CHAPTER 4

Editing a Project

CTP allows you to edit the a project either before or after network analysis. Error messages that occur during network analysis often cannot be resolved until you edit one or more network components.

To complete the procedures in this section, you must have a project open and the network(s) loaded. See the and the .

4.1 Editing Project Parameters

Use the following procedure to edit project parameters:

Step 1 Click **Project** in the Project Explorer pane.

Step 2 In the Properties pane, complete the following tasks as needed:

- Customer—Enter the name of the customer (128-character maximum) requiring this network design.
- Created by—Enter the user name (128-character maximum).
- Units—Displays the span measurement unit: Km (kilometers) or Miles.
- Price List—Choose the price database from the drop-down list.
- Layout—Displays ANSI (the North American standard) or ETSI (the international standard) to indicate the platform type. ANSI networks do not allow you to define SDH (ETSI) service demands. ETSI networks do not allow you to define SONET (ANSI) service demands.

4.2 Editing Network Parameters

Use the following procedure to edit network parameters:

Step 1 Click a network in the Project Explorer pane or Mgmt Tree.

Step 2 In the Properties pane, complete the following tasks as needed:

- Name—Enter the network name (128-character maximum).
- Position—Enter the object location in pixels.

- Created by—Enter the user name (128-character maximum).

- Status—Displays the state of the network (Design, Design-Analyzed, Install, and so on).

- Measurement Units—Choose Km or Miles from the drop-down list. Any change made to the measurement unit at the network level will change the measurement unit of all the ducts within that network. For additional information on changing the measurement units of an individual duct, see

- Per Side Installation Parameter—Check this check box to include the installation parameters of each side of the site in the NE Update XML file.

- Use Bundles—Check this check box to use the Multishelf Management Integrated Kit bundle when generating the BoM instead of the single items.

- Use Spare Parts—Check this check box to determine the spare parts required by the network. If the network is in the Upgrade state, the parts required to support the implemented services and the newly added present services are included. To generate a spare parts report, you must associate the sites in a network with a maintenance center before network analysis.

- Use Global Discount—Check this check box to use the global discount for the entire network. The global discount is applied to all components in the BoM.

- Global Discount—Enter a new global discount in the form of a percentage.

- Use Client Payg—Check this check box to include license for client cards. This option is applicable to AR-MXP, AR-XP, 100G-LC-C, 100G-CK-LC-C, and 10X10G-LC cards. This check box is checked by default.

- Service Level—Choose the service level (contract) identifier from the drop-down list.

- Service Length—Choose the maintenance service level length (in years) from the drop-down list.

- Include SW Licenses—Check this check box to include software licenses in the BoM.

- Include Paper Documentation—Check this check box to include paper documentation in the BoM.

- Include CD Documentation—Check this check box to include CD documentation in the BoM.

- Hide Bom/price discount—Check this check box to hide the global discount in the Unit Price column of the BoM.

- WSON PID—Check this check box to display the WSON PIDs in the BoM report.

- Dimension—Enter the network size in pixels.

- Background color—Click to choose a color for the network background.

- Background image—Displays the JPEG or GIF filename used as a background, if any. To choose a JPEG or GIF file as a background graphic for the network, click the down arrow and navigate to the desired directory.

4.3 Editing Site Parameters

Editing the site parameters allows you to make changes to the current site configuration. A site folder in the Project Explorer pane displays the interface node information. Each site contains an NE folder in which network elements (NEs) are placed. The NEs are created after the network analysis.

The following configurations result in more than one NE creation:

- Individual shelf with OIC site functionality: One NE for each side.
- Individual shelf: One NE for each shelf.
- Multishelf with line card: One NE and one NE for each line card shelf.

Modifications in the site structure, functionality, and type also modify the number of NEs created.

A site folder for an analyzed network design also contains the following items, many of which you can edit:

- A and B—For a Line or Line+ site, two interface nodes appear in the Project Explorer pane under the Site folder, labeled A and B. For a Terminal or Terminal+ site, only one interface node (A) appears.
- A(w) and A(p)—For a PSM Terminal Optical Path site or a PSM Terminal Multiple Section site, two interface sides appear in the Project Explorer pane under the Site folder, labeled A(w) and A(p). A(w) represents the working path and A(p) represents the protection path.
  For a PSM Terminal Optical Path site, the following options are available under the supported bands for the two interfaces.
  - For A(w): Amplifiers, add/drop, and DWDM protection
  - For A(p): DWDM protection

  For a PSM Terminal Multiple Section site, the following options are available under the supported bands for the two interfaces.
  - For A(w): Amplifiers, add/drop, and DWDM protection
  - For A(p): Amplifiers and DWDM protection

- C-Band or L-Band—Displays the supported band for the sides.
- Amplifiers—Lists the amplifiers and all related cards for each band and for each side.
- Add/Drop—Displays all of the add/drop and related cards for the band and side.
- Site Type Parameters—When selected, shows the site functionality and type in the Properties pane.
- Band Parameters—When selected, shows the output power in the Properties pane.
- Client—Lists the client cards.

Use the following procedure to edit site parameters. To delete a site, see the "4.24 Deleting Sites" section on page 4-134.

Step 1 In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.

Step 2 Click the desired Site folder. The site parameters appear in the Properties pane.

Step 3 Complete the following tasks to modify the site parameters in the Properties pane, as needed:

- Name—Enter the site name.
- Position—Enter the site pixel position; for example, an entry of 0,0 positions the Site icon in the upper-left corner of the NtView *Name* tab.
- MTTR (hours)—Enter the mean time to repair (MTTR) for all sites in the network. This value applies to every site in the network. If you change the MTTR value after creating sites, the new value will only apply to sites you create after the change.
- Maintenance Center—Choose the name of the maintenance center from the drop-down list. To create a maintenance center, see the "4.6 Creating a Maintenance Center" section on page 4-52.
- IP Address—Enter the IP address of the node.

- Shelf Management—Choose one of the shelf configuration types from the drop-down list:

  – Auto—Sets the default option of the Multi Shelf Switch for all the nodes with more than one shelf.

  – Multi Shelf Integrated Switch—All the MSTP optical cards (OADMs and amplifiers) reside in different shelves connected by a LAN. The LAN is implemented with switches connected to the MSTP shelves. For this option, Multi-Shelf Integrated Switch Cards (MS-ISC) are used to support the multishelf configuration.

  – Multi Shelf External Switch—All the MSTP optical cards (OADMs and amplifiers) reside in different shelves connected by a LAN. The LAN is implemented with switches external to the MSTP shelves (Cisco Catalyst 2950). For this option, two external Ethernet switch units (Cisco Catalyst 2950 and Cisco Catalyst 3650) are used to support the multishelf configuration. The Cisco Catalyst 2950 supports 12 subtending shelves and Cisco Catalyst 3650 supports 24 subtending shelves. CTP supports a maximum of 50 shelves, including the node controller shelf, in a multishelf configuration when the TNC, TNCE, TSC, TSCE, or TCC3 card is used as the node controller. CTP supports a maximum of 5 shelves, including the node controller shelf, in a multishelf configuration when TCC2P card is used as the node controller.

Note The M6 chassis, when used as node controller, can support three subtended shelves. The subtended M6 chassis can subtend two more shelves.

Note If you select the Shelf Management Type as Multi Shelf Integrated Switch or Multi Shelf External Switch, you can modify the MSM Shelf ID for multishelf management configuration. To modify the MSM Shelf ID, see "3.2.6 Viewing the Layout of Single Site" section on page 3-15.

  – Individual Shelf—All the MSTP optical cards (OADMs and amplifiers) reside in the same shelf. For this option, multishelf management is not supported; every shelf is managed as an independent shelf.

Note Shelf management is disabled for HYBRID 15454 ONS configuration.

Note If you chose Individual Shelf as the Shelf Management type, n Network Elements (NEs) will be created where n is the number of shelves. If you chose Multishelf as the Shelf Management type, all subtended shelves will belong to a single NE. The network elements are created after network analysis.

- Node Protection—Choose the node protection type from the drop-down list: Same Shelf or Separated Shelves.

Note Node protection is disabled for HYBRID 15454 ONS configuration.

- DCC Shelves Management—When checked, indicates that a TXP(P)_MR_2.5G card is in slot 12 on each shelf at each site.

- Installation w/o CTP—When checked indicates that the network is installed with the default parameters, so that the selected node can be installed without the Cisco Transport Planner configuration files (thresholds and setpoints).

- Node Type—(Release 9.1 and later releases) Enables you to choose the configuration type of the site.

- MSM External Switch—Enables you to choose the Multi Shelf External Switch type. The options are Auto, Cat 2950, and Cat 3650. The default option is Auto.

- Insulators—If checked, protects the Express Add/Drop (EAD) colorless ports of the 80-WXC-C cards configured as demux units.

> **Note**   The Cisco ONS 15216-FLD-2-ISO optical insulator is not supported in CTP Release 9.3 and later.

> **Note**   Optical insulator connections are displayed only in the Patchcord Installation tab in the Internal Connections report.

- Door—Choose the type of door from the drop-down list. The default option is Auto, which does not add any door type. Door and deep doors are two types of front doors that act as protective panels in the ONS 15454 M2 and ONS 15454 M6 chassis. The deep door provides additional space in front of the shelf to accommodate cables that do not fit inside the standard door.

- Service Level—Choose the service level from the drop-down list.

- Service Level Num of Years—Choose the maintenance service level (in years) from the drop-down list.

- Use Payg—Check this check box to enable the Pay As You Grow (PAYG) feature on the site. For more information about the Pay As You Grow feature, see the "1.8 Understanding the Pay As You Grow Feature" section on page 1-44.

- Enable NCS—Check this check box to use NCS PIDs for the selected site. For more information, see Table 2-3NCS PIDs, page 2-9.

- Osmine Compliant—When checked, indicates that the transponder/muxponder cards are placed in the shelves according to OSMINE placement rules.

- Hybrid Node—When checked, indicates that all the nodes are configured as hybrid MSTP/MSPP nodes.

- Max Num of Shelves—Choose the maximum number (from 1 to 4) of ANSI or ETSI shelves (that equip optical cards or transponder/muxponder cards) that can be placed in each rack in the site when generating the site layout.

- Chassis Type—Allows you to choose the chassis type. The options available are Auto, M12 Chassis, M6 Chassis, and M2 Chassis. The default option is Auto.

> **Note**   M2 chassis does not support MSM configuration.

The following section lists chassis selection rules for MSM with M2, M6, and M12 chassis (hybrid configuration):

- M2 chassis is not selected for MSM configuration.
- M6 chassis is forced when OSC Frame type is forced to GE.

- The layout is not built and an error message is displayed for the following conditions:

  - When the chassis type is forced as M12 (for Site1), M2 (for Site 2),a nd M12 (for Site 3).

  - When the chassis type is forced as M12 and when OSC pluggables are forced.

- M2 or M6 is not selected when the chassis type is selected as Auto. Table 4-1 summarizes the chassis selection rules when the chassis type is Auto. Table 4-2 summarizes the chassis selection rules when the FlexLayer modules are used.

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-b and 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line	Pass Through	—	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—	—	—
	Line amplifier	Line	Inline AT1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Glass Through	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	OSC Site	—	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Add/Drop	OADM[2]	List of AD-xC units INLINE ATT1	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
		Mux/Demux	Add: 32-MUX-O Drop: 32-DMX-O	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
	Hub	Mux/Demux	Add: 32-MUX-O Drop: 32-DMX-O	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			15216-MD-40-ODD (MD-ID-50)[3]	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line	Hub	WSS	Add: 32-WSS-C Drop: 32-DMX-O	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
		40-SMR1-C	15216-MD-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-b and 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line	Hub	40-SMR2-C	15216-MD-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No

Table 4-1 **Site Design Rules for MSTP 15454 ONS Configuration (continued)**

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line	Hub	80-WXC-C	15216-MD-40-ODD (MD-ID-50)[3]	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	No	Yes	Yes	Yes	No	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE (15216-ID-50)	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line	Hub	80-WXC-C-MUX/DMX	15216-MD-40-ODD	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	No	Yes	Yes	Yes	No	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
Line	Gain Equalizer	WSS	Add: 32-WSS-C	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	No	No
			40-WSS-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			Add: 40-WSS-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
		40-SMR1-C	None	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
		40-SMR2-C	None	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
		80-WXC-C	None	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No

Table 4-1   *Site Design Rules for MSTP 15454 ONS Configuration (continued)*

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line	R-OADM	WSS	Add: 32-WSS-C Drop: 32-DMX-O	Yes	No	No	Yes	Yes	No	No	No	Yes	No	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
		40-SMR1-C	15216-MD-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No

Table 4-1 **Site Design Rules for MSTP 15454 ONS Configuration (continued)**

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line	R-OADM	40-SMR2-C	15216-MD-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No

Table 4-1   *Site Design Rules for MSTP 15454 ONS Configuration (continued)*

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line	R-OADM	80-WXC-C	15216-MD-40-ODD (MD-ID-50)[3]	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE (15216-ID-50)	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-b and 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line	R-OADM	80-WXC-C MUX/DMX	15216-MD-40-ODD	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-b and 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Line+ (includes MMU)	Hub	WSS	Add: 32-WSS-C Drop: 32DMX-O	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	No	No	No	Yes	Yes	No	No
	ROADM	WSS	Add: 32-WSS-C Drop: 32DMX-O	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	No	No	No	Yes	Yes	No	No
Terminal	Add/Drop	AD-xC	OADM cards	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No
			FLD-4 Units	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
		Mux/Demux	Add: 32MUX-O Drop: 32DMX-O	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			15216-MD-40-ODD (MD-ID-50)[3]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-b and 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Terminal	R-OADM	WSS	Add: 32-WSS-C Drop: 32-DMX-O	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Terminal	R-OADM	40-SMR1-C	15216-MD-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
		40-SMR2-C	15216-MD-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Terminal	R-OADM	80-WXC-C	15216-MD-40-ODD (MD-ID-50)[3]	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE (15216-ID-50)	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1 **Site Design Rules for MSTP 15454 ONS Configuration (continued)**

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Terminal	R-OADM	80-WXC-C MUX/DMX	15216-MD-40-ODD	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			FLD-4 Units	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
Terminal + (includes MMU)	R-OADM	WSS	Add: 32-WSS-C Drop: 32DMX-O	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	No	No	No	Yes	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Multi-Degree	OXC[5]	40 WXC-C/ PP-MESH-4[6]	Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 80-WXC-C MUX Drop: 80-WXC-C DMX	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No

Table 4-1   *Site Design Rules for MSTP 15454 ONS Configuration (continued)*

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Multi-Degree	OXC[5]	80-WXC-C/ PP-MESH-4[6]	15216-MD-40-ODD (MD-ID-50)[3]	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE (15216-ID-50)	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
			Add: 80-WXC-C MUX Drop: 80-WXC-C DMX	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   ***Site Design Rules for MSTP 15454 ONS Configuration (continued)***

				C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
Structure	Functionality	Type	Card Options	32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Multi-Degree	OXC[5]	40 WXC/ PP-MESH-8[6]	Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 80-WXC-C MUX Drop: 80-WXC-C DMX	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
		80-WXC-C/ PP-MESH-8[6]	15216-MD-40-ODD (MD-ID-50)[3]	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Multi-Degree	OXC[5]	80-WXC-C/ PP-MESH-8[6]	Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE (15216-ID-50)	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
			Add: 80-WXC-C MUX Drop: 80-WXC-C DMX	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
		40-SMR2-C/ PP-4-SMR	15216-MD-40-ODD	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No
			Add: 80-WXC-C MUX Drop: 80-WXC-C DMX	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
		Flexible[7]	—	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
Multi-Degree	OIC	WSS	Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	No	Yes	Yes	Yes	No	No	Yes	No	No
			Add: 32-WSS-C Drop: 32-DMX-O	Yes	No	No	Yes	Yes	Yes	No	No	Yes	No	No
			Add: 40-WSS-E Drop: 40-DMX-E	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
Multi-Degree	OIC	80-WXC-C MUX/DMX	15216-MD-40-ODD	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
PSM Terminal - Multiple Section Protection	Add/Drop	AD-xC	OADM cards	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No
			FLD-4 Units	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes

Table 4-1 **Site Design Rules for MSTP 15454 ONS Configuration (continued)**

| Structure | Functionality | Type | Card Options | C-band 100 GHz | | | | C-band 50 GHz | | | L-band 100 GHz | Shelf Option[1] | | |
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
PSM Terminal - Multiple Section Protectio n	Add/Drop	Mux/Demux	Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No
			15216-MD-40-ODD (MD-ID-50)[3]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
	ROADM	WSS	Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
PSM Terminal - Multiple Section Protection	ROADM	80-WXC-C	15216-MD-40-ODD (MD-ID-50)[3]	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE (15216-ID-50)	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
PSM Terminal - Multiple Section Protection	ROADM	80-WXC-C MUX/DMX	15216-MD-40-ODD	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE (15216-ID-50)	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
PSM Terminal - Optical Path Protection	Add/Drop	AD-xC	OADM cards	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			FLD-4 Units	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
		Mux/Demux	Add: 40-MUX-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
			15216-MD-40-ODD (MD-ID-50)[3]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes

Table 4-1   ***Site Design Rules for MSTP 15454 ONS Configuration (continued)***

				C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
Structure	**Functionality**	**Type**	**Card Options**	**32/16 Chs**	**8 Chs**	**40 Chs**	**20 Chs**	**64 Chs**	**72 Chs**	**80 Chs**	**32 Chs**	**M12**	**M6**	**M2**
PSM Terminal - Optical Path Protection	ROADM	WSS	Add: 32-WSS-C Drop: 32-DMX-C	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE	No	No	No	Yes	Yes	Yes	Yes	No	Yes	No	No
		40-SMR1-C	15216-MD-40-ODD	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	No	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No

Table 4-1   ***Site Design Rules for MSTP 15454 ONS Configuration (continued)***

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
PSM Terminal - Optical Path Protection	ROADM	40-SMR2-C	15216-MD-40-ODD	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			15216-EF-40-ODD	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	No	Yes	No	No	No	No	Yes	No	No
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No

Table 4-1   ***Site Design Rules for MSTP 15454 ONS Configuration (continued)***

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-b and 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
PSM Terminal - Optical Path Protectio n	ROADM	80-WXC-C	15216-MD-40-ODD (MD-ID-50)[3]	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE (15216-ID-50)	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

Table 4-1   Site Design Rules for MSTP 15454 ONS Configuration (continued)

Structure	Functionality	Type	Card Options	C-band 100 GHz				C-band 50 GHz			L-band 100 GHz	Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	64 Chs	72 Chs	80 Chs	32 Chs	M12	M6	M2
PSM Terminal - Optical Path Protection	ROADM	80-WXC-C MUX/DMX	15216-MD-40-ODD	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			15216- MD-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No
			15216-EF-40-ODD (MD-XX-YY)[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
			15216-EF-40-EVEN	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			FLD-4 Units	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
			Add: 40-MUX-C Drop: 40-DMX-C	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No
			Add: 32-WSS-C Drop: 32-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-C Drop: 40-DMX-C	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
			Add: 40-WSS-CE Drop: 40-DMX-CE (15216-ID-50)	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No

1. The "Yes" indicates that the configuration is supported in the specific shelf and CTP selects the most convenient layout according to the number of units and user settings. The "No" indicates that the configuration is not supported on the specific shelf.

2. Available only if explicitly configured by the user.

3. The 15216-MD-ID-50 unit is placed by default in the 15216-MD-40-ODD unit. However, it can also be placed in the 15216-MD-40-EVEN unit if the design starts from the even grid.

4. The 15216-MD-ID-50 unit or 15216-MD-48-CM unit can be placed in the 15216-EF-40-ODD unit. It can also be placed in the 15216-EF-40-EVEN unit if the design starts from the even grid.

5. One or multiple sides can be selected as omnidirectional entry points.

6. One or multiple sides can be selected as omnidirectional or colorless side or both.

7. When the Flexible type is selected, the 40-WXC-C or 80-WXC-C card can be set on different sides.

Table 4-2   *Site Design Rules for HYBRID 15454 ONS Configuration (with FlexLayer Modules)*

Structure	Functionality	Type	Card Options	C-band 100 GHz					C-band 50GHz				Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	48 Chs [2]	64 Chs	72 Chs	80 Chs	96 Chs [2]	M12	M6	M2
Line	Pass Through	N/A	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	OLA	Line amplifier	FLA and FLB modules	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Pass Through	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	OSC-Site	—	—	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes
	Add/Drop	OADM	FLA, FLB, and FLD-4[3] modules	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes
		Mux/Demux	SC-4B + FLA-8	Yes	No	No	Yes	No	No	No	No	No	Yes	Yes	Yes
			MD-40-ODD	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			MD-40-EVEN	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			EF-40-ODD	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			EF-40-EVEN	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			MD-48-ODD (MD-48-CM)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			MD-48-EVEN	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Hub	OADM	FLA, FLB, and FLD-4[3] modules	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes
		Mux/Demux	SC-4B + FLA-8	Yes	No	No	Yes	No	No	No	No	No	Yes	Yes	Yes
			MD-40-ODD	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			MD-40-EVEN	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			EF-40-ODD	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			EF-40-EVEN	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			MD-48-ODD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			MD-48-EVEN (MD-48-CM)	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4-2   ***Site Design Rules for HYBRID 15454 ONS Configuration (with FlexLayer Modules) (continued)***

Structure	Functionality	Type	Card Options	C-band 100 GHz					C-band 50GHz				Shelf Option[1]		
				32/16 Chs	8 Chs	40 Chs	20 Chs	48 Chs[2]	64 Chs	72 Chs	80 Chs	96 Chs[2]	M12	M6	M2
Terminal	Add/Drop	OADM	FLA and FLB modules	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes
		Mux/Demux	SC-4B + FLA-8	Yes	No	No	Yes	No	No	No	No	No	Yes	Yes	Yes
			MD-40-ODD	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			MD-40-EVEN	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			EF-40-ODD	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			EF-40-EVEN	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			MD-48-ODD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			MD-48-EVEN (MD-48-CM)	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

1. Yes indicates that the configuration is supported in the specific shelf and CTP selects the most convenient layout according to the number of units and user settings. No indicates that the configuration is not supported on the specific shelf.

2. The design rules for 48 and 96 channels are supported only on point-to-point demands between two terminal sites or a sequence of hub sites. OPT-EDFA-17 or OPT-EDFA-24 units are allowed without DCU units.

3. FLA and FLB modules cannot be forced in a site with FLD-4 modules.

Table 4-3   Site Design Rules for NG-DWDM 15454 ONS Configuration (with FlexLayer Modules)

Structure	Functionality	Type	Card Options	C-band 100 GHz					C-band 50GHz				Shelf Option		
				32/16 Chs	8 Chs	40 Chs	20 Chs	48 Chs	64 Chs	72 Chs	80 Chs	96 Chs	M12	M6	M2
Line	Pass Through	N/A	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	NA
	OLA	Line amplifier	FLA and FLB modules	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
		Pass Through	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
	Hub	Mux/Demux	MD-48-ODD[1]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	NA
			MD-48-EVEN	No	No	No	No	No	Yes	Yes	Yes	Yes	NA	NA	NA
			16AD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	NA
		16-WXC	None	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
			MD-48-ODD	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
			MD-48-EVEN	No	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes	No
			16AD	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
	DGE	16-WXC	None	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Terminal	Add/Drop	Mux/Demux	16AD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	NA
			MD-48-ODD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	NA
			MD-48-EVEN	No	No	No	No	No	Yes	Yes	Yes	Yes	NA	NA	NA
	ROADM	16-WXC	16AD	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
			MD-48-ODD	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
			MD-48-EVEN	No	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes	No
Multi-degree	OXC	16-WXC	MD-48-ODD	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
			MD-48-EVEN	No	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes	No

1. MD-48-CM is placed into MD-48-ODD by default. It can also be placed into MD-48-EVEN if the design starts from an Even grid.

- **Power Supply**—Allows you to choose the type of power supply. The options available are Auto, AC Power, AC2 Power, DC Power and DC20 Power. The default option is Auto. However, AC2 Power is not applicable to the M2 Shelf.

- **Filler Card Type**—Choose the type of card to be placed in the empty slots of a chassis. The options are:

  - **Blank**—CTP enables placement of only blank cards.

- UTS Filler—CTP enables placement of blank cards in M12 chassis and Universal Transport System (UTS) filler cards in the M2 and M6 chassis. The two type of UTS filler cards placed by CTP are 15454-M-T-FILLER (in TNC and TSC card slots) and 15454-M-FILLER (in other slots).

- Populate Shelves From Bottom—Check this check box to instruct Cisco Transport Planner to place the shelves in the rack from the bottom. This is useful in installing shelves in tall racks. For more information about the order in which CTP fills the rack, see the "4.16.1 General Placement Rules" section on page 4-76.

- Redundant Power—(Release 9.2 and later releases, M6 chassis only) Enables you to choose the redundant power supply to be added. The options available are Auto, Yes, and No. The Default option is Yes.

- UTS AC Power Cables—(Release 9.2 and later releases) Enables you to choose the type of cables to be added for the AC power supply. The cables are listed based on the country type. The default option is EU.

- Redundant Controller Card—(Release 9.2 and later releases, M6 chassis only) Enables you to choose the redundant controller card. The options available are Auto, Yes, and No. The default option is Yes.

> **Note** M6 chassis without a redundant controller card is not supported in the MSM configuration.

- M6 Shelves—(Release 9.2 and later releases) Enter an integer value for the number of empty shelves to be added to the node layout. CTP supports a maximum of 29 extra M6 shelves. The Auto option does not add any shelves.

- M12 Shelves—(Release 9.2 and later releases) Enter an integer value for the number of empty shelves to be added to the node layout. CTP supports a maximum of 29 extra M12 shelves. The Auto option does not add any shelves.

- Node Controller—Enables you to choose a chassis as a node controller. The options available are Auto, M12 Chassis, and M6 Chassis. The default option is Auto.

- TCC Type (Release 9.4 and later releases)—Choose the type of TCC card, from the drop-down list. The options available are Auto, TCC2P, and TCC3. The default option is Auto, which selects the TCC3 card.

> **Note** The M12 chassis with TCC2P cards, when used as the node controller cannot subtend M6 chassis.

- M6/M2 Controller Type—Choose the type of controller card from the drop-down list. The options available are Auto, TNC/TSC, and TNC-E/TSC-E. The default option is Auto, which selects the TNC-E/TSC-E card.

> **Note** You can select a different M2/M6 controller type in a network in the release upgrade or upgrade state by unlocking the TSCE/TSC or TNCE/TNC card in the site layout.

- Scalable upto Degree—Choose the degree upto which the NG-DWDM node is scalable. Options available are 4, 8, and 12.

- Functionality—Displays the site functionality. To edit this field, double-click the site in the network view. The Edit dialog box appears. Choose the site functionality from the drop-down list. Table 4-1, Table 4-2, and Table 4-3 summarize the site design rules. The site icon changes depending on the functionality. For a description of the site icons, see Appendix A, "GUI Information and Shortcuts."

> **Note**   You can choose only the following options for the functionality parameter of intermediate sites (on both the working and protected sides) in a PSM Line or PSM Section network topology:
> PSM Section: Pass Through or Line amplifier
> PSM Line: Pass Through

  - Auto—Allows the highest degree of flexibility in creating the network. Cisco Transport Planner generates a design for the site with the lowest possible cost given the other constraints.

  - Pass Through—Indicates that no equipment will be located at this site.

  - Line amplifier—Prevents any add/drop traffic at this site.

  - OSC site—Indicates that site is designated for network communication, providing the possibility to access the OSC for management of the MSTP network. By default, no amplifiers are included in this site. However, if Cisco Transport Planner determines that an amplifier is required in the network, it can automatically place it at this location. Cisco Transport Planner allows you to set (force) preamplifier and booster amplifiers for each direction on a OSC site node.

  - Add/Drop—Indicates that this site has add/drop capability. Only point-to-point and P-ring circuits can be added/dropped at this site.

  - Hub—Indicates that this site is equipped with filters for adding and dropping all the channels (on both West and East sides). All express paths are open in hub configurations.

> **Note**   In HYBRID 15454 ONS configuration at least one node must be of the HUB functionality for the ring topology.

  - Gain equalizer—Indicates that this site uses WSS cards to control the generated tilt and extend unregenerated distances. The site is realized as an ROADM site without demultiplexer cards.

  - R-OADM—Indicates that this site supports Any-to-Any and also Fixed (point-to-point and P-ring) traffic types.

  - OXC—Indicates that this site uses OXC (optical cross connect) cards to control the generated tilt and extend unregenerated distances. This site is realized as an ROADM site without demultiplexer cards.

  - OIC—Indicates that this site uses OIC (optical inter connect) cards to control the generated tilt and extend unregenerated distances. This site is realized as an ROADM site without demultiplexer cards.

> **Note**   This functionality is available only for multidegree sites. Also, if you choose the structure of a site as multidegree and functionality as OXC, the Shelf Management option that you select should either be Integrated or External. Otherwise, the application displays an error message when analyzed.

- Type—Displays the site type. To edit this field, double-click the site in the network view. The Edit dialog box appears. Choose the site type from the drop-down list (see Table 4-1):

- Auto—Allows the highest degree of flexibility in creating the network. Cisco Transport Planner generates a design for the site with the lowest possible cost given the other set of constraints.

- Glass Through—Indicates a low-priority amplification site.

- Line—Indicates a high-priority amplification site.

- OADM—Indicates that it is a site with add/drop channels using discrete channel filters.

   The OADM units available for the MSTP 15454 ONS configuration are 1Ch, 2Ch, 4Ch, 1-band, 4-band, and FLD-4.

   The OADM units available for the Hybrid 15454 ONS configuration are FLB-2, FLA-8, and FLD-4.

Note
- Avoid using all FLA-2 or FLA-8 units because it can lead to a total loss of signal in the system. If there is an overlap of selected wavelengths between FLA-2 and FLA-8 units, CTP displays an error message. If you use more than six 6 FLA 2 units, then the insertion loss is about 18 dB.

- FLA-8 and FLB-2 modules cannot be forced in a site having FLD-4 modules.

- OADM units cannot be forced along with the FLD-4 units in MSTP 15454 ONS configuration.

- WSS—Indicates that it is a site equipped with 32DMX or 32DMX-O. This option allows you to force the use of specific ROADM units.

- Mux/Demux—Indicates that this is a full multiplexer/demultiplexer (FMD) site that adds and drops all channels on both sides using the 32MUX-O and 32DMX-O cards. Optical bypass is allowed.

- 80-WXC-C—Indicates that the site supports mesh and multi-ring topologies for 50 GHz networks.

- 80-WXC-C Mux/Dmx—Indicates that this is a full multiplexer/demultiplexer (FMD) site that adds and drops all channels on both sides using the 80-WXC-C card in mux/demux mode.

- 40-WXC-C w/PP-MESH-4—(Multidegree OXC sites only) Indicates the mesh type that is provided for sites with 80-WXC-C cards. If this type is selected, the site can support up to 4 degrees, independent of the number of fibers connected to the site.

- 40-WXC-C w/PP-MESH-8—(Multidegree OXC sites only) Indicates the mesh type that is provided for sites with 80-WXC-C cards units. If this type is selected, the site can support up to 8 degrees, independent of the number of fibers connected to the site

- 80-WXC-C w/PP-MESH-4—(Multidegree OXC sites only) Indicates the mesh type that is provided for sites with 80-WXC-C cards. A site with this type can support up to 4 degrees, independent of the number of fibers connected to the site.

- 80-WXC-C w/PP-MESH-8—(Multidegree OXC sites only) Indicates the mesh type that is provided for sites with 80-WXC-C cards. A site with this type can support up to 8 degrees, independent of the number of fibers connected to the site.

- WSS/DMX—Multidegree OIC sites only.

- Flexible—Indicates that the site can support different equipment on each side. Valid for multi-degree OXC sites equipping 40-WXC-C or 80-WXC-C units at the different sides.

- SMR-1—Single module ROADM-1 (SMR-1) for line and terminal sites. It integrates preamplifier, OSC splitter/combiner, and a 2x1 wavelength cross connect. SMR-1 will be the default configuration for design rules with 40, 32, 20, 16 channels and for Line ROADM, Line

Hub, and Terminal ROADM sites. SMR-1 configuration is selected only if the forced amplifier is compatible with it. For the same design rule, if SMR-1 is restricted, then SMR-2 will be the default configuration.

   – SMR-2—Single module ROADM-2 for line, terminal, and multidegree sites. It integrates preamplifier, booster, OSC splitter/combiner, and a 4x1 wavelength cross-connect. SMR-2 will be the default configuration for multidegree sites with less than 5 sides. SMR-2 uses a new 15454 PP-4-SMR Patch Panel that is different from the one that the earlier WXC card used. SMR-2 is not selected for multidegree sites with omnidirectional entry point.

   For both the SMR cards:

   – Cisco ONS 15216-EF-40-ODD units are automatically picked up as add/drop units for the SMR configuration. You can also force other mux/demux units like 32-WSS/32-DMX, or 40-WSS/40-DMX, or 40-MUX/40-DMX. To force these units, you should select the required site type and functionality.

   – You can place the SMR units in the Restricted Equipment list.

   – If 15216-EF-40-ODD/15216-MD-40-ODD is restricted, SMR with 40 mux/demux configuration will be the default site type.

- Scalable upto Degree—(For NG-DWDM only) Choose from the three degrees (4, 8, or 12) upto which the node is scalable.

- Anti ASE—Choose **Yes** to configure the site so that all the express channels on the site are optically dropped and reinserted. In addition, all the patch cords between the West and East sections are removed. Choose **Auto** to allow Cisco Transport Planner to decide if the site should be configured as anti-amplified spontaneous emissions (anti-ASE). See Table 4-1 and Table 4-2 for a summary of the site design rules. Anti-ASE is disabled for HYBRID 15454 ONS configuration.

Step 4   Click any side under a site to check the Omnidir Entry Point option. Check this option to mark the side as omnidirectional. This option is available only for multi-degree sides using OXC functionality and equipped with 40-SMR2-C or 40-WXC-C. Traffic cannot be added or dropped at the marked side and OSC units are not allowed. A side with Omnidir Entry Point option enabled can be connected only to a terminal site. Traffic from the terminal site is directed towards a side not having the omnidirectional property. You cannot create a service demand between the terminal site connected to the OXC through the omnidirectional side. Traffic directed to the OXC site is terminated on the sides without the omnidirectional property.

Step 5 To modify amplifier parameters, click **C-Band Amplifiers** or **L-Band Amplifiers** in the Project Explorer pane for the desired site interface. Choosing a value other than Auto will force a setting on the unit. For more information, see the "1.1.6 Auto, Forced, and Locked Parameters" section on page 1-16.

    a. In From Fiber area of the Properties pane, complete the following as needed:

- PRE—Choose the preamplifier from the drop-down list (**Auto**, **None, OPT-EDFA-17** [C-band], **OPT-EDFA-24** [C-band], **OPT-AMP-C** [C-band], **OPT-AMP-17** [C-band], **OPT-BSTE** [C-band] **OPT-PRE** [C-band], **OPT-BST** [C-band], **OPT-AMP-L** [L-band]), **EDRA1-26C-PRE** [C-band], **EDRA1-35C-PRE** [C-band], **EDRA2-26C-PRE** [C-band], or **EDRA2-35C-PRE** [C-band].

> **Note** EDRA amplifiers are applicable only for NGDWDM nodes. These amplifiers are not supported for the MSTP or HYBRID nodes.

> **Note** BST and RAMAN amplifiers are automatically set if you choose EDRA amplifiers. See the following table for more information.

Table 4-4   EDRA Amplifiers

PRE (For Fiber Area)	BST	RAMAN
EDRA1-26C-PRE	None	EDRA1-26C
EDRA1-35C-PRE	None	EDRA1-35C
EDRA2-26C-PRE	EDRA2-26C-BST	EDRA2-26C
EDRA2-35C-PRE	EDRA2-35C-BST	EDRA2-35C

> **Note** The OPT-EDFA-17 and OPT-EDFA-24 amplifiers do not support DCU modules.

> **Note** The OPT-AMP-C and OPT-PRE amplifiers support FDCU modules.

> **Note** If Raman amplification is enabled, the amplifier in the From Fiber area can be OPT-EDFA-17, OPT-EDFA-24, OPT-AMP-C, OPT-AMP-17, OPT-BST, OPT-BST-E, EDRA1-26C, EDRA1-35C, EDRA2-26C, or EDRA2-35C.

- DCU 1/2—Choose the DCU from the drop-down lists.

- Output power—Enter the output power.

- Tilt—Enter the desired tilt value.

- TDCU—Choose the TDCU type from the **TDCU units forcing** dialog box. You can force any of the following TDCU types:

    - Auto—CTP automatically places the fixed DCU units in the network.

    - AUTO-Fixed—CTP automatically places the fixed DCU units.

- AUTO-TDCU—CTP automatically places the TDCU units

- T-DCU Fine— Choose the TDCU Type as T-DCU Fine and the compensation value from the Compensation drop-down list. CTP places the T-DCU Fine unit in the network. If you choose the compensation value as Auto, CTP chooses the optimum compensation value.

- T-DCU Coarse—Choose the TDCU Type as T-DCU Coarse and the compensation value from the Compensation drop-down list. CTP places the T-DCU Coarse unit in the network. If you choose the compensation value as Auto, CTP chooses the optimum compensation value.

Note Forcing the TDCU at the site-level overrides the design rules that is set at the network-level. The TDCU type that is set at the site-level overrides the placement rules set at the network-level, except for the **Auto** option. The **Auto** option places the TDCU based on the value that is set at the network-level.

Note The TDCU units forcing dialog box can be launched from the TDCU Forcing Property when you select **C-Band Amplifiers** in the Project Explorer pane.

Note You can edit the TDCU unit only when DCU 1 and DCU 2 is set to Auto, and you can edit DCU 1 and DCU 2 only when the TDCU unit is set to Auto.

- FDCU—Choose the FDCU unit from the drop-down list. The options are Auto, None, 15216-FBGDCU-165, 15216-FBGDCU-331, 15216-FBGDCU-496, 15216-FBGDCU-661, 15216-FBGDCU-826, 15216-FBGDCU-992, 15216-FBGDCU-1157, 15216-FBGDCU-1322, 15216-FBGDCU-1653, 15216-FBGDCU-1983. The Auto option places a FDCU unit only if the value of the FDCU field is set to "Always" at the network level.

Note The FDCU field is enabled only if the amplifier selected in the Pre field is OPT-AMP-C or OPT-PRE, in the From fiber area.

- Attenuator In—Choose from the drop-down list the attenuator to be placed before the preamplifier position.
- Attenuator Out—Choose from the drop-down list the attenuator to be placed after the preamplifier position.

  While analyzing a network created in a CTP version earlier than Release 9.2.1, the Attenuator Out property inherits the value assigned to the Attenuator property in the Line/OADM area of the Add/Drop properties. Also, the lock applied to the Attenuator property is retained on the Attenuator Out property. The Attenuator property in the Line/OADM area of the Add/Drop properties is not available in CTP Release 10.0.

Note The Attenuator In and Attenuator Out drop-down lists are enabled only when a preamplifier is selected in the PRE drop-down list in the From Fiber area.

b. In the To Fiber area of the Properties pane, complete the following tasks as needed:

- BST—Choose the desired booster from the drop-down list (**Auto**, **None**, **OPT-EDFA-17** [C-band], **OPT-EDFA-24** [C-band], **OPT-AMP-C** [C-band], **OPT-AMP-17** [C-band], **OPT-BSTE** [C-band] **OPT-PRE** [C-band], **OPT-BST** [C-band], **OPT-AMP-L** [L-band], and **OPT-BST-L** [L-band]).

Note   The **EDRA2-26C-BST** [C-band], or **EDRA2-35C-BST** [C-band] amplifiers are automatically populated in the BST drop-down list when they are chosen in the PRE area.

Note   The OPT-EDFA-17 and OPT-EDFA-24 amplifiers do not support DCU modules.

Note   If Raman amplification is enabled, the amplifier in the To Fiber area can be OPT-EDFA-17, OPT-EDFA-24, OPT-AMP-C, OPT-BST, or OPT-BST-E.

- DCU 1/2—Choose the DCUs from the drop-down lists.
- Output power—Enter the output power.
- Tilt—Enter the tilt value.
- TDCU—Select the TDCU Type from the **TDCU units forcing** dialog box. You can force any of the following TDCU types:

   - Auto—CTP automatically places the fixed DCU units in the network.

   - AUTO-Fixed—CTP automatically places the fixed DCU units.

   - AUTO-TDCU—CTP automatically places the TDCU units.

   - T-DCU Fine— Select the TDCU Type as T-DCU Fine and choose the compensation value from the Compensation drop-down list. The CTP places the T-DCU Fine unit in the network. If you select the compensation value as Auto, CTP chooses the optimum compensation value.

   - T-DCU Coarse—Select the TDCU Type as T-DCU Coarse and choose the compensation value from the Compensation drop-down list. The CTP places the T-DCU Coarse unit in the network. If you select the compensation value as Auto, CTP chooses the optimum compensation value.

Note   Forcing the TDCU at the site-level overrides the design rules that is set at the network level. The TDCU type that is set at the site-level overrides the placement rules set at the network level, except for the **Auto** option. The **Auto** option places the TDCU based on the value that is set at the network-level.

Note   You can edit the TDCU unit only when DCU1 and DCU2 is set to Auto, and you can edit DCU1 and DCU2 only when the TDCU unit is set to Auto.

- FDCU—Choose the FDCU unit from the drop-down list. The options are Auto, None, 15216-FBGDCU-165, 15216-FBGDCU-331, 15216-FBGDCU-496, 15216-FBGDCU-661, 15216-FBGDCU-826, 15216-FBGDCU-992, 15216-FBGDCU-1157, 15216-FBGDCU-1322, 15216-FBGDCU-1653, 15216-FBGDCU-1983. The Auto option places a FDCU unit only if the value of the FDCU field is set to "Always" at the network level.

Note   This field is enabled only if the amplifier selected in the Bst field is OPT-AMP-C in the To Fiber area.

- Attenuator In—Choose from the drop-down list the attenuator to be placed before the post amplifier position.

- Attenuator Out—Choose from the drop-down list the attenuator to be placed after the post amplifier position.

Note   The Attenuator In and Attenuator Out properties are enabled only when a booster is selected in the BST drop-down list in the To Fiber area.

c. In the Properties pane, General area, choose the OSC from the drop-down list (**OSC-CSM** or **OSCM**).

d. In the Properties pane, Raman Amplification area, complete the following tasks as needed:

Note   Options in the Raman Amplification area are enabled for a side only if the fiber span connected to it is Raman amplified. For information about enabling Raman amplification on a fiber span, see the "4.14 Editing Fiber Span, Pair, and Fiber Parameters" section on page 4-69.

- RAMAN—Choose the Raman amplifier from the drop-down list. The options available are Auto, RAMAN-CTP, RAMAN-CTP-COP, OPT-RAMP-CE, and OPT-RAMP-C. EDRA amplifiers are available here only if they are chosen in the PRE area.

    These rules are applicable to RAMAN-CTP and RAMAN-COP configurations:

    - On selecting the RAMAN-CTP option, CTP places the 15454-M-RAMAN-CTP unit.

    - On selecting the RAMAN-COP-CTP option, CTP places both the 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP units. The 15454-M-RAMAN-COP unit cannot be placed as standalone.

    - The 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP units are placed only in M2 or M6 chassis and cannot be used without post-amplifiers.

    - The DCN extension has to be enabled on the Raman amplified span.

    - On selecting the RAMAN-CTP or RAMAN-CTP-COP option, the DCU1, DCU2, and TDCU parameters in the Raman Amplification area are disabled.

    - The Raman amplified span must have the same configuration at both ends, that is, either RAMAN-CTP or RAMAN-COP-CTP.

    - If the node on which RAMAN-CTP or RAMAN-CTP-COP has been configured is not a terminal or hub, then it should have the gain equalization capability. Therefore, such a node must be equipped with either 40-SMR1-C, 40-SMR2-C, 40-WXC-C, 80-WXC-C, 32MUX-O, 32DMX-0, or any WSS unit.

    - The RAMAN-CTP link can traverse up to two consecutive Raman amplified spans; whereas, the RAMAN-CTP-COP link can traverse only one Raman amplified span. However, the Raman amplified span can have intermediate pass-through nodes.

    - The traffic traversing the RAMAN-CTP-COP configured span must be dropped at the sides where the Raman amplified span terminates.

- If the RAMAN-CTP option is selected in the Restricted Equipment list, the RAMAN-COP option is selected implicitly.

Note A Raman amplifier must not be placed on a pass-through site. For example, in Figure 4-1, Site 1 is a pass-through site. The algorithm treats the span between Site 3 and Site 1 and the span between Site 1 and Site 2 as one span, and places the Raman amplifier on the external sites (Site2 and Site 3) on the ends of the span.

Note When EDRA amplifiers are chosen in the PRE area, the corresponding EDRA amplifiers are automatically set in the RAMAN section even when RAMAN amplification is disabled. When RAMAN amplification is enabled, the RAMAN-CTP and RAMAN-COP-CTP options are also available.

Figure 4-1   *Sites with Raman Amplifier*
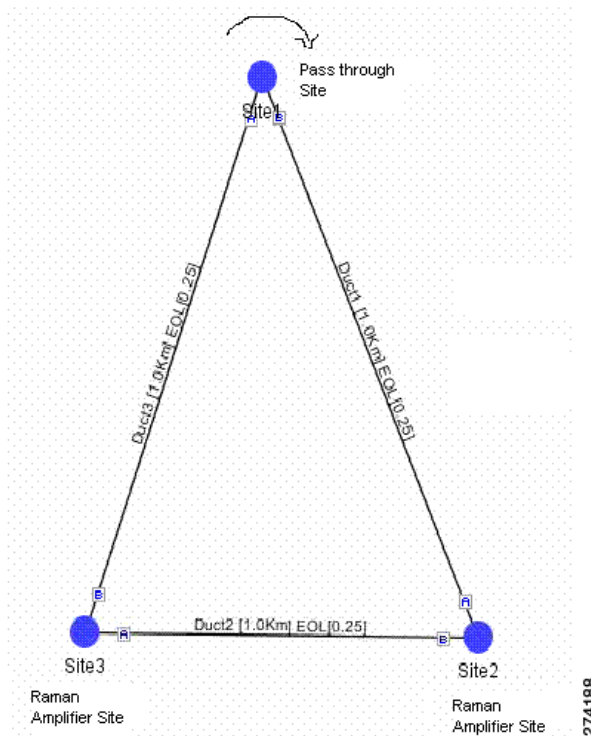
- DCU1—Choose the DCU from the drop-down list.
- DCU2—Choose the DCU from the drop-down list.
- Gain—Enter the gain value.
- Tilt—Enter the tilt value.
- TDCU—Select the TDCU Type from the **TDCU units forcing** dialog box. You can force any of the following TDCU types:

  - Auto—CTP automatically places the fixed DCU units in the network.

- AUTO-Fixed—CTP automatically places the fixed DCU units.

- AUTO-TDCU—CTP automatically places the TDCU units

- T-DCU Fine— Select the TDCU Type as T-DCU Fine and choose the compensation value from the Compensation drop-down list. The CTP places the T-DCU Fine unit in the network. If you select the compensation value as Auto, CTP chooses the optimum compensation value.

- T-DCU Coarse—Select the TDCU Type as T-DCU Coarse and choose the compensation value from the Compensation drop-down list. The CTP places the T-DCU Coarse unit in the network. If you select the compensation value as Auto, CTP chooses the optimum compensation value.

Note Forcing the TDCU at the site-level overrides the design rules that is set at the network-level. The TDCU type that is set at the site-level overrides the placement rules set at the network-level, except for the **Auto** option. The **Auto** option places the TDCU based on the value that is set at the network-level.

Note You can edit the TDCU unit only when the Raman Amplified option is selected in the fiber couple.

Note You can edit the TDCU unit only when DCU1 and DCU2 is set to Auto, and you can edit DCU1 and DCU2 only when the TDCU unit is set to Auto.

- FDCU—Choose the FDCU unit from the drop-down list. The options are Auto, None, 15216-FBGDCU-165, 15216-FBGDCU-331, 15216-FBGDCU-496, 15216-FBGDCU-661, 15216-FBGDCU-826, 15216-FBGDCU-992, 15216-FBGDCU-1157, 15216-FBGDCU-1322, 15216-FBGDCU-1653, 15216-FBGDCU-1983. The Auto option places a FDCU unit only if the value of the FDCU field is set to "Always" at the network level.

Note The OPT-RAMP-C and OPT-RAMP-CE cards support FDCU units.

- No post-amplifier—Check this check box to configure the Raman amplifier without having a post amplifier on the other side of the site. This configuration is useful in networks with special fibers where the power of channels entering the fiber is very low.

  The No post-amplifier check box is enabled only when the site structure is set to Line with the functionality as Line Amplifier and the type as Line.

  When the No post-amplifier check box is checked, the DCU1, DCU2, and TDCU parameters in the Raman Amplification area are disabled.

- In fiber output power—Specify the value of the maximum power allowed to enter the fiber at the other side of the node.

  You can edit the In fiber output power only when the No post-amplifier check box is checked.

Note In the Upgrade or Install mode, the No post-amplifier and the In fiber output properties are enabled only when the amplifier node is unlocked. For more information about unlocking site parameters, see the "2.10.5 Unlocking Parameters in the Network Design" section on page 2-59.

Step 6 To modify the add/drop parameters, click **Add/Drop** in the Project Explorer pane for the selected site interface. Choosing a value other than Auto will force a setting on the unit.

   a. In the OADM area, choose OADM or FLD units from the OADM Forcing drop-down list.

   b. In the Odd Grid Units area of the Properties pane, complete the following as needed:

- Patch Panel—Choose the patch panel from the drop-down list. The available options are Auto, PP-80-LC, 2RU 64 ports LC Patch Panel, and 1RU 64 ports Patch Panel.

- Demux—Choose the demultiplexer from the drop-down list. The available options are Auto, EF-40-ODD, MD-48-ODD, MD-40-ODD, FLA-8, 40-DMX-C, 32-DMX-O, and 32-DMX. The default option is Auto, which selects the EF-40-ODD unit.

- Mux—Choose the multiplexer from the drop-down list.The available options are Auto, EF-40-ODD, MD-48-ODD, MD-40-ODD, FLA-8, 40-MUX-C, 40-WSS, 32-MUX-O, and 32-WSS. The default option is Auto, which selects the EF-40-ODD unit.

   c. In the Even Grid Units area of the Properties pane, complete the following as needed:

- Patch Panel—Choose the patch panel from the drop-down list.The available options are Auto and PP-80-LC.

- Demux—Choose the demultiplexer from the drop-down list. The available options are Auto, EF-40-EVEN, MD-48-EVEN, 40-DMX-CE, and MD-40-EVEN. The default option is Auto, which selects the EF-40-EVEN unit.

- Mux—Choose the multiplexer from the drop-down list. The available options are Auto, EF-40-EVEN, MD-48-EVEN, 40-WSS-CE, and MD-40-EVEN. The default option is Auto, which selects the EF-40-EVEN unit.

   d. In the Interleaver/Deinterleaver area of the Properties pane, choose the interleaver/deinterleaver from the drop-down list. The available options are Auto, MD-48-CM, and MD-ID-50. The default option is Auto, which selects the MD-48-CM unit.

Note

- The FLD-4 units must be equipped as local add/drop units connected to the cross-connect card (SMR/WXC card) when they are forced on non-OADM site types.

- For the SMR, if the patch panel forced is different from an SMR PP MESH 4, then WSS is the site type instead of SMR.

- The EF-40-ODD/EVEN units and the MD-48-ODD/EVEN units support 48 and 96 channels respectively.

- If you select the MD-40-ODD, MD-40-EVEN, EF-40-ODD, or EF-40-EVEN unit as the mux, the same unit is automatically forced as the demux and vice-versa. The patch panel settings become uneditable if you choose the MD-40-ODD, MD-40-EVEN, EF-40-ODD, or EF-40-EVEN as the mux/demux unit.

- When FLA-8 is selected as the mux in a HYBRID 15454 ONS network, the same unit is automatically forced as the demux and vice-versa.

- When the MD-48-ODD and MD-48-EVEN units are selected as mux in a 96-channel HYBRID 15454 ONS network, the same units are automatically forced as the demux and vice-versa. The patch panel settings become uneditable.

- You can place the EF-40-ODD, EF-40-EVEN, MD-40-ODD, MD-40-EVEN, MD-48-ODD, MD-48-EVEN, MD-48-CM, and MD-ID-50 units in the Restricted Equipment list.

Step 7 To add Alien Shelves to the network, choose the required site from the Project Explorer.

In the properties pane, complete the following:

- Alien Shelf Name—Enter the name of the alien shelves to be added to the site. This name is displayed in the layout reports.

- Number of Alien Shelves—Enter the number of alien shelves to be added to the site.

  Number of alien shelves can vary based on the alien shelf height. The maximum number of alien shelves that can be added is 645, if the alien shelf height is 1RU (rack height being 44 rack units) and there are no other shelves in the layout.

  The maximum number of racks supported for a site is 15. If the addition of alien shelves require more than 15 racks, an error message is displayed in the summary report and the layout is not built for the site.

- Alien Shelf Height—Enter the height of the alien shelves in rack units (RU). If the alien shelf height is greater than the rack height, alien shelves are not added to the site. An error message is displayed for the same in the summary report.

Alien shelves are displayed only in the Layout report and are not listed in any other report. Alien shelves are not be added to the BoM.

4.4 Editing Side Labels

By default, CTP alphabetically names the sides with labels A through H. You can rename the sides as per requirement with any alphabet between A through H. Swapping of side labels is also possible. Use this procedure to edit side labels.

Note   In this guide, all references are to the default side labels A and B.

Note   Sides of a PSM Terminal site and the sides having remote add/drop ports cannot be renamed.

Step 1   In the Project Explorer, right-click the side label and choose **Edit** from the shortcut menu.

The Side Edit Dialog box is displayed. The left column, Side Name to be edited, displays the side names of all the sides present at the site. The right column, Names: Options, is used to enter a new name for the side.

Step 2   Click the cell in the Name: Options column and select a new name from the drop-down list.

Step 3   Repeat Step 2 for the other sides as required. Ensure that there is no duplication of side labels.

Step 4   Click **OK** to apply the new side labels. CTP will now display the new side labels at all interfaces where side names are displayed. For example, in the Project Explorer, various reports, and the network view.

Note   Layout rules are applied to the sides as per the new labels, unless the layout of the side is locked.

4.5 Editing Service Demand Association and Traffic Subnet

Use this procedure to change the association of a service demand from one traffic subnet to another. You can change the association if the destination subnetwork satisfies all of the add/drop requirements of the service demand.

You can edit a traffic subnet only in the Design mode; in Install and Upgrade mode, this feature is not supported.

Step 1 In the Project Explorer pane, right-click **Traffic Subnets** and choose **View Demand Relationship** from the shortcut menu. The Select Subnet dialog box appears (see Figure 4-3).

    a. Expand the Traffic Subnet folder to view the service demands associated with it.

    b. Click the **Move to Subnet** row to see the list of destination traffic subnets where this service demand can be moved to. The list will only contain those Traffic Subnets that can satisfy the add/drop needs of this service demand.

> **Note** Cisco Transport Planner will check to see if each user-forced demand can be met at the destination traffic subnet. In case the check fails, a message shall be displayed asking the user to confirm if this operation should be continued. Click Yes to continue. All the unfeasible properties within each demands will be reset to the default value.

    c. Select the desired destination traffic subnet and click **OK**.

Step 2 (Optional) To edit the wavelength set associated to a traffic subnet, right-click **Traffic Subnets** in the Project Explorer pane and choose **Edit Channel Plan**. The Traffic Subnet Builder dialog box appears (see Figure 4-2).

    a. Click the **Channel Rules** drop-down list to view the available channel rules.

    b. Select the desired channel rule and click **Apply**.

    c. Check the check box for the required wavelength in the Selection column to associate the wavelength to the traffic subnet. Uncheck the wavelength in the Selection column to remove the wavelength from the traffic subnet.

    d. Click **Save** to save the wavelength association for the selected channel rule.

    e. Click **OK** to apply the wavelength association to the traffic subnet.

Figure 4-2   Edit Channel Plan—Traffic Subnet Builder
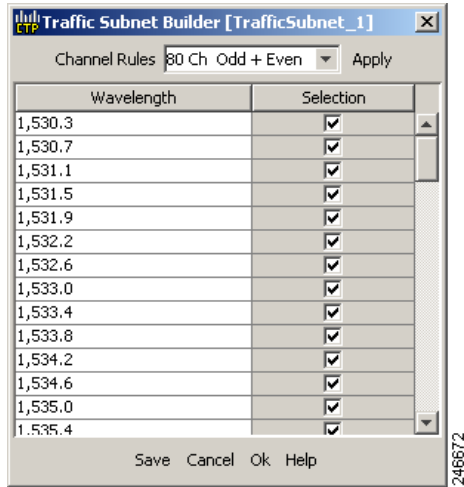
Step 3   To edit a defined traffic subnet, right-click **Traffic Subnets** in the Project Explorer pane and choose **Edit**. The Traffic Subnet Builder dialog box shown in Figure 4-3 appears.

   a.   From the Selected Ducts area, click the ducts you want to include the new the new traffic subnet and click **OK**. The selected ducts are added in the Choose Ducts area.

   b.   Click **OK**. The properties of the original traffic subnet are updated with the selected options.

> **Note**   Later, when analyzing the network, if the tool discovers that the order of the add/drop sites in the destination traffic subnet has been modified, the analyzer will mark these traffic demands as invalid and will not proceed with the analysis.

Figure 4-3   Select Subnet Dialog Box

Cisco Transport Planner DWDM Operations Guide, R10.0
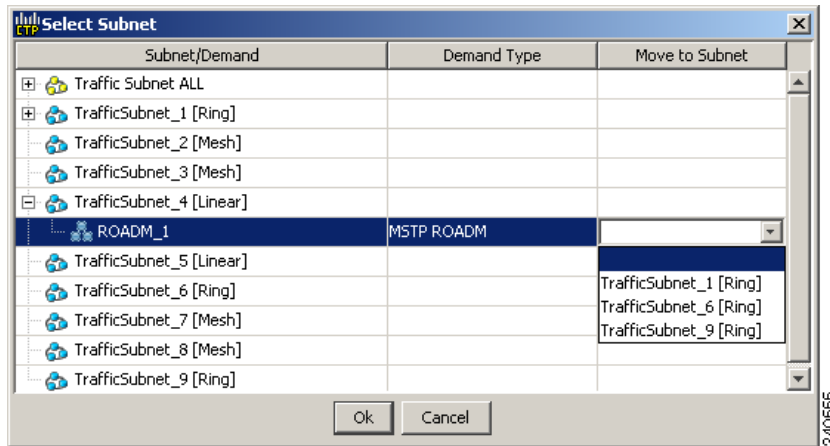
4.6 Creating a Maintenance Center

Use the following procedure to add maintenance centers that will supply your network with spare parts in the event of a failure. This feature helps your customer determine the quantity of spares that should be purchased, depending on the number of maintenance centers and their availability. Maintenance centers appear in the Maintenance Center folder under a site in the Project Explorer pane.

Step 1   In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.

Step 2   Scroll down the Project Explorer pane, right-click the **Maintenance Center** folder, and choose **New Maintenance Center** from the shortcut menu.

Step 3   Highlight the new maintenance center in the Project Explorer pane.

Step 4   In the Properties pane, complete the following as needed:

- Confidence Level—Choose the percentage that represents the required confidence level for finding needed spare parts in the maintenance center: **50**, **75**, **95**, or **99** percent.

- Restocking time (days)—Enter the time (including transportation) required to restock the part in the maintenance center.

Step 5   To associate a maintenance center with a site, see the "4.3 Editing Site Parameters" section on page 4-2.

4.7 Editing a Point-to-Point Demand

Use the following procedure to edit a point-to-point demand:

Step 1   In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.

In the Project Explorer pane, right-click the point-to-point demand and choose **Edit** from the shortcut menu. The Demand Editor appears (see Figure 4-4). The table lists the details of the demand as Demand > Service > Trail > Section.

Note   You can alternatively edit the point-to-point demand from the Network View. Right-click on the demand and click Edit to open the Demand Editor dialog box and edit the demand properties in the Properties pane.

The service can contain more than one trail based on the protection type. For more information about the Cisco Transport Planner icons, see Appendix A, "GUI Information and Shortcuts."

Figure 4-4   Edit Point-to-Point Demand Dialog Box
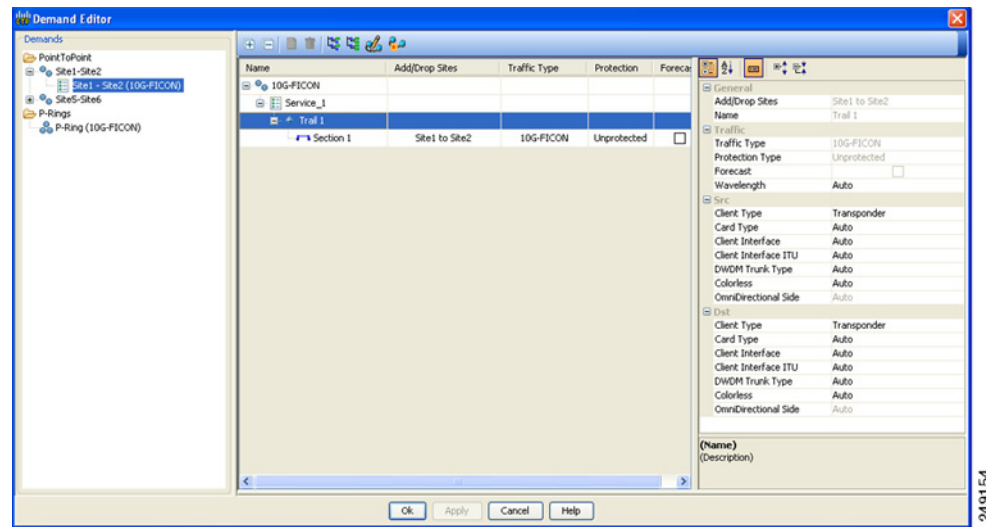
Step 2 At the demand level, you can edit the following properties in the Properties pane:

- Name—Edit the name of the demand.

- Traffic Type—Choose the desired traffic type from the drop-down list. The possible values are 100GE, 10G-FICON, 8G-FICON, 10GE LAN PHY, 10GE WAN PHY, 15530 10 Gbps Aggregated, 15530 2.5 Gbps Aggregated, 15530 Data MXP, 15530 MR Transport, 1G-FICON, 2G-FICON, 2R-Any Rate, 3G-SDI, 40GE LAN PHY, D1 Video, DV-6000, DVB ASI, ESCON, Fast Ethernet 100 Mbps, Fiber Channel, Fiber Channel 10G, Fiber Channel 2G, Fiber Channel 4G, Fiber Channel 8G, Gigabit Ethernet, SD-HDI, HD-SDI, HDTV, ISC-Compat, ISC-Peer-1G, ISC-Peer-1G with STP, ISC-Peer-2G, ISC-Peer-2G with STP, ISC-Peer-2R, OTU1, OTU2, OTU2e, OTU3, OTU4, SDI, Sysplex CLO, Sysplex ETR. The OC-12, OC-192, OC-3, OC-48 and OC-768 traffic types are specific to ANSI networks. STM1, STM16, STM256, STM4 and STM64 traffic types are specific to ETSI networks.

- Protection—Choose the desired protection type from the drop-down list. The possible values are Client1+1, Fiber-Switched, Y-Cable, PSM-OCH, and Unprotected.

Note   Y-Cable protection is not available for encrypted traffic types.

Step 3 At the service level, you can edit the following properties in the Properties pane:

- Forecast—Changes a present section to a forecast section.

- Encryption—Choose Yes to enable encryption or No to disable encryption.

- Wavelength—Forces a particular channel wavelength.

  – Auto—Allows the tool to assign a wavelength to the channel with the lowest possible cost, given the other set of constraints.

  – Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch**. Wavelengths are listed based on the selected band.

Step 4 At the trail level, you can edit the following properties in the Properties pane:

- Wavelength—Forces a particular channel wavelength.

- Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.

- Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch**. Wavelengths are listed based on the selected band.

- You can edit the following properties for the source and destination sites:

  - Client Type

  - Card Type

  - Client Interface

  - Client Interface ITU

  - DWDM Trunk Type

  - Colorless

  - OmniDirectional Side

  The options available are based on the service and card type selected.

✎ **Note**   You can force different card types for the source and destination sites.

Step 5   At the section level, you can edit the following properties in the properties pane:

- Optical Bypass—Specifies the sites from the drop-down list where the channels for the current demand will be optically dropped. Sites present between the source and destination sites along the path of this section are available as options.

- Wavelength—Forces a particular channel wavelength.

  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.

  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch**. Wavelengths are listed based on the selected band.

- You can edit the following properties for the source and destination sites:

  - Client Type

  - Card Type

  - Client Interface

  - Client Interface ITU

  - DWDM Trunk Type

  - Colorless

  - OmniDirectional Side

  The options available are based on the service and card type selected.

✎ **Note**   You can force different card types for the source and destination sites.

Step 6   To add a new service, click the **Add new service** icon in the toolbar. A new row appears.

Step 7   To delete an existing channel, select the row and click the **Delete service** icon in the toolbar.

Step 8   To edit path constraints, click the **Path Constraints Editor** icon in the toolbar. See "Creating a Point-to-Point Demand" section on page 21.

Step 9   To add a regeneration site, click the **Regeneration...** icon in the toolbar. The Regeneration editor appears. The regeneration site can be created only at the trail level. For more information, see the "2.7.10 Creating a Regeneration Site" section on page 2-46

> **Note**   When siblings of the same type (service, trail, or section) are chosen, the Properties pane displays the properties that are common. The properties that are different are marked with an asterisk.

Step 10   Click **OK** to save the changes to the channels and close the Demand Editor dialog box, or **Cancel** to close the dialog box without saving the changes.

4.8 Editing a P-Ring Demand

Use the following procedure to change the distribution of services in a P-ring service demand:

Step 1   In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.

In the Project Explorer pane, right-click the P-ring demand and choose **Edit** from the shortcut menu. The Demand Editor appears (see Figure 4-5). The table lists the details of the demand as Demand > Service > Trail > Section.

For more information about the Cisco Transport Planner icons, see Appendix A, "GUI Information and Shortcuts."

Figure 4-5   *Edit P-Ring Demand Dialog Box*
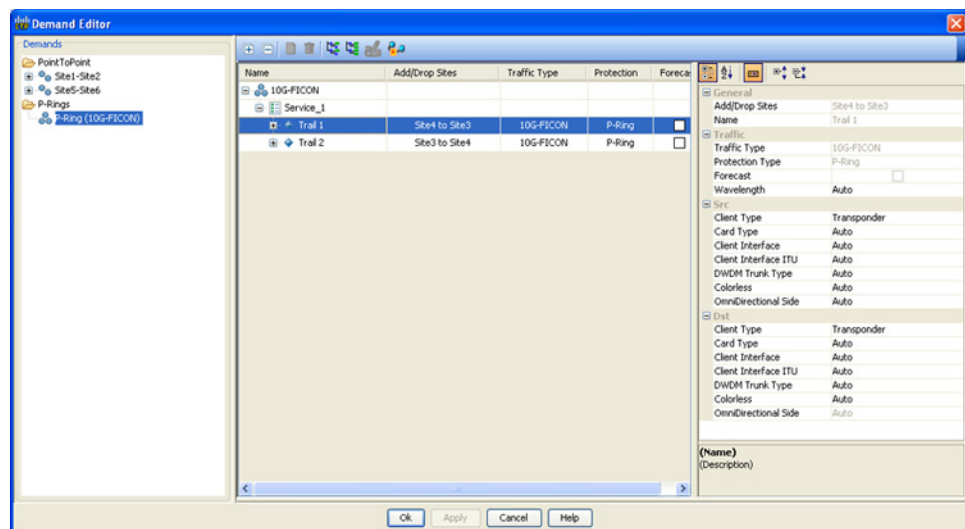
Step 2   At the demand level, you can edit the following properties in the properties pane:

- Name—Edit the name of the demand.

- Traffic Type—Choose the desired traffic type from the drop-down list. The possible values are 100GE, 10G-FICON, 10GE LAN PHY, 10GE WAN PHY, 15530 10 Gbps Aggregated, 15530 2.5 Gbps Aggregated, 15530 Data MXP, 15530 MR Transport, 1G-FICON, 2G-FICON, 2R-Any Rate, 3G-SDI, 40GE LAN PHY, D1 Video, DV-6000, DVB ASI, ESCON, Fast Ethernet 100 Mbps, Fiber Channel, Fiber Channel 10G, Fiber Channel 2G, Fiber Channel 4G, Gigabit Ethernet, HDTV, ISC-Compat, ISC-Peer-1G, ISC-Peer-2G, ISC-Peer-2R, OC-12, OC-192, OC-3, OC-48, OC-768, OTU1, OTU2, OTU2e, OTU3, OTU4, SDI, Sysplex CLO, and Sysplex ETR.

- Protection—Choose the desired protection type from the drop-down list. The possible values are Client1+1, Fiber-Switched, Y-Cable, PSM-OCH, and Unprotected.

Note Y-Cable protection is not available for encrypted traffic types.

Step 3 At the service level, you can edit the following properties in the Properties pane:

- Forecast—Changes a present section to a forecast section.

- Encryption—Choose Yes to enable encryption or No to disable encryption.

- Wavelength—Forces a particular channel wavelength.

  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.

  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch**. Wavelengths are listed based on the selected band.

Step 4 At the trail level, you can edit the following properties in the Properties pane:

- Wavelength—Forces a particular channel wavelength.

  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.

  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch**. Wavelengths are listed based on the selected band.

- You can edit the following properties for the source and destination sites:

  - Client Type
  - Card Type
  - Client Interface
  - Client Interface ITU
  - DWDM Trunk Type
  - Colorless
  - OmniDirectional Side

  The options available are based on the service and card type selected.

Note You can force different card types for the source and destination sites.

Step 5 At the section level, you can edit the following properties in the Properties pane:

- Optical Bypass—Specifies the sites from the drop-down list where the channels for the current demand will be optically dropped. Sites present between the source and destination sites along the path of this section are available as options.

- Wavelength—Forces a particular channel wavelength.

  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.

  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch**. Wavelengths are listed based on the selected band.

- You can edit the following properties for the source and destination sites:

  - Client Type

  - Card Type

  - Client Interface

  - Client Interface ITU

  - DWDM Trunk Type

  - Colorless

  - OmniDirectional Side

  The options available are based on the service and card type selected.

Note   You can force different card types for the source and destination sites.

Step 6   To add a new service, click the **Add new service** icon in the toolbar. A new row appears.

Step 7   To delete an existing service from the P-ring, choose the row and click the **Delete service** icon in the toolbar.

Step 8   To add a regeneration site, click the **Regeneration...** icon in the toolbar. The Regeneration Editor appears. The regeneration site can be created only at the trail level. For more information, see the "2.7.10 Creating a Regeneration Site" section on page 2-46.

Note   When siblings of the same type (service, trail, or section) are chosen, the Properties pane displays the properties that are common. The properties that are different are marked with an asterisk.

Step 9   Click **OK** to save the changes to the channels and close the Edit P-Ring Demand dialog box, or **Cancel** to close the dialog box without saving the changes.

4.9 Editing a ROADM Demand

Use the following procedure to change the distribution of services in a ROADM service demand:

Step 1   In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.

Step 2   Right-click ROADM demand and choose **Edit** from the shortcut menu. The Edit ROADM Demand dialog box appears (see Figure 4-6).

Figure 4-6   Edit ROADM Demand Dialog Box

Step 3   (Optional) If you copied properties of an existing ROADM demand, click Use Template to use the properties of the copied ROADM demand.

Step 4   Select a traffic pattern type from the from the Traffic Type drop-down list:

- Hub — If selected, the First Site drop-down list becomes available.

- Meshed—If selected, go to Step 6.

- Ring—If selected, choose the Connectivity type as either Unprotected Minimum Hop, Unprotected Optimum Path, or Unprotected Subnet, and proceed to Step 7.

> **Note**   Refer to the "1.1.5.2.3 ROADM Traffic Demands" section on page 1-14 for more information about the connectivity type choices.

Step 5   For Hub traffic types, select the originating site from the First Site drop-down list.

Step 6   Select a connectivity type from the Connectivity type drop-down list. The choices are Protected, Unprotected Minimum Hop, Unprotected Optimum Path, and Unprotected Subnet.

Step 7   In the Service types pane, check the check boxes for one or more client service types for the ROADM demand. The client interfaces that support each service type appear in the right pane.

Step 8   Check the OmniDirection check box to enable the omnidirectional property for the ROADM demand.

> **Note**
> - The omnidirectional property is applied to the unprotected ROADM demand only when all the sites in the ROADM group have a minimum of one omnidirectional side with two colorless ports on each side.
>
> - The omnidirectional property is applied to the protected ROADM demand only when all the sites in the ROADM group has minimum two omnidirectional sides with two colorless ports on each side.
>
> - When the ROADM demand is finalized, CTP shows the omnidirectional property as Yes irrespective of the source or destination.

Step 9   Check the Colorless check box to enable the colorless property for the ROADM demand.

Note
- The colorless property is applied to the unprotected ROADM demand only when one line side with one colorless port is available in each site.
- The colorless property is applied to the protected ROADM demand only when two line sides with one colorless port are available in each site.
- If there are no colorless ports on the line side but available on the omnidirectional side, CTP displays an error message.
- When the ROADM demand is finalized, CTP shows the colorless property as Yes irrespective of the source or destination.

Step 10   To further refine the client interfaces, complete the following options for each row in the right pane. Check boxes in gray are not available for the client interface selection.

- Yes/No—Check to select this card to implement the service type.
- Client Interface—Displays the card type for the selected service type.
- Y-Cable—Check to select Y-cable protection if the connectivity type is Protected.

Note   Y-cable protection is not available for encrypted traffic types.

- 1+1 Protected—Check to select 1+1 protection if the connectivity type is Protected.
- Fiber Switched—Check to select fiber-switching protection if the connectivity type is Protected.
- Supported Service—Displays the service types supported for the card.

You can select more than one client interface to support the same service type. By default, Cisco Transport Planner checks the best client interface to support each service.

Step 11   Click **OK** to save the changes to the demand.

4.10 Editing an Ethernet Aggregated Demand

Use the following procedure to edit Ethernet aggregated demands.

Step 1   In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.

Step 2   In the Project Explorer pane, right-click the Ethernet aggregated demand and choose **Edit demand** from the shortcut menu. The Ethernet Aggregated Demand dialog box appears (Figure 4-7).

Figure 4-7   Ethernet Aggregated Demand Dialog Box
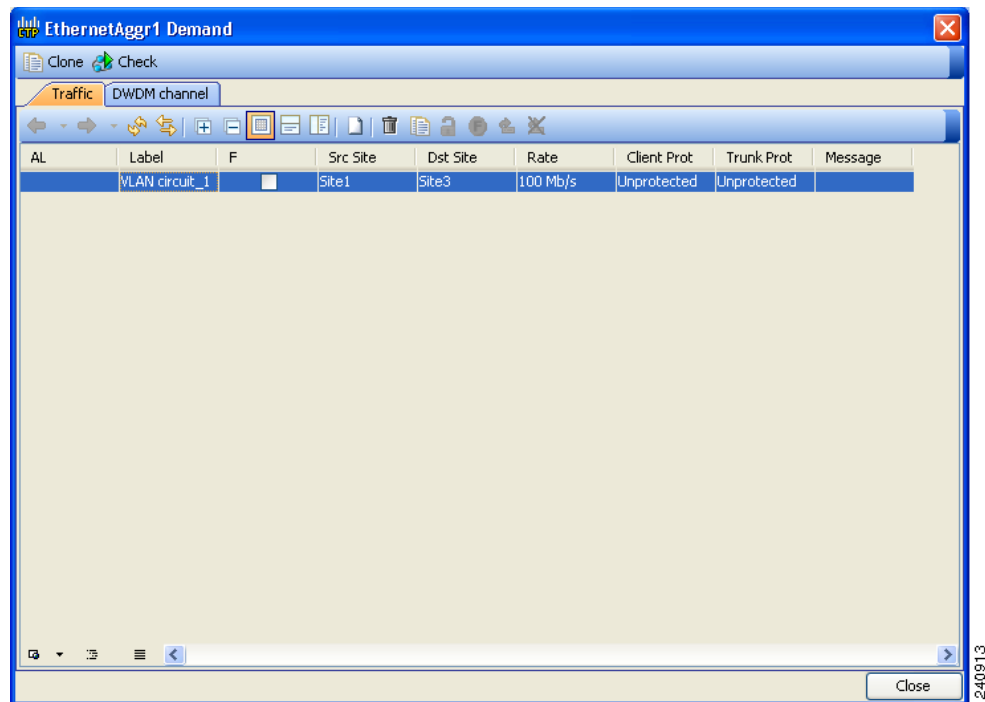
Step 3   If a circuit already exists, to make a copy of it, right-click the circuit and click **Copy Circuit.** A new circuit appears as a WDM traffic channel with the same parameters as the original circuit.

Step 4   To delete a circuit, right-click the circuit and click **Delete Circuit**.

Step 5   To modify the parameters of an existing circuit, double-click the circuit. The Edit Request dialog box appears (see Figure 4-8).

Figure 4-8 *Edit Request Dialog Box for an Ethernet WDM Transport Channel*

Step 6   The Edit request dialog box contains three areas of information: General, Src, and Dest.

General Area

- Label—Enter the label for the circuit. By default, VLAN_Circuit_x is used.

- Trunk Protection—Select the trunk protection type. Allowed values are:

    – Unprotected

    – Protected

- P/F—Choose Forecast if this demand will be needed in the future. Choose Present if this demand is needed now. This parameter drives the list of pluggable port modules to be equipped on the card and affects BoM reports.

- Path Forcing—Allows you to force the circuit routing on the traffic subnet associated with this demand. Allowed values are:

    – Auto—(Default) Causes the tool to automatically define the trunk path.

    – Side *x*—Represents the label of the side on the Src site where the circuit is routed.

- Client Protection—Choose the client protection type. Allowed values are:

    – Unprotected

    – Client 1+1

- Circuit Rate—Choose the circuit rates.

Src Area

- Site—Select the source site. Allowed values include the list of sites added in the WDM traffic channel.

- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.

- Card—Select the card. Allowed values are Auto, 10GE-XP, 10GE-EXP, GE-XP, and GE-EXP. Auto allows the tool to select an appropriate card type based on other constraints.

The Src area contains Working and Protected sub areas.

Working sub area

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.

- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

- Port Num—Select the port number. Allowed values are Auto, 1, and 2. Auto allows the tool to select an appropriate port number based on other constraints.

Protected sub area

These fields are enabled only if client protection is enabled in the Client Protection field.

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.

- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

- Port Num—Select the port number. Allowed values are Auto, 1, and 2. Auto allows the tool to select an appropriate port number based on other constraints.

Dest Area

- Site—Select the destination site. Allowed values include the list of sites added in the WDM traffic channel.

- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.

- Card—Select the card. Allowed values are Auto, 10GE-XP, 10GE-EXP, GE-XP, and GE-EXP. Auto allows the tool to select an appropriate card type based on other constraints.

The Dest area contains Working and Protected sub areas.

Working sub area

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.

- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

- Port Num—Select the port number. Allowed values are Auto, 1 to 20. Auto allows the tool to select an appropriate port number based on other constraints.

Protected sub area

These fields are enabled only if client protection is enabled in the Client Protection field.

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.

- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

- Port Num—Select the port number. Allowed values are Auto, and 1 to 20. Auto allows the tool to select an appropriate port number based on other constraints.

Step 7   Click **OK.**

Step 8   Click **Check** on the left corner of the window to generate a report showing the circuit path in the WDM traffic channel and to check any over-allocation of bandwidth. The report shows, in a row, each of the sites on the subnet, and each span in between.

Step 9   To edit the demand, click the **DWDM channel** tab.
See Figure 4-9.

The table lists the details of the demand as Demand > Service > Trail > Section.

For more information about the Cisco Transport Planner icons, see Appendix A, "GUI Information and Shortcuts."

Figure 4-9   DWDM Channel View in an Ethernet Aggregated Demand

Step 10   At the service level, you can edit the following properties in the Properties pane:

- Forecast—Changes a present section to a forecast section.

- Wavelength—Forces a particular channel wavelength.

  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.

  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch**. Wavelengths are listed based on the selected band.

Step 11 At the trail level, you can edit the following properties in the Properties pane:

- Wavelength—Forces a particular channel wavelength.
- You can edit the following property for the source and destination sites:
  – DWDM Trunk Type
  – Colorless
  – OmniDirectional Side

Step 12 At the section level, you can edit the following properties in the Properties pane:

- Optical Bypass—Specifies the sites from the drop-down list where the channels for the current demand will be optically dropped. Sites present between the source and destination sites along the path of this section are available as options.
- Wavelength—Forces a particular channel wavelength.
- You can edit the following property for the source and destination sites:
  – DWDM Trunk Type
  – Colorless
  – OmniDirectional Side

Step 13 To add a regeneration site, click the **Regeneration...** icon in the toolbar of the DWDM channel tab. The Regeneration Editor appears. The regeneration site can be created only at the trail level. For more information, see the "2.7.10 Creating a Regeneration Site" section on page 2-46

✎
Note When siblings of the same type (service, trail, or section) are chosen, the Properties pane displays the properties that are common. The properties that are different are marked with an asterisk.

Step 14 Click **Apply** to save the changes to the channels and click **Close**.

4.11 Editing a TDM Aggregated Demand

Use the following procedure to edit a TDM aggregated demand:

Step 1 In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.

Step 2 In the Project Explorer pane, right-click the TDM aggregated demand and choose **Edit demand** from the shortcut menu. The TDM Aggregated Demand dialog box appears (Figure 2-12).

Step 3 To make a copy of the circuit, right-click the circuit and click **Copy Circuit**. A new circuit appears under WDM Traffic channel with the same parameters as the original circuit.

Step 4 To delete a circuit, right-click the circuit and click **Delete Circuit**.

Step 5 To modify the parameters of an existing circuit, double-click the circuit. The **Edit request** dialog box appears (see Figure 4-10).

Figure 4-10   Edit Request in a TDM WDM Transport Channel

Step 6   The Edit request window contains three area of information: General, Src, and Dest.

General Area

- Label—Enter the label for the circuit. By default, VLAN_Circuit_x is used.

- Trunk Protection—Enter the trunk protection type. Allowed values are:
    - Unprotected
    - UPSR

- P/F—Select Forecast if this demand will be needed in the future. Select Present if this demand is needed now. This option drives the list of pluggable port modules to be equipped on the card and affects BoM reports.

- Path Forcing—This option allows you to force the circuit routing on the traffic subnet associated with this demand. The following values are supported:
    - Auto—(Default) Causes the tool to automatically define the trunk path.
    - Side *x*—Represents the label of the side on the Src site where the circuit is routed.

- Client Protection—Allowed values are:
    - Unprotected
    - 1+1 APS

- Circuit rate—Displays the allowed circuit rates.

Src Area

- Site—Select the source site. Allowed values include the list of sites added in the WDM traffic channel.

- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.

- Card—Select the card. Allowed values are Auto and ADM-*x*. Auto allows the tool to select an appropriate card type based on other constraints.

The Src area contains Working and Protected sub areas.

Working sub area

- Port Num—Select the port number. Allowed values are Auto and 1 to 16. Auto allows the tool to select an appropriate port number based on other constraints.

- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

Protected sub area

These fields are enabled only if client protection is enabled in the Client Protection field.

- Port Num—Select the port number. Allowed values are Auto and 1 to 16. Auto allows the tool to select an appropriate port number based on other constraints.

- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

Dest Area

- Site—Select the destination site. Allowed values include the list of sites added in the WDM traffic channel.

- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.

- Card—Select the card. Allowed values are Auto and ADM-*x*. Auto allows the tool to select an appropriate card type based on other constraints.

The Dest area contains Working and Protected sub areas.

Working sub area

- Port Num—Select the port number. Allowed values are Auto and 1 to 16. Auto allows the tool to select an appropriate port number based on other constraints.

- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

Protected sub area

- Port Num—Select the port number. Allowed values are Auto and 1 to 16. Auto allows the tool to select an appropriate port number based on other constraints.

- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

Step 7   Click **OK.**

Step 8   Click the **Check** tab in the left corner of the window to generate a report showing the circuit path in the WDM traffic channel and to check any over allocation of bandwidth. The report shows, in a row, each of the sites on the subnet, and each span in between.

Step 9   To edit the demand, click the **DWDM channel** tab.
See Figure 4-11.

The table lists the details of the demand as Demand > Service > Trail > Section.

For more information about the CTP icons, see Appendix A, "GUI Information and Shortcuts."

Figure 4-11   DWDM Channel View in a TDM Aggregated Demand

Step 10 At the service level, you can edit the following properties in the Properties pane:

- Forecast—Changes a present section to a forecast section.

- Wavelength—Forces a particular channel wavelength.

    - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.

    - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch**. Wavelengths are listed based on the selected band.

Step 11 At the trail level, you can edit the following properties in the Properties pane:

- Wavelength—Forces a particular channel wavelength.

- You can edit the following property for the source and destination sites:

    - DWDM Trunk Type

    - Colorless

    - OmniDirectional Side

Step 12 At the section level, you can edit the following properties in the Properties pane:

- Optical Bypass—Specifies the sites from the drop-down list where the channels for the current demand will be optically dropped. Sites present between the source and destination sites along the path of this section are available as options.

- Wavelength—Forces a particular channel wavelength.

- You can edit the following property for the source and destination sites:
  - DWDM Trunk Type
  - Colorless
  - OmniDirectional Side

Step 13 To add a regeneration site, click the **Regeneration...** icon in the toolbar of the DWDM channel tab. The Regeneration Editor appears. The regeneration site can be created only at the trail level. For more information, see the "2.7.10 Creating a Regeneration Site" section on page 2-46.

Note When siblings of the same type (service, trail, or section) are chosen, the Properties pane displays the properties that are common. The properties that are different are marked with an asterisk.

Step 14 Click **Apply** to save the changes to the channels and click **Close**.

4.12 Add or Remove Sites from P-Ring, Ethernet Aggregated, and TDM Aggregated Demands

To add or remove sites from P-Ring, Ethernet Aggregated, and TDM Aggregated demands:

Step 1 In the Project Explorer pane, right-click the network folder, and choose **Expand** from the shortcut menu. Perform the following.

- For P-Ring demand—In the Project Explorer pane, right-click the P-Ring demand and choose **Add/Remove Site** from the shortcut menu. The Add/Remove Sites dialog box listing all the sites in the network appears.

- For Ethernet Aggregated and TDM Aggregated demands—In the Project Explorer pane, right-click the Ethernet Aggregated or TDM Aggregated demand and choose **Add/Remove Site** from the shortcut menu. The Add/Remove Sites dialog box listing all the sites in the network appears.

Step 2 To add sites to the demand, select the sites in the Site Inclusion/Exclusion Panel and click the right arrow.

Sites can be added only when the demand is in Unlock[1] state. When a site is added to the demand, new trails are created to accommodate the new sites. The existing circuits in the demand are not affected.

Step 3 To remove sites from the demand, select the sites in the Site Inclusion/Exclusion Panel and click the left arrow.

Sites can be removed only when the demand is in Unlock[1] state. When a site is removed, all the associated circuits originating or terminating from that site are also removed.

Step 4 Click **OK** to confirm adding or removing sites from P-Ring, Ethernet Aggregated, and TDM Aggregated demands. The updated site details are displayed in the Demand Editor window.

---

1. To Unlock a demand, right-click the demand and choose **Unlock** from the shortcut menu.

4.13 Add or Remove Multiple Optical Bypass Sites

The Optical Bypass Editor allows to specify multiple sites where the channels for the current demand are optically dropped. To add or remove multiple optical bypass sites:

Step 1   Create a Point-to-Point, P-Ring, Ethernet Aggregated, or TDM Aggregated demand. To create a Point-to-Point, P-Ring, Ethernet Aggregated, or TDM Aggregated demand, see 2.7 Creating a Demand, page 2-19.

Step 2   Right-click the network folder and choose **Expand** from the shortcut menu.

In the Project Explorer pane, right-click the demand and choose **Edit** from the shortcut menu. The Demand Editor window appears. The Demand Editor window lists the details of the demand as Demand > Service > Trail > Section.

> **Note**   You can alternatively edit the demand from the network view. Right-click on the demand and click **Edit** to open the Demand Editor window.

Step 3   Select the section in the demand. Click **Optical Bypass** in the toolbar. The Optical Bypass Editor window appears.

Step 4   To add a site as optical bypass site, go to Step 5. To delete an optical bypass site, go to Step 6.

Step 5   To add an optical bypass site, select, a site in the Available Sites pane in the Optical Bypass Editor. Click the down arrow to move the selected site to the Optical Bypass Sites pane. Sites present between the source and destination sites along the path of this section can be added as optical bypass sites. To add optical bypass site to the network in Upgrade or Release Upgrade state, unlock the demand and site to be added.

Step 6   To delete an optical bypass site, select a site in the Optical Bypass Sites pane in the Optical Bypass Editor. Click the up arrow to move the selected site to Available Sites pane. When an optical bypass site is removed from the network, all the associated add/drop card are removed only when the site is in unlocked state.

Step 7   Click **OK** to confirm adding or deleting optical bypass site.

Step 8   Click **OK** to save the changes to the channels and close the Demand Editor dialog box.

4.14 Editing Fiber Span, Pair, and Fiber Parameters

Using the Properties pane you can manage a fiber span, a fiber pair, and individual fibers. A fiber pair consists of two different fibers (clockwise and counter-clockwise). Table 4-5 lists the properties that you can modify for a fiber span, fiber pair, or fiber.

Table 4-5   Editable Fiber Properties

Property	Fiber Span	Fiber Pair	Fiber
Name	Yes	Yes	No
Connection Type	No	No	No
EOL Ageing Loss	Yes	No	No

Table 4-5   *Editable Fiber Properties (continued)*

Property	Fiber Span	Fiber Pair	Fiber
EOL Ageing Factor	Yes	No	No
Measurement Units	Yes	No	No
Fiber Type	Yes	Yes	No
Span Length	Yes	Yes	Yes
FDP In and FDP Out	No	No	Yes
Length Based Loss	Yes	Yes	No
Connector Loss (per site)	Yes	Yes	Yes
Tot SOL Loss w/o Connectors	Yes	Yes	No
CD C-Band and CD L-Band	Yes	Yes	No
Loss	Yes	Yes	Yes
PMD at Fiber	Yes	Yes	Yes
Raman Amplified	Yes	Yes	No
Attenuation at Lambda One	Yes	Yes	No
Attenuation at Lambda Two	Yes	Yes	No

Use the following procedure to edit a fiber span, fiber pair, and fiber parameters:

Step 1   In the Project Explorer pane, right-click the **Fiber** folder and choose **Expand** from the shortcut menu.

Step 2   In the Project Explorer pane, click one of the following. The options available for editing in the Properties pane change depending on your selection.

- To edit a fiber span, click the duct identifier.

- To edit a fiber pair, click the fiber pair identifier.

- To edit an individual fiber, click the fiber identifier.

Step 3   In the Properties pane, edit the following parameters, as necessary. See Table 4-5 for the properties that you can change for a fiber span, fiber pair, or individual fiber.

- Name—Enter the desired name for the fiber span, pair, or fiber.

- Connection Type—Displays the type of connection between the sites that the fiber span connects.

- EOL Ageing Loss—Enter the EOL aging loss value. The EOL loss per span value is added at the end of life to each discrete fiber in the network (for example, to add an EOL margin for splicing). If you set the ageing factor, you do not need to set the ageing loss.

- EOL Ageing Factor—Enter the number to factor fiber aging. This factor is multiplied by the SOL total span loss without connectors. If you set the ageing loss, you do not need to set the ageing factor.

- Measurement Units—Choose the measurement unit (Km or Miles) for a fiber span (duct) from the drop-down list. You can set the measurement unit only for the duct, but not for the fiber pair (couple) or fiber.

- Fiber Type—Choose the type of fiber for each span in the network.

- Span Length—Enter the span length. The displayed unit of measurement is retrieved from the Span Length field.

- FDP In—Enter the fiber distribution panel (FDP) connector information where the fiber is connected at the receiving end.

- FDP Out—Enter the fiber distribution panel (FDP) connector information where the fiber is connected at the transmitting end.

- Length Based Loss—If this check box is checked, the fiber loss is determined by multiplying the Span Length with the Loss Factor. If this check box is unchecked, enter the total span loss value in the Tot SOL Loss w/o Connectors property.

- Connector loss [x]—Enter the concentrated connector loss at the end of the span terminating at the source site.

- Connector loss [y]—Enter the concentrated connector loss at the end of the span terminating at the destination site.

Note   By default, the Connector Loss property uses the value as specified in the DWDM Design Rules. You can override the default value by typing a new value. For more information about the DWDM Design Rules, see .

- Tot SOL Loss w/o Connectors—Enter the start of life fiber loss value for each span, excluding the connector concentrated loss.
  This property is disabled if the Length Based Loss check box is checked.

- CD C-Band and CD L-Band—Enter the fiber CD factor. The default value is dependent on the selected fiber type. Any value that you enter is lost whenever you change the fiber type. Chromatic dispersion is always entered in ps/nm/km. Fiber chromatic dispersion is defined for the middle of the wavelength band. C-band is defined at 1545.3 nm and L-band is defined at 1590.4 nm.

- Loss—Enter the value of the SOL fiber loss per kilometer used to calculate the loss of each span in the network. The fiber loss factor is always entered in dB/km.

- PMD at Fiber—The default value is dependent on the selected fiber type. You can type a new PMD value. Any entered value is lost whenever you change the fiber type and its default value is applied. PMD is always entered in ps/nm/km.
  If the PMD values entered for the individual fibers in a fiber couple are different from each other, then no PMD value is displayed for the fiber span (Duct) and the fiber pair (Couple) properties.

- Raman Amplified—Check this option to enable Raman amplification. It allows placement of Raman amplifiers on both end-points of the span. When this option is checked, the Raman amplification properties of the C-band amplifier are enabled.

Note   You can choose adjacent spans as Raman amplified and choose a site between these spans as a pass-through site. The algorithm treats the adjacent spans as one span and places the Raman amplifier on the external sites on the ends of the span. The Raman amplified span is indicated by two red dots.

- Attenuation at Lambda One—Enter the attenuation value for the first Raman signal. The default value is Auto, which allows the tool to select an appropriate value.

- Attenuation at Lambda Two—Enter the attenuation value for the second Raman signal. The default value is Auto, which allows the tool to select an appropriate value.

Step 4   As needed, view the following totals for a fiber span, fiber pair, or individual fiber on the Properties pane:

- **Loss BOL**—(Display only) Displays the total loss beginning of life (BOL) calculation.

✎
Note   BOL is also referred to as SOL.

- **Loss EOL**—(Display only) Displays the total loss EOL calculation.
- **CD**—(Display only) Displays the total chromatic dispersion.
- **PMD**—(Display only) Displays the total polarization mode dispersion.

4.15 Editing Fiber Spans, Fiber Pairs, and Fibers Using the Fibers Dialog Box

The Fibers Dialog lists all fiber spans, fiber pairs, and fibers in the network. Use the following procedure to view and edit fiber parameters in the Fibers Dialog box appears.

Step 1   In the Project Explorer pane, right-click the **Fibers** folder in the desired network and choose **Fibers Dialog** from the shortcut menu. The Fibers Dialog appears (Figure 4-12).

Figure 4-12   *Fibers Dialog*
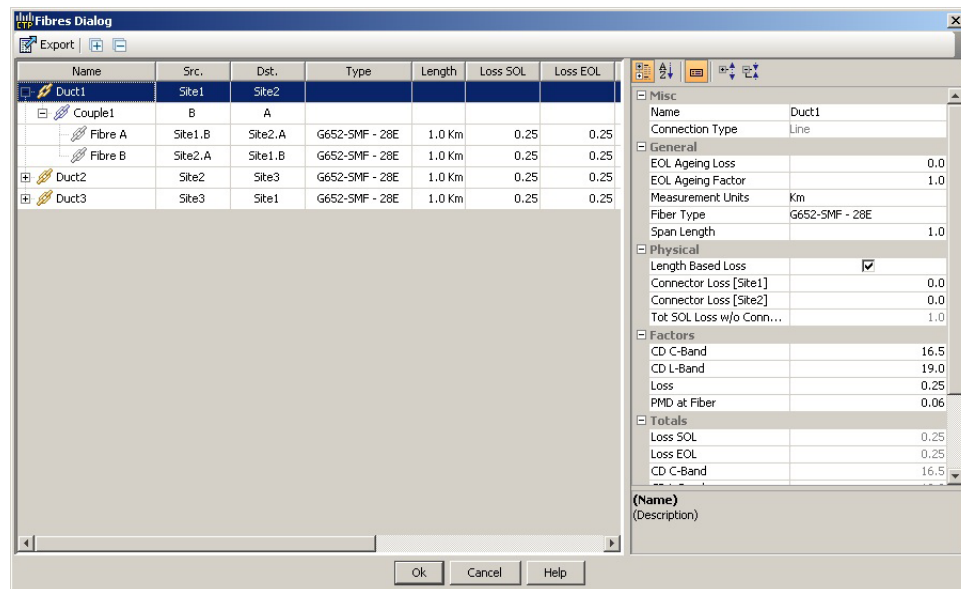
Table 4-6 describes the Fiber Dialog box columns.

Table 4-6   Fibers Dialog Box Columns

Column	Description
Name	Displays the name of the fiber span (Duct), pair (Couple), or fiber. Click the plus (+) sign by a Duct name to expand the list and show the Couple names. Click the plus (+) sign by a Couple name to expand the list and show the individual fiber names.
Src.	Displays the name of the source site or interface for the fiber span, fiber pair, or fiber.
Dst.	Displays the name of the destination site or interface for the fiber span, fiber pair, or fiber.
Type	Displays the type of fiber for each span in the network.
Length	Displays the span length. The displayed unit of measurement is retrieved from the Span Length field.
Loss SOL	Displays the total loss SOL calculation.
Loss EOL	Displays the total loss EOL calculation.
CD C-Band	Displays the total chromatic dispersion for the C-band.
CD L-Band	Displays the total chromatic dispersion for the L-band.
PMD	Displays the total polarization mode dispersion (PMD).
QD C-Band	Displays the secondary order dispersion for C-band.
QD L-Band	Displays the secondary order dispersion for L-band.
RD	Displays the random dispersion value.

Step 2 To edit a fiber span, fiber pair, or fiber, select it in the Fibers Dialog. The Properties pane in the right area of the Fibers Dialog displays the properties for the selected item.

Step 3 In the Properties pane, edit the following parameters, as necessary. See Table 4-5 for the properties that you can change for a fiber span, fiber pair, or individual fiber.

- Name—Enter the desired name for the fiber span, pair, or fiber.
- EOL Ageing loss—Enter the EOL aging loss value. The EOL loss per span value is added at the end of life to each discrete fiber in the network (for example, to add an EOL margin for splicing). If you set the ageing factor, you do not need to set the ageing loss.
- EOL Ageing factor—Enter the number to factor fiber aging. This factor is multiplied by the SOL total span loss without connectors. If you set the ageing loss, you do not need to set the ageing factor.
- Measurement Units— You can view the span length and the measurement unit of each fiber span (Duct), fiber pair (Couple), and fiber. You cannot change the measurement unit of the fiber span and pair (Couple). To change the measurement unit of the fiber span and pair, edit the measurement unit of the corresponding duct.
- Fiber Type—Choose the type of fiber for each span in the network.
- OSC Frame Type—Choose the OSC frame type. The options available are Auto, OC3 Frame, GE Frame, and FE Frame. The default option at is Auto. When set in Auto, CTP will use FE Frame as the preferred frame type.
- Span Length—Enter the span length. The displayed unit of measurement is retrieved from the Span Length field.

- FDP In—Enter the fiber distribution panel (FDP) connector information where the fiber is connected at the receiving end.

- FDP Out—Enter the fiber distribution panel (FDP) connector information where the fiber is connected at the transmitting end.

- Length Based Loss—If this check box is checked, the fiber loss is determined by multiplying the Span Length with the Loss Factor. If this check box is unchecked, enter the total span loss value in the Tot SOL Loss w/o Connectors property.

- Connector loss [x]—Enter the concentrated connector loss at the end of the span terminating at the source site.

- Connector loss [y]—Enter the concentrated connector loss at the end of the span terminating at the destination site.

> **Note** By default, the Connector Loss property takes the value as specified in the DWDM Design Rules. Any entered value will overwrite the default value. For more information about the DWDM Design Rules, see "1.6.3 Setting the Default Platform Values" section on page 1-27.

- Tot SOL Loss w/o Connectors—Enter the start of life link fiber loss for each span, without the connector concentrated loss. The total SOL loss without connectors is equal to the loss factor multiplied by the length.
  This property is disabled if the Length Based Loss check box is selected.

- CD C-Band and CD L-Band—Enter the fiber CD factor. The default value is dependent on the selected fiber type. Any value that you enter is lost whenever you change the fiber type. Chromatic dispersion is always entered in ps/nm/km. Fiber chromatic dispersion is defined for the middle of the wavelength band. C band is defined at 1545.3 nm. L band is defined at 1590.4 nm.

- Loss—Enter the value of the SOL fiber loss per kilometer used to calculate the loss of each span in the network. The fiber loss factor is always entered in dB/km.

- PMD at Fiber—The default value is dependent on the selected fiber type. You can type a new PMD value. Any entered value is lost whenever you change the fiber type and its default value is applied. PMD is always entered in ps/nm/km.
  If the PMD values entered for the individual fibers in a fiber couple are different from each other, then no PMD value is displayed for the fiber span (Duct) and the fiber pair (Couple) properties.

- Raman Amplified—Check this option to enable Raman amplification. It allows placement of Raman amplifiers on both end-points of the span. When this option is checked, the Raman amplification properties of the C-band amplifier are enabled.

> **Note** You can select adjacent spans as Raman Amplified and select a site between these spans as a pass-through site. The algorithm treats the adjacent spans as one span and places the Raman amplifier on the external sites on the ends of the span.

- Attenuation at Lambda One—Enter the attenuation value for the first Raman signal. The default value is Auto, which allows the tool to select an appropriate value.

- Attenuation at Lambda Two—Enter the attenuation value for the second Raman signal. The default value is Auto, which allows the tool to select an appropriate value.

CTP updates the Fibers Dialog box with the new values.

Step 4   As needed, view the following totals for a fiber span, fiber pair, or individual fiber on the Properties pane:

- Loss BOL—(Display only) Displays the total loss BOL calculation.

> **Note**   BOL is also referred to as SOL.

- Loss EOL—(Display only) Displays the total loss EOL calculation.
- CD—(Display only) Displays the total chromatic dispersion.
- PMD—(Display only) Displays the total polarization mode dispersion.

Step 5   Click **OK**.

4.15.1 Exporting the Fiber Spans, Fiber Pairs, and Fibers in a Network

Use the following procedure to export all fiber spans, fiber pairs, and single fibers in a network to a .xls format:

Step 1   In the Project Explorer pane, right-click the **Fibers** folder in the desired network and choose **Fibers Dialog** from the shortcut menu. The Fibers Dialog box appears (Figure 4-12).

Step 2   Click **Export**. The Fibers Export dialog box appears.

Step 3   Navigate to the desired directory, type the XLS filename, and click **Save**.

4.16 Rack Rules

This section describes the following rules:

- 4.16.1 General Placement Rules
- 4.16.2 M2 and M6 Placement Rules
- 4.16.3 DCU Placement Rules
- 4.16.4 Fiber Storage Placement Rules
- 4.16.5 Air Ramp Placement Rules
- 4.16.6 Patch Panel Placement Rules
- 4.16.7 15216-MD-40-ODD/EVEN, 15216-EF-40-ODD/EVEN, and 15216-MD-48-ODD/EVEN Unit Placement Rules
- 4.16.8 SMR Placement Rules
- 4.16.9 Client Shelf Placement Rules
- 4.16.10 Y-Cable Placement Rules

4.16.1 General Placement Rules

The following general rules apply to rack filling:

- CTP provisions the shelves in the rack from the top in the following order:

    1. PDP

    2. Ethernet switch shelf

    3. EAP shelf (fan out)

    4. Y-cable shelves (FlexLayer or Y-cable FMT)

    5. Band Combiner/Interleaver-deinterleaver FlexLayer shelf

    6. DCU shelves

    7. Patch-panel L shelves (PP-64-LC and FMT-32-Ch)

    8. 15216 40-Channel Mux/Demux unit

    9. Air ramp (only for ETSI M12 shelves)

    10. MSTP optical shelves

    11. Air ramp (only for ANSI and ETSI M12 shelves)

    12. Fiber storage shelf

    13. Patch-panel shelves (for ETSI)

    14. PP-MESH-4/PP-MESH-8

    15. Transponder shelves (Present)

    16. Line card shelves (Present)

    17. Transponder shelves (Forecast)

    18. Line card shelves (Forecast)

- If the Populate Shelves From Bottom check box is checked in the Layout area of Site properties, CTP provisions the shelves of the rack from the bottom. The shelves are arranged in the rack from top to bottom in the following order:

    1. PDP

    2. Line card shelves (Forecast)

    3. Transponder shelves (Forecast)

    4. Line card shelves (Present)

    5. Transponder shelves (Present)

    6. PP-MESH-4/PP-MESH-8

    7. Patch-panel shelves (for ETSI)

    8. Air ramp (only for ETSI M12 shelves)

    9. MSTP optical shelves

    10. Air ramp (only for ANSI/ETSI M12 shelves)

    11. Fiber storage shelf

    12. 15216 40-Channel Mux/Demux unit

13. DCU shelves

14. Patch-panel L shelves (PP-64-LC and FMT-32-Ch)

15. Band Combiner/Interleaver-deinterleaver FlexLayer shelf

16. Y-cable shelves (FlexLayer or Y-cable FMT)

17. EAP shelf (fan out)

18. Ethernet switch shelf

- External switch shelf can be placed anywhere in any rack.

- The shelves from the DCU to the fiber storage unit are related to the optical shelf and must be used for every optical shelf.

- You cannot force the TDCU units in both Raman and post amplifier positions.

- The Power Distribution Panel (PDP) is always at the top of each rack and it is assumed to be a part of the rack.

- CTP places the MSTP optical shelf in the first available (layout unlocked) shelf position, starting from the first rack of the site or from the first rack of each side (for sites with site protection).

- CTP places as many shelves as possible within a rack, taking into account the height of the racks and the height of each shelf as shown in the following table:

Height	Rack/Shelf
2000 mm	- ANSI rack - ETSI rack
44.75 mm (1 RU for ANSI)	- DCU (ANSI) shelf - 15454-PP-64-LC PATCH-PANEL (ANSI) shelf (4.7/5.0 patch panel) - 15216-MD-40-ODD - Fiber storage (ANSI) shelf - PDP (ANSI) shelf - Air ramp (ANSI) shelf - FlexLayer shelf - Ethernet switch - Ethernet Adapter Panel (EAP) shelf (fan out)
89.50 mm (2 RU for ANSI)	- 15454-PP2-64-LC PATCH-PANEL (ANSI) shelf - 15454-YCBL-LC (ANSI) shelf - 15454-80 LC-PC-II (PATCH-PANEL ANSI) - PP-MESH-4 (MESH PATCH-PANEL ANSI) - PP-MESH-8 (MESH PATCH-PANEL ANSI)

Height	Rack/Shelf
50 mm (1 RU for ETSI)	• DCU (ETSI) shelf • 15454-PP-64-LC PATCH-PANEL (ETSI) shelf (4.7/5.0 patch panel) • 15216-MD-40-ODD • Fiber storage (ETSI) shelf • PDP (ETSI) shelf • Air ramp (ETSI) shelf • FlexLayer shelf • Ethernet switch • Ethernet Adapter Panel (EAP) shelf (fan out)
100 mm (2 RU for ETSI)	• 15454-PP2-64-LC PATCH-PANEL (ETSI) shelf • 15454-YCBL-LC (ETSI) shelf • 15454-80 LC-PC-II (PATCH-PANEL ETSI) • PP-MESH-4 (MESH PATCH-PANEL ETSI) • PP-MESH-8 (MESH PATCH-PANEL ETSI)
407 mm	Card chassis ANSI (MSTP and transponder) shelf
617 mm	Card chassis ETSI (MSTP and transponder) shelf
254 mm (6 RU)	M6 shelf
89.50 mm (2 RU)	M2 shelf

4.16.2 M2 and M6 Placement Rules

The following rules apply to M2 and M6 chassis placement:

- CTP places one M6 chassis on top of another M6 chassis without any air ramp.

- CTP does not allow an M2 chassis in an MSM configuration. If you force an M2 chassis in an MSM configuration, an error message is displayed.

4.16.3 DCU Placement Rules

The following rules apply to DCU placement:

- CTP places the DCU shelves and DCU units on top of each MSTP optical shelf connected to the entering fiber of the span (or spans) to be compensated.

- If no room is available within the recommended space (for example, during an upgrade), then CTP places the DCU shelves and units in any of the other racks, starting preferably in the same rack as the MSTP optical shelf.

- CTP computes the DCU patchcord length with respect to the preamplifier position, using the same rules as the ones defined for TXP/MXP units.

4.16.4 Fiber Storage Placement Rules

The following rules apply to fiber storage placement:

- If the fiber storage option is flagged as ON/AUTO, CTP places one fiber storage shelf below each MSTP optical shelf.

- If MSTP optical shelves are in different racks, CTP places a fiber storage shelf in each rack with an MSTP optical shelf.

4.16.5 Air Ramp Placement Rules

The following rules apply to air ramp placement:

- An ANSI shelf must always have another ANSI shelf, an air ramp, or an empty space at the bottom of it.

- An ETSI shelf must always have one air ramp on top of it and one air ramp or an empty space at the bottom of it.

- Air ramp is not required on top of the ETSI shelf if the ETSI shelf is placed directly below the PDP in the rack.

CTP automatically adjusts the air ramp placement when changes occur in the layout options.

4.16.6 Patch Panel Placement Rules

The following rules apply to patch panel placement:

- If you choose 15454-PP-64-LC, 15454-PP2-64-LC, or 15454-80-LC-PP-II patch panel, CTP deploys one patch panel for each side in the site.

  For example:

  - For a C-band /Odd channel terminal equipped with 32-Mux/Demux units: one patch panel shelf

  - For a C-band /Odd channel full-OADM: two patch-panel shelves.

    CTP places the two patch panel shelves together in the same rack when site protection is disabled and places them in two separate racks when site protection is enabled.

- CTP places the patch panel shelves together on top of the OTS main shelf (under the DCU).

- If the length of the MPO does not allow the patch panels to be together on top of the OTS main shelf (under the DCU shelves), then CTP places the patch panel shelves according to the following rules:

  - ETSI (without node protection)

    If the OTS units in both sides can be hosted within one shelf, then the layout is as shown in Figure 4-13.

Figure 4-13   ***Patch-Panel Placement for ETSI Without Node Protection***
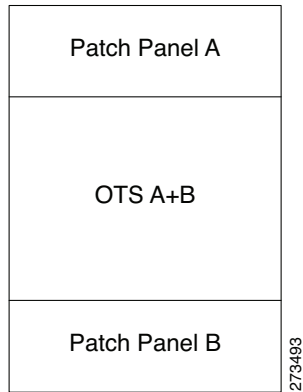
  – ANSI and ETSI (without node protection)

  If the OTS units on both sides cannot be hosted within one shelf, then the layout is as shown in
  Figure 4-14.

Figure 4-14   ***Patch-Panel Placement for ANSI and ETSI Without Node Protection***
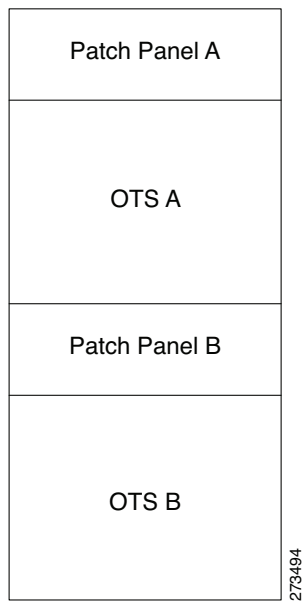
  – ANSI and ETSI 3-N degree

  For ANSI and ETSI 3-N degree, the layout is as shown in Figure 4-15.

Figure 4-15   Patch-Panel Placement for ANSI and ETSI 3-N Degree
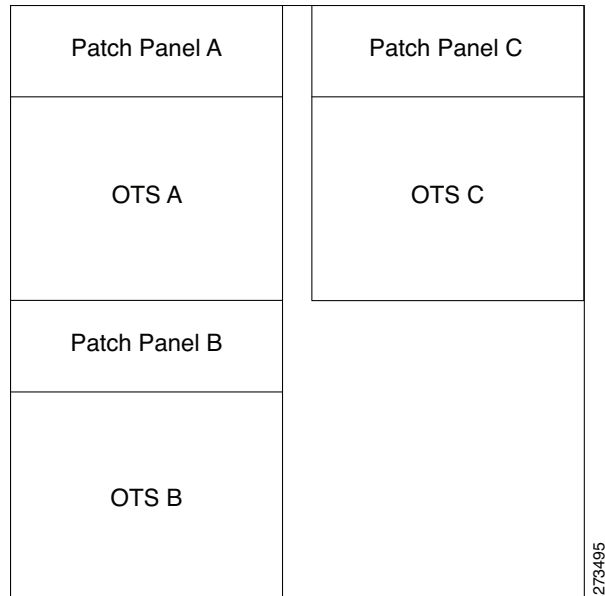
- Side occupying more than one shelf—ANSI

    For a side occupying more than one shelf (ANSI), the layout is as shown in Figure 4-16.

Figure 4-16   Patch-Panel Placement—Side Occupying More than One Shelf (ANSI)
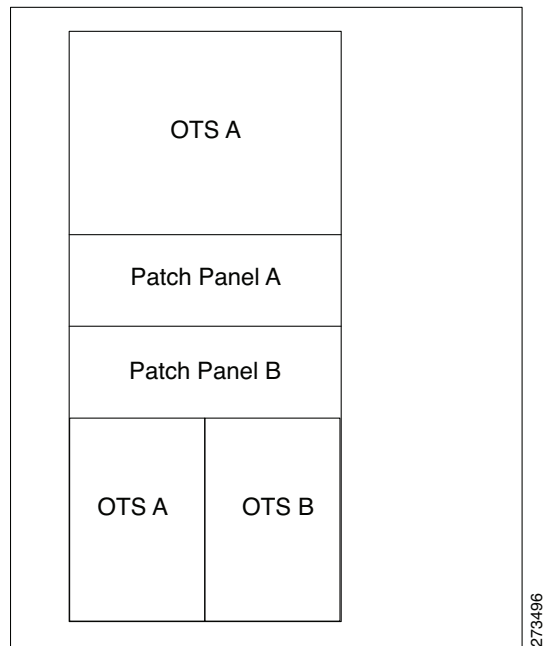
- Side occupying more than one shelf—ETSI

    For a side occupying more than one shelf (ETSI), the layout is as shown in Figure 4-17.

Figure 4-17   Patch-Panel Placement—Side Occupying More than One Shelf (ETSI)
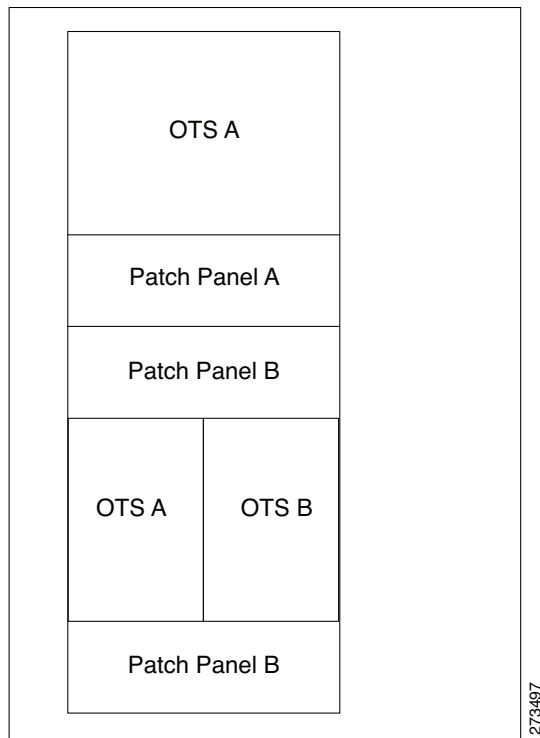
- If the OTS optical units cannot fit in one MSTP optical shelf, then CTP hosts the cards that are connected to the patch panel through MPO cables in the same shelf and places the patch-panel shelf on top of it.

4.16.7 15216-MD-40-ODD/EVEN, 15216-EF-40-ODD/EVEN, and 15216-MD-48-ODD/EVEN Unit Placement Rules

The following rules apply to ONS 15216 40-channel and 48-channel mux/demux units:

- CTP occupies the shelves in the rack from the top, adding the 15216-EF-40-ODD/15216-MD-40-ODD unit as close as possible to the shelf that contains the SMR cards.

    Note   The SMR card refers to both the 40-SMR1-C and 40-SMR2-C cards.

- CTP automatically selects the 15216-EF-40-ODD as the add/drop units for SMR card configurations.

- You can move the 15216-EF-40-ODD/15216-MD-40-ODD unit to other shelves. However, a warning message is displayed suggesting that you place the 15216-MD-40-ODD unit as close as possible to the shelf that contains the SMR cards.

- You can manually force the 15216-EF-40-ODD/15216-MD-40-ODD unit with the 15216 FlexLayer modules (15216 FLB-2, FLA-8, FLD-4, FLD-9, CS-4).

- If you try to manually force the 15216-EF-40-ODD/15216-MD-40-ODD unit into the WSS site types, an error message is displayed.

- The 15216-MD-ID-50 units are replaced by the 15216-MD-48-CM units when the network is unlocked after an upgrade.

- To achieve network optimization, CTP applies the following placement rules based on the maximum channel requirements as defined by the optical subnet design rule. For more information about optical subnet design, see the "2.4 Creating an Optical Subnet" section on page 2-14.

  - If the maximum channel count is less than or equal to 40, a 15216-EF-40-ODD or 15216-MD-40-ODD unit is placed.

  - If the maximum channel count is greater than 40 and the traffic has:

    Only odd wavelengths, then the 15216-EF-40-ODD/15216-MD-40-ODD and MD-48-CM units are placed.

    Only even wavelengths, then the 15216-EF-40-EVEN or 15216-MD-40-EVEN and MD-48-CM units are placed.

    Both odd and even wavelengths, then the 15216-EF-40-ODD/15216-MD-40-ODD, 15216-EF-40-EVEN/15216-MD-40-EVEN, and MD-48-CM units are placed.

These placement rules are also applicable to the traffic being dropped at omnidirectional sides. For more information about the omnidirectional functionality, see the "2.7.2 Understanding Omnidirectional Functionality" section on page 2-19.

Note   By default, the 15216-EF-40-ODD/15216-MD-40-ODD and 15216-EF-40-EVEN/15216-MD-40-EVEN units are used when colored omnidirectional sides are configured with the 80-WXC-C card; whereas the 40-MUX-C and 40-DMX-C cards are used by default to configure colored omnidirectional sides with the 40-WXC-C card.

- The 15216-MD-48-ODD and 15216-MD-48-EVEN units are allowed only in 48 or 96 channel hybrid networks.

- OPT-EDFA-17 or OPT-EDFA-24 units are automatically placed when the 15216-MD-48-ODD and 15216-MD-48-EVEN units are selected. If you manually force any other type of amplifier, an error message is displayed.

- The default interleaver-deinterleaver used is the MD-48-CM unit.

4.16.8 SMR Placement Rules

Following are the placement rules for SMR:

Note   SMR refers to both SMR-1 and SMR-2 cards.

- If 15216 40-channel mux/demux units are associated with SMR, they must be placed in the same rack.

- The patch panel used for SMR-2 (SMR PP MESH 4) must be placed above the shelf where the SMR is placed.

- Forced OTS cards (like AMP, BST) are placed first, followed by SMR.

- For a line site, SMR of the first side must be placed left in the shelf and that of the next side must be placed right.
- In the upgrade scenario, if 15216 40-channel mux/demux units are associated with SMR, they must be placed in the same rack, even if there are free slots in the existing shelves. Movement of SMR card to another shelf or rack displays a warning message.

4.16.9 Client Shelf Placement Rules

The following rules apply to client shelf placement:

- Node protection as same shelf:

  CTP places the client shelves from the first rack in an optimized manner.

- Node protection as separated shelves:

  CTP places the client shelves, with unprotected or 1+1 protected cards, with their respective OTS racks. See Figure 4-18.

Figure 4-18   *Client Shelf Placement-Node protection as Separated Shelves*

OTS A	Unprotected A	OTS B
Unprotected A		Unprotected B
Unprotected A		Unprotected B
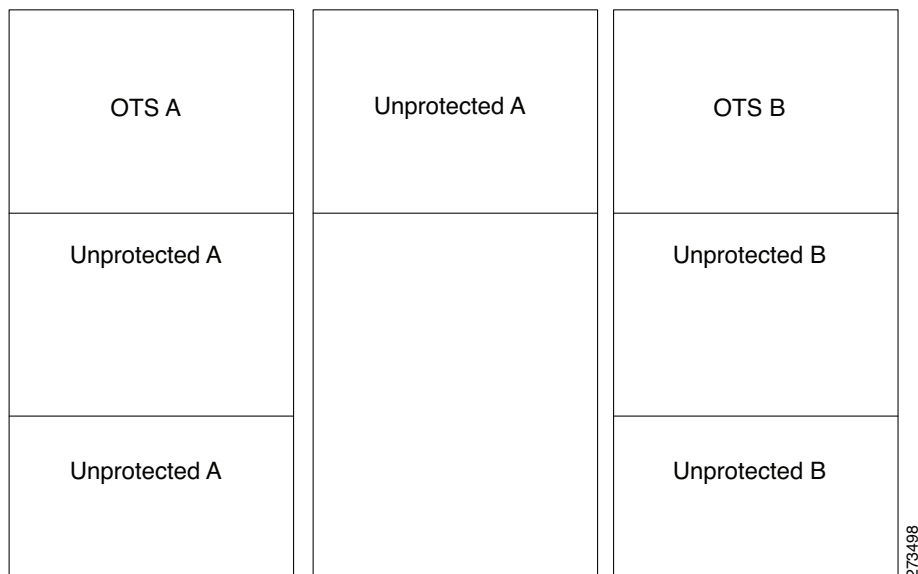
- CTP places the client shelves, filled with protection and aggregated demands, from the first rack in an optimized manner. CTP places these shelves after placing the unprotected or 1+1 protected shelves. CTP places the remaining client shelves, after filling the last OTS side rack, in new racks placed after the last OTS side rack. See Figure 4-19.

Figure 4-19   Client Shelf Placement-Protection and Aggregated Demand

OTS A	Unprotected A	OTS B	Y-Cable
Unprotected A	Y-Cable	Unprotected B	Aggregated Demands
Unprotected A	Aggregated Demands	Unprotected B	

273499

4.16.10 Y-Cable Placement Rules

The following rules apply to Y-cable placement:

- CTP numbers each Y-cable protection module within the Y-cable protection shelf with progressive numbers (1 to n).

- The required number of Y-cable protection modules depends on the number of client ports (on transponders and muxponders) implementing the Y-cable protection within the racks in the site.

- Each Y-cable protection module can only connect transponders within the same rack.

- The shelf containing the Y-cable protection modules can be partially full.

- CTP uses single-mode or multimode Y-cable protection modules depending on the client interface on the transponder implementing the Y-cable protection.

- If a rack cannot physically hold all the Y-cable protection modules required to manage the Y-cable protected transponders, then CTP moves one client shelf (for example, the bottom shelf) to the next rack. If the moved shelf contains Y-cable protected transponders, then CTP moves the related Y-cable protection modules together.

- CTP shifts the shelf if (as mentioned in the previous item) no space is available within the rack to hold the shelves and the Y-cable protection modules required to support both present and future traffic demands.

- A Y-cable protection FlexLayer module (supporting two different Y-cable protection groups) in a rack could be partially unused even if additional shelves equipped with transponders are deployed in a rack that follows in the site.

4.17 Shelf Rules

This section includes the following rules:

4.17.1 General Shelf Placement Rules

The following subsections list the general rules for and constraints on card slot placement.

4.17.1.1 Card Slots

Each unit represented in the layout includes the slot occupancy provided in the following lists for one-slot and two-slot units.

- One-slot units:
  - Blank
  - AIC
  - TCC3 or TCC2P
  - T-DCU Fine
  - T-DCU Coarse
  - OSCM, OSC-CSM
  - AD-1C, AD-2C, AD-4C
  - AD-1B, AD-4B
  - 4MD
  - OPT-PRE, OPT-BST, OPT-BST-L, OPT-BST-E
  - AMP-17-C
  - AMP-C
  - 32-DMX
  - 40-DMX-C
  - 40-DMX-E

- **–** 40-MUX-C
- **–** MMU
- **–** PSM
- **–** All the line cards
- **–** All TXP and MXP units
- **–** 10GE-XP
- **–** OTU2-XP
- **–** MS-ISC-100T
- **–** TSC
- **–** TNC
- **–** OPT-EDFA-17
- **–** OPT-EDFA-24
- **–** AR-MXP
- **–** AR-XP
- **–** 100G-ME-C
- **–** 100G-LC-C
- **–** 100G-CK-LC-C
- **–** 10X10G-LC
- **–** WSE
- **Two-slot units:**
  - **–** 32MUX-O
  - **–** 32DMX-O
  - **–** 32-WSS
  - **–** 40-WXC
  - **–** 80-WXC-C
  - **–** 40-WSS-C
  - **–** 40-WSS-E
  - **–** OPT-AMP-L
  - **–** OPT-RAMP-C
  - **–** OPT-RAMP-CE
  - **–** ADM-10G, GE-XP
  - **–** 40G CP-DQPSK MXP
  - **–** 40G CP-DQPSK ME MXP
  - **–** 40G CP-DQPSK TXP
  - **–** 40G CP-DQPSK ME TXP
  - **–** CFP-LC
- **FlexLayer module**
  - **–** C/L Band Combiner

- 15216 modules
    - FLB-2
    - FLA-8
    - FLD-4
    - FLD-9
    - SC-4B
    - MD-40-ODD
    - MD-40-EVEN
    - EF-40-ODD
    - EF-40-EVEN
    - MD-48-ODD
    - MD-48-EVEN
- DCU module
    - A DCU module takes half of the DCU shelf space.

4.17.1.2 Card Slot Constraints

- TCC units are placed in slots 7 or 11 of the M12 chassis. The Generated layout always places both working and standby TCC unit on each shelf.
- AIC units are placed in slot 9 of the M12 chassis.
- OSCM units are placed only in slots 8 or 10 of the M12 chassis.
- MS-ISC-100T units are placed in slots 6 and 12 of the M12 chassis.
- 2.5G and 10G line cards only are placed in slots 5, 6, 12, and 13 of the M12 chassis.
- TSC or TNC cards are placed in slots 1 and 8 of the M6 chassis.
- TSC or TNC card is placed in slot 1 of the M2 chassis.
- OSCM card is replaced with a TNC card when an OSCM card is selected and the chassis type is forced as M2 or M6 (if M2 or M6 chassis placement will not optimize the layout unless it is forced).
- TSC cards are placed as controller cards for the additional M2 or M6 chassis.
- For OSMINE compliance, the CTP does not place any card (if there is no booster placed by algorithm for that side) in slot 2 or in slot 16. CTP places a blank faceplate in slot 2 and 16. If the OTS side contains booster card, it is placed in slot 2 or slot 16.
- T-DCU units are placed in slots 1 to 6 and 12 to 17 of the M12 chassis.
- RAMAN-CTP and RAMAN-COP units as a pair in either of the adjacent slots 2 and 3, 4 and 5, or 6 and 7 of the M6 chassis.
- Standalone 100G-LC-C, 100G-CK-LC-C, 100G-ME-C, and 10X10G-LC cards are placed in slots 2 and 3 of the M2 chassis or in slots 2, 3, 4, 5, 6, and 7 of the M6 chassis.
- WSE cards are placed in slots 2 and 3 of the M2 chassis or in slots 2, 3, 4, 5, 6, and 7 of the M6 chassis.
- CFP-LC cards are placed in slots 3 and 5 of the M6 chassis.
- 10X10G-LC and 100G-LC-C or 100G-ME-C units are placed as a pair in either of the adjacent slots 2 and 3, 4 and 5, or 6 and 7 of the M6 chassis.

- CFP-LC and 100G-LC-C or 100G-ME-C units are placed as a pair in either of the adjacent slots 3 and 2, 5 and 4, or 7 and 6 of the M6 chassis.

- 10X10G-LC and 100G-CK-LC-C or 100G-ME-C units are placed as a pair in either of the adjacent slots 2 and 3, 4 and 5, or 6 and 7 of the M6 chassis.

- CFP-LC and 100G-CK-LC-C or 100G-ME-C units are placed as a pair in either of the adjacent slots 3 and 2, 5 and 4, or 7 and 6 of the M6 chassis.

Note CTP allows a double slot card movement when the destination has a blank faceplate followed with a single slot card or the destination is a single slot card followed by a blank card.

4.17.2 Multishelf Placement Rules

- Multishelf site aggregate some of shelves that do not hold XC units.

- CTP creates the layout even if the MSTP equipment (for example, OTS and TXP/MXP units, but not ITU line cards) in a site is to be deployed on more than the available number of MSTP shelves. In this case CTP generates the error message, "Generated layout exceeded the maximum number of shelves in a multishelf site".

- The MSTP and MSPP (line card) shelves can be placed on the same rack even if MSPP shelves cannot be part of the multishelf management.

- By default, CTP designates the OTS optical shelf in rack number 1 as the Node Controller (NC).

- The software running on the node assigns a shelf number when a subtended shelf is registered to the NC. You can assign any of the available numbers in the allowed range [1 to 8]. The numbers do not have to be consecutive.

- The maximum number of shelves in a multishelf configuration are:
  - 8 when using a multishelf integrated switch
  - 12 when using a multishelf external switch

The following subsections list the placement rules for different types of multishelf configurations.

4.17.2.1 Auto

When the Shelf Management parameter is set to Auto:

- If the node controller is an M6, external switch is placed when:
  Total number of shelves > (2 * M6) + 1
  where
  M6 = Number of Cisco ONS 15454 M6 shelves

  The number of external switches placed depend on the number of shelves exceeding the value (2 * M6) + 1.

- If the node controller is an M12, external switch is placed by default.

  CTP adds additional external switches when:
  Total number of shelves > (total number of shelves subtended by the first switch) + (M6 * 2)

4.17.2.2 Multishelf Integrated Switch

When the Shelf Management parameter is set to Multi Shelf Integrated:

- The LAN architecture of different MSTP shelves is implemented using the Cisco ONS 15454 MS-ISC-100T cards.

- To cope with TCC redundancy and to guarantee multishelf LAN reliability, the Cisco ONS 15454 MS-ISC-100T cards are redundant (connected to both the active and standby TCC units).

- CTP places both the Cisco ONS 15454 MS-ISC-100T cards in the node controller shelf.

- CTP places the Cisco ONS 15454 MS-ISC-100T cards in slots 6 and 12.

- If the node controller is an M6:

    - CTP does not place an external switch.

    - Total shelves that can be subtended = (M6 * 2) + 1.

- If the node controller is an M12:

    - CTP does not place an external switch.

    - CTP places Cisco ONS 15454 MS-ISC-100T card on the node controller chassis.

    - Total shelves that can be subtended = (M6 * 2) + 8.

4.17.2.3 Multishelf External Switch

When the Shelf Management parameter is set to Multi Shelf External:

- The LAN architecture of different MSTP shelves is implemented using Catalyst 2950G-24-EI-DC units.

- To cope with TCC redundancy and to guarantee multishelf LAN reliability, Catalyst 2950G-24-EI-DC units are redundant (connected to both the active and standby TCC units).

- CTP places both Catalyst 2950G-24-EI-DC units on the same rack of the Node Controller (NC) shelf.

- If the node controller is an M6:

    - The Multi Shelf External Switch is placed in the layout irrespective of the node controller.

    - Additional external switches are placed when
      Total number of shelves > (total number of shelves subtended by the first switch) + (M6 * 2)

- If the node controller is an M12:

    - External switch is placed by default.

    - Additional external switches are placed when
      Total number of shelves > (total number of shelves subtended by the first switch) + (M6 * 2)

4.17.2.4 Shelf Management in Upgraded or Release-Upgraded Network

The following rules apply for Shelf Management on upgraded or release-upgraded network with layout in locked state:

- When the Shelf Management configuration type is Auto:

    - If the M12 chassis is the node controller and the MS-ISC card is placed in the layout—On upgrading the network if the layout cannot accommodate all the subtended shelves added, then the Multi Shelf External Switch (Cisco Catalyst 3650) is placed in the layout.

- If M6 chassis is the node controller and there is no Multi Shelf External Switch placed—On upgrading the network if the number of the M6 chassis cannot support all the shelves, then the Multi Shelf External Switch is placed in the layout.

- When the Shelf Management configuration type is Multi Shelf Integrated:

  - If M12 chassis is the node controller and the MS-ISC cards are placed in the layout—On upgrading the network if the layout cannot accommodate all the subtended shelves, then CTP displays an error message.

  - If M6 chassis is the node controller—On upgrading the network if the M6 chassis cannot support all the subtended shelves, then CTP displays an error message.

- When the Shelf Management configuration type is Multi Shelf External Switch:

  - If the Cisco Catalyst 2950 is placed in the base network—On upgrading the network if the Cisco Catalyst 2950 cannot subtend all the shelves, then the Cisco Catalyst 3650 is placed in addition to the Cisco Catalyst 2950 in the layout.

4.17.2.5 Multishelf Separate Shelves

CTP orders the racks by first placing all the units facing one side and then all the other units facing the other side.

4.17.2.6 Multishelf Separate Nodes

- If the site functionality is not ROADM or OADM, CTP displays the following warning message at the end of the network analysis:

  "Separate nodes are allowed on ROADM/OADM sites only and cannot be applied to Site 'x'"

- If the site functionality is ROADM or OADM, CTP orders the rack by first placing all the units facing one side and then all the other units facing the other side.

- For OIC nodes with multishelf configuration, all the sides are placed in the layout in an optimized manner (like OXC). The entire site is considered as one Network Element. Two MSISC cards or two CAT switches are used in this configuration.

- For OIC node with individual shelf configuration, each degree is considered as one Network Element and each side is placed in separate racks and shelves. MSISC cards or CAT switches are not used in this configuration.

4.17.3 M2 and M6 Shelf Placement Rules

- CTP places OSC-CSM card in an M6 shelf when the M6 shelf is used as an OSC regenerator site.

- CTP chooses the following:

  - TNC card as the node controller for an M6 shelf

  - TNC card for OTS shelves

  - TSC card if OSC card is not required

  - TSC card for all the client shelves

  - TSC card for sites with DCN extension

  - TSC card as the node controller if OSC-CSM card is required

- CTP does not support a combination of TSC and TNC cards in an M6 shelf

- CTP does not support the following cards on an M6 shelf:
  - AIC
  - AIC-I
  - OSCM
  - ISC

> ✎
>
> **Note**   CTP does not allow the use of M2 chassis in an MSM configuration.

- CTP places a maximum of four 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, WSE, or 10X10G-LC cards on an M6 shelf with an AC power supply. This limitation does not apply to an M6 shelf with AC2 power, DC power and DC20 power supply.

- CTP places only one 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, WSE, or 10X10G-LC card on an M2 shelf with AC power supply. This limitation does not apply to an M2 shelf with DC power and DC20 power supply.

- CTP places a normal layout when the Bay Layout option is forced with a 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, WSE, or CFP-LC card.

4.17.4 Alien Shelf Placement Rules

Following are the placement rules for alien shelves:

- Alien shelves are added to the rack after all the other shelves are added.

  They are added to the first available rack with free space equal to or greater than the alien shelf height.

- All the alien shelves in a site must have the same height and name.

- Different sites can have different alien shelf height and name.

- Height of the alien shelf should be less than that of the rack height.

- Number of alien shelves can vary based on the alien shelf height. Maximum number of alien shelves that can be added is 600, if the alien shelf height is 1 Rack Unit (RU) and there are no other shelves.

- Product-IDs are not assigned to the alien shelves.

- Alien shelves are not be added to the BoM.

4.17.5 OTS Unit Placement Rules

This section includes the following topics:

4.17.5.1 Shelf Placement Rules

The following subsections provide the placement rules for the different types of shelf configurations.

- CTP places the sides in alphabetical order in the shelves. This order is broken only for the purpose of optimisation.

For example, if sides A and C takes exactly half the shelf and B takes more than half, then the A and B sides do not go in the same shelf. CTP places A and C in the same shelf for the purpose of optimization and places B in the next shelf.

- CTP places the optical units within the OTS optical shelves by following the optical signal flow. However, for OSMINE designs, CTP places the MMU unit last to keep 32-WSS/Mux units adjacent to 32-Demux units.

  For example: Booster or OSC-CSM->Preamplifier->WXC->WSS or Mux ->Demux or A/D filters

  To optimize slot occupancy, this order can be changed (for example, Demux before WSS when a single slot is free in the left side).

- If the OPT-RAMP-C or the OPT-RAMP-CE unit is present, it must fill the outer slots (1 to 2 or 16 to 17).

- CTP places the TDC units (TDCU- FC and TDCU-CC) in slots 1 to 6 and 12 to 17.

Individual Shelf

- All OTS optical units (except for TXP/MXP or line card) reside in one shelf.

- CTP places TXP/MXP (or ITU line card depending on the hybrid parameter setting) units in the free slots in the OTS optical shelf.

- If all the OTS units cannot be placed within the OTS shelf, then CTP generates the following error message:

  "Layout not feasible for {0} Individual Shelf configuration - No room in the optical shelf to host all the OTS units".

Individual Shelf and Multishelf (Same Shelf)

- CTP places the optical units facing side A on the left side of the shelf and the optical units facing side B on the right side of the shelf.

- If one side of the shelf is full but more units (for example, add/drop filters) need to be placed within the shelf, then CTP uses the empty slots on the other side.

Individual Shelf and Multishelf (Both Same Shelf and Separate Shelves)

- For line sites, CTP places the OSC unit, the preamplifier, and the booster units facing side A on the left side of the shelf and places the OSC unit, the preamplifier, and the booster units facing side B on the right side of the shelf.

  The same placement applies for multidegree sites if both A and B units fit into one shelf (a half shelf for A and a half shelf for B).

- If a side requires more than a half shelf, CTP places the units from left to right.

Multishelf Same Shelf

- CTP places all the OTS optical units apart from a 4MD unit in a single OTS optical shelf.

- CTP places the additional 4MD unit that could not be placed within the first shelf in the second shelf.

Multishelf Separate Shelves

- CTP places all MSTP units facing one side and all MSTP units facing other side in separate racks.

- CTP places all optical units facing one side in a single OTS optical shelf.

- For terminal and line sites, CTP places units facing one side from left to right and the units facing the other side from right to left

- Shelf numbers are assigned in the following order:
    - Increasing number to all OTS shelves, from the first side to the last side.
    - Increasing number to all client shelves, from the first side to the last side.

4.17.5.2 PSM Card Placement Rules

- With OCH protection, CTP places PSM cards anywhere in the service slots but preferably next to the related TXP/MXP unit.

- With line protection, CTP places PSM cards before any other card in the slots 1 or 17.

- With section protection, CTP places PSM card next to the PRE.

4.17.6 Cisco ONS 15216 FlexLayer Unit Placement Rules

These are the Cisco ONS 15216 FlexLayer unit placement rules:

- CTP places the FLB-2, FLA-8, FLD-4, FLD-9, and Cisco ONS 15216-MD-40-ODD units in FlexLayer shelves.

- The FLD-4 units are placed on the rack along with the other units specific to that side.

- The FLA-2 and FLA-8 add/drop units are placed next to each other.

- The Cisco ONS 15216 shelf accommodates four cards. The cards cannot be moved within the shelf or across the shelves.

- CTP places the FLD-4 units in all the four slots in the sequence—Top-Left, Bottom-Left, Top-Right, and Bottom-Right.

- CTP does not place the FLD-4 units automatically. The FLD-4 units have to be forced by configuring the OADM Forcing property on each side of the node.

- CTP places FLD-9 optical insulators in the two 1 RU slots, starting first with the left slots and then the right slots.

- If the Cisco ONS 15216-MD-40-ODD unit is used, CTP places the Cisco ONS 15216 shelf near the Cisco ONS 15216-MD-40-ODD shelf.

- If the EAD colorless ports of the 80-WXC-C cards are configured as demux units and protected by optical insulators, CTP places the FlexLayer shelf as close to the 80-WXC-C demux units, immediately after any required air ramp.

4.17.7 Controller Cards Placement Rules

These are the controller card placement rules for an M12 shelf.

- By default, CTP places TCC3 controller cards when an unlocked network is analyzed.

- If a locked network is analyzed, any existing TCC2P card is not replaced with a TCC3 card.

- TCC3 cards are placed in any new M12 chassis being added in a locked network. No changes are made to the existing M12 chassis with TCC2P controller card.

4.17.8 Client Cards Placement Rules

This section consists of the following topics:

- 4.17.8.1 Node Placement Rules
- 4.17.8.2 Manual Regeneration Rules
- 4.17.8.3 OTU2_XP Card Placement Rules
- 4.17.8.4 AR-MXP and AR-XP Card Placement Rules
- 4.17.8.5 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC Cards Card Placement Rules
- 4.17.8.6 TXP/MXP and ITU Line Card Placement Rules
- 4.17.8.7 Transponder and Muxponder Card Placement Rules

4.17.8.1 Node Placement Rules

The following subsections provide the placement rules for different types of node configurations.

Non-Multidegree Node

CTP places the side A card in the left half of the shelf and the side B card in the right half of the shelf.

Multidegree Node

CTP places the client cards from the available space in the left half of the shelf and then in the right half of the shelf.

Node Protection as Same Shelf

CTP places the client cards from the first available shelf in an optimized manner.

Node Protection as Separate Shelves:

CTP places the unprotected and 1+1 protected client cards in respective OTS racks. CTP places all the unprotected and 1+1 protected client cards before placing the next OTS side cards.

CTP places the protection and aggregated cards after placing all the OTS, unprotected, and 1+1 protection cards. The protection and aggregated cards do not follow any specific placement rule. So CTP places them in the available space in the OTS shelf, then in existing client shelves (unprotected and 1+1 shelves), and then in new client shelves.

4.17.8.2 Manual Regeneration Rules

The following subsection provide the placement rules for manual regeneration.

- CTP places a pair of back-to-back transponders in the same shelf whenever possible. However, CTP does not add an additional shelf so that the transponder/muxponder pair of units can be in the same shelf.
- With node protection as separate shelves, the two cards can be placed in their respective OTS side racks, but if free space is available in the other side of the OTS rack, the cards are placed there first before a new shelf is created.

4.17.8.3 OTU2_XP Card Placement Rules

The following subsection provide the placement rules for OTU2_XP card.

Transponder Mode

- If the card is used in transponder mode and if both trunk have the same side, then CTP places the card in the same side of the OTS rack.

- If the trunks have two different sides, then CTP places the card in any available space in an optimized manner.

Regen Mode

With separate shelves, the trunks are connected to two different sides, so they will always be placed in available space in an optimized manner.

Mixed Mode

For cards that have TXP and Regen mode in two different trunks, CTP follows the rules for the mode with the more-specific rules and places the cards in an optimized manner.

Splitter

Because this feature is the same as fiber switched, CTP follows the rules for fiber-switched cards placed in any available space in an optimized manner.

Y-cable

The existing Y-cable client card placement rules are followed. The pair is placed in the same shelf.

4.17.8.4 AR-MXP and AR-XP Card Placement Rules

The following subsections provide the placement rules for AR-MXP and AR-XP cards.

TXP_MR, TXPP_MR, MXP_MR, MXPP_MR, MXP_DME, MXPP_DME, MXP-4x2.5-10G, and MXPP-4x2.5-10G Card Modes

- If the card is used in transponder mode and if both trunks have the same side, then CTP places the card in the same side of the OTS rack.

- If the trunks have two different sides, then CTP places the card in any available space in an optimized manner.

- If the trunks have only one side, CTP places the card where the side is assigned.

RGN_10G Mode

With separate shelves, the trunks are connected to two different sides, so they are placed in any available space in an optimized manner.

Splitter

Because this feature is the same as fiber-switched, CTP follows the rules for fiber-switched cards placed in any available space in an optimized manner.

Y-cable

The existing Y-cable client card placement rules are followed. The pair is placed in the same shelf.

4.17.8.5 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC Cards Card Placement Rules

Table 4-7 summarizes the card placement rules for 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC cards.

Table 4-7   Card Placement Rules for 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC Cards

Card	Operational Mode	Peer Card	Valid Card Slot	Valid Peer Card Slot
100G-LC-C	TXP-100G (Standalone 100GE Transponder)	—	M2—Slots 2 and 3 M6—Slots 2 to 7	—
	RGN-100G (100G Regenerator)	100G-LC-C	M2—Slot-2 M2—Slot-3 M6—Slot-2 M6—Slot-3 M6—Slot-4 M6—Slot-5 M6—Slot-6 M6—Slot-7	M2—Slot-3 M2—Slot-2 M6—Slot-3 M6—Slot-2 M6—Slot-5 M6—Slot-4 M6—Slot-7 M6—Slot-6
100G-CK-LC-C	TXP-100G (Standalone 100GE Transponder)	—	M2—Slots 2 and 3 M6—Slots 2 to 7	—
	RGN-100G (100G Regenerator)	100G-LC-C or 100G-CK-LC-C	M2—Slot-2 M2—Slot-3 M6—Slot-2 M6—Slot-3 M6—Slot-4 M6—Slot-5 M6—Slot-6 M6—Slot-7	M2—Slot-3 M2—Slot-2 M6—Slot-3 M6—Slot-2 M6—Slot-5 M6—Slot-4 M6—Slot-7 M6—Slot-6
10x10G-LC	MXP-10x10G (10x10G Muxponder)	100G-LC-C	M6—Slot-2 M6—Slot-3 M6—Slot-4 M6—Slot-5 M6—Slot-6 M6—Slot-7	M6—Slot-3 M6—Slot-2 M6—Slot-5 M6—Slot-4 M6—Slot-7 M6—Slot-6
	RGN-10G (5x10G Transponder)	—	M2—Slots 2 and 3 M6—Slots 2 to 7	—
	TXP-10G (5x10G Regenerator)	—	M2—Slots 2 and 3 M6—Slots 2 to 7	—
CFP-LC	2x40G Muxponder	100G-LC-C	M6—Slot-3 M6—Slot-5	M6—Slot 2 or 5 M6—Slot 4 or 7
	CFP-TXP (100G Transponder)—One port	100G-LC-C	M6—Slot-3 M6—Slot-5	M6—Slot 2 or 5 M6—Slot 4 or 7
	CFP-TXP (100G Transponder)—Two ports	Two 100G-LC-C	M6—Slot-3 M6—Slot-5	M6—Slot 2 and 5 M6—Slot 4 and 7

4.17.8.6 TXP/MXP and ITU Line Card Placement Rules

The following subsection provide the placement rules for TXP/MXP and ITU line cards.

- CTP places the TXP/MXP unit (or ITU line card for a hybrid site) by first filling the empty slots in the OTS optical shelves and then the slots in the following shelves.

- The site-protection option affects placement rules for both MSTP and MSPP units (line cards) even if MSPP shelves are not managed by the system in the multi-shelf site.

- If an MXP unit supports both protected and unprotected channels, CTP applies the rules for protected MXP channel.

- CTP places TXP/MXP units that implement fiber-switched protection in any rack in order to minimize the number of shelves.

- CTP places each of the transponders included in a fiber-switched protection site on either the left or right shelf side in order to fill the empty slots.

- By default, CTP uses side A to place Y-cable client interfaces within shelves in the racks. If the rack using side B is filled but can host *n* additional shelves, and an additional side A rack hosting only Y-cable client units has been added, then if the number of these client unit shelves is <= *n* these shelves are moved to the side B rack.

- CTP places the MSPP line cards in M12 chassis irrespective of the chassis type selected.

- With multishelf node protection, all the units facing a different side are placed in different racks (even with multidegree nodes) with the exception of units (TXP/MXP) that need to be placed in the same shelf to support required functionality (for example, Y-cable protection units or 1+1 line cards).

TXP/Line Card Placement (OSMINE Noncompliant)

- Y-cable Protection

  TXP/MXP units that are part of a Y-cable protection sites are placed within the same shelf, but the unit facing side A is preferably placed on the left side of the shelf (slots 1to 6) the unit facing side B is preferably placed on the right side of the shelf (slots 12 to 17).

- Individual Shelf and Multishelf Side A and B Same Shelf

  - 1+1 Client Protection:

    CTP places TXP/MXP units or line cards that are part of a 1+1 client protection within the same shelf, but the unit facing side A is placed on the left side of the shelf (slots 1 to 6) and the unit facing side B is placed on the right side of the shelf (slots 12 to 17).

  - Unprotected Transponder or Line Card.

    CTP places TXP/MXP units and line cards related to side A traffic in the left side of the shelf (slots 1 to 6) and the transponders and line cards related to side B traffic in the right side of the shelf (slots 12 to 17). If side A and side B have a different number of added or dropped channels, then CTP places the remaining client boards (transponder or line card) to fill remaining available slots even if they are not on the preferred side of the shelf.

- Multishelf Side A and Side B Separate Shelves

  - 1+1 Client Protection:

    -TXP/MXP

    For TXP/MXP units that are part of a 1+1 client protection site, CTP places the client unit facing side A in the shelf of the unit facing side A and the client unit facing side B in the shelf of the units facing side B.

- Line Card

For line cards that are part of a 1+1 client protection site, CTP places both units in the same shelf (the switch is done by XC). The unit facing side A is on the left side of the shelf (slots 1 to 6) the unit facing side B is on the right side of the shelf (slots 12 to 17).

– Unprotected Transponder or Line Cards

CTP places TXP/MXP units and line cards facing side A in the shelf of the appropriate rack as defined in the previous bullet item, but fills all the slots of the shelf.

TXP/Line Card Placement (OSMINE Compliant)

– 1+1, Y-cable Protected Transponder or Line Card

CTP places each transponder or line card that is involved in a Client 1+1 or Y-cable protection group in adjacent slots. In a protection group, CTP places the TXP/MXP facing side A in the left slot and the TXP/MXP facing side B in the right slot.

– Unprotected Transponder or Line Card

CTP places TXP/MXP units or line card facing side A in the shelf of the appropriate rack as defined in the previous bullet item, but fills all the slots of the shelf.

4.17.8.7 Transponder and Muxponder Card Placement Rules

- In an ADM single-card configuration with node protection as same shelf, CTP places the card in an optimized manner. CTP looks for space in all OTS shelves, then in the existing client shelves, and then creates a new shelf if needed.

- In an ADM single-card configuration with node protection as separate shelves, if the trunks use same side (for example, A,A), then CTP places the card in the respective OTS side rack. If the trunks use different sides (A,B), CTP places the card in any shelf or rack in an optimized manner.

4.17.9 Hybrid Site Layout Constraints

- For a site flagged as a Hybrid node configuration, CTP does not place either the XC or SONET/SDH units and displays the following message:

  "The generated BOM does not include SONET/SDH units."

- For a site with an individual shelf and flagged as a Hybrid Node configuration, when the resulting site type does not allow placing all the (OTS optical) units within the OTS shelf, then CTP displays the following error message:

  "Hybrid layout not feasible for <SiteX> - Resulting NE Site Type configuration xxxx (e.g. AUTO [A/D])"

- CTP does not place an ADM-10G card in a shelf with a line card even when Hybrid Site configuration is enabled.

4.17.10 DCU - Layout Constraints

- For multishelf site protection configurations, each DCU shelf containing DCU modules that compensates for the chromatic dispersion of fiber entering in one side is placed in the same rack of the MSTP optical shelf as the one holding units facing on that side.

For example, CTP places the side A DCU shelf and side A DCU units in the same rack as the one holding the MSTP optical shelf with units facing side A.

- For configurations with an individual shelf or no site protection, the CTP places the DCU shelves in the same rack as the one holding the MSTP optical shelf.

- CTP places the DCU units within the shelf as follows:

    – In general, the DCU faces side A on the left side of the DCU shelf and the DCU faces side B on the right side of the DCU shelf.

    – If two DCU units are required on one side and no DCU units are required on the other side, then CTP places both units within the same DCU shelf.

    The following examples are for various DCU shelf configuration:

    Example 1: DCU side A | DCU side B

    Example 2: DCU side A | DCU side A

    Example 3:

    Upper shelf: DCU side A | Empty

    Lower shelf: DCU side A | DCU side B

    – DCUs for side A are placed from top to bottom, from left to right.

    – DCUs for side B are placed from top to bottom, from left to right.

4.17.11 Multidegree Layout Rules

This section consists of the following topics:

- 4.17.11.1 General OTS Units Placement Rules
- 4.17.11.2 OXC Multidegree Layout Rules
- 4.17.11.3 OIC Multidegree Layout Rules

4.17.11.1 General OTS Units Placement Rules

The following subsections provide placement rules for different types of unit configurations.

- Each "half shelf" gets a different default side ID if side B holds a card that can be part of the side object (a card connected to the span).

- The software running on the node (the patch-cord manager) moves shelf by shelf from shelf ID = 1 to shelf ID = 8 and from slots 1 to 6 to slots 12 to17 (even on the right side of the shelf the order is always left to right). For each half shelf, each time the software finds a unit that is part of a side object, it automatically assigns a side ID to all the units within that half shelf (starting from side A and incrementing each ID).

- The side ID is not incremented if the patch-cord manager finds an empty half shelf or an half shelf that does not hold a card that can be part of the side object.

- The side ID is not maintained when moving cards from one shelf to another.

- If the patch-cord manager finds a user-defined (or NE update-defined) side ID, it uses the assigned label for that side. The next side encountered is labeled as user side ID +1.

- For multidegree nodes without node protection, the layout algorithm fills each half shelf with units starting from the outside to the inside of the shelf.

OTS unit placement (without node protection)

- For each side, the layout algorithm starts placing all the OTS units of one side within the first free half-shelf. If no free half shelf is found, then a new shelf is added to the layout.

- If the OTS unit of one side cannot be hosted within a half shelf, then the following cases are possible:

  – If the second half of the same shelf is empty, then the remaining units of current side are placed within the second half shelf.

  – If the second half of the shelf is not available, then this half shelf is unused for holding OTS units of this side, and all the OTS units of this side are moved to a new empty shelf. Empty half shelves can be filled with remaining OTS units of first side that can be placed within an half shelf.

- OTS units of different sides cannot be placed within the same half shelf. If half shelf is only partially filled with OTS cards, then the remaining slots are filled with client cards (transponders).

OTS unit placement (with node protection)

With node protection, a different shelf or rack must be used for each side of the unit.

Client unit placement

- If an OTS shelf or half shelf has empty slots, the layout algorithm starts filling the empty slots with client cards of that side.

- For a multishelf site without node protection, if no other client card of the OTS side is placed (due to some additional constraint such as OSMINE) within this shelf, then any other client card of any other side is placed in the empty slot.

Y-cable protected unit placement (same shelf and separated shelves):

Client pairs are deployed (both in the same shelf) using the following criteria:

  – A and B sides (A left, B right)

  – A and C sides (A left, C right)

  – B and C sides (B left, C right)

  – B and D sides (B left, D right)

  The goal is to optimize shelf occupancy, so available slots in existing shelves are used first, then new shelves are created if needed.

1+1 protected unit placement

- Same shelf:

  Client pairs are deployed (both in the same shelf) using the following criteria:

  – A and B sides (A left, B right)

  – A and C sides (A left, C right)

  – B and C sides (B left, C right)

  – B and D sides (B left, D right)

  The goal is to optimize shelf occupancy, so available slots in existing shelves are used first, then new shelves are created if needed.

- Separate shelves:

  Each client is deployed in a rack related to its own side.

The goal is to optimize shelf occupancy, so available slots in existing shelves are used first, then new shelves are created if needed.

DCU unit placement

- In a multidegree node site, CTP places the DCU units for a side within the same rack that contains the OTS unit shelf for that side.

- In an unlocked rack layout, CTP places the DCU shelves in a rack with each one above the related OTS shelf.

- In an unlocked rack layout, CTP places the DCU units to use the optimal number of DCU shelves.

- CTP places the DCU units for each side starting from the first free slot in the existing DCU shelf, and then adding a new DCU shelf when no space is available.

4.17.11.2 OXC Multidegree Layout Rules

- OXC multidegree sites are supported with multishelf only.

- The following message appears if an OXC multidegree site with single shelf is selected: "Multi Shelf management is required for OXC MultiDegree Site site name"

4.17.11.3 OIC Multidegree Layout Rules

From Release 9.1 onwards, for OIC nodes with multishelf configuration, all the sides are placed in the layout in an optimized manner (like OXC). The entire site is considered as one Network Element. Two MSISC cards or two CAT switches are used in this configuration.

For OIC node with individual shelf configuration, each degree is considered as one Network Element and each side is placed in separate racks and shelves. MSISC cards or CAT switches are not used in this configuration.

4.18 Card Rules

This section includes the following rules:

- 4.18.1 AR-MXP and AR-XP Card Constraints
- 4.18.2 AR-MXP and AR-XP Card Operational Modes
- 4.18.3 AR-MXP and AR-XP Card Client-Payloads
- 4.18.4 AR-MXP and AR-XP Card Mode–Port Restrictions
- 4.18.5 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC Card Constraints
- 4.18.6 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC Cards Operation Modes
- 4.18.7 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, and 10X10G-LC Cards Regeneration Configurations
- 4.18.8 WSE Card Constraints
- 4.18.9 WSE Card Operation Modes
- 4.18.10 WSE Card Regeneration Configurations

4.18.1 AR-MXP and AR-XP Card Constraints

This section lists AR-MXP and AR-XP card constraints.

- AR-MXP and AR-XP cards are supported only in Point-to-Point, P-Ring, and ROADM demands.
- AR-MXP and AR-XP cards do not interoperate with the following cards:
  - MXP-MR-10DME
  - MXPP-MR-10DME
  - MXP_MR_2.5G
  - MXPP_MR_2.5G
  - TXPP_MR_2.5G
  - GE_XP card
  - 10GE_XP card
  - ADM-10G card
- AR-XP card supports a maximum bandwidth of 20 Gbps.
- AR-MXP card supports a maximum bandwidth of 10 Gbps.
- In the AR-MXP card, if any of the SFP ports are aggregated to any of the XFP port, the other XFP port cannot be used.
- AR-MXP card supports a maximum of four OTU1 trunk ports or one OTU2 trunk port.
- AR-MXP card does not support MXP-VAD-10G (High Rate) operation mode.

4.18.2 AR-MXP and AR-XP Card Operational Modes

Table 4-8 provides a list of operational modes supported by AR-MXP and AR-XP cards.

Table 4-8   Operational modes supported by AR-MXP and AR-XP cards

Card Mode	Rate	AR-XP	AR-MXP
TXP_MR (Unprotected Transponder)	High Rate	Yes	Yes
	Low Rate	Yes	Yes
TXPP_MR (Protected Transponder)	Low Rate	Yes	Yes
MXP_DME (Unprotected Data Muxponder)	High Rate	Yes	Yes
MXPP_DME (Protected Data Muxponder)	High Rate	No	Yes
	Low Rate	No	No
MXP_MR (Unprotected Multi-Rate Muxponder)	High Rate	Yes	Yes
	Low Rate	Yes	Yes
MXPP_MR (Protected Multi-Rate Muxponder)	High Rate	No	Yes
	Low Rate	Yes	Yes
MXP-4x2.5-10G (OC48/OTU1 Unprotected Muxponder)	High Rate	Yes	Yes

Table 4-8 **Operational modes supported by AR-MXP and AR-XP cards (continued)**

Card Mode	Rate	AR-XP	AR-MXP
MXPP-4x2.5-10G (OC48/OTU1 Protected Muxponder)	High Rate	No	Yes
RGN_10G (OTU2 Regenerator)	High Rate	Yes	Yes
RGN_2.5G (OTU1 Regenerator)	Low Rate	Yes	Yes
MXP-VDC-10G (Video Muxponder)	High Rate	No	Yes

4.18.3 AR-MXP and AR-XP Card Client-Payloads

Table 4-9 provides client-payload mapping supported by AR-MXP and AR-XP cards.

Table 4-9   *AR-MXP and AR-XP Card Supported Client-Payload Mapping—SONET/SDH, Ethernet, OTU1, and FC*

| Card Mode | Rate | SONET/SDH | | | Ethernet | | | OTU1 | FC | | | | ESCON |
		OC3/STM1	OC12/STM4	OC48/STM16	FE	GE	10GE/OTU2	OTU1	FICON1G/FC1G	FICON2G/FC2G	FICON4G/FC4G	FICON8G/FC8G	
TXP_MR	LOW	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes
	HIGH	No	No	No	No	No	No	No	No	No	No	Yes	No
TXPP_MR	LOW	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes
	HIGH	No	No	No	No	No	No	No	No	No	No	No	No
MXP_DME	HIGH	No	No	No	No	Yes	No	No	Yes	Yes	Yes	No	No
MXPP_DME	HIGH	No	No	No	No	Yes	No	No	Yes	Yes	Yes	No	No
MXP_MR	LOW	Yes	Yes	No	Yes	Yes	No	No	Yes	No	No	No	Yes
	HIGH	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
MXPP-MR	LOW	Yes	Yes	No	Yes	Yes	No	No	Yes	No	No	No	Yes
	HIGH	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
MXP-4x2.5-10G	HIGH	No	No	Yes	No	No	No	Yes	No	No	No	No	No
MXPP-4x2.5-10G	HIGH	No	No	Yes	No	No	No	Yes	No	No	No	No	No
MXP-VD-10G	HIGH	No	No	No	No	No	No	No	No	No	No	No	No
RGN_10G	HIGH	No	No	No	No	No	Yes	No	No	No	No	No	No
RGN_2.5G	LOW	No	No	No	No	No	No	Yes	No	No	No	No	No

Table 4-10   AR-MXP and AR-XP Card Supported Client-Payload Mapping—ISC and Video

Card Mode	Rate	ISC			Video		
		ISC-1	ISC3_STP_1G	ISC3_STP_2G	SD-SDI	HD-SDI	3G-SDI
TXP_MR	LOW	No	Yes	Yes	No	No	No
	HIGH	No	No	No	No	No	No
TXPP_MR	LOW	No	Yes	Yes	No	No	No
	HIGH	No	No	No	No	No	No
MXP_DME	HIGH	No	No	No	No	No	No
MXPP_DME	HIGH	No	No	No	No	No	No
MXP_MR	LOW	No	No	No	No	No	No
	HIGH	No	No	No	Yes	Yes	No
MXPP-MR	LOW	No	No	No	No	No	No
	HIGH	No	No	No	Yes	Yes	No
MXP-4x2.5-10G	HIGH	No	No	No	No	No	No
MXPP-4x2.5-10G	HIGH	No	No	No	No	No	No
MXP-VD-10G	HIGH	No	No	No	No	No	Yes
RGN_10G	HIGH	No	No	No	No	No	No
RGN_2.5G	LOW	No	No	No	No	No	No

4.18.4 AR-MXP and AR-XP Card Mode–Port Restrictions

Table 4-11 lists card mode–port restrictions for the AR-MXP card.

Table 4-11   Card Mode–Port Mapping for AR-MXP Card

AR-MXP Configurations			Operational Mode Instance – 1		Operational Mode Instance – 2		Operational Mode Instance – 3		Operational Mode Instance – 4	
Operational Mode	Rate	Client: Trunk Mapping	Client Port(s)	Trunk Port(s)	Client Port(s)	Trunk Port(s)	Client Port(s)	Trunk Port(s)	Client Port(s)	Trunk Port(s)
TXP-MR	LOW	1 : 1	4	8	3	7	2[1]	6[1]	1[1]	5[1]
	HIGH	1 : 1	9	10	—	—	—	—	—	—
TXPP-MR	LOW	1 : 2	1	5,6	2[1]	7,8[1]	—	—	—	—
	HIGH	NIL	—	—	—	—	—	—	—	—
MXP-DME	HIGH	4 : 1	1 to 4	9	5 to 8	10	—	—	—	—
		8 : 1	1 to 8	9	—	—	—	—	—	—
MXP-MR	LOW	N : 2 (N=2,3,4,5,6,7)	D[2]	5 or 6	D[2]	7 or 8	—	—	—	—
	HIGH	N : 1 (N=2,3,4,5,6,7 or 8)	D[2]	9	—	—	—	—	—	—
MXPP-MR	LOW	N : 2 (N=2,3,4,5,6)	D[2]	5,6	D[2]	7,8	—	—	—	—
	HIGH	N : 2 (N=2,3,4,5,6,7,8)	D[2]	9,10	—	—	—	—	—	—
MXP-4x2.5-10G	HIGH	4 : 1	1 to 4 -> or 5 to 8->	9 or 10	—	—	—	—	—	—
MXPP-4x2.5-10G	HIGH	4 : 2	1 to 4 -> or 5 to 8->	9,10	—	—	—	—	—	—
MXP-VAD-10G	HIGH	3 : 1	1 to 3	9	—	—	—	—	—	—
RGN-10G	HIGH	1 : 1	9	10	—	—	—	—	—	—
RGN-2.5G	LOW	1 : 1	4	8	3	7	2[1]	6[1]	1[1]	5[1]

1. Not supported if the adjacent AR-MXP cards use OTU1 as client ports.

2. D = dynamic mapping of clinet ports.

Table 4-12 lists card mode–port restrictions for the AR-XP card.

Table 4-12 **Card Mode–Port Mapping for AR-XP Card**

AR-XP Configurations			Operational Mode Instance – 1		Operational Mode Instance – 2		Operational Mode Instance – 3		Operational Mode Instance – 4	
Card Mode	**Rate**	**Client : Trunk Mapping**	**Client Port(s)**	**Trunk Port(s)**	**Client Port(s)**	**Trunk Port(s)**	**Client Port(s)**	**Trunk Port(s)**	**Client Port(s)**	**Trunk Port(s)**
TXP-MR	LOW	1 : 1	4	8	3	7	2	6	1	5
	HIGH	1 : 1	9	10	—	—	—	—	—	—
TXPP-MR	LOW	1 : 2	1	5,6	2	7,8	—	—	—	—
	HIGH	NIL	—	—	—	—	—	—	—	—
MXP-DME	HIGH	4 : 1	1 to 4	9	5 to 8	10	—	—	—	—
		8 : 1	1 to 8	9	—	—	—	—	—	—
MXPP-DME	HIGH	8 : 2	1 to 8	9,10	—	—	—	—	—	—
MXP-MR	LOW	N : 2 (N=2 to 7)	D[1]	5 or 6	D[1]	7 or 8	—	—	—	—
	HIGH	N : 1 (N=2 to 8)	D[1]	9	D[1]	10	—	—	—	—
MXPP-MR	LOW	N : 2 (N=2 to 6)	D[1]	5,6	D[1]	7,8	—	—	—	—
	HIGH	N : 2 (N=2 to 8)	D[1]	9,10	—	—	—	—	—	—
MXP-4x2.5-10G	HIGH	4 : 1	1 to 4	9	5 to 8	10	—	—	—	—
MXPP-4x2.5-10G	HIGH	4 : 2	1 to 4 or 5 to 8	9,10	—	—	—	—	—	—
MXP-VAD-10G	HIGH	3 : 1	1 to 3	9	—	—	—	—	—	—
RGN-10G	HIGH	1 : 1	9	10	—	—	—	—	—	—
RGN-2.5G	LOW	1 : 1	4	8	3	7	2	6	1	5

1. D = dynamic mapping of clinet ports.

4.18.5 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC Card Constraints

This section lists 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC card constrains.

- The 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC cards are supported only in Point-to-Point and ROADM demands.
- The 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC cards are supported only in unprotected service demands.

4.18.6 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC Cards Operation Modes

Table 4-13 provides a list of operational modes supported by the 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC cards.

Table 4-13   Operating Modes and Supported Payloads for 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC Cards

Card	Operational Mode	Supported Client Payloads
100G-LC-C or 100G-ME-C	TXP-100G (Standalone 100GE Transponder)	OTU4, 100GE
	RGN-100G (100G Regenerator)	— Regeneration of any 100 G configuration
100G-CK-LC-C	TXP-100G (Standalone 100GE Transponder)	OTU4, 100GE, 40GE LAN PHY
	RGN-100G (100G Regenerator)	— Regeneration of any 100 G configuration
10x10G-LC	MXP-10x10G (10x10G Muxponder + 100G-LC-C or 100G-ME-C)	OC192/STM-64, 10GE-LAN Phy, 10GE-WAN Phy (using OC192), OTU2, OTU2e, 8G FC, 8G FICON, 10G FC, 10G FICON
	RGN-10G (5x10G Regenerator)	OC192/STM-64, 10GE-LAN Phy, 10GE-WAN Phy (using OC192), OTU2, OTU2e, 10G FC, 10G FICON
	TXP-10G (5x10G Transponder)	OC192/STM-64, 10GE-LAN Phy, 10GE-WAN Phy (using OC192), OTU2, OTU2e, 8G FC, 8G FICON, 10G FC, 10G FICON

Card	Operational Mode	Supported Client Payloads
CFP-LC	2x40G Muxponder + 100G-LC-C or 100G-ME-C	OTU3/40GE-LAN Phy
	CFP-TXP (100G Transponder + 100G-LC-C or 100G-ME-C)—One port	OTU4, 100GE
	CFP-TXP (100G Transponder + 2x100G-LC-C or 2x100G-ME-C)—Two ports	OTU4, 100GE

4.18.7 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, and 10X10G-LC Cards Regeneration Configurations

The 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, and 10X10G-LC cards support the following regeneration configurations:

- Two 100G-ME-C or 100G-LC-C cards placed in adjacent slots connected through the chassis backplane.
- Two 100G-CK-LC-C cards or one 100G-LC-C card and one 100G-CK-LC-C card can be used for regeneration.
- One 10X10G-LC card placed in any slot with five ports used as regeneration ports. The port pairs used for regeneration are 1-2, 3-4, 5-6, 7-8, and 9-10.

4.18.8 WSE Card Constraints

This section lists the WSE card constrains.

- The WSE card is supported only in Point-to-Point, P-ring and ROADM demands.
- The WSE card does not have Y-cable protection.

4.18.9 WSE Card Operation Modes

Table 4-14 provides a list of operational modes supported by the WSE card.

Table 4-14   Operating Modes and Supported Payloads for WSE Cards

Card	Operational Mode	Supported Client Payloads
WSE	RGN-10G (5x10G Regenerator)	OTU2e
	TXP-10G (5x10G Transponder)	10GE LAN PHY and OTU2

4.18.10 WSE Card Regeneration Configurations

The WSE card supports the following regeneration configuration:

- One WSE card placed in any slot with five ports used as regeneration ports. The port pairs used for regeneration are 1-2, 3-4, 5-6, 7-8, and 9-10.

4.19 OSMINE Layout Rules

For OSMINE layout rules, see Appendix G, "OSMINE Layout Rules".

4.20 Adjusting Site Layout

Site layout adjustment is a feature that allows you to move a selected card from its current slot to another slot in the chassis. This feature helps you customize the site layout based on your requirements. You can move both present and forecast cards. Cisco Transport Planner will automatically change the card position values and cable lengths in the Traffic Matrix report, Aggregated TDM /Ethernet report, Internal Connection report, and BoM report. You can view the modified reports by reopening the report. Shelf movement is possible for the following:

- All PP-Mesh, Patch Panel, Alien shelf, and DCU shelves.
- DCU cards
- EAP, Air Ramp, Fan Tray, Flex Shelf, and External Switch.

Site layout adjustments can only be done on a network that has been analyzed and is in any administrative state (Design, Upgrade, or Installation). Site layout adjustment can also be done on a release-upgraded network that has been analyzed.

Use the following procedure to move a card to a new position:

Step 1 Right-click the site for which you want to move the cards in the rack and choose **Layout** (see Figure 4-20). The Details dialog box appears (see Figure 4-21).

Figure 4-20   Selecting the Layout View
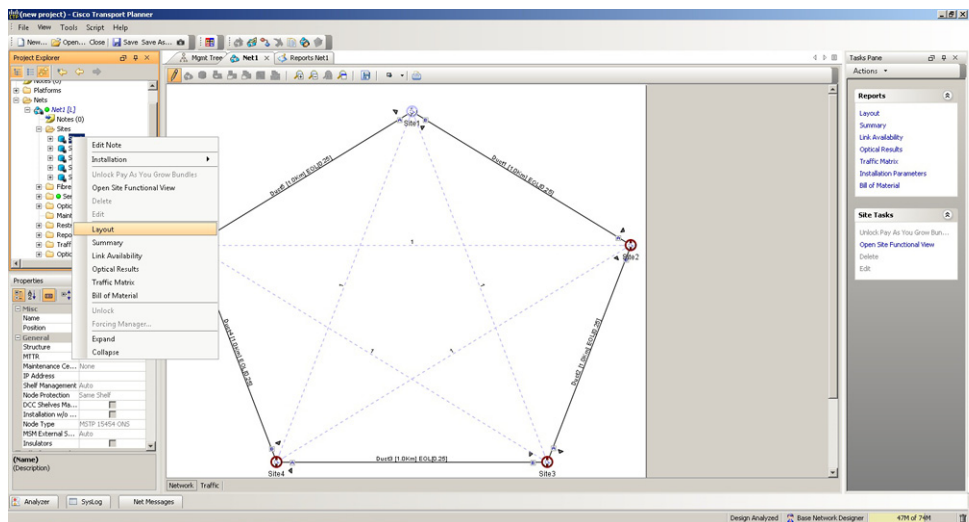
Figure 4-21   Details Dialog Box
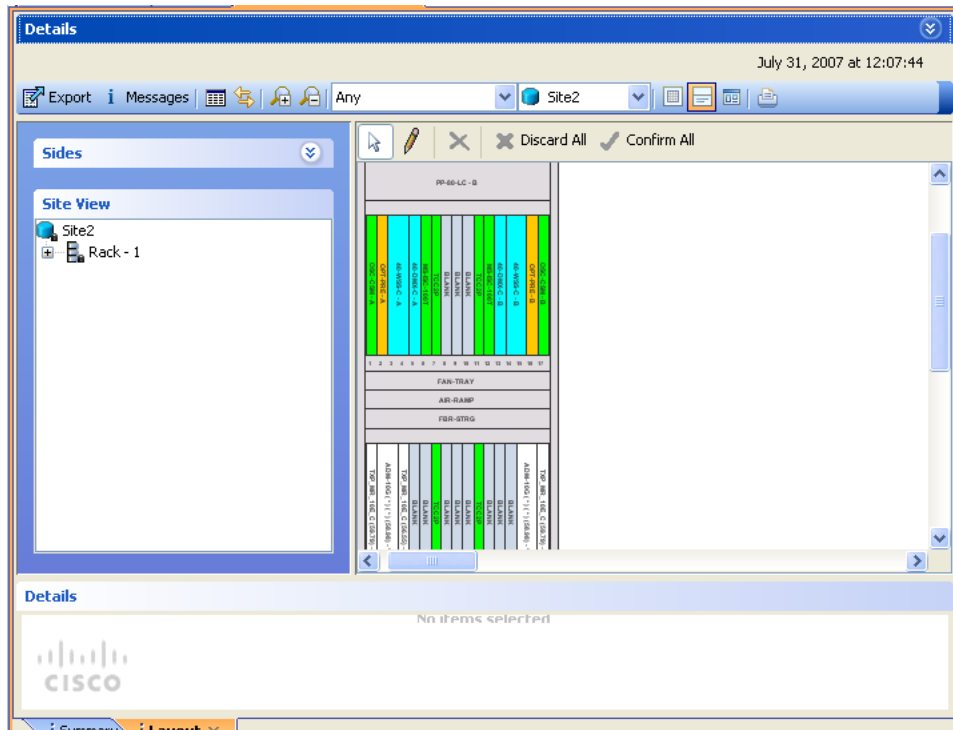
Step 2   Choose the **Locked & Unlocked** mode from the drop-down list for the layout.

Step 3   Choose **Draw Mode** and then click the card and move it to the desired slot in the shelf (see Figure 4-22).

Figure 4-22 **Site Layout Before Adjustment**
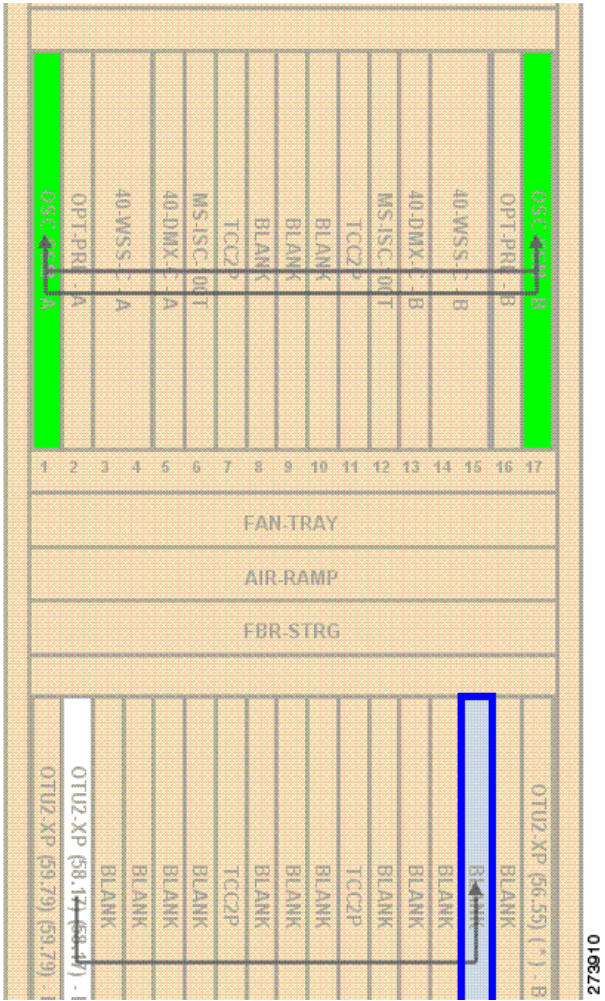
Step 4   Click **Confirm All** to confirm the changes made. When you confirm all site adjustments, Cisco Transport Planner automatically unlocks both the source and destination slot positions (see).

Figure 4-23   Site Layout After Adjustment
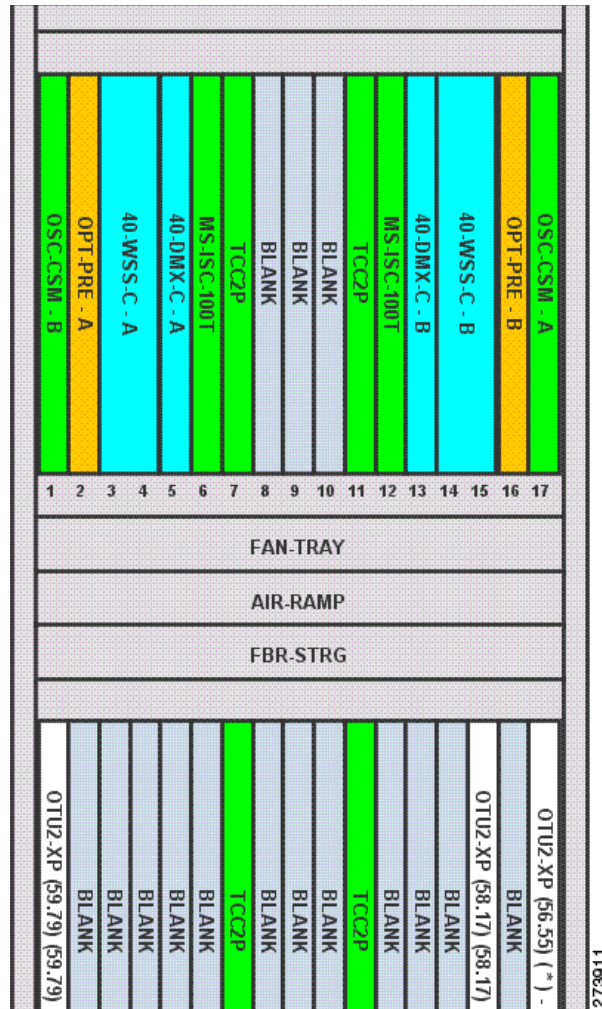
Note   The destination slot position must be within an existing shelf on the existing rack. A destination slot can be any empty slot or any other slot containing a client/OTS card. It cannot be a slot you have already defined as the destination for another position change (in the current layout adjustment session).

Note   A double slot card can be moved if the destination has one slot card and blank card.

Table 4-15 lists the allowed site layout adjustments.

The following constraints are applicable to card layout adjustment:

- When the network is moved to design mode, all the reports are deleted. When you analyze the network again, the reports are regenerated with the cards placed in their default positions. To avoid this default placement upgrade the network, add the services, and then analyze the network so that the cards are retained in the same position. In some cases, you may need to unlock the site.

- Only OSCM cards can be moved to slots 8 or 10.

- MS-ISC, Blank, TCC, and AIC cards cannot be moved. Cards cannot be moved to slots 6 or 12 if MS-ISC cards are present in those slots.

- DCU cards can to move only to empty locations in another DCU shelf. You can also swap a DCU card with another DCU card in the same shelf, between shelves in the same rack, or between shelves in different racks in analyzed or upgrade analyzed networks. You cannot create new shelves to accommodate a DCU card.

- In DCC shelf management, TXP-MR-2.5G or TXPP-MR-2.5G cards in slot 12 cannot be moved.

- The other constraints are included in Table 4-15.

Table 4-15   Allowed Site Layout Movements

From/To	OTS	Unprotected/Fiber-switched TXP-MXP	Unprotected/Fiber-switched LC	1+1 Protected TXP-MXP	1+1 Protected LC	Y-cable Protected TXP	Y-cable Protected MXP/Multi-trunk	Y-cable and 1+1 Protection in Same Card	1+1 Protected Multi-trunk	PSM Line/Section	PSM-OCH
OTS	Yes [1]	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes
Unprotected/Fiber-switched TXP-MXP	Yes	Yes	No	Yes for same-shelf protection; Yes for separated-shelves protection	No	No	No	No	Yes for same-shelf protection; Yes for separated-shelves protection	Yes	Yes
Unprotected/Fiber-switched LC	No	No	Yes	No	No for different shelves; Yes for same shelf	No	No	No	No	No	No
1+1 Protected TXP-MXP	Yes	Yes	No	Yes for same-shelf protection; Yes for separated-shelves protection	No	No	No	No	Yes for same-shelf protection; Yes for separated-shelves protection	No	Yes for same-shelf protection; Yes for separated-shelves protection

Table 4-15   Allowed Site Layout Movements

From/To	OTS	Unprotected/Fiber-switched TXP-MXP	Unprotected/Fiber-switched LC	1+1 Protected TXP-MXP	1+1 Protected LC	Y-cable Protected TXP	Y-cable Protected MXP/Multi-trunk	Y-cable and 1+1 Protection in Same Card	1+1 Protected Multi-trunk	PSM Line / Section	PSM-OCH
1+1 Protected LC	No	No	**Yes**	No	**Yes**	No	No	No	No	No	No
Y- cable Protected TXP	**Yes**	Yes	No	**Yes** for same-shelf protection; **Yes** for separated shelves protection	No	**Yes**	**Yes**	No	**Yes** for same-shelf protection; **Yes** for separated-shelves protection	No	**Yes**
Y- cable Protected MXP/ Multi-trunk	**Yes**	Yes	No	**Yes** for same-shelf protection; **Yes** for separated shelves protection	No	No	No	No	**Yes** for same-shelf protection; **Yes** for separated shelves protection	No	**Yes**
Y- Cable and 1+1 Protection on Same Card	**Yes**	Yes	No	**Yes** for same-shelf protection; **Yes** for separated-shelves protection	No	No	No	No	No	No	No

Table 4-15   Allowed Site Layout Movements

From/To	OTS	Unprotected/Fiber-switched TXP-MXP	Unprotected/Fiber-switched LC	1+1 Protected TXP-MXP	1+1 Protected LC	Y-cable Protected TXP	Y-cable Protected MXP/Multi-trunk	Y-cable and 1+1 Protection in Same Card	1+1 Protected Multi-trunk	PSM Line / Section	PSM-OCH
1+1 Protected Multi-trunk	**Yes**	Yes	No	**Yes** for same-shelf protection; **Yes** for separated-shelves protection	No	No	No	No	**Yes** for same-shelf protection; **Yes** for separated-shelves protection	No	**Yes** for same-shelf protection; **Yes** for separated-shelves protection
PSM Line/Section	**Yes**	Yes	No	No	No	No	No	No	No	No	No
PSM-OCH	**Yes**	Yes	No	**Yes** for same-shelf protection; **Yes** for separated-shelves protection	No	No	No	No	**Yes** for same-shelf protection; **Yes** for separated-shelves protection	No	No

1. For all site movements marked as **Yes**, Cisco Transport Planner creates a reverse link. For example, when a Y-cable protected TXP is moved to an OTS card, a reverse link (that is, a link between the OTS card and the Y-cable protected TXP) is created automatically.

4.20.1 Constraints in Layout Adjustments in M2 and M6 Shelves

The following constraints are applicable to card layout adjustment in an M2 or M6 shelf:

- Card movement is allowed between the following chassis:
    - 15454 ONS chassis to M6 and vice-versa
    - M6 chassis to M2 chassis and vice-versa
    - M6 chassis to M6 chassis
    - M2 chassis to M2 chassis
- TNC or TSC card movements are not allowed.
- The movement for the following cards from ONS 15454 chassis to M2 or M6 chassis is not allowed:

– OSCM

– AIC

– ISC

4.20.2 Constraints in Layout Adjustments

For any other kind of forced position, Cisco Transport Planner will not prevent you from forcing any destination position even if it does not match some of the layout recommended constraints (for example, OSMINE or TXP/MXP 1+1 Client protection).

You need to ensure that the following conditions are met when doing layout adjustments:

- Site layout adjustments can only be done on a network that has been analyzed and is in any administrative state (Design, Upgrade, or Installation).
- A pair of TXP/MXP cards that are part of a Y-cable protection group must stay within the same shelf.
- A pair of ADM-10G cards that are part of the same ADM peer group must stay within the same shelf.
- A pair of line cards that are part of a protection group must stay within the same shelf.
- A pair of line cards in a site that are part of a P-ring circuit must stay within the same shelf.
- You should not perform more than five movements before clicking the **ConfirmAll** button.
- Manual layout adjustment is not supported for FLD-4 units.

4.20.3 Adjusting the Shelf Layout

You can adjust the shelf layout using the "Move" option. To adjust the shelf layout do the following:

Step 1   Right-click the site for which you want to move the shelves in the rack and choose **Layout**.

Step 2   Right-click on the shelf and select **Move**. The **Shelf Movement** dialog box opens.

Step 3   In the Shelf Movement dialog box select the following:

- **Source Rack**— Specifies the selected shelf rack. You cannot edit this field.
- **Destination Rack**— Select the destination rack ID to move the shelf to the selected rack.
- **From RU**— Displays the shelf number of the selected shelf. You cannot edit this field.
- **To RU**—Select the exact rack unit position to move the shelf.
- **Swap**— Check the check box to swap the source and destination shelves that are of the same rack unit size.

Note   If you do not select the Swap option, then you can move any shelf to any rack or within the rack, if an empty slot is available.

Step 4   Click **OK**. Cisco Transport Planner will automatically change the shelf position values and cable lengths in the Traffic Matrix report, Aggregated TDM /Ethernet report, Internal Connection report, and BoM report.

Note   To move a passive shelf, right-click on the passive shelf and follow Step 2 to Step 4 of the shelf movement.

4.20.4 Shelf Movement Rules

The following constraints are applicable to shelf movement adjustments:

- You can move any shelf to any rack or a shelf within a rack if the slot position is blank.
- You can do site adjustments in only one site before confirming the changes.
- Only one shelf movement can be performed at a time.
- The maximum number of 15 racks can be created.
- Shelf movement is not possible for PDP shelf.
- You can move the Y-cable protection module shelf within the rack in the available space.
- Passive shelves can be moved within the same rack or across the racks.
- After every shelf movement, the Layout is analyzed to modify the BOM, based on the cables that are connected.
- Cisco Transport Planner will automatically update the layout with the new shelf position values and cable lengths in the Traffic Matrix report, Aggregated TDM /Ethernet report, Internal Connection report, and BoM report.
- Air ramp and fiber storage associated with the ANSI/ETSI shelf will be automatically moved with the 15454 ONS shelf movement.
- The shelf movement is not allowed if there is no space to accommodate the air ramp and fiber storage associated with the shelf.
- M6 and 15454 ONS shelves can be moved in the same rack or across racks.
- When the source and destination chassis are of different RUs, move the source chassis below the destination chassis if the space is available. Interchanging the chassis are not allowed.

4.20.5 Modifying Shelf Management Properties

CTP enables you to modify the Shelf Management configuration type when the layout is in Locked state.

- When the Shelf Management configuration type is changed from Multi Shelf Integrated Switch to Multi Shelf External Switch, CTP:
  - Places the Multi Shelf External Switch at the end of the rack. If space is not available, a new rack is created.
  - Adds the Multi Shelf External Switch to the BoM, and the MS-ISC card is removed from the BoM if the node controller is M12 chassis.
  - Network analysis is not blocked.
- When the Shelf Management configuration type is changed from Multi Shelf External Switch to Multi Shelf Integrated Switch, CTP prompts to unlock the layout.

• When the Shelf Management configuration type is changed from Auto to Multi Shelf External Switch, Multi Shelf Integrated Switch, or Individual Shelf, CTP prompts to unlock the layout.

4.20.6 Card Movement Rules

The following constraints are applicable to card movements:

• AR-MXP card follows the existing MXP card movement rules.

• AR-XP card follows the existing TXP card movement rules.

• AR-MXP and AR-XP cards are allowed to move to the Cisco ONS 15454 shelf only when the Cisco ONS 15454 shelf has a FTA4 fan tray assembly.

• AR-MXP and AR-XP cards are allowed to move to an M2 or M6 shelf from the Cisco ONS 15454 shelf and vice-versa. If any protection is configured, then the existing protection rules are applied.

• AR-MXP and AR-XP cards are allowed to move to an M2 shelf from an M6 shelf and vice-versa. If any protection is configured, then the existing protection rules are applied.

4.21 Arranging Sites

Sites can be arranged into four different configurations. Use the following procedure to arrange the sites into a configuration or to move all of the sites so that they appear in the Cisco Transport Planner window:

Step 1 Click the **NtView** *Name* tab.

Step 2 Click the Arrange Sites drop-down list, and choose one of the following:

✎ **Note** All shapes are approximations.

• Fit to visible rectangle view—Zooms to display all sites in the NtView *Name* tab.

• Arrange to an ellipse—Rearranges all sites in an ellipse form (Figure 4-24).

Figure 4-24   *Ellipse Shape*
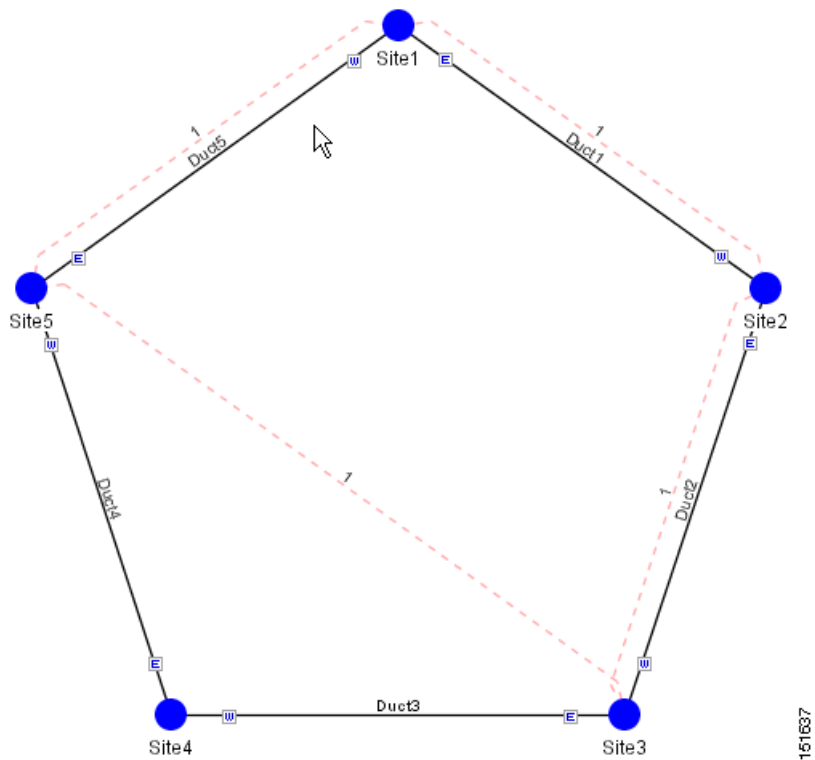
- Arrange to a square—Rearranges all sites in a square form so that the sites appear clockwise around the square (Figure 4-25). To complete a full square, this arrangement requires at least four sites.
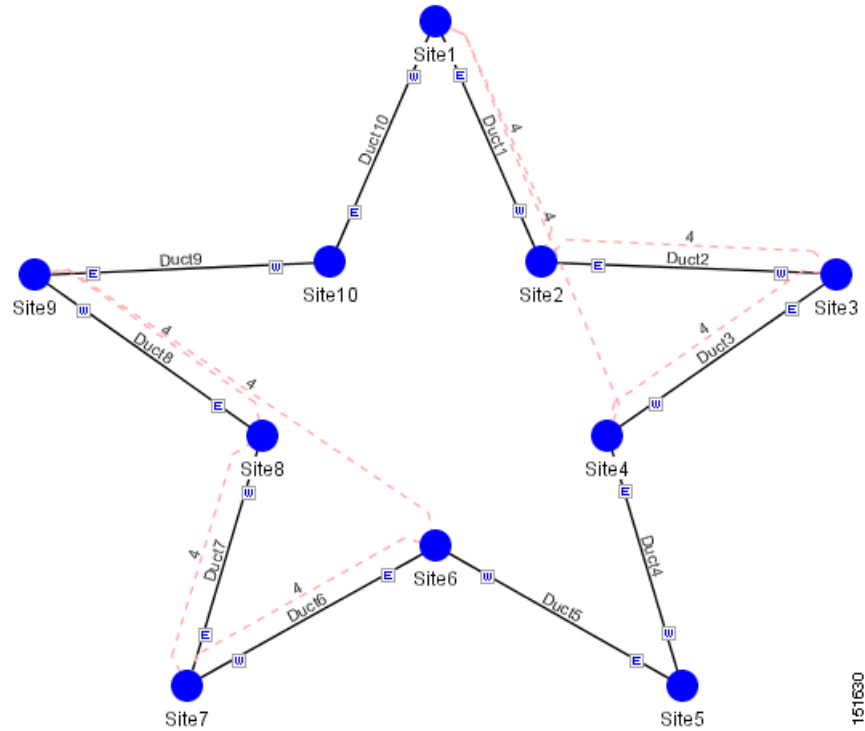
Figure 4-25   Square Shape
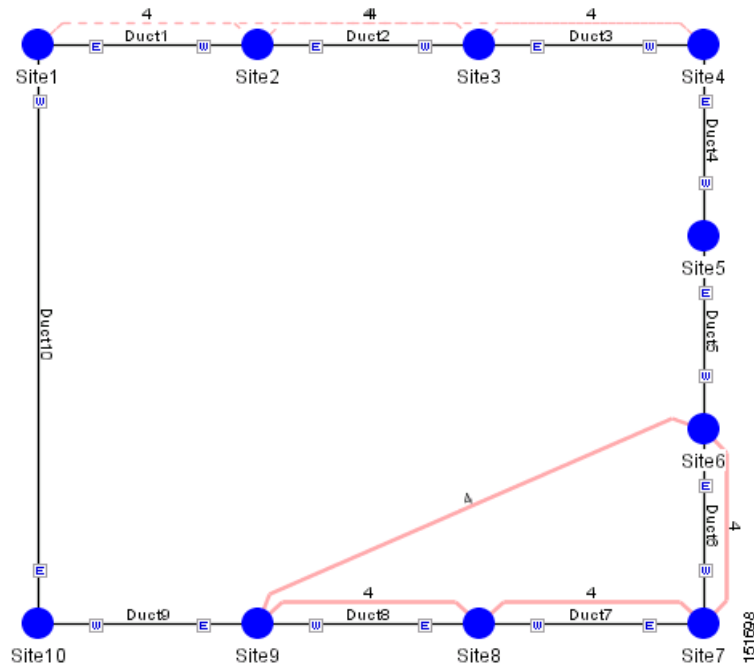
- Arrange to a snake—Rearranges all sites so that they cross the NtView *Name* tab from right to left and then left to right in a serpentine, linear format (Figure 4-26).
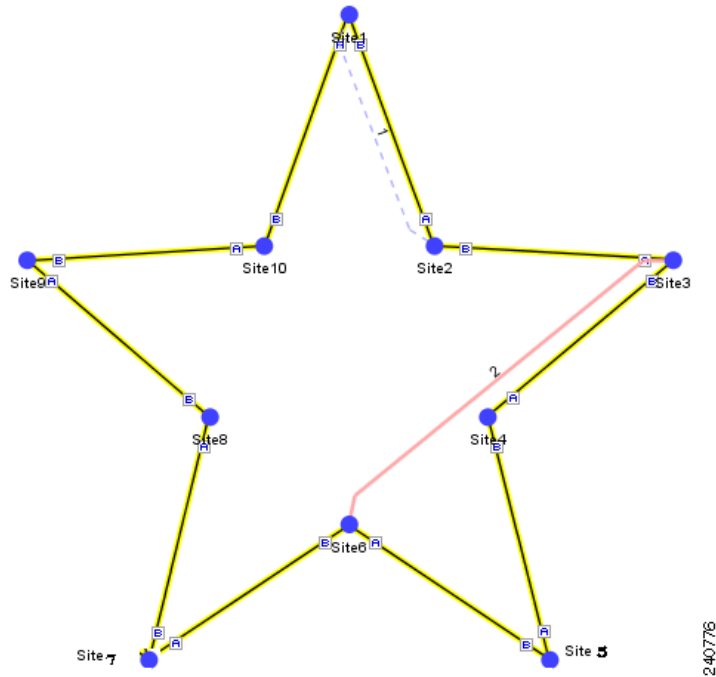
Figure 4-26   Snake Shape
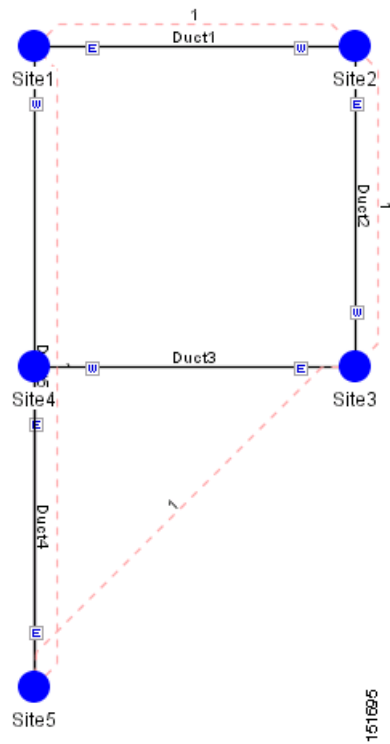
- Arrange to a double ring—Rearranges the sites into a dual ring format (Figure 4-27).

Figure 4-27   *Double Ring Shape*

- Arrange to Fit to Maximum Rectangle View—Arranges sites in proportion, using all network map area (Figure 4-28).

Figure 4-28   Fit to Maximum Rectangle View Shape

4.22 Modifying Site Properties

You can edit a site after you have created it using the Network Creation Wizard. To create a site, see the "2.1 Creating a Project" section on page 2-1. The following properties of a site can be modified:

- Site Structure
- Site Functionality
- Site Type
- Number of Sides

To edit the properties of a site:

Step 1   In the Project Explorer pane, click the Sites folder. The list of sites included in the network appears.

Step 2   Complete any one of the following:

- In Project Explorer pane, right-click the site you want to modify and select **Edit**.
- In NtView, double-click the site icon.
- In NtView, right-click the site icon and select Edit.

The **Site Edit** dialog box appears (Figure 4-29).

Figure 4-29   Sites Edit Dialog
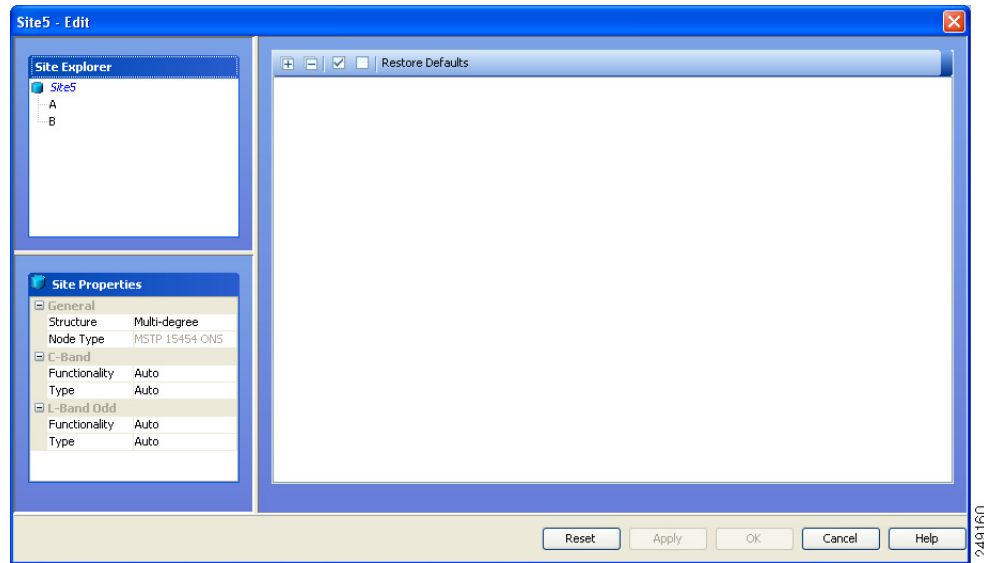
- Choose the **Structure** type from the drop-down list in the **Site Properties** pane:

Structure	Supported Configurations	Description	Possible Structure Edits
Line	• MSTP 15454 ONS • HYBRID 15454 ONS • NG-DWDM	Two pairs of fibers are terminated at the node.	Can be changed to Line+ site. **Note** Line+site structure edit is applicable only on MSTP 15454 ONS
Terminal	• MSTP 15454 ONS • HYBRID 15454 ONS • NG-DWDM	A single pair of fiber is terminated at the node.	Can be changed to a Terminal+ site.
Line+	• MSTP 15454 ONS	Two pairs of fibers are terminated at the node, but the number of fibers can be increased when an MMU card (topology upgrade) is installed. This node is ready to scale to become a multidegree node after MMUs are installed in this node.	Can be changed to a Line site.

Structure	Supported Configurations	Description	Possible Structure Edits
Terminal+	MSTP 15454 ONS	A single pair of fiber is terminated at the node, but the number of fibers can be increased if an MMU card (topology upgrade) is installed. This node is ready to scale to become a multidegree node after MMUs are installed in this node.	Can be changed to a Terminal site.
Multi-degree	• MSTP 15454 ONS • NG-DWDM	Nodes have more than two sides and face more than two fiber spans.	

✎ **Note** You cannot edit the site structure parameter of PSM sites. For PSM sites with add/drop functionality, mux/demux is the supported site type. For PSM Line sites ROADM functionality, 40-SMR1-C, 40-SMR2-C, and WSS are the supported site types. For PSM section sites with ROADM functionality, WSS is the only supported site type.

To change any other structure (such as changing Line to Terminal), you must delete and reinsert the site.

- Choose the **C-Band** and **L-Band** parameters from the drop-down list. See Table 4-1 and Table 4-2 for additional details on Site Design rules.

✎ **Note** L-band is not applicable to HYBRID 15454 ONS configuration.

- Right-click the site, click **Add Side,** and choose **Line** or **Omni-Directional** or **Multiple Omni-Directional** to add a line or omnidirectional or multiple omni-directional sides to a site (Figure 4-30). The new side gets listed under the site in the Site Explorer pane. If the site added is omnidirectional, the Omnidirectional Side property of the side is set to **Yes**. You can add a side to a site only if the site does not already have the maximum number of allowed sides provisioned for it. Click **Apply** after adding each side for the change to take effect.

✎ **Note** Line side is not applicable to NG-DWDM configuration.

**Figure 4-30   Add Sides Option**
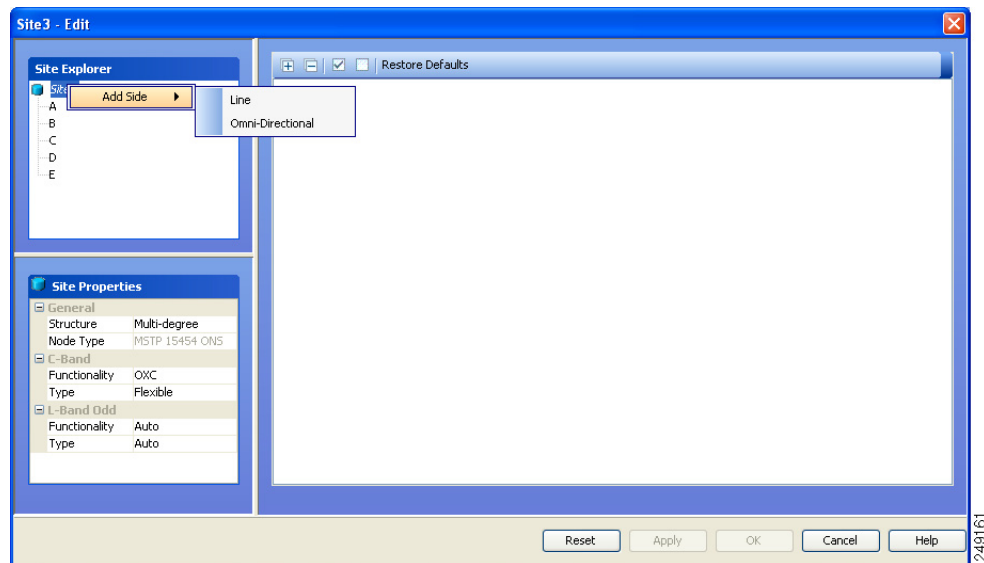
Step 3   Click a side to view and modify properties associated with it in the Side Properties pane:

- Label—Displays the label of the side.

- OmniDir Entry Point—Displays the value of the OmniDir Entry Point option.

- Colorless Ports (Non 100G for NG-DWDM)—Displays the number of colorless ports on the side.

- Colorless 100G Ports—Displays the number of colorless 100G ports on the side.

- Remote Spur—Displays the number of remote spurs associated with the side.

- Omnidirectional Side—Displays the value of the omnidirectional property for the side.

- Side Type—Displays the type of the side. This property can be edited for multi-degree sites with OXC functionality and type as flexible.

- Omni Side Type—(NG-DWDM configuration only) The options available are Auto, 4X4 COFS (default), and 16-WXC. For an 8-degree node, 16-WXC card alone is available.

Step 4   Right-click a side and select any of the following options to modify the properties of a side. Click **Apply** after selecting each option for the change to take effect.

Figure 4-31   Side right-click options
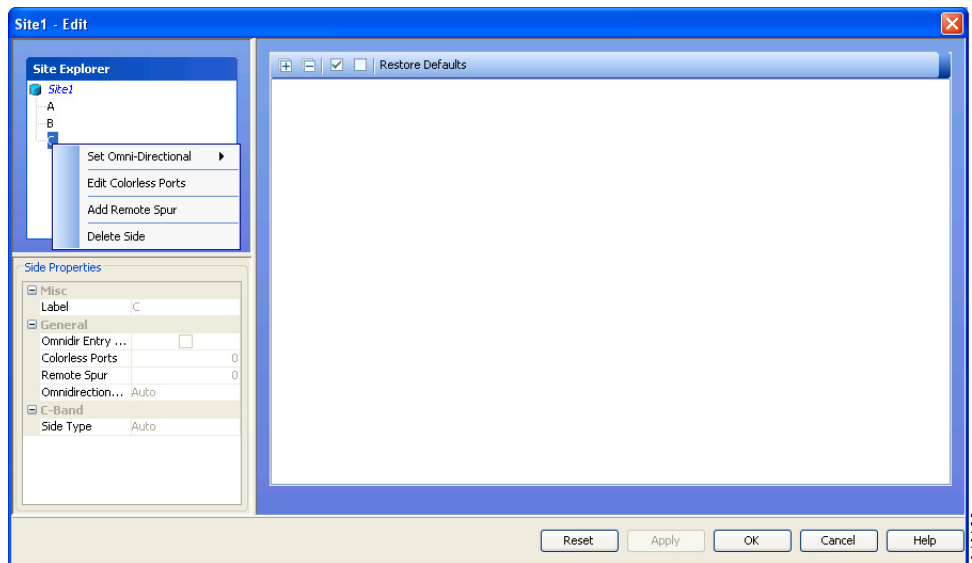
- **Set Omni-Directional**—Allows you to set the omnidirectional property of the side. The available values are Auto, Yes, and No. The default option is Auto. The Auto option allows CTP to dynamically enable omnidirectional functionality on a side in the following ways:

  – If there are no free sides (free sides are those sides not connected by ducts) available on a site, and the site has less than eight provisioned sides, CTP automatically creates an omnidirectional side.

  – If one or more free sides are available, CTP automatically makes one of the free sides omnidirectional.

  The Yes option indicates that omnidirectional demands can be dropped on the side and the No option indicates that omnidirectional demands cannot be dropped on the side.
  For information on supported site structure and functionality for omnidirectional sides, see "2.7.2 Understanding Omnidirectional Functionality" section on page 2-19.

- **Edit Colorless Ports**—Allows you to add or edit colorless ports in the Colorless Ports dialog. The maximum number of colorless ports allowed per side, varies according to the site functionality and type as defined in the following table:

Functionality	Type	Colorless ports (50 GHz)	Colorless ports (100 GHz)
ROADM	80-WXC-C (mux/demux)	72	72
ROADM / Hub / Terminal	40-SMR1-C	9	9
	40-SMR2-C	9	9
Hub / Terminal	80-WXC-C (mux/demux)	80	80

Functionality	Type	Colorless ports (50 GHz)	Colorless ports (100 GHz)
OIC	80-WXC-C (mux/demux)	72 if 2 sides are connected to ducts. 63 if 3 sides are connected to ducts. 54 if 4 sides are connected to ducts. 45 if 5 sides are connected to ducts. 36 if 6 sides are connected to ducts. 27 if 7 sides are connected to ducts. 18 is 8 sides are connected to ducts.	72 if 2 sides are connected to ducts. 63 if 3 sides are connected to ducts. 54 if 4 sides are connected to ducts. 45 if 5 sides are connected to ducts. 36 if 6 sides are connected to ducts. 27 if 7 sides are connected to ducts. 18 is 8 sides are connected to ducts.
OXC	80-WXC-C	9	9
	40-SMR2-C	9	9
	Flexible	9	9

Note   For OXC nodes with 80-WXC-C, 40-SMRC-2 or Flexible configurations, the maximum number of colorless ports allowed also indicates the maximum number of demands (colored and colorless) that can be added to the side. Forcing the maximum number of colorless ports on a side prevents any colored demand from being added to the side.

For example, if you force nine colorless ports on a side of an OXC node with 80-WXC-C card, then a colored demand cannot be dropped on the side. However, if you force only seven colorless ports, the remaining two ports can be utilized for dropping two colored demands.

For NG-DWDM nodes:

Side	No. of Ports for Non 100G Colorless	No. of Ports for 100G Colorless
Terminal	0-17	0-96
Hub	0-17	0-96
Omnidirectional	0-17	0-96
Line side of multi-degree node	0-13	0-13

- **Add Remote Spur**—Allows you to add a remote add/drop port to the side and increments the Remote Add/Drop Port property of the side by one. You can add only one remote add/drop port to a side. For sites with 80-WXC-C card (mux/demux mode), the number of remote add/drop ports allowed varies depending on the number of available Express Add/Drop (EAD) ports on the side.

Note   Remote Spur is not applicable to NG-DWDM configuration.

To add or remove remote add/drop ports, the network must be in Design or Upgrade mode, and the sites must have a defined structure, functionality, and type as described in the following table.

Structure	Functionality	Type	Equipment
Line	ROADM / Hub	40-SMR1-C	40-SMR1-C
		40-SMR2-C	40-SMR2-C
		80-WXC-C	80-WXC-C (bidirectional)
		80-WXC-C (mux/demux)	80-WXC-C (mux/demux)
Terminal **Note** Terminal sites must not have amplifiers or DCUs connected to them while connecting to a remote add/drop port. A terminal site with a remote add/drop port cannot be upgraded to any other site structure.	ROADM	40-SMR1-C	40-SMR1-C
		40-SMR2-C	40-SMR2-C
		80-WXC-C (mux/demux)	80-WXC-C (mux/demux)
Multi-degree	OXC	80-WXC-C w/ MESH-PP-4	80-WXC-C
		80-WXC w/ MESH-PP-8	80-WXC-C
		Flexible	80-WXC-C (bidirectional) or 40-WXC-C
		40-SMR2-C + 15454-PP-4-SMR	40-SMR2-C
	OIC	80-WXC-C (mux/demux)	80-WXC-C (mux/demux)

Note
- You cannot add remote spurs to sites with functionality or type set to Auto, or to sites with protection type set to PSM Line or PSM Section.
- Amplifiers and DCUs are not supported on any sides of a remote spur.
- If a remote terminal has active units, DCN extension must be implemented on the spur link.
- Remote spurs are not supported for colorless sites with OXC functionality, or equipped with 40-SMR1-C or 40-SMR2-C.

You can define local add/drop units at a side where a remote add/drop port is present, only if the local add/drop units are connected to an 80-WXC-C card configured as mux/demux.
To delete a remote spur, delete the side associated with it; this reduces the Remote Add/Drop Port property of the side by one. You cannot delete a side with a remote add/drop port if the port is connected to a remote network terminal.

- **Delete Side**—Allows you to delete the selected side. If you delete an omnidirectional side or a colorless side, any locked service referencing the side is unlocked.

Step 5   Click **Apply**. The selected changes are applied to the site.

Step 6   Click **OK** to save the changes and exit the **Edit** dialog box.

Note   When you modify a site, Cisco Transport Planner does not allow you to decrease the number of node sites. For example, it would not be possible to change a Line site to a Line+ or Multi-Degree site but, a Multi-Degree site can be changed to a Line site.

Table 4-16 shows the structure modifications that you can make using Cisco Transport Planner.

Table 4-16   Permitted Structure Modifications

Starting Structure	Ending Structure
Terminal or Terminal+	Line, Line+, Multi-Degree
Line or Line+	Multi-Degree

When you modify the properties of a site, Cisco Transport Planner checks the compatibility between the original site properties and the new configurations that you make on each site. It also checks for consistency in the add/drop section and/or in the amplifier/DCU section and displays a warning message in case of inconsistency. Cisco Transport Planner then unlocks the related instances and/or parameters for you to make modifications. If the units were forced, Cisco Transport Planner removes the forcing to perform the required modifications.

If the starting instances/parameters are consistent, even if not optimal for the ending configuration, Cisco Transport Planner will warn the user about possible sub-optimization, but the related unit/parameter will be kept Locked (with its Layout property).

While upgrading a site equipped with 80-WXC-C, 80-WXC-C Mux/Demux, or 80-WXC-C with MESH-PP-4/8, CTP unlocks the entire site. This is not applicable for flexible site types.

For Multi-Degree sites with OXC functionality, if you upgrade the type of the site to Flexible, CTP unlocks the entire site. For Multi-degree sites with OXC functionality and flexible type, if you change the configuration of a side (from 40-WXC-C to 80-WXC-C, or vice versa), CTP unlocks only the parameters of the changed side.

Site modifications that require unlocking of some instances/parameters are provided in Table 4-17.

Table 4-17   Site Modification Unlock Instances/Parameters

Starting Configuration	Ending Configuration	Mandatory Unlock	Suggested Unlock
Line, PT	Line, OLA	All amplifiers/DCU section	-
Line, OSC-site	Line, OLA	All amplifiers cards.	-
Line, OLA	Line, A/D	None.	All amplifier cards
Line, OLA	Line, ROADM	None.	All amplifier cards
Line, A/D, OADM-xc	Line, ROADM	All OADM-xc cards.	All amplifier cards
Line, HUB, WSS	Line, ROADM	None.	All amplifier cards
Term, ROADM, WSS	Line, ROADM, WSS	None.	All amplifier cards

Table 4-17   Site Modification Unlock Instances/Parameters

Starting Configuration	Ending Configuration	Mandatory Unlock	Suggested Unlock
Term, ROADM, WSS	Multi-degree, WSS	32-DMX-O (if present)	All amplifier cards
Line, ROADM, WSS	Multi-degree, WXC, PP-MESH-4	32-DMX-O (if present)	WSS cards, 40-MUX-C is the default; all amplifier cards
Line, ROADM, WSS	Multi-degree, WXC, PP-MESH-8	32-DMX-O (if present), AMP-17 cards (if present)	WSS units (40-MUX-C is the default), all amplifier cards

4.23 Deleting Notes

Use the following procedure to delete a note from any item in the Project Explorer pane:

Step 1 Double-click the **Notes** folder.

Step 2 In the Notes window, click **Go** in the Action column for the note that you want to delete. The item is highlighted in the Project Explorer pane.

Step 3 Right-click the item in the Project Explorer pane and choose **Delete Note** from the shortcut menu.

4.24 Deleting Sites

Use the following procedure to delete sites from a network. You can delete a site if the site is in the Unlocked state and does not have a traffic demand set up on it. You can delete sites from a network in the Design state only.

Step 1 Verify that the site is in the Unlocked state in the Project Explorer pane. For more information, see the "2.10.5 Unlocking Parameters in the Network Design" section on page 2-59.

Step 2 Delete traffic demands on the site. For more information, see the "4.25 Deleting a Traffic Demand" section on page 4-136.

Step 3 In the NtView *Name* tab, click the Site icon and click **Delete** from the Tasks Pane. You can also right-click on the Site icon and click **Delete** from the shortcut menu. For more information about the Cisco Transport Planner icons, see Appendix A, "GUI Information and Shortcuts."

Step 4 For a Line or Line+ site, a confirmation dialog box is displayed. Click **No** to delete the fiber spans along with the site. Click **Yes** to delete the site and replace the two fiber spans connected to it with a single fiber span that directly connects the adjacent sites. The new fiber span is created as per the rules in the "4.24.1 Fiber Joining Rules" section on page 4-135.

4.24.1 Fiber Joining Rules

When deleting a Line or Line+ site, the sites adjacent to the deleted site can be directly connected with a new fiber span that inherits properties from the old fiber spans. The new fiber span can be created when these conditions are fulfilled.

- No traffic is added, dropped, or bypassed at the deleted site.

- No remote Add/Drop site is connected to the deleted site.

- The following fiber properties must be the same for both the fibers that are connected to the site to be deleted.

  - Fiber Type

  - Connection Type

  - Length Based Loss

  - DCN Extension

  - OSC Frame Type

  - Optical Subnet Design Rules (both for C-band and L-band)

  - Raman Amplification

  - Measurement Units

If the above conditions are not fulfilled, the fibers cannot be joined. You have to delete the site along with the fibers connected to it.

Following property values are inherited from the old fiber spans as per the specified rules.

- Properties acquired by the fiber span (Duct):

  - EOL Ageing Loss = The value that is greater in the two fibers

  - EOL Ageing Factor = The value that is greater in the two fibers

- Properties acquired by the fiber pair (Couple):

  - CD C-band and CD L-band = $(CD1 * L1 + CD2 * L2) / (L1 + L2)$

    where

    CD1 = Chromatic dispersion of the first fiber
    CD2 = Chromatic dispersion of the second fiber
    L1 = Length of the first fiber
    L2 = Length of the second fiber

  - PMD = $SQRT[(P1^2 *L1 + P2^2 *L2) / (L1 + L2)]$

    where

    SQRT = Square root
    P1 = PMD of the first fiber
    P2 = PMD of the second fiber
    L1 = Length of the first fiber
    L2 = Length of the second fiber

  - QD C-band and QD L-band = The value that is greater in the two fibers

Cisco Transport Planner DWDM Operations Guide, R10.0

  – RD Factor = The value that is greater in the two fibers

- Properties acquired by the fiber:

  – Span Length = Cumulative length of the old fiber spans

  – Loss factor = [(LF1 x L1) + (LF2 x L2)] / (L1 + L2)

  where

  LF1 = Loss factor of the first fiber
  LF2 = Loss factor of the second fiber
  L1 = Length of the first fiber
  L2 = Length of the second fiber

  – Connector Loss = The value of the corresponding site

4.25 Deleting a Traffic Demand

A traffic demand must be in the Unlocked state before you can delete it. Use the following procedure to delete a traffic demand:

Step 1 In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.

Step 2 Verify that the demand is in the Unlocked state. For more information, see the "2.10.5 Unlocking Parameters in the Network Design" section on page 2-59.

Step 3 Right-click the demand that you want to delete in the Project Explorer pane and choose **Delete** from the shortcut menu. As an alternative, you can click **Delete** in the Tasks Pane.

4.26 Deleting a Traffic Subnet

Use the following procedure to delete a created traffic subnet. The Traffic Subnet ALL cannot be deleted.

Step 1 In the Project Explorer pane, click the **Net** > **Traffic Subnets** folder to expand it.

Step 2 Right-click the traffic subnet to be deleted and select **Delete** to delete the subnet.

Step 3 If the traffic subnet being deleted is associated with demands, a dialog box will appear listing all the demands associated with this subnet. These associations will be removed and the demands will be moved to the Traffic Subnet ALL demand. Upon confirmation, the traffic subnet will be deleted.

Note Demands moved under **Traffic Subnet All** will be marked invalid and the network will not be analyzed, until the user associates the demands with either a Ring or Linear subnet.

4.27 Deleting a Fiber Span

Use the following procedure to delete a fiber span from the network design:

Step 1   In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.

Step 2   In the Project Explorer pane, right-click the duct that you want to delete and choose **Delete** from the shortcut menu. As an alternative, you can click **Delete** in the Tasks Pane.

Step 3   Click **Yes** to confirm the fiber deletion.

4.28 Deleting a Network

To delete a network from a project, in the Network Mgmt Tree tab click the network and choose **Delete** from the Tasks Pane. You cannot delete a network if it is the only network in a project.