR_EN (from E)	X	—	—	—	—	—	—	—	X	—

Table 2-2 Modes Supported by Circuit Type (continued)

	MONE	MONF	MONEF	SPLTE	SPLTF	SPLTEF	LOOPE	LOOPF	SPLTA	SPLTB
UPSR_DROP UPSR_DC UPSR_EN (from F)	—	X	—	—	—	—	—	—	—	X
UPSR_UPSR	X	X	X	X	X	X	X	X	X	X
Unmapped AID	X	—	—	X	—	—	X	—	—	—

**Note**

- The <AID> provided in the CONN-TACC command designates the E side and the other automatically becomes the F side.
- In the case of all 1-way circuits (1-way, UPSR_HEAD, UPSR_DROP, UPSR_DC, UPSR_EN):
 - If the AID specified is the source AID, the direction is designated as from E in the above table.
 - If the AID specified is the destination AID or the drop side, the direction is designated as from F in the above table.

2.3 TL1 Gateway

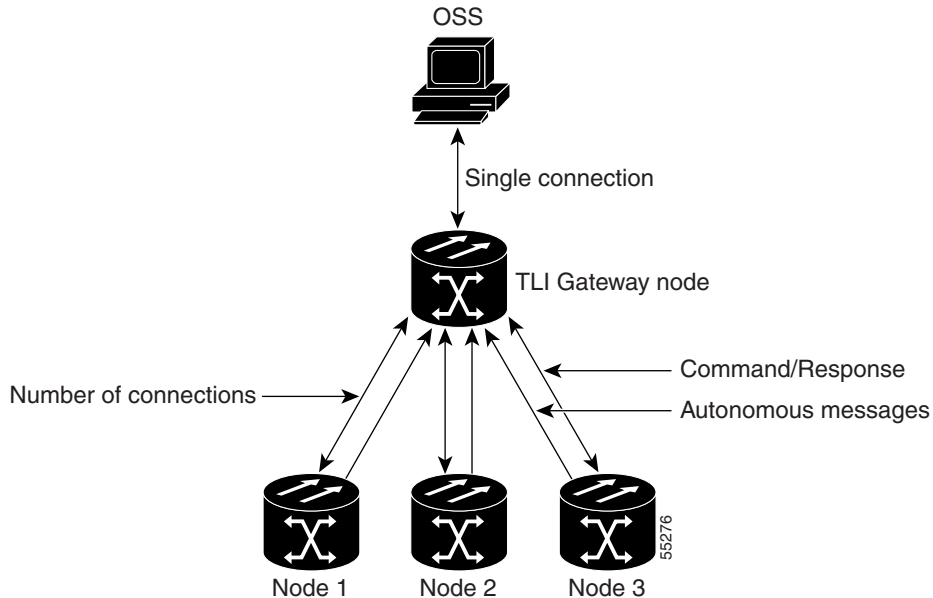
This section describes the TL1 Gateway and provides procedures and examples for implementing TL1 Gateway on the ONS 15454, ONS 15327, ONS 15310-CL, and ONS 15600.

2.3.1 Gateway Network Element Topology

You can issue TL1 commands to multiple nodes via a single connection through the TL1 Gateway. Any node can serve as a Gateway Network Element (GNE), End Network Element (ENE), or Intermediate Network Element (INE). A node becomes a GNE when a TL1 user connects to it and enters a command destined for another node. An ENE is an end node because it processes a TL1 command that is passed to it from another node. An INE is an intermediate node because of topology; it has no special hardware, software, or provisioning.

To implement the TL1 Gateway, use the desired ENE's TID in the ACT-USER command to initiate a session between the GNE and the ENE. Once a session is established you need to enter the ENE's TID in all of the subsequent commands that are destined for the ENE. From the GNE, you can access several remote nodes which become the ENEs. The ENEs are the message destinations or origins. The INE handles the DCC TCP/IP packet exchange.

The GNE Session is the connection that multiplexes TL1 messages between the OSS/craftsperson and the GNE. The GNE demultiplexes incoming operations support system (OSS) TL1 commands and forwards them to the remote ENE. The GNE also multiplexes incoming responses and autonomous messages to the GNE Session. The ENE Session is the connection that exchanges messages between the GNE and the remote ENE. [Figure 2-25](#) shows the GNE topology.

Figure 2-25 Example of a GNE Topology

2.3.2 TL1 Sessions

Each NE can support up to a maximum of 20 concurrent communication sessions (connections from an OS/NE to the GNE). The TL1 connections can be made through telnet sessions from the LAN or from the craft/serial port connection on the NE. One TL1 session is reserved for the active serial port connection. The remaining 19 sessions are used for TL1 sessions through the LAN (wire-wrap, active serial port, or DCC). [Table 2-3](#) shows the number of serial port and LAN connections per platform.

Table 2-3 Number of TL1 Sessions per Platform

Platform	Number of Serial Port Sessions	Number of LAN Sessions	Total Number of TL1 Sessions
Cisco ONS 15454	1	19	20
Cisco ONS 15310-CL	1	19	20
Cisco ONS 15310-MA	2	18	20
Cisco ONS 15600	2	18	20

2.3.3 TL1 Gateway and ENE Sessions

Only a limited number of TL1 users logged into an NE at any given time can establish sessions to other ENEs. The active serial port sessions are reserved and can always become a GNE session. The number of ENE sessions is based on the number of gateway communications sessions (GNE sessions).

Each NE can support up to 12 concurrent communication gateway sessions, depending on the NE type. The maximum number of ENE sessions also varies depending on the NE type.

You can dynamically distribute the maximum number of ENE sessions to balance the number of concurrent gateway communication sessions. The GNE treats the concurrent gateway communication sessions and ENE/GNE limit as a resource pool. It continues to allocate resources until the pool is exhausted. When the pool is exhausted, the GNE returns an “All Gateways in Use” message or an “All ENE Connections in Use” message.

**Note**

The speed of the TL1 gateway and the maximum number of connections are limited by shared system resources, such as CTC, CTM, etc. The response time is slow as connections are increased and activity on these connections increases. Alarm storms, additional users, network latency, etc. also increase response time.

Cisco ONS 15600 allows up to 500 ENEs per GNE session from Software Release 6.0 and higher.

The gateway resource pools for each platform are shown in [Table 2-4](#).

Table 2-4 Gateway Resource Pool

Platform	Maximum Number of GNE Sessions	Maximum Number of ENEs over IP DCC	Maximum Number of ENEs over OSI DCC
Cisco ONS 15454	11 (10 + 1)	176	20
Cisco ONS 15310-CL	6 (5 + 1)	92	20
Cisco ONS 15310-MA	7 (5 + 2)	112	20
Cisco ONS 15600	12 (10 + 2)	192 (500)	20

**Note**

Every ENE over an OSI DCC is equivalent to two ENEs over an IP DCC. If you use a combination of IP and OSI ENE sessions, it is important to remember that the maximum number of ENEs supported is equal to the number of IP ENEs plus two times the number of OSI ENEs ($IP + 2 \times OSI$).

For example, for Cisco ONS 15454 GNE, if you use 100 ENEs over IP DCC, then you can use only 38 ENEs over OSI DCC ($100 + 2 \times 38 = 176$). For Cisco ONS 15310-MA GNE, if you use 30 ENEs over OSI DCC, then you can use only 52 ENEs over IP DCC ($2 \times 30 + 52 = 112$).

Examples of GNE/ENE resource allocation are provided in [Table 2-5](#).

Table 2-5 Examples of Ideal ENE to GNE Resource Allocations

Applicable Cards	Number of GNE Communication Sessions	Number of ENEs over IP DCC	Number of ENEs over OSI DCC
15454 (TCC/TCC+/TCC2/TCC2P), 15310-CL (CTX), 15310-MA (CTX-2500), 15600 (TSC)	1	16	16
15454 (TCC/TCC+/TCC2/TCC2P), 15310-CL (CTX), 15310-MA (CTX-2500), 15600 (TSC)	2	32	20
15454 (TCC/TCC+/TCC2/TCC2P), 15310-CL (CTX), 15310-MA (CTX-2500), 15600 (TSC)	3	48	20
15454 (TCC/TCC+/TCC2/TCC2P), 15310-CL (CTX), 15310-MA (CTX-2500), 15600 (TSC)	4	64	20

Table 2-5 Examples of Ideal ENE to GNE Resource Allocations (continued)

15454 (TCC/TCC+/TCC2/TCC2P), 15310-CL (CTX), 15310-MA (CTX-2500), 15600 (TSC)	5	80	20
15454 (TCC/TCC+/TCC2/TCC2P), 15310-CL (CTX), 15310-MA (CTX-2500), 15600 (TSC)	6	96	20
15454 (TCC2/TCC2P), 15310-MA (CTX-2500), 15600 (TSC)	7	112	20
15454 (TCC2/TCC2P), 15600 (TSC)	8	128	20
15454 (TCC2/TCC2P), 15600 (TSC)	9	144	20
15454 (TCC2/TCC2P), 15600 (TSC)	10	160	20
15454 (TCC2/TCC2P), 15600 (TSC)	11	176	20
15600 (TSC)	12	192	20

2.3.4 Implementing TL1 Gateway



Note

Issuing commands to specific nodes in the network is accomplished by entering a unique node name in the TID field in each TL1 message. The TID field is synonymous with the name of the node and is the second token in a TL1 command.

The following procedures demonstrate TL1 Gateway on a four-node ring (without TL1 Gateway in [Figure 2-26](#) and with TL1 Gateway in [Figure 2-27](#)), where:

- Node 0 is the GNE.
- Node 1 is the ENE 1.
- Node 2 is the INE 2.
- Node 3 is the ENE 3.

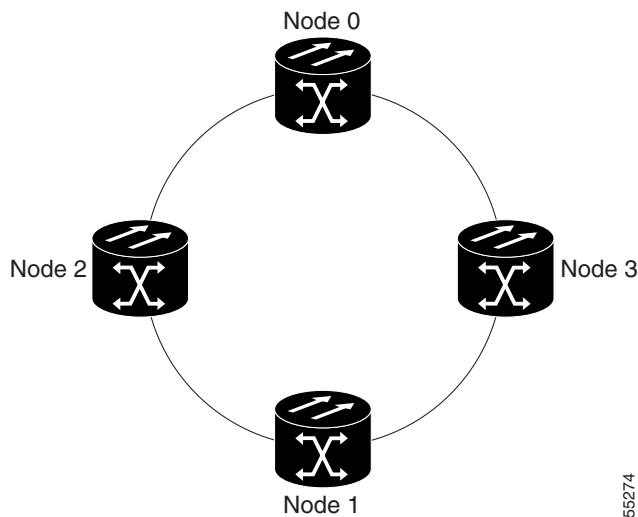
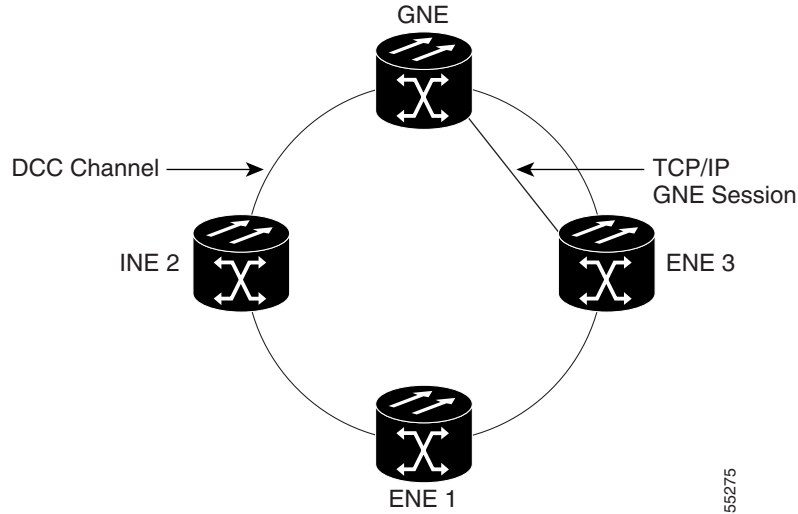
Figure 2-26 Four-Node Ring Without TL1 Gateway

Figure 2-27 Four-Node Ring With TL1 Gateway

Log Into a Remote ENE

-
- Step 1** Telnet or connect through the serial port to Node 0, which will become the GNE.
- Step 2** To connect to the ENE 1 node, enter the TL1 login command using the following input example:
 ACT-USER:NODE1:USERNAME:1234:PASSWORD;
 The GNE forwards the login to ENE 1. After successful login, ENE 1 sends a COMPLD response.
- Step 3** When you are logged into ENE 1, enter the following TL1 login command to connect to ENE 3:
 ACT-USER:NODE3:USERNAME:1234:PASSWORD;
 The GNE forwards the login to ENE 3. After successful login, the ENE 3 sends a COMPLD response.
-

Forward Commands by Specifying the ENE TID (Node 1 or Node 3)

When you are logged into ENE 1 and ENE 3, enter a command and designate a specific TID, as shown in the following example:

RTRV-HDR:NODE1::1;

will retrieve the header of Node 1 and

RTRV-HDR:NODE3::3;

will retrieve the header of Node 3.

Receive Autonomous Messages from the Remote ENE

To receive autonomous messages from the remote ENE, you must log into the remote ENE. When you are logged in, you will begin to receive autonomous messages. The source of the message is identified in the header of the message.

Log Out of a Remote ENE

To disconnect from a remote ENE, you must use the CANC-USER command as follows:

CANC-USER:NODE1:USERNAME:1; will disconnect ENE 1 and

CANC-USER:NODE3:USERNAME:3; will disconnect ENE 3.

The GNE forwards the logout to the remote ENEs. The GNE/ENE TCP session is closed.

2.4 Ring Provisioning

This section provides information and sample procedures for setting up STS or VT circuits over existing path protection and bidirectional line switch ring (BLSR) configurations using TL1, including:

- Path Protection topology
- Path Protection cross-connections
- Ring-to-ring interconnection
- 1-way drop and continue

**Note**

Because the ONS 15454, ONS 15327, ONS 15310-CL and ONS 15600 implements logical path protection, there are no defined east and west ports. Instead, the east STS path for one circuit can exit a different port than the east STS path of another circuit, even though the west STS paths for both circuits might share the same port.

**Note**

The ONS 15310-CL does not support BLSR.

2.4.1 Path Protection Topology

No special configuration of the physical path protection topology is required other than connecting the fibers to the nodes. The east and west paths must exit a node at different ports (to ensure link diversity), but there are no other physical topology restrictions.

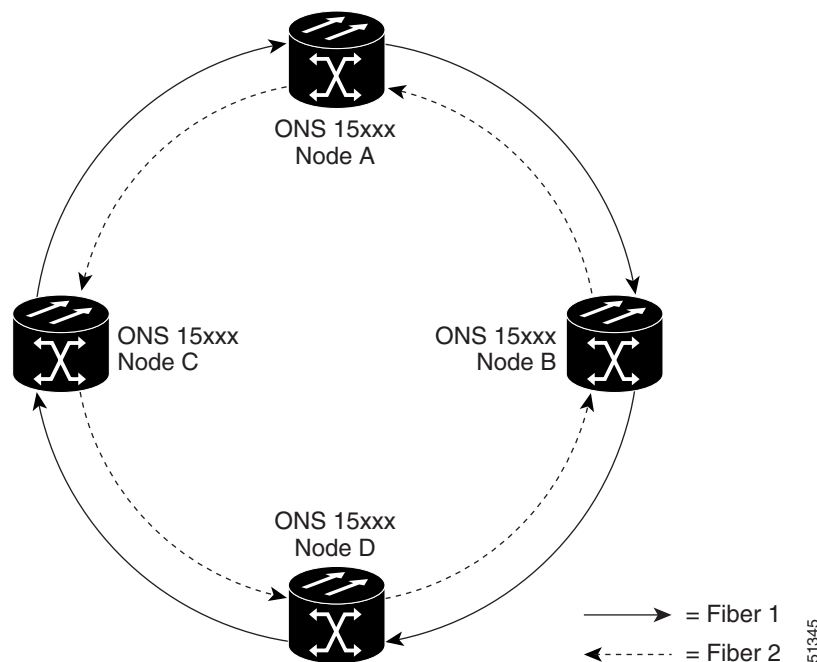
ONS 15xxx networks give you the option to set up path-protected mesh networks (PPMNs). PPMNs extend the protection scheme of a path protection from the basic ring configuration to the meshed architecture of several interconnected rings. For more information about PPMN, refer to the Cisco Procedure Guide applicable to your platform.

2.4.2 Path Protection Cross-Connections

To create a path protection cross-connection using TL1, you only need to designate whether it is a 1-way or 2-way cross-connect, but the access identifier (AID) must be more explicit. For example, to create a 1-way path protection circuit over the network with nodes A, B, C, and D and segments A-B, B-D, A-C, C-D as shown in [Figure 2-28](#), enter the following commands (Node A is the source node and Node D is the destination node):

```
ENT-CRS-STST1:A:FROM,TO1&TO2:CTAG1::1WAY;
ENT-CRS-STST1:B:FROM,TO:CTAG2::1WAY;
ENT-CRS-STST1:C:FROM,TO:CTAG3::1WAY;
ENT-CRS-STST1:D:FROM1&FROM2,TO:CTAG4::1WAY;
```

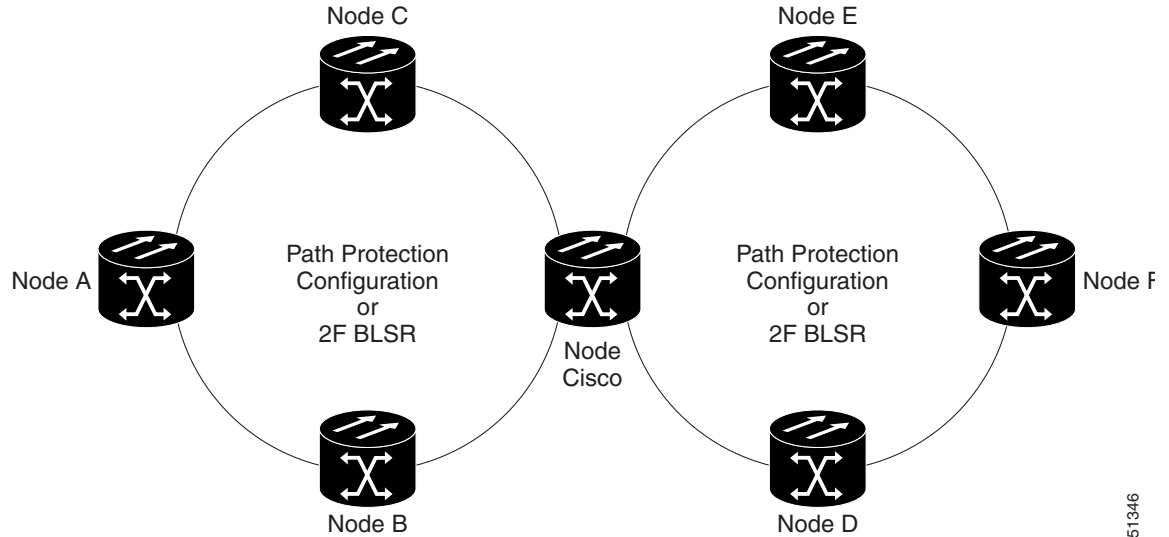
Figure 2-28 Network Configured With a 1-Way Path Protection Circuit



2.4.3 Ring-to-Ring Interconnection

In the following examples, the form “5/1/1” represents “Slot 5, Port 1, STS 1.” For VTs add the normal VT Group and VT ID extensions. These examples also assume that the slots/ports have been auto-provisioned (via a plug-in event) and that the ports involved have been placed into the in service state using a port configuration command, for example, ED-OCN.

For the examples in this section, both rings traverse the same node; therefore, only a single cross-connection is required to create the ring-to-ring connection. This is shown in [Figure 2-29](#). The node named “Cisco” is in the nexus.

Figure 2-29 Network Map With Cisco Node Showing Ring-to-Ring Interconnection

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2.4.4 Path Protection to Path Protection Connection Example

Ring 1 = Path Protection

Ring 2 = Path Protection

This example, illustrated in [Figure 2-30](#), uses an OC-3-4 card to feed Ring 2. Ring 1 can have any OC-N trunk card, but the trunk card is most likely a single-port OC-48 or OC-12.



Note

The STS calculation formula is: $((\text{Port \#} - 1) * \text{Number of STS per port}) + \text{STS\#}$.
STS 12/3/2 maps to STS-12-8 $((3-1)*3) + 2$.

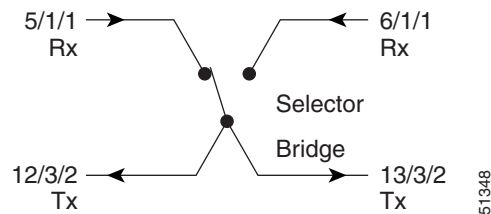
Figure 2-30 Path Protection-to-Path Protection Connection Specifications Through the Cisco Node

Node Cisco			
Path Protection configuration 1			
5/1/1	West	East	6/1/1
Path Protection configuration 2			
12/3/2	West	East	13/3/2

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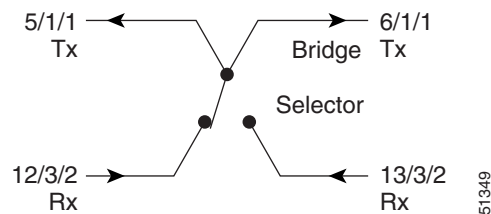
Use the command `ENT-CRS-STS1:CISCO:STS-5-1&STS-6-1,STS-12-8&STS-13-8:CTAG1::2WAY;` to create a selector between 5/1/1 and 6/1/1 which is bridged to Ring 2 (12/3/2 and 13/3/2), as shown in Figure 2-31.

Figure 2-31 Selector Between 5/1/1 and 6/1/1



The command also creates a selector between 12/3/2 and 13/3/2 to a bridge to Ring 1 (5/1/1 and 6/1/1), as shown in Figure 2-32.

Figure 2-32 Selector Between 12/3/2 and 13/3/2



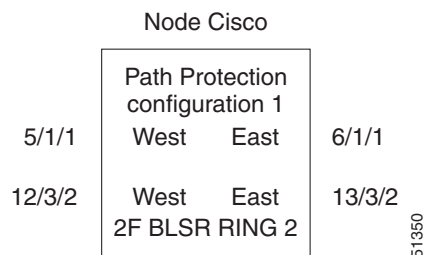
2.4.5 Path Protection to Two-Fiber BLSR Connection Example

Ring 1 = path protection

Ring 2 = Two-fiber BLSR

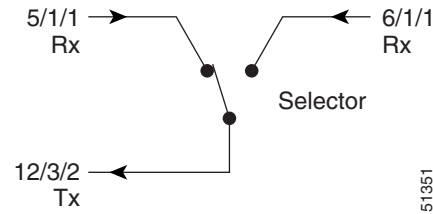
This example, illustrated in Figure 2-33, uses a path protection end-point with a drop on a two-fiber BLSR and the west span of the two-fiber BLSR (Ring 2) for the active path of the circuit. The example also uses multiport addressing for Ring 2 and is based on a multiport OC12-4 card (this is only important for computing the STS AID for multiport cards) where $13/3/2 = \text{STS-13-26}$ and where $26 = (((3-1)*12) + 2)$.

Figure 2-33 Path Protection to Two-Fiber BLSR



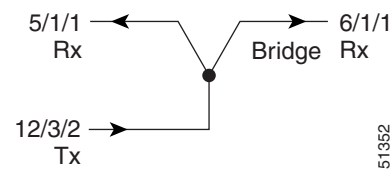
Use the command `ENT-CRS-STS1:CISCO:STS-5-1&STS-6-1,STS12-26:CTAG2::2WAY;` to create a selector between 5/1/1 and 6/1/1 which connects to 12/3/2 on Ring 2, as shown in Figure 2-34.

Figure 2-34 Selector Between 5/1/1 and 6/1/1



The command also creates a bridge from 12/3/2 to Ring 1 (5/1/1 and 6/1/1), as shown in Figure 2-35.

Figure 2-35 Bridge from 12/3/2 to Ring



In this configuration a two-fiber BLSR switch can automatically reconnect the selector output to the protection path on the east port (12/3/2 assuming OC-12) if necessary.

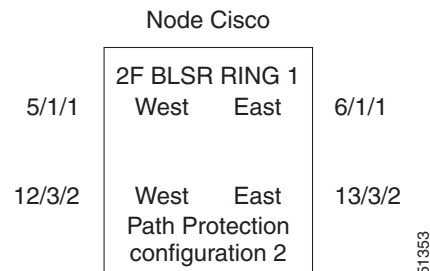
2.4.6 Two-Fiber BLSR to Path Protection Connection Example

Ring 1 = Two-fiber BLSR

Ring 2 = Path Protection

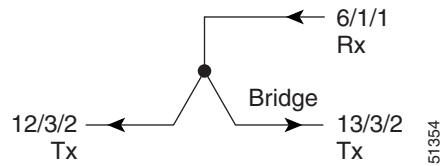
This example, illustrated in Figure 2-36, uses a path protection end-point with a drop on a two-fiber BLSR (Ring 1) and uses the east span of the two-fiber BLSR (Ring 1) for the active path of the circuit. For STS addressing, the path protection is an OC-3 (for example, STS-13-8).

Figure 2-36 Two-Fiber BLSR to Path Protection



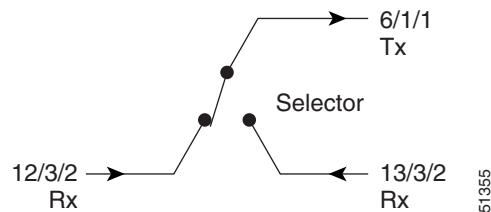
Use the ENT-CRS-ST51:CISCO:STS-6-1,STS-12-8&STS-13-8:CTAG3::2WAY;
to create a bridge from 6/1/1 to Ring 2 (12/3/2 and 13/3/2), as shown in [Figure 2-37](#).

Figure 2-37 Bridge from 6/1/1 to Ring 2



The command also creates a selector between 12/3/2 and 13/3/2 to Ring 1 (6/1/1) as shown in [Figure 2-38](#).

Figure 2-38 Selector Between 12/3/2 and 13/3/2 to Ring 1



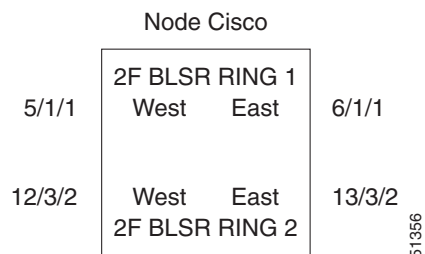
2.4.7 Two-Fiber BLSR to Two-Fiber BLSR Connection Example

Ring 1 = Two-fiber BLSR

Ring 2 = Two-fiber BLSR

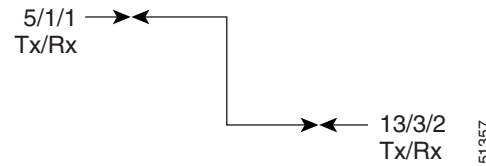
All protection for a two-fiber BLSR interconnecting to a two-fiber BLSR is performed at the line level. You can make the connection with a 2-way cross-connect from an STS on the working side of the two-fiber BLSR span of Ring 1 to an STS on the working side of a two-fiber BLSR span on Ring 2. The connections can be east to east, east to west, west to east, and west to west. This example, illustrated in [Figure 2-39](#), uses Ring 1 west to Ring 2 east and assumes an OC-12-4 card in Slots 12 and 13 for subtending to a two-fiber BLSR (Ring 2).

Figure 2-39 Two-Fiber BLSR to Two-Fiber BLSR



Use the ENT-CRS-ST51:CISCO:STS-5-1,STS-13-26:CTAG4::2WAY;
to create a 2-way connection from 5/1/1 to 13/3/2 as shown in [Figure 2-40](#).

Figure 2-40 2-Way Connection from 5/1/1 to 13/3/2



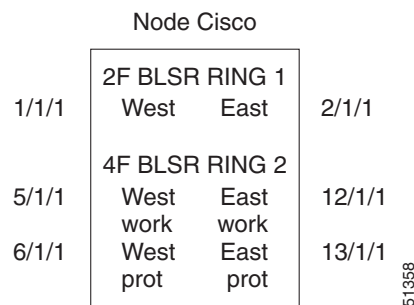
2.4.8 Two-Fiber BLSR to Four-Fiber BLSR Connection Example (ONS 15454)

Ring 1 = Two-fiber BLSR

Ring 2 = Four-fiber BLSR

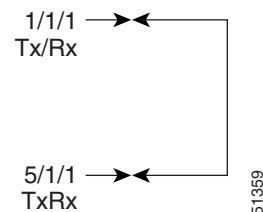
All protection for a two-fiber BLSR interconnecting to a four-fiber BLSR is performed at the line level. You can make the connection with a simple 2-way cross-connect from the appropriate side, east or west, of the two-fiber BLSR to the working fiber of the appropriate side, east or west, of the four-fiber BLSR, as shown in [Figure 2-41](#).

Figure 2-41 Two-Fiber BLSR to Four-Fiber BLSR



Use the command ENT-CRS-ST51:CISCO:STS-1-1,STS-5-1:CTAG5::2WAY;
to create a 2-way connection from 1/1/1 to 5/1/1, as shown in [Figure 2-42](#).

Figure 2-42 2-Way Connection from 1/1/1 to 5/1/1



In the event of a failure, the software will automatically switch the traffic to the appropriate line and path.

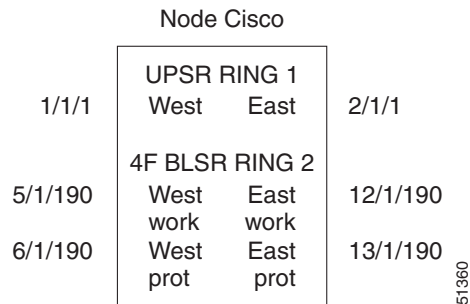
2.4.9 Path Protection to Four-Fiber BLSR Connection Example (ONS 15454)

Ring 1 = Path Protection

Ring 2 = Four-fiber BLSR

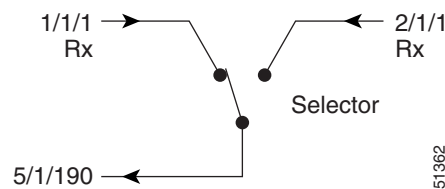
This example uses the west span of the four-fiber BLSR (Ring 2) for the active path of the circuit. The example also assumes that the four-fiber BLSR travels over OC-192 spans, as shown in [Figure 2-43](#).

Figure 2-43 Path Protection to Four-Fiber BLSR



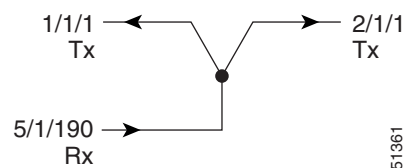
Use the command `ENT-CRS-ST51:CISCO:STS-1-1&STS-2-1&STS-5-190:CTAG6::2WAY;` to create a selector between 1/1/1 and 2/1/1 to Ring 2 (5/1/190), as shown in [Figure 2-44](#).

Figure 2-44 Selector Between 1/1/1 and 2/1/1 to Ring 2 (5/1/190)



The command also creates a bridge from 5/1/190 to Ring 1 (1/1/1 and 2/1/1), as shown in [Figure 2-45](#).

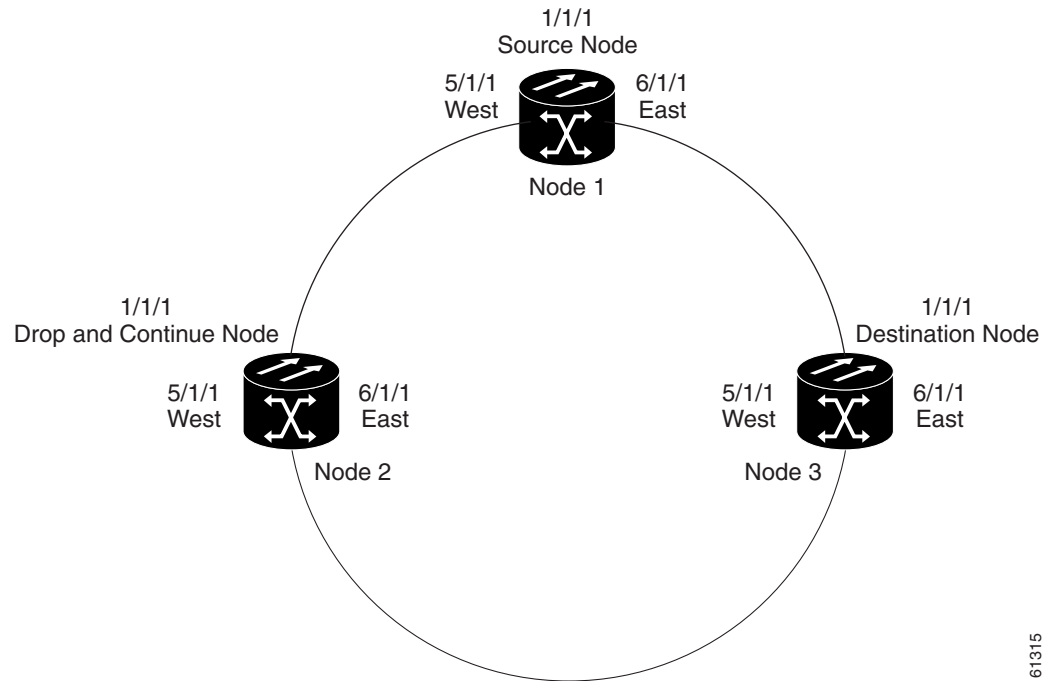
Figure 2-45 Bridge From 5/1/190 to Ring 1 (1/1/1 and 2/1/1)



2.4.10 1-Way Drop and Continue

The following examples show how to create a 1-way drop and continue cross-connect. The examples use three nodes (Node 1, Node 2, and Node 3) in a ring configuration (Figure 2-46). Node 1 is the source node, Node 2 has the drop and continue, and Node 3 is the destination.

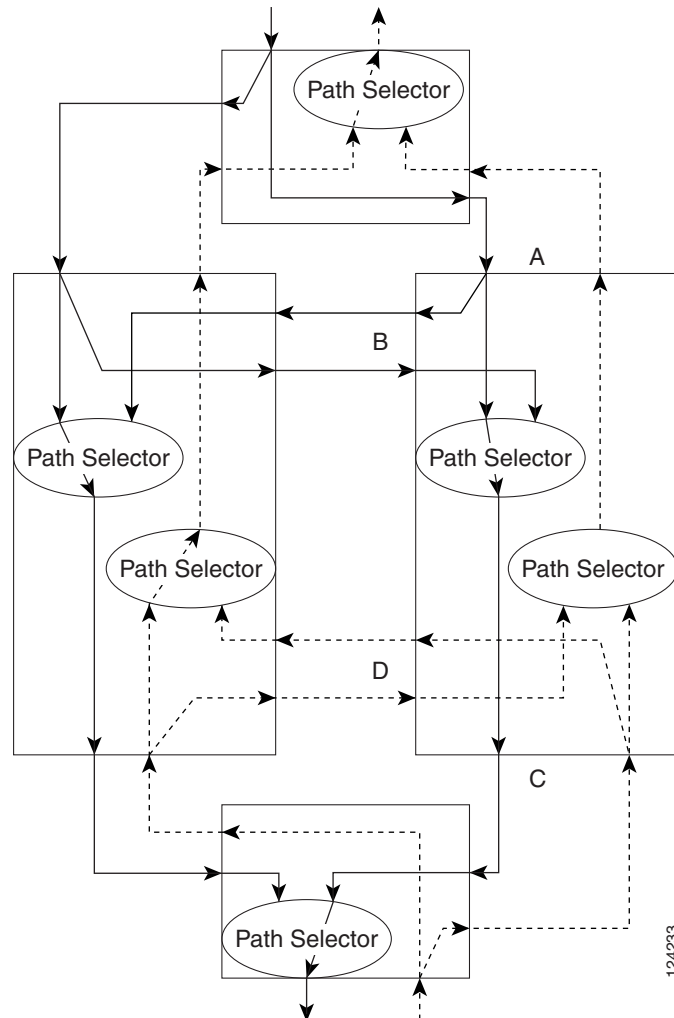
Figure 2-46 1-Way Drop and Continue



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Figure 2-47 shows a circuit diagram example of the orientation of AIDs associated with the ENT-CRS command used to establish drop and continue connections.

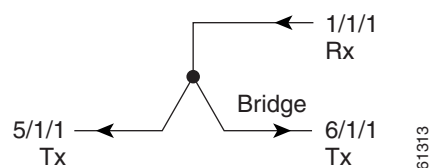
Figure 2-47 Orientation of AIDs Used to Establish Drop and Continue Connections



2.4.11 Node 1 Configuration Example (Source Node)

Issue the command `ENT-CRS-STSn::STS-1-1,STS-5-1&STS-6-1:CTAG::1WAY;` command on Node 1.

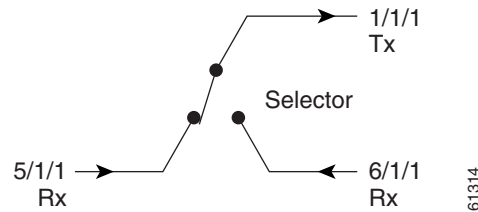
Figure 2-48 Bridge from 1/1/1 to 5/1/1 and 6/1/1



2.4.12 Node 2 Configuration Example (Drop and Continue Node)

Issue the command `ENT-CRS-STSn::STS-5-1&STS-6-1,STS-1-1:CTAG::1WAYDC;` on Node 2.

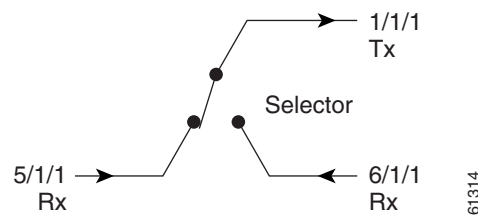
Figure 2-49 Selector Between 5/1/1 and 6/1/1 to 1/1/1



2.4.13 Node 3 Configuration Example (Destination Node)

Issue the command `ENT-CRS-STSn::STS-5-1&STS-6-1,STS-1-1:CTAG::1WAY;` on Node 3.

Figure 2-50 Selector Between 5/1/1 and 6/1/1 to 1/1/1



2.5 PCA Provisioning

You can provision or retrieve protection channel access (PCA) cross-connections on two-fiber and four-fiber BLSR topologies at these supported OC rates: OC-12 (two-fiber only), OC-48, and OC-192. The traffic on the protection channel is referred to as extra-traffic and has the lowest priority level. Extra traffic will be preempted by any working traffic that requires the use of the protection channel.

In a two-fiber BLSR the extra traffic is provisioned on the upper half of the bandwidth path. In a four-fiber BLSR the extra traffic is provisioned on the protect fiber. The PCA provisioning feature allows you to establish the PCA cross-connection on the protection path of the two-fiber BLSR and protection channel of the four-fiber BLSR only when the query is an explicit request.

There are two PCA connection types: 1WAYPCA and 2WAYPCA. The PCA cross-connection is provisioned only when the user provides an explicit request using the `ENT-CRS-STSp/VT1` commands. If the cross-connection is a PCA cross-connection, either 1WAYPCA or 2WAYPCA is shown in the CCT field of the `RTRV-CRS-STSp/VT1` command output.

1WAYPCA and 2WAYPCA are only used in the TL1 user interface to provide usability and visibility for the user to specify a PCA cross-connection type in the TL1 cross-connection commands.

**Note**

- Cisco ONS 15600 does not support BLSR for OC-12.
- The network must be configured as either a two-fiber or four-fiber OC-12, OC-48, or OC-192 BLSR.
- The STS or VT1 path cross-connection can be established with TL1 commands (ENT-CRS-xxx).
- Because the RTRV-CRS-xxx command does not include the optional CTYPE field to specify a connection type, the output result reports the matched cross-connections based on the queried AID(s); therefore, the retrieved cross-connection inventory can be both PCA and non-PCA cross-connections.

2.5.1 Provision a PCA Cross-Connection

Input format for provisioning a PCA cross-connection:

Example 2-25 *ENT-CRS-<PATH>[:<TID>]:<FROM>,<TO>:<CTAG>::[:<CCT>][:];*
<PATH>::={STS_PATH | VT1}
[<CCT>]::={1WAY, 1WAYDC, 1WAYEN, 2WAY, 1WAYPCA, 2WAYPCA}, it defaults to 2WAY.
{STS_PATH}::={STS1 | STS3C | STS6C | STS9C | STS12C | STS24C | STS48C | STS192C}

STS= all the STS bandwidth cross-connections.

VT1=VT1_5 cross-connection.

Input example of provisioning an STS3C PCA cross-connection:

Example 2-26 *ENT-CRS-STS3C::STS-1-1,STS-2-1:123::2WAYPCA;*

**Note**

If the [<CCT>] of this cross-connection provisioning command is either 1WAYPCA or 2WAYPCA, and the NONE of both <FROM> and <TO> AID is PCA AID, an IIAC (Input, Invalid PCA AIDs) error message is returned.

**Note**

If sending this command with a non-PCA cross-connection type (CCT), and one (or two) AIDs is/are the PCA AIDs, an IIAC (The PCA AID Is Not Allowed for the Queried CCT Type) error message is returned.

2.5.2 Retrieve a PCA Cross-Connection

Input Format for retrieving a PCA cross-connection:

Example 2-27 *RTRV-CRS-[:<PATH>]:[:<TID>]:<AID>:<CTAG>[:[:];<PATH>::=*
{STS_PATH | VT1 | STS}

If PATH is STS, it will retrieve all the STS cross-connections based on the queried AIDs.

<AID>={FacilityAIDs, STSAIDs, VTAIDs, ALL}

Output format of the PCA STSp cross-connection retrieval command:

Example 2-28 "<FROM>,<TO>:2WAYPCA,STS3C"

Output format of the PCA VT cross-connection retrieval command:

Example 2-29 "<FROM>,<TO>:2WAYPCA"

2.6 FTP Software Download



Note

FTP timeout is 30 seconds and is not user-configurable.

The file transfer protocol (FTP) software download feature downloads a software package to the inactive flash partition residing on either the TCC2/TCC2P, XTC, 15310-CL-CTX, or TSC card. FTP software download provides for simplex and duplex TCC2/TCC2P, XTC, 15310-CL-CTX, or TSC card downloads, success and failure status, and in-progress status at 20% increments.

2.6.1 COPY-RFILE

The COPY-RFILE command downloads a new software package from the location specified by the FTP URL into the inactive flash partition residing on either the TCC2/TCC2P, XTC, 15310-CL-CTX or TSC card. COPY-RFILE can also be used to backup and restore the database file.



Note

Since Release 5.0, PACKAGE_PATH is relative to your home directory, instead of being an absolute path from the root directory of the NE. If you want to specify an absolute path, start the path with the string '%2F'.

Input format:

Example 2-30 *COPY-RFILE:[<TID>]:[<SRC>]:<CTAG>::TYPE=<XFERTYPE>,[SRC=<SRC1>],[DEST=<DEST>],[OVWRT=<OVWRT>];*

where:

- SRC is the type of file being transferred
- <XFERTYPE> is the file transfer protocol
- <SRC1> specifies the source of the file to be transferred. Only the FTP URL is supported. In a nonfirewall environment the format for the URL is:
"FTP://FTTPUSER[:FTP_PASSWORD]]@FTP_HOST_IP[:FTP_PORT]
/PACKAGE_PATH[:TYPE=I]"

where:

- FTP_USER is the userid to connect to the computer with the package file
- FTP_PASSWORD is the password used to connect to the computer with the package file

- FTP_HOST_IP is the IP address of the computer with the package file, DNS lookup of hostnames is not supported
- FTP_PORT defaults to 21
- PACKAGE_PATH is the long path name to the package file starting from the home directory of the logged-in user.

In a firewall environment the hostname should be replaced with a list of IP addresses each separated by a “@” character. The first IP address should be for the computer where the package file is stored. Subsequent IP addresses are for firewall computers moving outward toward the edge of the network until the final IP address listed is the computer that outside users use to first access the network.

For example, if your topology is:

“FTPHOST <-> GNE3 <-> GNE2 <-> GNE1 <-> ENE”

the FTP URL is:

FTP://FTP_USER:FTP_PASSWORD@FTP_HOST_IP@GNE3@GNE2@GNE1/
PACKAGE_PATH

SRC1 is a String

- DEST specifies the destination of the file to be transferred. The comments for the SRC parameter are also valid here. DEST is a string
- If OVWRT is YES, then files are overwritten. Currently only YES is supported. Using a NO value for OVWRT will result in an error message.



Note

- FTP is the only allowed file transfer method.
- The use of the SWDL and the extended FTP URL syntax are required by the COPY-RFILE syntax.

2.6.2 APPLY

The APPLY command can activate or revert software depending on the version of software loaded on the active and protect flash. An error is returned if the node is attempting to activate to an older software load or trying to revert to a newer software load. If this command is successful the appropriate flash is selected and the TCC2/TCC2P, XTC, 15310-CL-CTX, or TSC card will reboot.

Input format:

Example 2-31 *APPLY:[<TID>]::<CTAG>[::<MEM_SW_TYPE>]:*

where:

- <MEM_SW_TYPE> indicates memory switch action during the software upgrade.

2.6.3 REPT EVT FXFR

REPT EVT FXFR is an autonomous message used to report the start, completion, and completed percentage status of the FTP software download. REPT EVT FXFR also reports any failure during the software upgrade including invalid package, invalid path, invalid userid/password, and loss of network connection.

Note:

1. The “FXFR_RSLT” is only sent when the “FXFR_STATUS” is COMPLD.
2. The “BYTES_XFRD” is only sent when the “FXFR_STATUS” is IP or COMPLD.

Output format:

Example 2-32 *SID DATE TIME*
A ATAG REPT EVT FXFR
 "<FILENAME>,<FXFR_STATUS>,<FXFR_RSLT>,<BYTES_XFRD>]"
 ;

where:

- <FILENAME> indicates the transferred file path name and is a string. When a package is being transferred between the FTP server and the controller cards, the filename field will contain the string “active”. Following this transfer, if there is a second controller card on the node, the file will be copied over to the second card. While this is happening, REPT EVT FXFR messages will be generated with a filename of “standby”.
- <FXFR_STATUS> indicates the file transferred status: Start, IP (in progress), or COMPLD.
- <FXFR_RSLT> indicates the file transferred result: success or failure. <FXFR_RSLT> is optional
- <BYTES_XFRD> indicates the transferred byte count. <BYTES_XFRD> is a string and is optional

2.6.4 Downloading New Software

The following procedure downloads new software to the TCC2/TCC2P, XTC, 15310-CL-CTX or TSC card using TL1.

Download New Software



Note Only Superusers can download and activate software.

- Step 1** Copy the new software package (15454-0340-X02E-2804.pkg) to an FTP host.
- Step 2** Establish a TL1 session with the target NE.
- Step 3** Login with the ACT-USER command.
- Step 4** Check the working and protect software on the NE by issuing the RTRV-NE-GEN command.

Input example:

Example 2-33 *RTRV-NE-GEN:::1;*

Output example:

Example 2-34 *VA454-94 1970-01-06 22:22:12*
M 1 COMPLD
"IPADDR=10.82.87.94,IPMASK=255.255.255.224,DEFRTT=10.82.86.1,
ETHIPADDR=10.82.87.94,ETHIPMASK=255.255.255.224,NAME=VA454-94,
SWER=3.40.00,LOAD=03.40-002G-14.21,PROTSWVER=4.00.00,
PROTLOAD=04.00-X02G-25.07,DEFDESC=\"FACTORY DEFAULTS\""
;

Step 5 Issue the COPY-RFILE command. This command will initiate the download process. See the [“2.6.1 COPY-RFILE” section on page 2-45](#) for command syntax.

In the following example the package is located in “/%/2FUSR/CET/VINTARA” in the host 10.77.22.199. The userid and passwords are TL1 and CISCO454. The directory path of the package is similar to what you will see during an FTP session.

Example 2-35 *COPY-RFILE::RFILE-*
PKG:CTAG::TYPE=SWDL,SRC=\"FTP://TL1:CISCO454@10.77.29.199
/%/2FUSR/CET/VINTARA/15454-0340-X02E-2804.PKG\";

DEV208 1970-01-10 11:51:57
M CTAG COMPLD
;

Step 6 If any of the parameters are wrong or if the host is not accessible, a REPT EVT FXFR message will report from the following list. A download failure can result from one or more of the following:

- Directory path of the package is invalid or not found
- Package is invalid (for example, an ONS 15454 package on an ONS 15327, vice-versa, or an invalid file type)
- Package not found on specified path
- Userid/password or hostname is invalid
- Host is not accessible
- Firewall userid/password or host in invalid
- Node rebooted/lost connection during download
- If software download is already in progress
- If the node or the host timed out during FTP protocol

Example 2-36 *DEV208 1970-01-10 11:52:02*
A 2816,2816 REPT EVT EQPT
 "SLOT-11:SFTWDOWN-FAIL,TC,,,,,,;\ SOFTWARE DOWNLOAD FAILED\,TCC"
 ;

Step 7 If the download is successful the REPT EVT FXFR message will report an active start:

Example 2-37 *DEV208 1970-01-10 11:52:15*
A 2818,2818 REPT EVT FXFR
 "ACTIVE START"
 ;

Step 8 A SFTDOWN minor alarm is raised to indicate that the software download is in progress. The SFTDOWN alarm will clear when the download is complete.

Example 2-38 *DEV208 1970-01--10 11:52:15*
***** 2817,2817 REPT ALM EQPT
 "SLOT-7:MN,SFTWDOWN,NSA,,,,;\ SOFTWARE DOWNLOAD IN PROGRESS\,TCC"
 ;

Use the in-progress status at any time during the software download to verify the RTRV-NE-GEN command.

Example 2-39 *RTRV-NE-GEN*

VA454-94 1970-01-06 22:22:12
M 1 COMPLD
 "IPADDR=10.82.87.94,IPMASK=255.255.255.224,DEFRTR=10.82.86.1,
 ETHIPADDR=10.82.87.94,EHTIPMASK=255.255.255.224,NAME=VA454-94,
 SWVER=3.40.00,LOAD=03.40-002G-14-21,PROTSWVER=NONE,
 PROTLOAD=DOWNLOADINPROGRESS,DEFDESC=\FACTORY DEFAULTS\
 ;

Step 9 The download progress is reported by the REPT EVT FXFR message which will report a message after every 20% of download is complete as shown:

Example 2-40 *DEV208 1970-01-10 11:53:12*
A 2820,2820 REPT EVT FXFR
 "ACTIVE,IP,,20"
 ;

DEV208 1970-01-10 11:53:12
A 2820,2820 REPT EVT FXFR
 "ACTIVE,IP,,40"
 ;

DEV208 1970-01-10 11:53:12
A 2820,2820 REPT EVT FXFR
 "ACTIVE,IP,,60"
 ;

DEV208 1970-01-10 11:53:12

```
A 2820,2820 REPT EVT FXFR
"ACTIVE,IP,,80"
;
```

- Step 10** If the TL1 session times out during download or if the user terminates the TL1 session the download will continue. The download completion can be confirmed by issuing the RTRV-NE-GEN command and verifying the PROTLOAD.

Example 2-41 RTRV-NE-GEN:::1;

```
VA454-94 1970-01-06 22:22:12
M 1 COMPLD
"IPADDR=10.82.87.94,IPMASK=255.255.255.224,DEFRTR=10.82.86.1,
ETHIPADDR=10.82.87.94,EHTIPMASK=255.255.254.0,NAME=VA454-94,
SWVER=3.40.00,LOAD=03.40-002G-14-21,PROTSWVER=4.00.00,
PROTLOAD=03.40-X02E-28.04,DEFDESC=\\FACTORY DEFAULTS\\"
;
```

- Step 11** REPT EVT FXFR confirms the completion of the software download.

Example 2-42 DEV208 1970-01-10 12:01:16

```
A 2825,2825 REPT EVT FXFR
"ACTIVE,COMPLD,SUCCESS"
;
```

- Step 12** The SFTDOWN alarm clears when the download is complete.

Example 2-43 DEV208 1970-01-10 11:52:15

```
* 2826,2817 REPT ALM EQPT
"SLOT-7:CL,SFTWDOWN,NSA,,,,:\\"SOFTWARE DOWNLOAD IN PROGRESS\\"TCC"
;
```

2.6.5 Activating New Software

After the software is successfully downloaded, the new software which resides in the protect load must be activated to run on the NE. The APPLY command can be used to activate and revert depending on the version of the protect software and the newly downloaded software (see the [“2.6.2 APPLY” section on page 2-46](#) for correct APPLY syntax).

Activate New Software

- Step 1** If the protect software is newer than the working software, activate it as shown:

Example 2-44 APPLY::1::ACT;

```
DEV208 1970-01-10 13:40:53
M 1 COMPLD
;
```

An error is reported if a revert is attempted with a newer protect software.

Step 2 If the APPLY command is successful, logout of the TL1 session using the CANC-USER command:

Example 2-45 *CANC-USER::CISCO15:1;*

```
VA454-94 1970-01-07 01:18:18
M 1 COMPLD
;
```

After a successful completion of the APPLY command the NE will reboot and the TL1 session will disconnect. When the NE comes up after the reboot it will be running the new software. Traffic switches are possible during activation.

2.6.6 Remote Software Download/Activation Using the GNE

In a network with SDCC-connected ONS 15454, ONS 15327 and ONS 15310-CLs remote download and activation are possible using the GNE/ENE feature supported in TL1. The GNE must be connected by a LAN and the remaining ENEs can download the new software package through fiber from the GNE.

For remote software downloading, complete the steps in the [“Download New Software” procedure on page 2-47](#) and the [“Activate New Software” procedure on page 2-50](#), but ensure that the TID in each command is filled with the ENE node name.

Each GNE can support 20 (TCC2/TCC2P) or 6 (XTC or 15310-CL-CTX) concurrent communication gateway sessions and up to a maximum of 176 (TCC2/TCC2P) or 96 (XTC or 15310-CL-CTX) ENEs/GNE. For more information on TL1 Gateway, see the [“2.3 TL1 Gateway” section on page 2-26](#).

Example 2-46 *ACT-USER:NODE1:CISCO15:1;
ACT-USER:NODE2:CISCO15:1;
ACT-USER:NODE3:CISCO15:1;
ACT-USER:NODE4:CISCO15:1;
ACT-USER:NODE5:CISCO15:1;*

Five simultaneous software downloads can be initiated using the COPY-RFILE command with appropriate TIDs. All downloads will be independent of each other and download speeds might differ.

Example 2-47 *COPY-RFILE:NODE1:RFILE-PKG:CTAG::TYPE=SWDL,SRC="FTP://TL1:
CISCO454@10.77.29.199/USR/CET/VINTARA/15454-0340-X02E-2804.PKG";

COPY-RFILE:NODE2:RFILE-PKG...
COPY-RFILE:NODE3:RFILE-PKG...
COPY-RFILE:NODE4:RFILE-PKG...
COPY-RFILE:NODE5:RFILE-PKG...*

Individual REPT EVT FXFR messages can be isolated using the node names. RTRV-NE-GEN also requires the individual node names entered in the TID to see a specific download status.

You can activate the software on all of the nodes using the GNE node.



Note

Activate the GNE last, after activating all the ENEs or else ENE connectivity will be lost when the GNE starts to reboot for activation.

Example 2-48 *APPLY:NODE1::1::ACT;
 APPLY:NODE2::1::ACT;
 APPLY:NODE3::1::ACT;
 APPLY:NODE4::1::ACT;
 APPLY:NODE5::1::ACT;*

2.7 Scheduled PM Report

The scheduled performance monitoring (PM) report is a feature that extends the capability of PM reporting for the Cisco ONS 15454, ONS 15327, ONS 15310-CL and ONS 15600. With scheduled PM report the system automatically and periodically generates the PM report of any specified facility or cross-connection.



Note

- The current maximum number of schedules allowed to be created for an NE is 1000. If this number of schedules has been created for the NE, an error message “Reach Limits Of MAX Schedules Allowed. Can Not Add More” will be returned if trying to create more schedules on the NE.
- Identical schedules for an NE is not allowed. Two schedules are considered identical if they have the same AID, MOD2 type, performance monitor type, performance monitor level, location, direction and time period.
- An error message “Duplicate Schedule” is returned if you create a schedule which is a duplicate of an existing schedule. However, if the existing schedule expires (with the parameter <NUMINVL> equal to zero when retrieved by the RTRV-PMSCHED command which means no more performance monitoring report to be sent), then the new schedule with the identical parameter will replace the existing schedule.
- When you create a PM schedule, the minimum report interval should not be less than five minutes.
- Refer to the *Cisco ONS SONET TL1 Command Guide* for complete command and autonomous message information.

2.7.1 Create a PM Schedule and Receive an Autonomous PM Report

1. Issue the SCHED-PMREPT-<MOD2> command to create a PM schedule.
2. Issue the ALW-PMREPT-ALL command to allow the current TL1 session to be able to receive the autonomous PM report.

2.7.2 Manage PM Schedules

1. Create a PM schedule by issuing the SCHED-PMREPT-<MOD2> command.
2. Delete a PM schedule by issuing the SCHED-PMREPT-<MOD2> command with the <NUMREPT> parameter equal to zero.



Note The PM schedules created on a facility or a cross-connect will be automatically deleted if the card or the cross-connect are unprovisioned.

3. Retrieve all the PM schedules created on the node by issuing the RTRV-PMSCHED-ALL command. Retrieve a particular MOD2 type of PM schedule by issuing the RTRV-PMSCHED-<MOD2> command.



Note The system will not automatically delete the schedules that are expired, for example, a schedule is created to report PM 10 times. After 10 PM reports are sent, the schedule is expired. The expired schedule can be identified by its <NUMINVL> field (equal to zero) in the response of RTRV-PMSCHED.

2.7.3 Enable or Disable a TL1 Session to Receive Autonomous PM Reports

1. Enable a TL1 session to receive a scheduled PM report by issuing the ALW-PMREPT-ALL command.



Note By default, a TL1 session is disabled to receive PM reports. The ALW-PMREPT-ALL command enables a TL1 user to receive all the scheduled PM reports from the system, regardless of whether or not the schedule is created by this TL1 user or by any other TL1 user.

2. Disable a TL1 session to receive any scheduled PM report by issuing the INH-PMREPT-ALL command.

2.8 Bridge and Roll

Cisco ONS 15454, ONS 15327, ONS 15600, ONS 15310-CL

Bridge and Roll functionality allows live traffic to be moved (rolled) from one entity to another. This section provides information and sample procedures for single-rolling, dual-rolling and protection rolling for one-way or two-way circuits using TL1 commands, including:

- Path Level Rolling—Rolls cross-connections at the VT1.5, STS1, and STSNc rate for all supported TDM drops (OC3, OC12, OC48, and OC192). Individual rolls are done at the Path Level.
- Line Level Rolling—Rolls all cross-connections from one port/facility to another port/facility.
- Bulk Rolling—Rolls a subset of cross-connections from one port/facility to another port/facility

There are two roll modes:

- In automatic mode, the leg to be rolled is automatically dropped upon detection of a valid input signal on the new path.
- In manual mode, the leg to be rolled is retained upon detection of a valid signal on the new path. The leg must be dropped manually.



Caution

If you have created a roll on the circuit and it has detected a valid signal, do not cancel it. Cancelling a valid roll will cause a traffic hit of more than 1300 ms. If you want to revert back from a valid roll, complete the roll and use bridge and roll again to roll it back.



Caution

Performing bridge and roll on an STS-192C (ONS 15454) might cause a traffic hit of 50 ms.



Note

The path width rules for creating circuits apply when rolling circuits. For example, if you roll an STS3c starting at STS#1, you cannot roll it to another port and start it at STS#2. You have to start it at STS#1.

2.8.1 Restrictions

The following restrictions apply for bridge and roll using TL1 in this release:

1. Rolling is not allowed on electrical cards or Ethernet cards.
2. Rolling is not allowed on hairpin circuits.
3. Rolling is not allowed on monitor circuits.
4. Rolling is not allowed on any cross-connection that is involved in test access.
5. Rolling is not allowed on any cross-connection that is involved in cross-connect loopbacks.
6. Rolling is not allowed on any port that is involved in facility or equipment loopbacks. This restriction applies to both “roll from” and “roll to.”
7. When rolling on a 1+1 protected circuit, the “roll to” cannot be on the protect port of the protection group.
8. Rolling on a BLSR protected circuit cannot violate the rules governing BLSR circuits: a circuit that traverses a BLSR must use the same STS number on the ring between source and destination.
9. Rolling on a BLSR protected circuit will be denied if there is an existing protection switch on the ring. If the protection switch happens after the roll is initiated, the system will not monitor valid signals on the “roll to” path until the protection switching is cleared.
10. Rolling on a path protection protected circuit cannot violate the rules governing path protection circuits: path protection circuits must have one bridge and one selector.
11. The bridge and selector of a path protection protected circuit cannot be rolled away.
12. In the case of a dual roll on a path protection protected circuit, both roll points have to be on either the working or protect path of the circuit. For example, you cannot specify one roll point on the working path and the other roll point on the protect path of the circuit being rolled.
13. When rolling on a path protection protected circuit, the “roll to” cannot be line protected (1+1 or BLSR protected). TL1 can only ensure this on the bridge and selector node, not on the intermediate node.

14. When rolling on a mixed protection circuit, the roll points have to be within the same protection domain.
15. Rolling using TL1 can be performed on a CTC-created cross-connection.



Note If a roll is created using TL1 it cannot be edited or deleted by CTC.

16. Rolling using TL1 can be performed on a TL1 cross-connection.



Note If a roll is created using CTC it cannot be edited or deleted by TL1.

17. If the intermediate path of a circuit is being rolled away to another circuit, the second circuit cannot carry any live traffic.



Note After a roll is completed, the second circuit will form the new intermediate path of the original circuit.

18. Rolling cannot be performed on VT tunnels or VT aggregation point (VAP) circuits passing through less than four nodes.

The following restrictions apply for bridge and roll using TL1 VCAT in this release:

1. For non open-ended VCAT circuits, you cannot change the source or destination of the circuit.
2. For open-ended VCAT circuits, you can change the source or destination of the circuit, but only on the open end.

The following restrictions apply for bridge and roll using TL1 common fiber-routed VCAT circuits in this release:

3. Rolling cannot change the common fiber property of a common fiber-routed VCAT circuit.
4. When rolling on a VCAT member circuit, in order not to change the common fiber property of a common fiber-routed VCAT circuit, you can roll the member from one time slot to a different time slot within the same fiber.

2.8.2 Bridge and Roll TL1 Commands

The following commands are used for bridge and roll:

- DLT-BULKROLL-<OCN_TYPE>

This command deletes or completes an attempted rolling operation. This command supports line level rolling/bulk rolling and cannot be used for path-level rolling. The rolls that are created using the ENT-BULKROLL-<OCN_TYPE> command can be deleted using the DLT-BULKROLL-<OCN_TYPE> command.

- DLT-ROLL-<MOD_PATH>

This command deletes an attempted rolling operation or completes an attempted rolling operation.

- ED-BULKROLL-<OCN_TYPE>

This command edits information about rolling traffic from one endpoint to another without interrupting service. This command can use the CMDMDE option to force a valid signal. The only parameter that can be edited is CMDMDE. The time slots cannot be edited. This command supports line-level rolling/bulk rolling and cannot be used for path-level rolling.

- ED-ROLL-<MOD_PATH>

This command edits information about rolling traffic from one endpoint to another without interrupting service. This command can use the CMDMDE option to force a valid signal. The only parameter that can be edited is CMDMDE. The time slots cannot be edited.

- ENT-BULKROLL-<OCN_TYPE>

This command enters information about rolling traffic from one endpoint to another without interrupting service. This command supports line level/bulk rolling and cannot be used for single path-level rolling.

- ENT-ROLL-<MOD_PATH>

This command enters information about rolling traffic from one endpoint to another without interrupting service. This command supports STS and VT path-level rolling only.

- RTRV-BULKROLL-<OCN_TYPE>

This command retrieves roll data parameters. This command supports line-level rolling/bulk rolling and cannot be used for path-level rolling.

- RTRV-ROLL-<MOD_PATH>

This command retrieves roll data parameters.

2.8.3 2-Way Circuit Single Roll and Dual Roll Procedures

Single roll operation moves either the source or destination of a circuit to a new endpoint:

- Onto the same node or
- Onto a different node

In single roll operation, you only choose one roll point during the process.

Dual roll operation reroutes a segment between two roll points of a circuit. The new route can be:

- A new link (no circuit is required), or
- Another circuit (created before or during the bridge and roll process)
- In dual roll operation, you choose two roll points during the process.

2.8.3.1 Create a 2-Way Circuit Single Roll or Dual Roll

To create a 2-way circuit single roll or dual roll, enter the ENT-ROLL-<MOD_PATH> command or the ENT-BULKROLL-<OCN_TYPE> command depending on the type of roll you want to perform.

Input Formats:

- ENT-ROLL-<MOD_PATH>:[<TID>]:<FROM>,<TO>:<CTAG>:::RFROM=<RFROM>,
RTO=<RTO>,RMODE=<RMODE>,[CMDMDE=<CMDMDE>];

- ENT-BULKROLL-<OCN_TYPE>:[<TID>]:<FROM>:<CTAG>::RTOSTART=<RTOSTART>,[RFROMSTART=<RFROMSTART>],[RFROMEND=<RFROMEND>],RMODE=<RMODE>,[CMDMDE=<CMDMDE>];

Step 1 Choose which type of roll you want to perform and enter the corresponding command:

- For automatic rolling onto the same facility, but different STS (path roll):

Input Example:

```
ENT-ROLL-STs1:CISCO:STS-1-1-1,STS-2-1-1:1::RFROM=STS-2-1-1,
RTO=STS-3-1-1,RMODE=AUTO,CMDMDE=FRCD;
```

- For manual rolling onto the same facility, but different STS (path roll):

Input Example:

```
ENT-ROLL-STs1:CISCO:STS-1-1-1,STS-2-1-1:1::RFROM=STS-2-1-1,
RTO=STS-3-1-1,RMODE=MAN,CMDMDE=FRCD;
```

- For rolling onto a different facility with the same or different STS (line roll):

Input Example:

```
ENT-BULKROLL-OC48:CISCO:FAC-5-1:123::RFROMSTART=STS-5-1-1,
RTOSTART=STS-6-1-1,RMODE=AUTO,CMDMDE=FRCD;
```

This command will roll all the STS and VT paths to a facility on Slot 6 with the same STS as shown in [Table 2-6](#).

Table 2-6 2-Way Circuit Single or Dual Line Roll with ENT-BULKROLL

Paths	Before Roll	After Roll
STS#1	STS-5-1-1	STS-6-1-1
STS#2	STS-5-1-2	STS-6-1-2
VT#1 on STS#3	VT1-5-1-3-1-1	VT1-6-1-3-1-1
VT#2 on STS#3	VT1-5-1-3-2-4	VT1-6-1-3-2-4
STS#4	STS-5-1-4	STS-6-1-4
STS#5	STS-5-1-5	STS-6-1-5
VT#3 on STS#6	VT1-5-1-6-1-1	VT1-6-1-6-1-1

- For rolling a set of circuits onto a different facility (bulk roll):

Input Example:

```
ENT-BULKROLL-OC48:CISCO:FAC-5-1:123::RFROMSTART=STS-5-1-1,
RTOSTART=STS-6-1-1,RFROMEND=STS-5-1-4,RMODE=AUTO,CMDMDE=FRCD;
```

This command will roll the paths shown in [Table 2-7](#).

Table 2-7 2-Way Circuit Single or Dual Bulk Roll with ENT-BULKROLL

Paths	Before Roll	After Roll
STS#1	STS-5-1-1	STS-6-1-1
STS#2	STS-5-1-2	STS-6-1-2
VT#1 on STS#3	VT1-5-1-3-1-1	VT1-6-1-3-1-1

Table 2-7 2-Way Circuit Single or Dual Bulk Roll with ENT-BULKROLL (continued)

Paths	Before Roll	After Roll
VT#2 on STS#3	VT1-5-1-3-2-4	VT1-6-1-3-2-4
STS#4	STS-5-1-4	STS-6-1-4

Step 2 If you performed a manual roll, you must confirm the circuit is valid by issuing the RTRV-BULKROLL-<OCN_TYPE> command:

Input Format:

RTRV-BULKROLL-<OCN_TYPE>:[<TID>]:<SRC>:<CTAG>;

Input Example:

RTRV-BULKROLL-OC12:CISCO:FAC-3-1:1;

2.8.4 1-Way Circuit Single Roll and Dual Roll Procedures

Single roll operation moves either the source or destination of a circuit to a new endpoint:

- Onto the same node or
- Onto a different node

In single roll operation you only choose one roll point during the process.

Dual roll operation reroutes a segment between two roll points of a circuit. The new route can be:

- A new link (no circuit is required), or
- Another circuit (created before or during the bridge and roll process).
- In dual roll operation, you choose two roll points during the process.

2.8.4.1 Create a 1-Way Circuit Single Roll

To create a 1-way circuit single roll, enter the ENT-ROLL-<MOD_PATH> command or the ENT-BULKROLL-<OCN_TYPE> command depending on the type of roll you want to perform.

Input Formats:

- ENT-ROLL-<MOD_PATH>:[<TID>]:<FROM>,<TO>:<CTAG>::RFROM=<RFROM>,RTO=<RTO>,RMODE=<RMODE>,[CMDMDE=<CMDMDE>];



Note For a 1-way destination roll, the roll mode must be manual (MAN).

- ENT-BULKROLL-<OCN_TYPE>:[<TID>]:<FROM>:<CTAG>::RTOSTART=<RTOSTART>,[RFROMSTART=<RFROMSTART>],[RFROMEND=<RFROMEND>],RMODE=<RMODE>,[CMDMDE=<CMDMDE>];

Step 1 Choose which type of roll you want to perform and enter the corresponding command:

- For automatic rolling onto the same facility, but different STS (path roll):

Input Example:

```
ENT-ROLL-STIS1:CISCO:STS-1-1-1,STS-2-1-1:1:::RFROM=STS-2-1-1,
RTO=STS-3-1-1,RMODE=AUTO,CMDMDE=FRCD;
```

- For manual rolling onto the same facility, but different STS (path roll):

Input Example:

```
ENT-ROLL-STIS1:CISCO:STS-1-1-1,STS-2-1-1:1:::RFROM=STS-2-1-1,
RTO=STS-3-1-1,RMODE=MAN,CMDMDE=FRCD;
```

- For rolling onto a different facility with the same or different STS (line roll):

Input Example:

```
ENT-ROLL-STIS1:CISCO:STS-1-1-1,STS-2-1-1:1:::RFROM=STS-2-1-1,
RTO=STS-3-1-1,RMODE=AUTO,CMDMDE=FRCD;
```

This command will roll all the STS and VT paths to a facility on Slot 6 with the same STS as shown in [Table 2-8](#) below:

Table 2-8 1-Way Circuit Single Line Roll with ENT-BULKROLL

Paths	Before Roll	After Roll
STS#1	STS-5-1-1	STS-6-1-1
STS#2	STS-5-1-2	STS-6-1-2
VT#1 on STS#3	VT1-5-1-3-1-1	VT1-6-1-3-1-1
VT#2 on STS#3	VT1-5-1-3-2-4	VT1-6-1-3-2-4
STS#4	STS-5-1-4	STS-6-1-4
STS#5	STS-5-1-5	STS-6-1-5
VT#3 on STS#6	VT1-5-1-6-1-1	VT1-6-1-6-1-1

- For rolling a set of circuits onto a different facility (bulk roll):

Input Example:

```
ENT-BULKROLL-OC48:CISCO:FAC-5-1:123:::RTOSTART=STS-6-1-1,
RFROMSTART=STS-5-1-1,RFROMEND=STS-5-1-4,RMODE=AUTO,CMDMDE=FRCD;
```

This command will roll the paths shown in [Table 2-9](#) as follows:

Table 2-9 1-Way Circuit Single Bulk Roll with ENT-BULKROLL

Paths	Before Roll	After Roll
STS#1	STS-5-1-1	STS-6-1-1
STS#2	STS-5-1-2	STS-6-1-2
VT#1 on STS#3	VT1-5-1-3-1-1	VT1-6-1-3-1-1
VT#2 on STS#3	VT1-5-1-3-2-4	VT1-6-1-3-2-4
STS#4	STS-5-1-4	STS-6-1-4

Step 2 If you performed a manual roll, you must confirm the circuit is valid by issuing the RTRV-BULKROLL-<OCN_TYPE> command:

Input Format:

RTRV-BULKROLL-<OCN_TYPE>:[<TID>]:<SRC>:<CTAG>;

Input Example:

RTRV-BULKROLL-OC12:CISCO:FAC-3-1:1;

2.8.4.2 Create a 1-Way Circuit Dual Roll

In this procedure, both the source and destination nodes are rolled. There are two types of dual rolls:

- Dual roll for a single circuit within the same facilities but to a different time slot.
- Dual roll for a single circuit from one span card to another span card.

Step 1 Determine which type of roll you want to perform on the source node and follow the steps in the [“2.8.3 2-Way Circuit Single Roll and Dual Roll Procedures”](#) section on page 2-56.

Step 2 Determine which type of roll you want to perform on the destination node and follow the steps in the [“2.8.3 2-Way Circuit Single Roll and Dual Roll Procedures”](#) procedure on page 2-56.

2.8.5 Protection Rolling Procedures

To perform protection rolls, follow the procedures in the [“2.8.3 2-Way Circuit Single Roll and Dual Roll Procedures”](#) section on page 2-56 and the [“2.8.4 1-Way Circuit Single Roll and Dual Roll Procedures”](#) section on page 2-58.



Note

Before performing a protection roll, either from one protection group to another or within the same protection group, the protection group must already be provisioned.

[Table 2-10](#) shows what kind of protection rolls are supported from one domain to another. X indicates the roll is allowed.

Table 2-10 Supported Protection Rolls

Roll From Domain	Roll To Domain				
	BLSR	PCA	1+1	Path Protection	Unprotected
BLSR	X	X	X		X
PCA	X	X	X		X
1+1	X	X	X		X
Path Protection				X	
Unprotected	X	X	X		X

2.9 1:N Low-Density to 1:N High-Density Upgrade

(Cisco ONS 15454)

The following procedure describes the upgrade of DS1 electrical cards to DS1/E1-56 high-density cards using TL1. This procedure can be performed only when logged in as a Superuser.



Note

- Protect cards must be upgraded before working cards because working cards cannot have more capabilities than their protect card.
- You cannot upgrade electrical cards from low-density to high-density if the low-density electrical cards are installed in Slots 4, 5 or 6 on the A side or 12, 13 or 14 on the B side of the shelf. Only cards in slots 1, 2, 16 and 17 can be upgraded to high-density electrical cards.
- The following limitations apply when upgrading low-density electrical cards to high-density electrical cards:
 - The protect card must be in a protection group.
 - The protect card must not protect any low-density electrical cards on Slots 4, 5 or 6 if on the A Side of the shelf and Slots 12, 13 or 14 if on the B Side of the shelf.
- Perform this procedure on low-density cards that are already in 1:N protection.

Step 1 On the protect card, change the card type from low-density to high-density:

Input Format:

CHG-EQPT:[<TID>]:<AID>:<CTAG>::<NEW_EQPT_TYPE>;

Input Example:

CHG-EQPT::SLOT-15:123::DS1-E1-56;

Step 2 Physically remove the low-density protect card and insert the high-density protect card.

Step 3 Switch the traffic from the working card to the protect card:

Input Format:

SW-TOPROTN-EQPT:[<TID>]:<AID>:<CTAG>::[<MODE>],[<DIRN>;

Input Example:

SW-TOPROTN-EQPT::SLOT-16:123::FRCD,SLOT-15,BTH;

Step 4 On the working card, change the card type from low-density to high-density:

Input Format:

CHG-EQPT:[<TID>]:<AID>:<CTAG>::<NEW_EQPT_TYPE>;

Input Example:

CHG-EQPT::SLOT-16:123::DS1-E1-56;

Step 5 Physically remove the working low-density card and insert the high-density card.

- Step 6** Switch the traffic back onto the working high-density card:
- Input Format:
- ```
SW-TOWKG-EQPT:[<TID>]:<AID>:<CTAG>::[<MODE>],[<DIRN>];
```
- Input Example:
- ```
SW-TOWKG-EQPT::SLOT-16:123::FRCD,BTH;
```
- Step 7** Repeat these steps to upgrade the other low-density card in the protection group.
-

2.10 Remote Monitoring-Managed PMs

This section describes the retrieval, threshold setting, threshold crossing alerts (TCAs) and scheduled performance monitoring (PM) reporting for all the remote monitoring (RMON)-managed PM data in the Cisco ONS 15454, ONS 15327, ONS 15310-CL and ONS 15600.



Note

Cisco ONS 15600 does not support RMONTH commands. For ONS 15600, RMON counts can be retrieved using TL1 commands, but RMON thresholds cannot be set using TL1.

The cards that support RMON PMs include: G1K-4, ML1000-2/ML100T-12, FC_MR-4, ASAP-4, MXP_MR_2.5G/MXPP_MR_2.5G, and ML-100T-8/CE-100T-8. The PM types for these cards include Ethernet statistic types defined in standard SNMP/RMON MIB, and also include other statistic types managed by RMON, for example, the Fibre Channel statistic types.

When creating an RMON threshold, there are two threshold values that need to be specified. The first threshold is the rising threshold and the other is the falling threshold. There are other parameters that need to be specified when creating the RMON threshold, for example, the startup type and the sample type.



Note

There can be more than one threshold defined for each RMON statistic type.

The current bucket is not defined by the RMON. RMON-managed PM only shows the history data of the PMs and the data accumulated since the last time the counters are cleared (RAW-DATA).

In the RMON TCA, the accumulation time period is not the predefined PM bucket accumulation time, such as 15-MIN or 1-DAY. It can be any integer (any time greater than 10 seconds) that is defined when creating the RMON threshold.



Note

For platform-specific PM information, refer to the Procedure Guide and Reference Manual of that platform.

2.10.1 RTRV-PM-<MOD2>

The RTRV-PM-<MOD2> command retrieves the RMON-managed PMs.

The TL1 modifiers FSTE/GIGE/POS are used to retrieve the RMON-managed Ethernet PM, if the Ethernet port is a FSTE/GIGE/POS port type. The FC modifier retrieves the RMON-managed Fibre Channel PM.

There are three accumulation time periods for RMON statistics: 1-MIN, 1-HR, and RAW-DATA. For RMON-managed PMs, only history PM buckets and RAW-DATA are supported and there is no current bucket defined for RMON-managed PMs. When RAW-DATA is specified in the input of RTRV-PM, the date and time specified in the input will be ignored. The mondate and montime in the output will be the last time the counters were cleared. RAW-DATA will be the default TMPER value for RMON-managed PM retrieval.

Because RMON PM only supports the history data if the accumulation time period is 1-MIN, 15-MIN, 1-HR, or 1-DAY, you must specify the correct history PM bucket for the RTRV-PM command to succeed.

When retrieving PM, if an unsupported montype is specified, an error message will be returned.

Currently there is no support of LOCN (location) and DIRN (direction) for RMON-managed data statistics.

Input Format

```
RTRV-PM-<MOD2>:[<TID>]:<AID>:<CTAG>::[<MONTYPE>],[<MONLEV>],[<LSTM>],
[<DIRECTION>],[<TMPER>],[<DATE>],[<TIME>;
```

Input Example

```
RTRV-PM-GIGE:TID:FAC-2-1:123::ETHERSTATSOCTETS,,,1-MIN,04-11,12-45;
RTRV-PM-GIGE:TID:FAC-2-1:123::,,,RAW-DATA;
```

Output Format

```
SID DATE TIME
M CTAG COMPLD
  "<AID>,[<AIDTYPE>]:<MONTYPE>,<MONVAL>,[<VLDTY>],[<LOCN>],
  [<DIRECTION>],[<TMPER>],[<MONDAT>],[<MONTM>]"
;
```

Output Example

```
TID-000 1998-06-20 14:30:00
M 001 COMPLD
  "FAC-2-1,GIGE:etherStatsOctets,21,COMPL,,,1-MIN,04-11,12-45"
;
```

[Table 2-11](#) shows the error messages associated with the RTRV-PM-<MOD2> command.

Table 2-11 Error Messages for RTRV-PM-<MOD2>

Error Code	Description	Scenario When the Error Message is Sent
IDNV	TMPER Type Not Supported	The TMPER parameter specified is not applicable for the MOD2 type. For example, 1-MIN is not applicable for OC48 PM types.
IDNV	Current Interval Not Supported For RMON PMs	The current interval is specified by default, or is explicitly specified by mondat/montm, when the TMPER is 1-MIN, 15-MIN, 1-HR, or 1-DAY.

2.10.2 ENT-RMONTH-<MOD2_RMON>

The ENT-RMONTH-<MOD2_RMON> command creates a threshold type (an entry in the RMON alarm table) for an RMON statistic, for the RMON-managed PMs. An event (TCA) is generated and reported when the threshold is crossed in the appropriate direction during the sampled time period.

More than one threshold can be created by using different parameters (rising/falling threshold), for each montype.

This command applies to G1000, GIGE, FSTE, POS, and FC data objects.

Input Format

```
ENT-RMONTH-<MOD2>:[<TID>]:<AID>:<CTAG>::<MONTYPE>,,,<INTVL>:RISE=<RISE>,
FALL=<FALL>,[SAMPLE=<SAMPLE>],[STARTUP=<STARTUP >][:];
```

Input Example

The following example creates an entry in the RMON threshold table for the etherStatsOctets statistic type with an interval equal to 100 seconds, rising threshold of 1000, falling threshold of 100, DELTA sampling type and the startup type of RISING-OR-LTING.

```
ENT-RMONTH-GIGE:CISCO:FAC-2-1:123::ETHERSTATSOCTETS,,,100:RISE=1000,
FALL=100,SAMPLE=DELTA,STARTUP=RISING-OR-LTING;
```

[Table 2-12](#) shows the error messages associated with the ENT-RMONTH-<MOD2_RMON> command.

Table 2-12 Error Messages for ENT-RMONTH-<MOD2_RMON>

Error Code	Description	Scenario When the Error Message is Sent
IDNV	Invalid Interval	The input interval value is less than 10.
IDRG	Invalid Threshold Value	The rising/falling threshold is less than 0, or the falling threshold is greater than or equal to rising threshold.
IDNV	Invalid MONTYPE value	The montype is not applicable to the data type (represented by the MOD2).
IIDT	Cannot Create More RMON Threshold	The number of RMON threshold created reached the maximum (256).
IIDT	Duplicate RMON Threshold	There already is a threshold created with the exact parameters.

2.10.3 DLT-RMONTH-<MOD2_RMON>

The DLT-RMONTH-<MOD2_RMON> command deletes a threshold type (an entry in the RMON alarm table) created for a montype (RMON statistic type). Because there can be multiple thresholds created for a particular montype, you must specify all the necessary parameters for the threshold, in order to identify the particular threshold to be deleted.

This command applies to G1000, GIGE, FSTE, POS, and FC data objects.

Input Format

DLT-RMONTH-<MOD2>:[<TID>]:<AID>:<CTAG>::<MONTYPE>,,,<INTVL>:RISE=<RISE>,
FALL=<FALL>,[SAMPLE=<SAMPLE>],[STARTUP=<STARTUP>][:];

Input Example

The following example deletes an entry in the RMON threshold table for the etherStatsOctets statistic type, with an interval equal to 100 seconds, rising threshold of 1000, falling threshold of 100, DELTA sampling type, and the startup type of BOTH.

DLT-RMONTH-GIGE:CISCO:FAC-2-1:123::ETHERSTATSOCTETS,,,100:RISE=1000,FALL=100,
SAMPLE=DELTA,STARTUP=BOTH;

Table 2-13 shows the error messages associated with the DLT-RMONTH-<MOD2_RMON> command.

Table 2-13 Error Messages for DLT-RMONTH-<MOD2_RMON>

Error Code	Description	Scenario When the Error Message is Sent
IDNV	Invalid Interval	The input interval value is less than 10.
IDRG	Invalid Threshold Value	The rising/falling threshold is less than 0, or the falling threshold is greater than or equal to rising threshold.
IDNV	Invalid MONTYPE value	The montype is not applicable to the data type (represented by the MOD2).
SROF	RMON Threshold Does Not Exist	The RMON threshold you are trying to delete does not exist.

2.10.4 RTRV-RMONTH-<MOD2_RMON>

The RTRV-RMONTH-<MOD2_RMON> command retrieves the thresholds defined in the RMON alarm table.

Input Format

RTRV-RMONTH-<MOD2>:[<TID>]:<AID>:<CTAG>::<MONTYPE>]>,,,<INTVL>]:[RISE=<RISE>],[FALL=<FALL>],[SAMPLE=<SAMPLE>],[STARTUP=<STARTUP>];

Input Example

The following example retrieves all the thresholds defined in the RMON threshold table for the etherStatsOctets statistics type.

```
RTRV-RMONTH-GIGE:TID:FAC-2-1:123::ETHERSTATSOCTETS;
```

The following example retrieves all the thresholds with the DELTA sampling type, RISING startup type, for the etherStatsOctets statistics type, defined in the RMON threshold table.

```
RTRV-RMONTH-GIGE:CISCO:FAC-2-1:123::ETHERSTATSOCTETS:SAMPLE=DELTA,
STARTUP=RISING;
```

Output Format

```
SID DATE TIME
M CTAG COMPLD
"<AID>,[<AIDTYPE>]:<MONTYPE>,,,[<INTVL>]:INDEX=<INDEX>,RISE=<RISE>,
FALL=<FALL>,SAMPLE=<SAMPLE>,STARTUP=<STARTUP>"
;
```

Output Example

```
TID-000 1998-06-20 14:30:00
M 001 COMPLD
"FAC-2-1,GIGE:ETHERSTATSOCTETS,,,100:INDEX=2,RISE=1000,FALL=100,
SAMPLE=DELTA,STARTUP=RISING"
;
```

Table 2-14 shows the error messages associated with the DLT-RMONTH-<MOD2_RMON> command.

Table 2-14 Error Messages for RTRV-RMONTH-<MOD2_RMON>

Error Code	Description	Scenario When the Error Message is Sent
IDNV	Invalid Interval	The input interval value is less than 10.
IDRG	Invalid Threshold Value	The rising/falling threshold is less than 0, or the falling threshold is greater than or equal to rising threshold.
IDNV	Invalid MONTYPE value	The montype is not applicable to the data type (represented by the MOD2).
SROF	RMON Threshold Does Not Exist	The RMON threshold you are trying to delete does not exist.

2.10.5 REPT EVT <MOD2ALM> for Threshold Crossing Events

The REPT EVT <MOD2ALM> autonomous message reports the threshold crossing event for the RMON statistics.

The HT or LT is generated when crossing the RISING or FALLING threshold.

The table index for threshold in the RMON alarm table is enclosed in the text of the TCA description. This table index appears in the output of the RTRV-RMONTH command also. You can retrieve additional information regarding the threshold that generates the TCA by issuing the RTRV-RMONTH command and comparing the output with corresponding table index.

Output Format

```

SID DATE TIME
M CTAG COMPLD
"<AID>:<CONDTYPE>,<CONDEFF>,<OCRDAT>,<OCRTM>,<LOCN>,<MONVAL>,<THLEV>,<TMPER>:<DESC>,<AIDDET>]"
;

```

Output Example

```

VA454-23 2000-02-20 08:47:03
A 512.512 REPT EVT G1000
"FAC-2-1,G1000:T-ETHERSTATSOCTETS-HT,TC,09-30,23-59-59,,,1003,
1000,;"RMON THRESHOLD CROSSING ALARM # 1 \"",G1000-4"
;

```

2.10.6 INIT-REG-<MOD2>

This command initializes the PM registers.

This command applies to G1K-4, GIGE, FSTE, and FC data objects.

Only RAW-DATA is allowed to be specified for TMPER because no history data will be cleared for RMON-managed PMs by INIT-REG-<MOD2>.

2.10.7 SCHED-PMREPT-<MOD2>

This command schedules/reschedules the NE to report the performance monitoring data.

The three accumulation time periods form RMON statistics are: 1-MIN, 1-HR, and RAW-DATA.

2.10.8 RTRV-PMSCHED-<MOD2>

This command retrieves the RMON statistics reporting schedule that was set for the NE by the SCHED-PMREPT-<MOD2> command.

The LOCN parameter is optional in the output of RTRV-PMSCHED-<MOD2>, and no LOCN information will be given in the output of RTRV-PMSCHED for RMON PM schedule.

2.10.9 REPT PM <MOD2>

Reports autonomous monitoring statistics as a result of the schedule created by SCHED-PMREPT-<MOD2>.

The LOCN parameter is optional in the output of REPT PM <MOD2> message, and no LOCN information will be given in the output of REPT PM <MOD2>.

2.10.10 REPT DBCHG

Reports any changes on the NE that result from issuing the following commands:

1. ENT-RMONTH-<MOD2>
2. DLT-RMONTH-<MOD2>

Also reports when an RMON PM schedule is created or deleted via the SCHED-PMREPT-<MO2> command.

2.10.11 MONTYPE Defined for Ethernet Statistics and Condition Type for TCA

The names of Ethernet and Fibre Channel montypes are defined exactly as they are defined in the corresponding SNMP MIB statistics group. For example, etherStatsUndersizePkts will be used as the name for the same RMON statistics defined in request for comment (RFC)1757.

Unlike the PM of other SONET entities (such as, STS path, OCn), there are two condition types defined for the TCAs of each RMON-managed statistics type; Ethernet or Fibre Channel montype. One condition type is for the rising threshold, and the other is for the falling threshold. For example, there are two condition types for etherStatsUndersizePkts stats type: T-etherStatsUndersizePkts-HT for the rising threshold, and T-etherStatsUndersizePkts-LT for the falling threshold.



Note

For platform-specific PM information, refer to the Procedure Guide and Reference Manual of that platform.

2.10.12 Enumerated types

2.10.12.1 TMPER

Table 2-15 *TMPER Type*

Values	Description
1-DAY	Performance Parameter Accumulation Interval Length - Every 24 Hours. For SONET PM data (line/session/path), only 1 day of history data is available. For RMON managed data stats, there are 7 days of history data are available.
15-MIN	Performance Parameter Accumulation Interval Length - Every 15 Minutes. 32 history data are available.
1-MIN	Performance Parameter Accumulation Interval Length - Every 1 minute. Only applicable to RMON stats. 60 history data are available.

Table 2-15 *TMPER Type (continued)*

Values	Description
1-HR	Performance Parameter Accumulation Interval Length - Every 1 Hours. Only applicable to RMON stats. 24 history data are available.
RAW-DATA	The data shown is accumulated starting from the last time the counters are cleared. This is only applicable to RMON managed PMs.

2.10.12.2 SAMPLE_TYPE

SAMPLE_TYPE (Table 2-16) describes how the data will be calculated during the sampling period.

Table 2-16 *SAMPLE_TYPE*

Value	Description
ABSOLUTE	Comparing directly
DELTA	Comparing with the current value of the selected variable subtracted by the last sample.

2.10.12.3 STARTUP_TYPE

STARTUP_TYPE (Table 2-17) indicates whether an event will be generated when the first valid sample is crossing the rising or falling threshold.

Table 2-17 *STARTUP_TYPE*

Value	Description
RISING	Generate the event when the sample is greater than or equal to the rising threshold.
FALLING	Generate the event when the sample is smaller than or equal to the falling threshold.
RISING-OR-LTING	Generate the event when the sample is crossing the rising threshold, or it is crossing the falling threshold.

2.10.13 Notes for DWDM Card Types

The PM for client port and/or chunk port (OCH) can include both the RMON-managed PM and the SONET PM when the client payload is provisioned as 1GFC/2GFC/10GFC/1GFICON/2GFICON/GIGE/10GIGE for the following cards:

- MXP_2.5G_10G
- TXP_MR_10G
- TXP_MR_2.5G
- TXP_MR_10E
- MXP_MR_2.5G

2.10.13.1 Client Port of DWDM Cards

When the client port of a DWDM card is provisioned as 1GFC/2GFC/10GFC/1GFICON/2GFICON/GIGE/10GIGE, the applicable PM for the client port includes both the RMON-managed PM and the SONET PM. Therefore, the behavior of the RTRV-PM-MMOD2>, INIT-REG-<MOD2>, and SCHED-PMREPT-<MOD2> commands is different from the Ethernet or Fibre Channel port of the other cards where only RMON PM is applicable. The differences include:

- LOCN and DIRN parameters are applicable to the RTRV-PM-<MOD2>, INIT-REG-<MOD2>, and SCHED-PMREPT-<MOD2> commands because they are applicable to the SONET optics PM. When the LOCN or DIRN parameter is specified it would only apply to the SONET optics PM.
- Because 1-MIN, 1-HR, or RAW-DATA are not applicable to the SONET optics PM, no SONET optics PM would be returned in the output of RTRV-PM. If RAW-DATA is specified in the input of the INIT-REG command, no SONET optics PM counter will be cleared.
- When the accumulation time period is specified as 15-MIN or 1-DAY and the PM history bucket is specified as 0 (current bucket), only the SONET optics PM will be returned in the output of the RTRV-PM command. No RMON-managed PM will be included in the output of the RTRV-PM command because RMON PM does not have current bucket.
- A SONET optics PM motype cannot be specified in the input of the INIT-REG command only the SONET optics PM counters will be cleared. When the ALL motype is specified, both the RMON and the SONET optics PM counters will be cleared.
- The commands used to manage RMON thresholds (ENT-RMONTH, DLT-RMONTH, and RTRV-RMONTH) are only applicable to the RMON PM of the client port. The SONET optics PM thresholds of the client port are still managed by the SET-TH and RTRV-TH commands. For example, if the client port type of an MXP_MR_2.5G card is provisioned as GIGE, the following commands would be used to create an RMON threshold:

```
ENT-RMONTH-GIGE::FAC-2-1-1:1::IFINOTETS,,,1000:RISE=1000,FALL=900;
```

And the following command would be used to set the SONET optics PM threshold:

```
SET-TH-GIGE::FAC-2-1-1:1LBCL-MIN,0.2;
```

2.10.13.2 OCH Port of the DWDM Card

The OCH port of the TXP_MR_10G and TXP_MR_10E cards include the RMON-managed 8B10B PM as well as the other SONET PM when their client port is provisioned as GIGE/10GIGE or 1GFC/2GFC/10GFC.

The RTRV-PM-OCH, INIT-REG-OCH, SCHED-PMREPT-OCH and REPT PM OCH commands have similar behaviors as mentioned in the [“2.10.13.1 Client Port of DWDM Cards”](#) section on page 2-70.

2.11 Rules for Framing Type Autoprovisioning in CTC Versus TL1

The DS3/DS3E/DS3XM/DS3I/DS1cards can autosense framing and set the format accordingly; however, this framing autosense feature can only be set using CTC. Use CTC to set the FMT attribute on DS3/DS3E/DS3XM/DS3I/DS1cards to autoprovision. The FMT field will blank out for a few seconds while the card is determining the framing mode received by that particular port. The FMT field is set accordingly to unframed, M23, or CBit. If the card is not present (preprovisioned), setting the FMT field to autoprovision will result in the FMT field defaulting to unframed.

The TL1 interface does not support the autoprovision option for the DS3/DS3E/DS3XM/DS3I/DS1cards; it only supports unframed, M23, or CBit. If autoprovision is selected from CTC and at the same time the TL1 command RTRV-T3 is issued, the TL1 output will indicate the FMT field as unframed during the time period that the card (if present) is autosensing the frame format. If the card is not present (preprovisioned), the response of the RTRV-T3 command (after CTC sets the FMT to autoprovision) will indicate the FMT field as unframed.

2.12 Provisioning Rules for Transponder and Muxponder Cards

This section provides provisioning rules associated with the following cards and pluggable port modules (PPMs):

- MXP_2.5G_10G/TXP_MR_10G
- TXP_MR_2.5G/TXPP_MR_2.5G
- MXP_2.5G_10E/TXP_MR_10E
- MXP_MR_2.5G/MXPP_MR_2.5G

2.12.1 PPM Provisioning Rules

Card must be provisioned.

TL1 commands are:

- ENT/DLT-EQPT

Example of provisioning PPM on Slot-2, first PPM:

```
ENT-EQPT::PPM-2-1:100::PPM-1PORT;
```

2.12.2 Payload Provisioning Rules

1. PPM must first be provisioned.
2. Changing the payload data type requires:
 - a. All ports being edited must be in the OOS-MA,DSBLD state because this change is service affecting.
 - b. All ports being edited must not have any DCC terminations.
 - c. All ports being edited must not be part of any timing source.
 - d. The section trace mode of all ports being edited must be OFF.
 - e. For all regeneration and retiming (2R) payload types, trunk ports must not have GCC termination or OTN/FEC enabled.
 - f. The payload cannot be changed if any ports being edited are part of a Y-cable protection group.
 - g. Only the TXP card can be used for the 10GigE payload. Termination mode must be set to Transparent-AIS or Transparent-Squelch (TXP_MR_10E only).
3. To set the payload to a speed other than OC-3/OC-12/OC-48/OC-192, the termination mode must be set to Transparent-AIS or Transparent-Squelch (TXP_MR_10E only). For Fibre Channel cards and all 2R payload types, the termination mode is not applicable and must be set to Transparent (AIS or Squelch).

4. Changing payload while in a regeneration group requires first unprovisioning the regeneration group, unprovisioning the payload, reprovisioning the payload, and reprovisioning the regeneration group.

The TL1 commands are:

- ENT/DLT/ED-(OCn, nGIGE, nGFC, 2R)

Examples of provisioning payload:

ENT-OC12

ENT-10GIGE

ED-2GFC

- ENT/DLT/ED-EQPT

Example of setting termination mode:

ENT-EQPT::SLOT-1:116::TXP-MR-10E:CARDMODE=DWDM-TRANS-AIS;

2.12.3 OC-N Payload Provisioning Parameters

SONET payloads are supported by DWDM cards according to [Table 2-18](#). These payloads are configurable only for the Section and Line layers. STS layers cannot be provisioned or retrieved.

Table 2-18 Payload/Card Mode Support

Card Type	Payload	Card Mode
TXP_MR_10G	OC192	DWDM-LINE
	10GIGE	DWDM-SECTION DWDM-TRANS-AIS DWDM-TRANS-AIS with REGEN group
	OC192, 10GIGE	Does not support PPM. Card mode not applicable.
MXP_2.5G_10G	OC48	DWDM-LINE DWDM-SECTION DWDM-TRANS-AIS
TXP_MR_2.5G and TXPP_MR_2.5G	1GIGE, 1GF, 1GFICON, 2GFICON, ESCON, ISC1, ISC3, ETRCLO, DV6000, HDTV, D1VIDEO	DWDM-TRANS-AIS with REGEN group. Must be DWDM-TRANS-AIS. Requires the DWRAP and FEC disabled on the network/OCH ports.
	OC3, OC12, OC48	DWDM-LINE, DWDM-SECTION, DWDM-TRANS-AIS
TXP_MR_10E	OC192	DWDM-LINE, DWDM-SECTION, DWDM-TRANS-AIS, DWDM-TRANS-SSQUELCH
	10GIGE, 10GFC	DWDM-TRANS-AIS, DWDM-TRANS-SQUELCH, With REGEN group it must be DWDM-TRANS-AIS, DWDM-TRANS-SQUELCH

Table 2-18 Payload/Card Mode Support (continued)

Card Type	Payload	Card Mode
MXP_2.5G_10E	OC48	DWDM-SECTION, DWDM-TRANS-AIS, DWDM-TRANS-SQUELCH
MXP_MR_2.5G AND MXPP_MR_2.5G	Port-1: 1GFC, 1GFICON, GIGE Port-2: 1GFC, 2GFC, 1GFICON, 2GFICON, GIGE ¹	FCGE ²

1. If 2GFC or 2GFICON is on Port-2, then Port-1 must be unprovisioned. If Port-1 is provisioned then Port-2 cannot contain 2GFC or 2GFICON because of bandwidth limitations. Ports 3 through 8 are not available. ESCON payload is not supported.
2. ESCON and mixed card modes are not supported.

The configuration parameters for OCn ports can be retrieved/edited using the ED-<OCN_TYPE> and RTRV-<OCN_TYPE> commands. The following is a list of restrictions when using the ED/RTRV-<OCN_TYPE> command parameters:

- DCC/LDCC parameters are used to enable/disable SDCC/LDCC functionality respectively.
- Synchronization parameters are applicable only to cards supporting synchronization: MXP-2.5G-10G, TXP-MR-10E, and MXP-2.5G-10E. Only SYNMSG and SENDDUS parameters are supported.
- Signal fail/signal degrade can be provisioned using SDBER and SFBER parameters respectively.
- Soak time and administrative/service state parameters can be provisioned using, SOAK, SOAKLEFT, PST, SST and CMDMDE parameters.
- The SONET/SDH selection can be provisioned using the MODE parameter.
- The name of the facility can be provisioned using the NAME parameter.
- The J0 section parameters can be provisioned using the EXPTRC, TRC, INCTRC, TRCMODE and TRCFORMAT parameters.

2.12.4 Termination Mode Provisioning Rules

1. This is a card-level operation.
2. Only applicable to payload types: OC-3/OC-12/OC-48/OC-192.
3. Changing termination mode requires:
 - a. All ports must be in OOS state because this change is traffic-affecting.
 - b. All ports must not have DCC termination (GCC is not applicable).
 - c. The Section Trace Mode on all ports must be OFF>.
 - d. The trunk port must not be part of any timing source.
 - e. If any port is Y-cable protected, rules a. to d. are applied to the peer's slot.
4. Section and line termination mode is supported for the following payloads: OC-3/OC-12/OC-48/OC-192.
5. You cannot change the termination mode if the port is part of a Y-cable protection or regeneration group.
6. Termination mode provisioning does not apply to the MXP_MR_2.5G and MXPP_MR_2.5G cards.

The TL1 commands are:

- ENT/ED-EQPT

Examples of setting termination mode:

```
ED-EQPT::SLOT-1:116::CARDMODE=DWDM-LINE;
```

2.12.5 Wavelength Provisioning Rules

1. Changing trunk wavelength requires:
 - a. All trunk ports must be in the OOS state because this change is service-affecting.
2. Setting the wavelength to the first tunable wavelength will cause the first wavelength from the card manufacturing data to be used as the operational wavelength.
3. If the provisioned wavelength is set to the first tunable wavelength, any removal of an operational card and subsequent replacement with a card for a different wavelength will not cause a mismatch alarm to be raised.
4. To receive the mismatch alarm notification, you need to explicitly provision the wavelength and not use the first tunable wavelength.

The TL1 commands are:

- ENT/ED-EQPT

Example of setting card-level wavelength:

```
ED-EQPT:VA454-22:SLOT-1:116::PWL=1530.33;
```


2.12.6 Regeneration Group Provisioning Rules

1. The protect and unprotected version of the transponder (TXP) card can be used in a regeneration group.
2. When the protect version of the TXP card is used as a regeneration group, the LOCKOUT_OF_PROTECTION, inhibit switching command will be issued on the working trunk port.
3. You cannot unlock the inhibit switching command until the regeneration group is unprovisioned for the protect TXP.
4. Regeneration group provisioning will be denied if there is a FORCE or MANUAL switching command already provisioned on the trunk ports for the protect TXP.
5. A regeneration group enables the continuation of the client signal across multiple spans.
6. Provisioning a regeneration group requires:
 - a. Peer-slot must not be itself.
 - b. Peer-slot must at least be preprovisioned.
 - c. Peer-slot must not be part of another regeneration group.
 - d. Peer-slot must not be part of a Y-cable protection group.
 - e. Same card type.
 - f. Same payload type and data rate.
 - g. Same G.709 OTN status.
 - h. Same FEC status.
 - i. Termination mode has to be set to transparent (AIS or SQUELCH) mode.

The TL1 commands are:

- ED/ENT-EQPT

Example of setting card-level regeneration group:

```
ED-EQPT::SLOT-2:CTAG:::PROTID=SLOT-2,NAME=REGENGROUPNAME;
```

2.12.7 DCC/GCC Provisioning Rules

1. The DCC can be provisioned on the client port of a TXP and MXP card.
2. All 2R payload types do not support GCC.
3. Provisioning a DCC requires:
 - a. Payload data type is set to OC-3/OC-12/OC-48/OC-192.
 - b. Termination mode is set to line/section terminated if the card supports provisionable termination mode.
4. The DCC can be provisioned on the trunk line provided that G.709 is provisionable and G.709 OTN status is turned off:
 - a. To provision a GCC on the trunk port the G.709 should be enabled.
 - b. To provision a DCC on the trunk port the G.709 should be disabled.
5. Only the working client port in a Y-cable protection scheme is allowed to be provisioned with DCC.

- Only the working trunk port in a splitter protection scheme can be provisioned with DCC or GCC.

The TL1 commands are:

- ED-(OCn, nGIGE, nGFC)

Example of provisioning DCC/GCC:

```
ED-OC192::FAC-1-1-1:100:::COMM=DCC:OOS,AINS;
```

- ED-OCH

Example of provisioning DCC/GCC:

```
ED-OCH::CHAN-6-2:114:::COMM=GCC:OOS,AINS;
```

2.12.8 G.709 OTN, FEC and OTN SDBER/SFBER Provisioning Rules

- The G.709 OTN, FEC and OTN SDBER/SFBER can only be provisioned on the trunk port.
- All 2R (transparent) payload types (HDTV, passthrough) do not support G.709 OTN or FEC.
- To enable the G.709 OTN status:
 - All trunk ports must be in OOS state.
 - All trunk ports must not have any SDCC provisioned.
- In order to disable G.709:
 - All trunk ports must be in OOS state.
 - All trunk ports must not have any GCC or active trail trace identification (TTI) mode provisioned.
- FEC status can be enabled only if G.709 is enabled.
- To change FEC status, it requires that all trunk ports be in the OOS state.
- Only G.709 OTN, FEC status, and the SDBER/SFBER setting on the working trunk port can be changed in the protected version of the TXP. The value provisioned on the working trunk port will be reflected on the protect trunk port.
- The G.709 OTN Pane is only provisionable in non-2R (or unframed) payload type.
- When G.709 is turned on, the OTN SFBER value is always set to 1E-5 and no other BER values are provisionable.

The TL1 commands are:

- ED-OCH

Example of provisioning G.709, FEC and OTN SDBER/SFBER:

```
ED-OCH::CHAN-6-2:114:::OSDBER=1E-6,DWRAP=Y,FEC=Y,:OOS,AINS;
```

2.12.9 Synchronization Provisioning Rules

- The TXP is through-timed (passthrough) and:
 - Cannot be used for a timing source (TXP_MR_10G, TXP_MR_2.5G and TXPP_MR_2.5G).
 - TXP_MR_10E can be used as a time reference (only the client port, not the trunk port).
 - MXP_MR_2.5G and MXPP_MR_2.5G card trunk ports can be used as a timing source.

2. Only MXP ports can be used for a timing source. Trunk port is only allowed as a timing reference if G.709 is off and the termination mode is line or section.
3. For MXP cards, all client ports are available for timing source irrespective of termination mode.

The TL1 commands are:

- ENT/ED-OCn

Example of setting port-level synchronization attributes:

```
ED-OC48::FAC-1-1-1:CTAG::SYNCMSG=Y,SENDDUS=N;;
```

- ED-OCH

Example of setting port-level synchronization attributes:

```
ED-OCH::CHAN-6-2:114::SYNCMSG=N,SENDDUS=Y;;
```

2.12.10 Section Trace Provisioning (J0) Rules

1. The client and trunk ports only support the section trace if the payload is OC-3/OC-12/OC-48/OC-192.
2. The client and the trunk ports support the section trace only in line/section terminated mode.
3. In line termination mode the supported trace modes are MANUAL and MANUAL_NO_AIS trace modes.
4. In section termination mode the supported trace mode is only MANUAL_NO_AIS trace mode.
5. The section trace supports 1 or 16 bytes length trace format.
6. The trace mode of AUTO and AUTO-NO-AIS are not supported.
7. No trace is applicable for 2R (unframed) payload types, for example, DV-6000, HDTV, and ESCON.
8. The section trace received string should appear when the card is in transparent-AIS or TRANSPARENT-SQUELCH termination mode and the payload is OC-3/OC-12/OC-48/OC-192.
9. When the client port is configured in a Y-cable protection group the received string is always retrieved from the active client port.
10. If the line is Y-cable protected trace can only be provisioned on the working port, however the provisioning will be duplicated between the two ports. Both ports will contain the same values. This rule applies to the following parameters: Mode, Format, Send String and Expected String.
11. The MXP_2.5G_10E card is used for client test connection on client ports. For the trunk port the TTI is used.
12. The TXP_MR_10E card is used to test connections on client trunk ports.
13. On MXP_MR_2.5G/MXPP_MR_2.5G cards the trunk port section trace can be provisioned following the rules for line terminated SONET.

The TL1 commands are:

- ED-OCn for trace provisioning of client ports provisioned for OCn payload.

Example of provisioning port-level trace:

```
ED-OC48::FAC-6-1-1:10::EXPTRC="AAA",TRC="AAA",TRCMODE=MAN,  
TRCFORMAT=16-BYTE;
```

- ED-TRC-OCH for trace provisioning of trunk/OCH DWDM ports.

Example of provisioning port-level trace:

```
ED-TRC-OCH::CHAN-6-2:10:::EXPTRC="AAA",TRC="AAA",TRCMODE=MAN,
TRCLEVEL-J0,TRCFORMAT=64-BYTE;
```

2.12.11 Trail Trace Identification Provisioning Rules

1. For the TXPP_MR_2.5G card, TTI can be provisioned on both the working trunk ports only, however the provisioning will be duplicated between the two ports. Both ports will contain the same values. This rule applies to the following parameters: Mode, Format, Send String, and Expected String.
2. The TTI level trace supports only the 64-byte length trace format.
3. The TTI level trace supports only the MANUAL and MANUAL_NO_AIS trace modes.
4. The TTI received string is always retrieved from the active trunk port.
5. The TTI level trace can be provisioned for section and path monitoring.
6. MXP_MR_2.5G and MXPP_MR_2.5G cards do not support TTI.

The TL1 commands are:

- ED-TRC-OCH

Example of provisioning port-level trace:

```
ED-TRC-OCH::CHAN-6-2:10:::EXPTRC="AAA",TRC="AAA",TRCMODE=MAN,
TRCLEVEL=TTI-PM,TRCFORMAT=64-BYTE;
```

2.12.12 PM and Alarm Threshold Provisioning Rules

1. When the framing type is unframed, for example, HDTV, DV6000:
 - a. Only optics threshold provisioning and PM are applicable.
 - b. Depending on the ESCON SFP type, optics threshold provisioning and PM might be supported.
2. Optics PM supports only Near End, 15MIN and 1DAY interval buckets.
3. When the framing type is FIBRE CHANNEL and ETHERNET (for example, 1GFC, 1G Ethernet):
 - a. Only 8B10B threshold provisioning and PM are available. (Applicable only to TXP_MR_2.5G/TXPP_MR_2.5G and MXP_2.5G_10G/TXP_MR_10G cards.)
 - b. 2G Fibre Channel does not support 8B10B threshold provisioning and PM.
4. 8B10B applies to both Tx and Rx directions. (Applicable only to TXP_MR_2.5G/TXPP_MR_2.5G and MXP_2.5G_10G/TXP_MR_10G cards.)
5. 8B10B PM supports only Near End, 15MIN and 1DAY interval buckets.
6. 8B10B layer is not used for MXP_2.5G_10E and TXP_MR_10E cards.
7. When the framing type is SONET/SDH, all monitored PM parameter terminology will follow the current chassis type.
8. The OTN thresholds are only applicable if G.709 OTN status is enabled.
9. The FEC thresholds are only applicable if the G.709 and FEC are enabled.

10. If the line is configured in a Y Cable or splitter protection group, only the working line thresholds can be provisioned. The working line thresholds will be reflected on the protect line thresholds. This rule applies for all threshold types including G.709 OTN and FEC thresholds.
11. Payload PM can be independently retrieved for both the working and protect port.

The TL1 commands are:

- SET-TH-(OCn, nGIGE, nGFC, OCH)

Examples of port-level threshold setting:

```
SET-TH-OC48::FAC-1-1-1:123::CVL,12,NEND,,15-MIN;
```

```
SET-TH-OCH::CHAN-6-1:123::ES-PM,12,NEND,,15-MIN;
```

- RTRV-PM-(OCn, nGIGE, nGFC, OCH)

Examples of port-level threshold setting:

```
RTRV-PM-OC48::FAC-1-1-1:123::CVL,10-UP,NEND,BTH,15-MIN,04-11,12-45;
```

```
RTRV-PM-OCH::CHAN-6-1:123::ES-PM,10-UP,NEND, BTH,15-MIN,04-11,12-45;
```

2.12.13 Y-Cable Protection Group Provisioning Rules

1. A Y-cable protection group can be created between the client ports of two unprotected TXPs only.
2. While in Y-cable protection, a TXP cannot be part of a regeneration group.
3. Only the working client port can be provisioned with SDCC.
4. Y-cable cannot be provisioned for a protect version of the TXP_MR_2.5G card.
5. Only the working ports (not the protect) can be provisioned with DCC and timing reference.

The TL1 commands are:

- ENT/DLT/ED-FFP-(OCn, nGIGE, nGFC)

Examples of Y Cable provisioning:

```
ENT-FFP-OC48::FAC-1-1-1,FAC-2-1-1:100:::PROTOTYPE=Y-CABLE,  
PROTID=DC-METRO-1,RVRTV=Y,RVTM=1.0,PSDIRN=BI;
```

```
ENT-FFP-10GIGE::FAC-1-1-1,FAC-2-1-1:100:::PROTOTYPE=Y-CABLE,  
PROTID=DC-METRO-2,RVRTV=Y,RVTM=1.0,PSDIRN=BI;
```

2.12.14 Splitter Protection Group Provisioning Rules



Note

Splitter protection group provisioning rules apply only to the protect version of the TXP card.

1. Splitter protection group cannot be created or deleted.
2. Splitter protection group is created automatically when a protect TXP card is provisioned.
3. The only editable attributes are: Revertive, Revertivetime and Transponder mode.

The TL1 commands are:

- ED-FFP-OCH

Example of editing splitter protection group attributes:

```
ED-FFP-OCH::CHAN-2-1:100:::PROTID=DC-METRO3,RVRTV=Y,
RVTM=5.0,PSDIRN=BI;
```

2.12.15 Loopback Provisioning Rules

1. Loopback can be provisioned on the client and trunk ports.
2. Both terminal and facility loopback types can be provisioned.
3. Loopback is not applicable when the framing type is UNFRAMED (HDTV, DV6000).
4. For the protect TXP, the following loopback rules apply to the trunk ports:
 - a. Only one loopback can be provisioned at the trunk ports at any given time.
 - b. Loopback is allowed if the sibling trunk port is OOS-MT.
 - c. Provisioning a loopback on a trunk port will trigger the inhibit switching command LOCKOUT_OF_PROTECTION or LOCKOUT_OF_WORKING depending on whether the working or the protect is placed in a loopback.
 - d. Once a loopback is provisioned on a trunk port, both the trunk ports will transmit the signal of the loopback port signal.
 - e. A loopback will be denied if there is a FORCE or MANUAL switching command in place on the trunk ports.
 - f. You cannot remove the inhibit switching command issued as a result of the loopback. This command will be removed only when the loopback is removed.

The TL1 commands are:

- ED-FFP-OCH

Example of editing splitter protection group attributes:

```
ED-FFP-OCH::CHAN-2-1:100:::PROTID=DC-METRO3,RVRTV=Y,
RVTM=5.0,PSDIRN=BI;
```

2.12.16 Automatic Laser Shutdown Provisioning Rules

1. ALS can be provisioned on the client and trunk ports.
2. If the trunk port is configured in a splitter protection group only the working trunk can be provisioned for ALS. However, provisioning on the working trunk port is reflected on the protect port.
3. For the protected TXP, ALS mode will only take effect when both ports receive LOS.

The TL1 commands to provision are:

- ED-ALS

Example of editing ALS attributes:

```
ED-ALS::FAC-1-1-1:100:::ALSMODE=Y,ALSRCINT=130,ALSRCPW=35.1,RLASER=Y;
```

- ED-ALS- (OCn, nGIGE, nGFC, OTS, OMS, OCH)

Example of editing ALS attributes:

```
ED-ALS-OC192::FAC-1-1-1:100:::ALSMODE=Y,ALSRCINT=130,
ALSRCPW=35.1,RLASER=Y;
```

2.12.17 Port State Model Provisioning Rules

1. The enhanced state model port state of primary state=OOS and secondary state=AINS is not supported for the 1GigE/2GigE payload type.
2. The working and protect ports can be put in IS/OOS independently.
3. For the protect TXP card:
 - a. Setting the protect trunk port to OOS enables the suppression of alarms on that port and will enable the card to be used like an unprotected card, but the card still cannot be used for a Y-cable protection group.
 - b. Setting the protect trunk port to OOS will not switch off the transmit laser unless both trunk ports are OOS.
 - c. The protect trunk port cannot be IS if there is a loopback or a regeneration group provisioned.

The TL1 commands are:

- ED-(OCn, nGIGE, nGFC, OCH)

Example of editing Port State:

```
ED-OC48::FAC-6-1-1:114:::OOS,AINS;
ED-10GIGE::FAC-6-1:114:::OOS,AINS;
ED-OCH::CHAN-6-1:114:::IS;
```

2.12.18 SONET-Related Provisioning Rules

1. The SD/SFBER can only be provisioned on the working trunk port (OCH) for the protect TXP card. Values set at the working port will be reflected on the trunk port.

The TL1 commands are:

- ED-OCH

Example of editing trunk port attributes:

```
ED-OCH::CHAN-6-2:114:::RDIRN=W-E,EXPWLEN=1530.32,VOAATTN=2.5,
VOAPWR=7.5,CALOPWR=0,CHPOWER=2.0,NAME="NYLINE",SFBER=1E-5,
SDBER=1E-6,ALSMODE=MAN,ALSRCINT=60,ALSRCPW=35.1,COMM=DCC,
GCCRATE=192K,OSDBER=1E-6,DWRAP=Y,FEC=Y,
MACADDR=OO-OE-AA-BB-CC-DD,SYNCMSG=N,SENDDUS=Y,
RLASER=Y,SOAK=10,OSPF=Y:OOS,AINS;
```

2.12.19 Overhead Circuit Provisioning Rules

1. LOW/EOW is possible between the AIC-I, OCn and TXP/TXPP cards in any combination in line-terminated mode.
2. F1/D4-D12 UDC:
 - a. Not possible between TXP/TXPP and AIC-I cards in line-terminated mode.
 - b. Not possible between TXP/TXPP and OCn cards in line-terminated mode.
 - c. Possible between OC-N ports.
3. All OH bytes are passed across client and DWDM ports in transparent mode.
4. SDCC/LDCC tunneling is not possible in line-terminated mode.
5. No end-to-end OH circuit provisioning. In Release 6.0 you can stitch them at each node.
6. For MXP_MR_2.5G and MXPP_MR_2.5G cards these rules apply to the trunk port only.

2.12.20 Hardware Limitation Rules

1. ESCON SFP does not support any monitoring.
2. Optics thresholds and PM are not shown on client ports.
3. HI/LO-TXPOWER is not supported for TXP_MR_2.5G and TXPP_MR_2.5G Cards.

