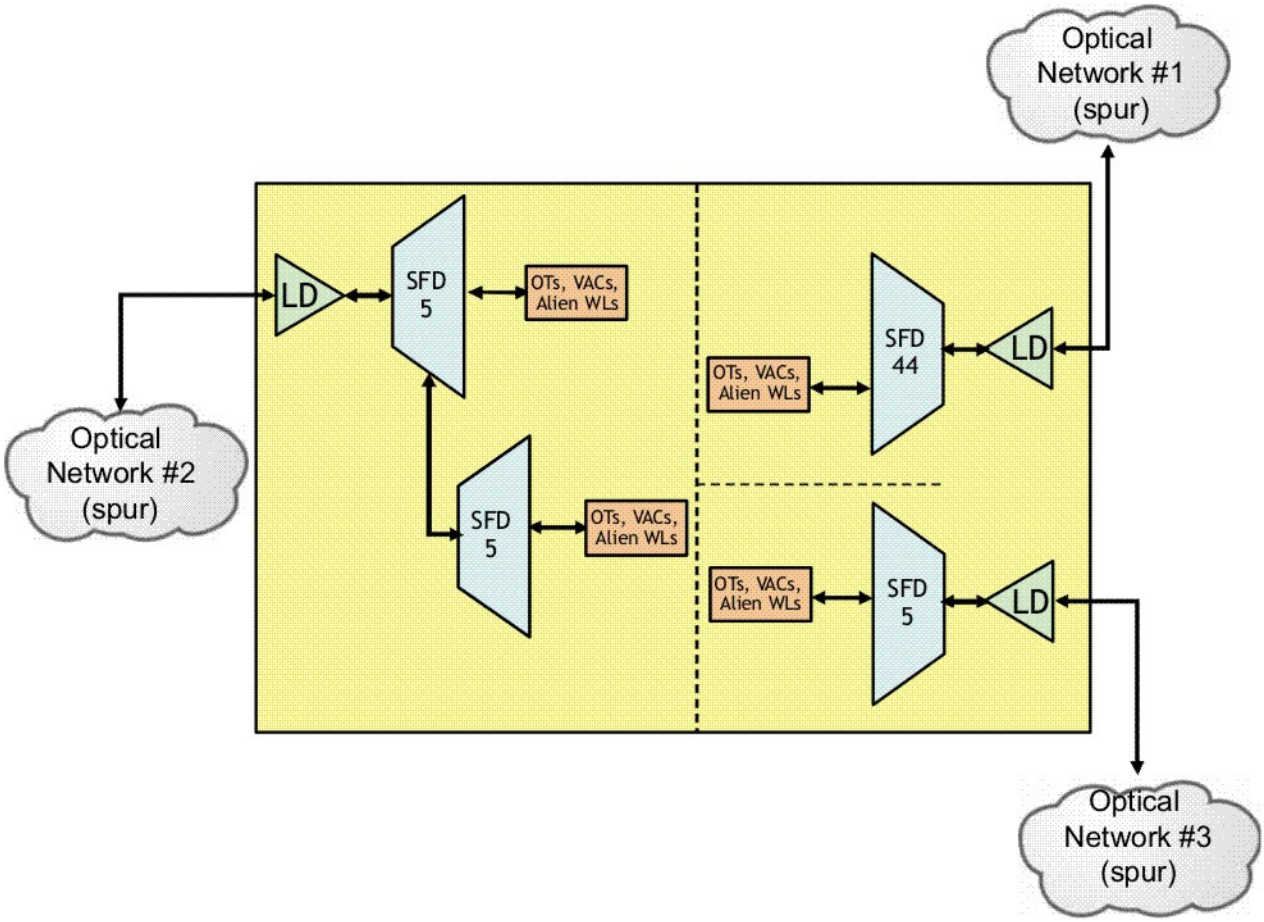
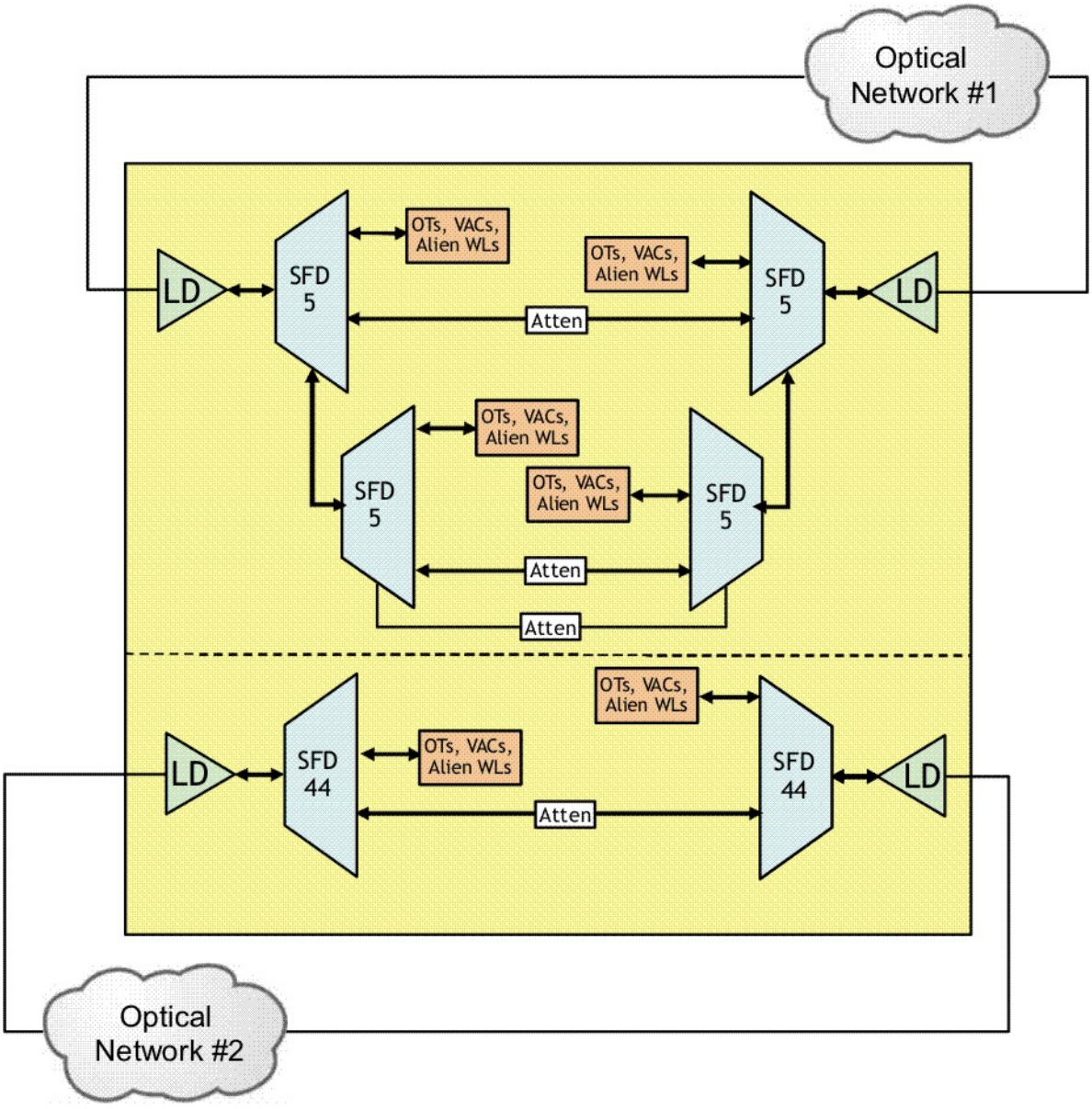
The following figure illustrates three or more fully disjoint optical lines of any valid degree 1 DWDM and/or CWDM line configuration. (There is no traffic passing between any of the spurs.)

Figure 17-148 Disjoint domain: Fully Disjoint Lines



The following figure illustrates multiple disjoint FOADM ring nodes in the same NE. (There is no traffic passing between the rings.)

Figure 17-149 Disjoint domain: Fully Disjoint FOADM Ring Nodes



OT cascading

Overview

The Alcatel-Lucent 1830 PSS supports cascaded OTs. For this configuration, a signal is added at an OT client port and multiplexed onto the higher bandwidth line port. The signal is then added at a second OT supporting an even higher rate, and multiplexed to its line port. The reverse path is taken when the signal is dropped.

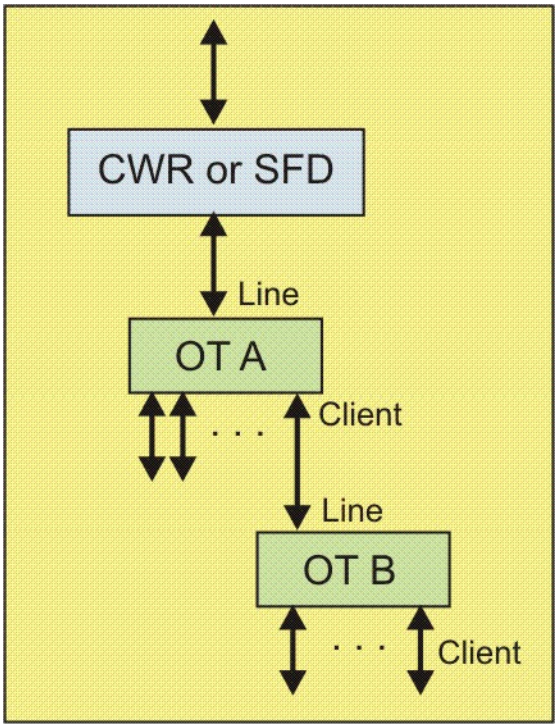
Cascaded OT configurations are not supported for the PSS-16 shelf, but software does not preclude them.

OT cascade configurations

Cascaded OTs are supported as shown in the following figure.

Note: Multiple “OT B”s may be connected to an “OT A”, and each “OT B” need not be the same card type.

Figure 17-150 OT cascade configuration example



Supported OTs

The following table identifies cards that support symmetric configurations, where the OTs are cascaded on both the A-end and Z-end of a service:

Table 17-28 Cascaded OTs

OT A Client port	OT B Line port	Max. OT B's into OT A
11STMM10 OTU1	4DPA4	4
11DPM12 OTU1	4DPA4	4
11QPEN4 OTU2	11DPE12	4[1]
	11DPE12A	4[1]
	11DPE12E	4[1]
	11DPM12	4[2]
43SCX4 OTU2	11DPM12	4
43SCX4E OTU2	11DPM12	4
43STX4P OTU2	11DPM12	4
112SCX10	11DPE12, 11DPE12E, 11DPM12, 11OPE8, 11QCE12X, 11QPE24	10
112SNX10	11DPE12, 11DPE12E, 11DPM12, 11OPE8, 11QCE12X, 11QPE24 11QPEN4[3]	10
112SDX11	11QPA4*, 11QPEN4	10
130SCX10	1DPE12E, 11DPM12, 11OPE8, 11QCE12X, 11QPE24, 11QPA4*, 11QPEN4*	10
130SNX10	1DPE12E, 11DPM12, 11OPE8, 11QCE12X, 11QPE24, 11QPA4*	10
	11QPEN4[3]	10

Notes:

1. This configuration provides encrypted transmission for GbE services.
2. This configuration provides encrypted transmission for GbE and FC100/FC200/FC400 services.
3. Not supported with the 11QPEN4 FC1200 client port. 10GFC and DDR clients are not supported.

4. *10GFC and DDR clients are not supported.

Cascade support details

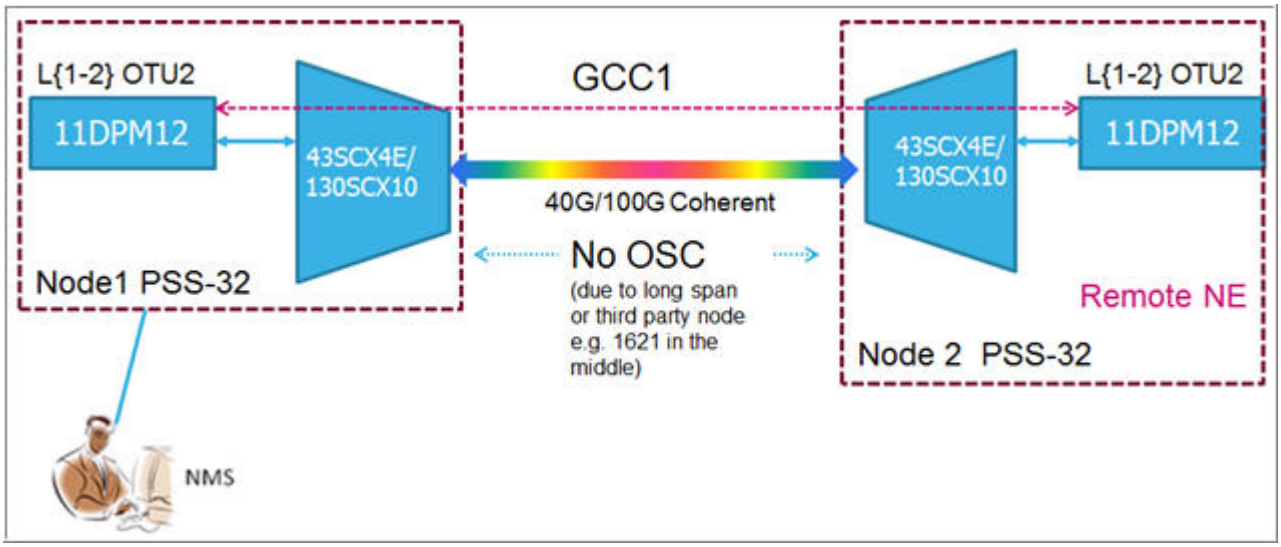
Cascaded OT configuration are supported as follows:

- An internal topological link is provisioned between the OT A client port and the OT B line port.
- The cross-connect terminates on the OT A line port. OT B is not included in a cross-connect.
- There is no wave key encoding on OT B. So the eVOA port is not used.
- There is no alarm correlation between OT A and OT B.

11DPM12 cascade over 40G or 100G using GCC1 for nodal communication

To remotely manage a far-end equipment, starting from Release 7.0, 11DPM12 cascade over 40G or 100G using GCC1 for nodal communication is supported. The 11DPM12 is cascaded to a coherent MUX card, (for example, 43SCX4 or 130SCX10) and use GCC1 inside ODU2 to remotely manage the far-end equipment. This configuration is managed and fully supported by the NMS.

Figure 17-151 GCC1 Transmission configuration



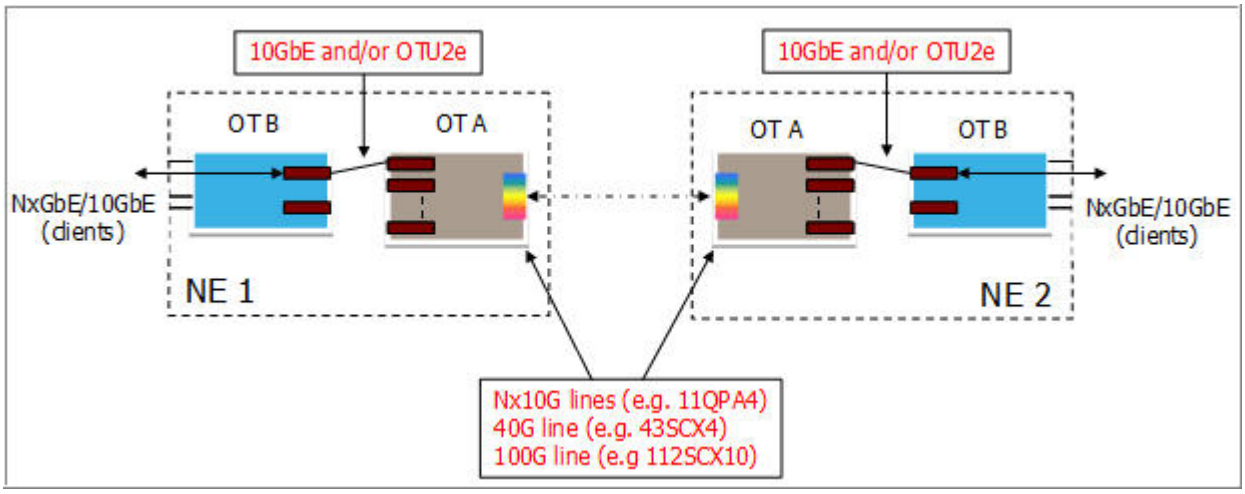
In the Transmission configuration as shown in Figure 17-151, “GCC1 Transmission configuration” (p. 17-183), Node 2 is remotely managed through GCC1. Wavekey information is propagated on GCC1. All OAM & P support is validated across the GCC1. Since GCCn on 11DPM12 is already supported by the NE software, the validation of remote provisioning, monitoring, PM and log collection, alarm surveillance on Node 2 is done.

Note: The GCC1 function on 11DPM12 is independent with line-side FEC type of coherent cards. For example, it should not matter if the 130SCX10 is running in HDFEC mode or SDFEC mode.

Dual stage OT cascaded configuration

The following sections describe the Layer 2 cascaded OT configurations supported, starting from Release 7.0. For dual-stage OT cascading, a signal is added to an OT client port and multiplexed onto the higher bandwidth line port. The signal is then added to a second higher-rate OT and multiplexed to its line port. The reverse path is taken when the signal is dropped. The A-end and Z-end of the service are symmetrical (that is, OT A and OT B are the same on both ends of the service).

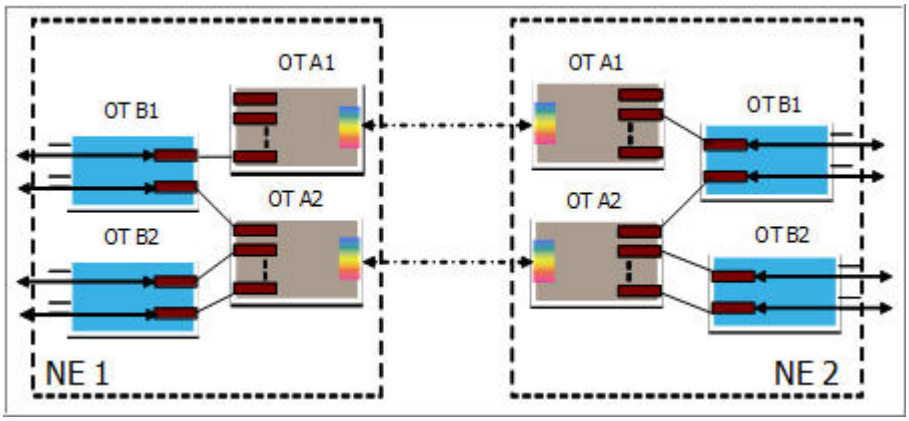
Figure 17-152 Configuration for cascaded dual stage OTs



The cascaded OT configuration is intended to be supported as follows:

- The OT A client port and OT B line port must be provisioned with the same rate and FEC type (where applicable).
- An internal topological link is provisioned between the OT A client port and the OT B line port.
- The cross-connect terminates on the OT A line port. OT B is not included in a cross-connect.
- There is no wave key encoding on OT B so the eVOA port, if present, is not used.
- There is no alarm correlation between OT A and OT B.
- Multiple ports from OT B or multiple OT Bs may be connected to the same OT A, as shown in the following Figure.

Figure 17-153 Configuration for cascaded dual stage OTs - Multiple OTs



The following are cascaded OT configurations supported in this release:

- 11QPE24 + 112SCX10/112SNX10: For this configuration, an 11QPE24 (OT B) line port is connected to a 112SCX10/112SNX10 (OT A) client port. Up to 10 11QPE24 OTs may be connected to one 112SCX10/112SNX10.
- 11QPE24 + 130SCX10/130SNX10: For this configuration, an 11QPE24 (OT B) line port is connected to a 130SCX10/130SNX10 (OT A) client port. Up to 10 11QPE24 OTs may be connected to one 130SCX10/130SNX10.
- The 11DPE12E line port is connected to a 130SCX10 client port. Up to 10x10G line ports from the same or different 11DPE12E OTs may be connected to one 130SCX10.

In-line amplifier (ILA)

Introduction

Although there is no specific “type” for a particular node, such as In Line Amplifier (ILA) or TOADM, a node's configuration is determined by its topological interconnections. A node acts as an in-line amplifier if its topological links are configured to include one or more amplifiers with no CWR or SFD/SFC cards. A node acts as a TOADM if CWR cards are included in its topological configuration.

ILA node

An ILA amplifies the optical channels and terminates the OSC for two optical lines. The ILA consists of two LDs with optional Raman amplifiers, and the necessary DCMs, power, and control cards in a standard shelf.

The following amplifiers can be used in an ILA configuration:

- Unidirectional:
  - AM2125A - High power (+21 dBm), 25 dB gain optical amplifier with mid-stage access
  - AM2125B - High power (+21 dBm), 25 dB gain optical amplifier with no mid-stage access
  - AM2318A - Variable low gain amplifier with no mid-stage access
  - A2P2125 - Hybrid 2 pump Raman/EDFA amplifier
  - AM2032A - Variable gain amplifier with no mid-stage access
  - AM2625A - Variable high gain amplifier with no mid-stage access
- Bidirectional
- ALPHG (Low Power High Gain Amplifier) - Provides 10 to 30 dB of gain, with flat (tilt within ±0.5 dB) outputs available over a gain range of 10-23dB, with mid-stage access.
- AHPHG (High Power High Gain Amplifier) - Provides 13 to 33 dB of gain, with a flat gain range of 13 to 26 dB, with mid-stage access.
- AHPLG (High Power Low Gain Amplifier) - Provides 6 to 24 dB of gain, with a flat gain range of 6 to 17 dB, and mid-stage access.
- A2325A (23 dBm variable gain amplifier) - Used for span losses between 13 dB to 24 dB with an extend span loss range from 24 dB to 31 dB, with mid-stage access

An RA2P is optional on each line of an ILA. A WTOCM/WTOCMA is also optional on an ILA. However, an RA2P cannot be used before an A2P2125. See the *Alcatel-Lucent 1830 Photonic Service Switch (PSS) Release 8.2 Engineering and Planning Tool User Guide* for further information.

Note: For information on ILA nodes using the Alcatel-Lucent 1830 PSS-1 AHP see the .

The following diagram illustrates an example of an ILA configuration. **Note:** The SIG OUT ports of both LDs are connected to the span.

Figure 17-154 ILA with bidirectional LDs and optional RA2Ps

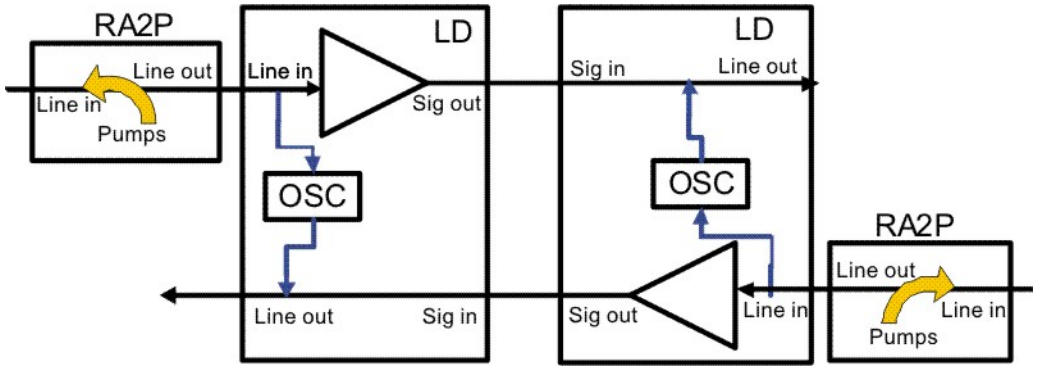
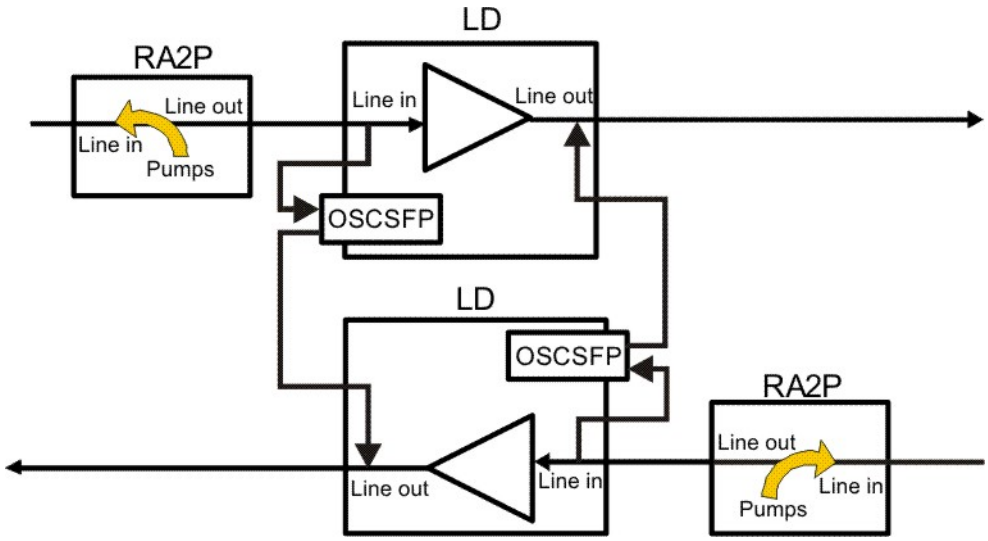


Figure 17-155 ILA-2: ILA with unidirectional LDs and optional RA2Ps



Unidirectional topology connection assignments

With unidirectional LDs, topology and port connection assignments are required. Manual external and internal topology assignments are required for the following LD ports

- AM2125A ingress LineIn and AM2125A egress LineOut
- AM2125B ingress LineIn and AM2125B egress LineOut
- RA2P LineIn and RA2P LineOut

  Note: OSC SFP and WTOCM/WTOCMA topology assignments are not required.

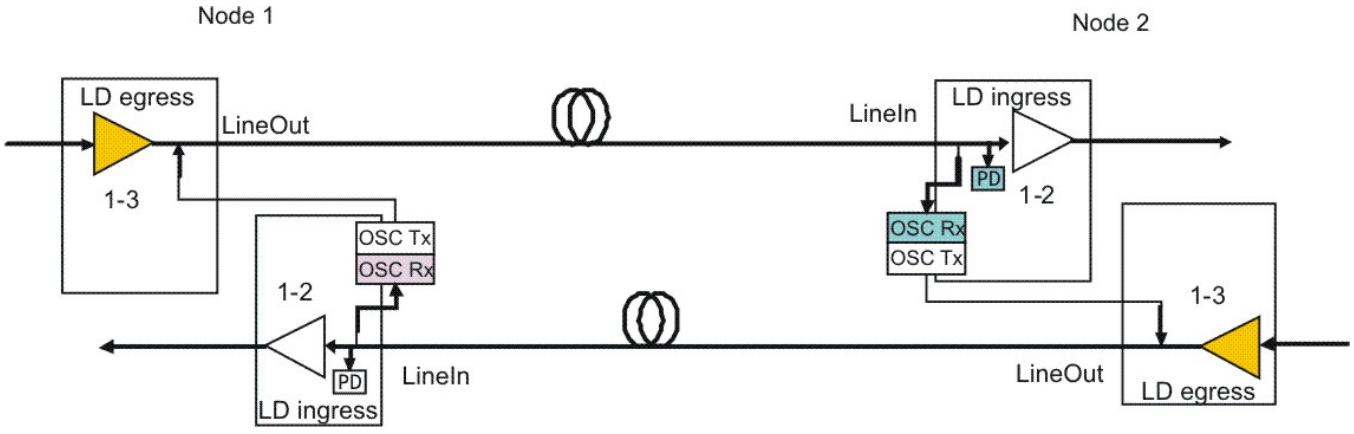
Note: AM2125A has DCM ports that need to be connected to DCM or looped back directly.

For topology using AM2125A or AM2125B as an example, users can assign the correct unidirectional external topology based on the following diagram.

- Node 1: 1-3 LineOut to Node 2: 1-2 LineIn
- Node 2: 1-3 LineOut to Node 1: 1-2 LineIn

Note: Delete the external topology first if both nodes have been connected to outside fiber plant.

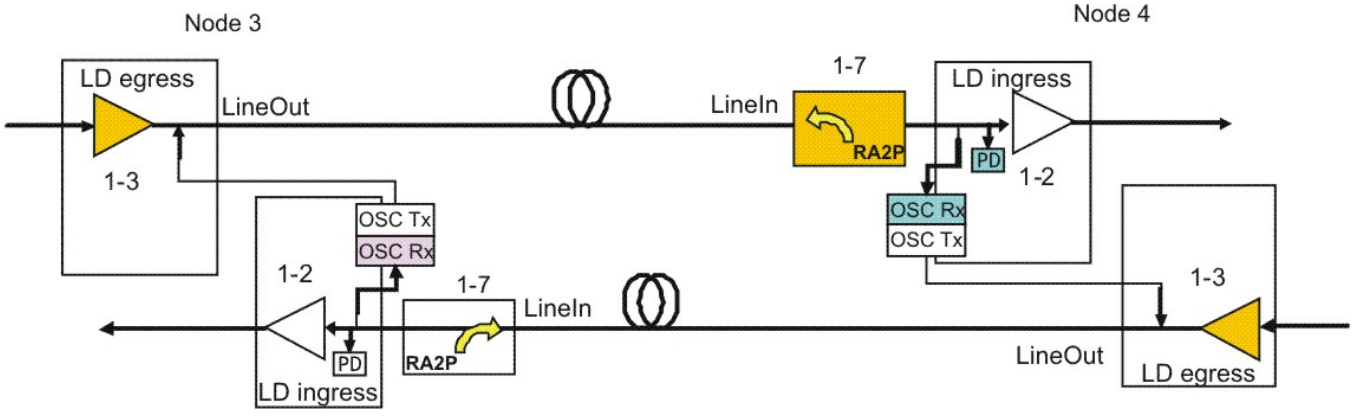
Figure 17-156 AM2125A/B topology assignments



For topology using AM2125A or AM2125B and RA2P as an example, users can assign the correct unidirectional external and internal topology based on the following diagram.

- External: Node 3: 1-3 LineOut to Node 4: 1-7 LineIn, Node 4: 1-3 LineOut to Node 3: 1-7 LineIn
- Internal: Node 3: 1-7 LineOut to 1-2 LineIn, Node 4: 1-7 LineOut to 1-2 LineIn

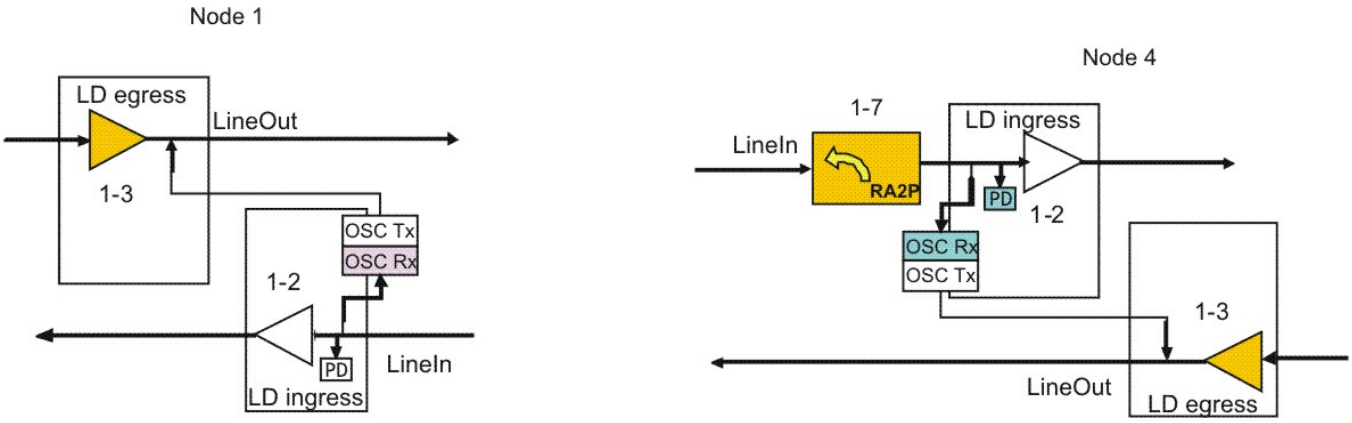
Figure 17-157 AM2125A/B topology assignments with RA2P



Line Driver opposing port connections need to be manually assigned. Assign the correct opposite port connections based on the following diagram.

- No RA2P: 1-3 LineOut to 1-2 LineIn
- With RA2P: 1-3 lineOut to 1-7 LineIn

Figure 17-158 LD opposing port assignments with and without RA2P



PSS-8 In-line Amplifier (ILA) configuration

An ILA is composed of two bidirectional LD or two unidirectional LDs.

The following LD cards are supported on PSS-8 ILA configuration:

- AM2125A
- AM2318A
- AM2625A
- AM2032A
- AHPHG
- AHPLG
- RA2P

RA2P is optional on each line of ILA.

PSS-8 has up to four full slots for LD, so one shelf can cover most case of ILA scenarios.

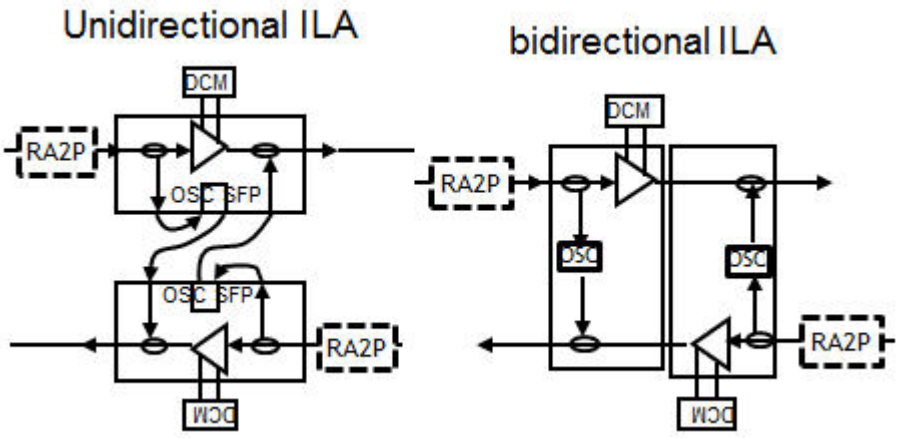
Table 17-29 Valid LD combinations for ILA node

Raman Amp	Ingress LD	Egress LD
None	AHPHG	None
None	AHPLG	None
None	AM2032A	None

Table 17-29 Valid LD combinations for ILA node (continued)

Raman Amp	Ingress LD	Egress LD
None	AM2125A	None
None	AM2318A	None
None	AM2625A	None
RA2P	AHPHG	None
RA2P	AHPLG	None
RA2P	AM2032A	None
RA2P	AM2125A	None
RA2P	AM2318A	None

Figure 17-159 ILA composed on Unidirectional amplifier and bidirectional amplifier



Single-fiber bi-directional nodes

Bidirectional CWDM overview

Some applications require bidirectional transmission over a single fiber. A Alcatel-Lucent 1830 PSS-32 or Alcatel-Lucent 1830 PSS-16 FOADM CWDM node can be configured to support such an application using CWDM filters. Each bidirectional transmission requires different CWDM wavelengths in each direction.

This is accomplished with 2 fiber connections (transmit and receive) from the OT to two adjacent wavelength connections on the MUX (in) side of the filter. The wavelengths pass between the MUX side of the filter and the OMD out port in both the receive and transmit directions. The single fiber connected to the OMD out port carries signals in both directions on their assigned wavelengths.

Bidirectional transmission over a single fiber is supported with any of the following filters and OTs:

- SFC2 (A, B, C, or D)
- SFC4 (A or B)
- SFC8
- 4DPA4
- 4DPA2
- 11STAR1
- 11STMM10

Configurations

An Alcatel-Lucent1830 PSS FOADM CWDM node can be configured to support the following CWDM bidirectional configurations:

- Single-Fiber Bidirectional Terminal Node (1830 PSS-32/1830 PSS-1)
- Single-Fiber bidirectional 2-Degree OADM Node, Symmetrical (1830 PSS-1)
- Single-Fiber bidirectional CWDM-DWDM regeneration (1830 PSS-32)

Single-fiber CWDM bidirectional terminal node

Single-fiber bidirectional transmission is supported in a terminal (1-degree) OADM configuration using a single CWDM filter. Any of the supported filters may be used as illustrated in the following illustrations.

Figure 17-160 Line terminal with SFC2 filter

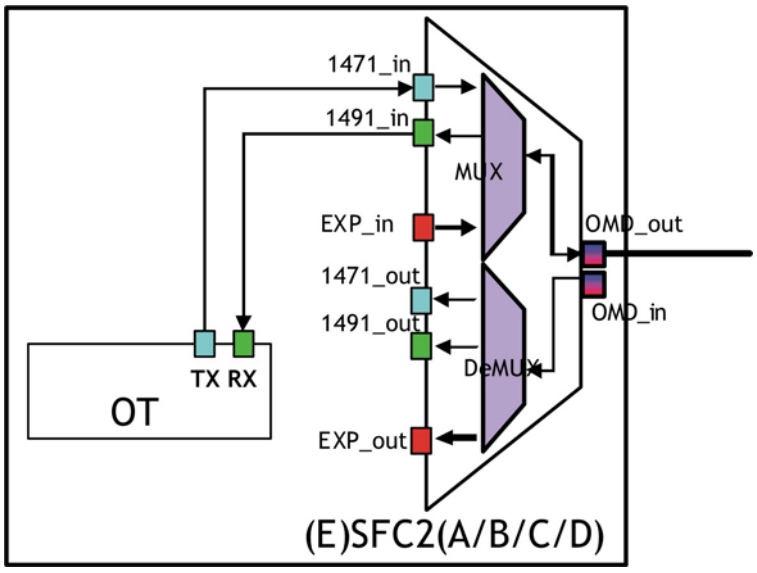


Figure 17-161 Line terminal with SFC4 filter

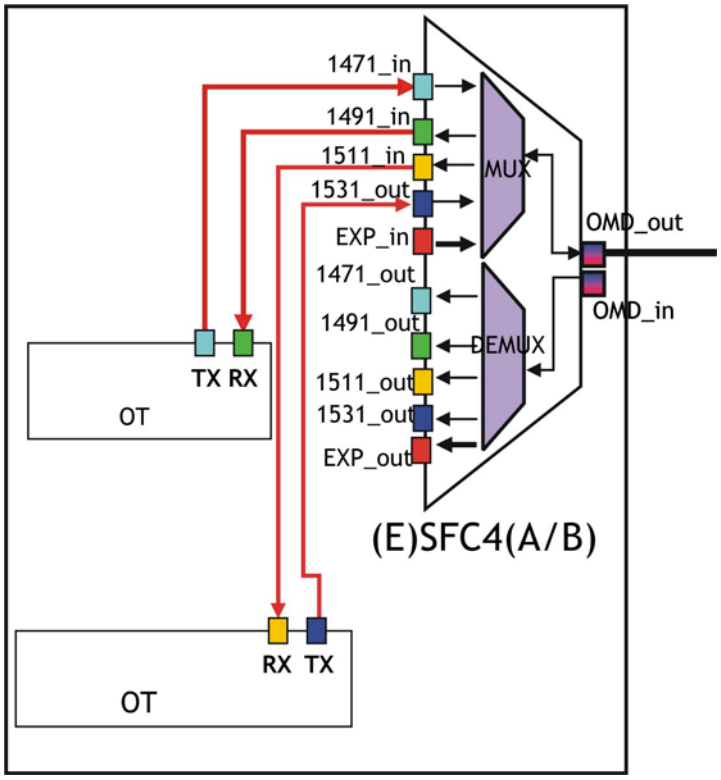
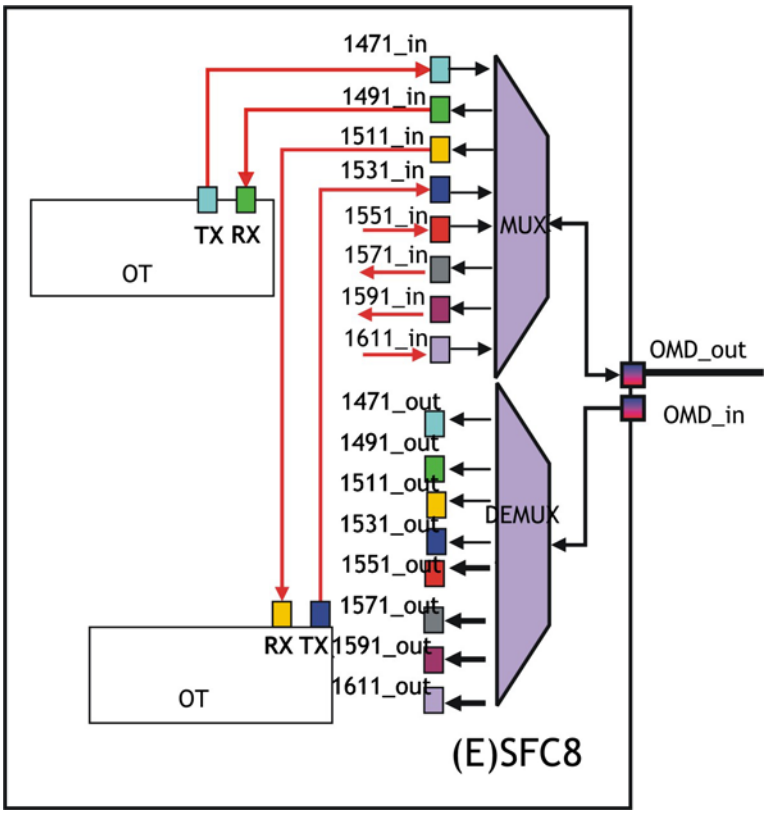


Figure 17-162 Line terminal with SFC8 filter

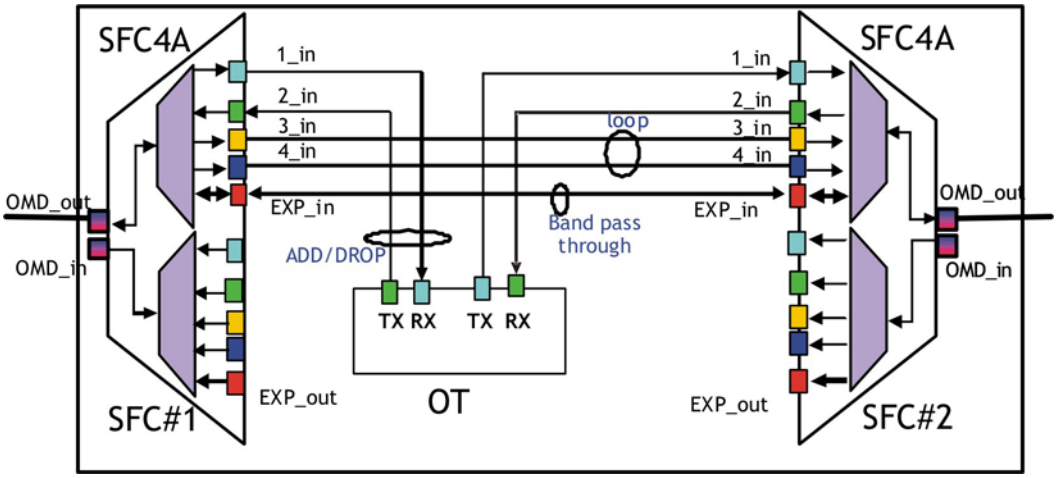


With SFC4 and SFC8 filters, receive and transmit channels must be specially arranged to reduce the crosstalk. A channel selected for one direction (receive or transmit), must not have both adjacent channels selected for the same direction. For example, a correct channel arrangement is shown above for SFC8 single-fiber configuration: 1471 Tx, 1491 Rx, 1511 Rx, 1531 Tx, 1551 Tx, 1571 Rx, 1591 Rx, 1611 Tx.

Single-fiber CWDM bidirectional 2-Degree OADM node, symmetrical

The 1830 PSS-32 and 1830 PSS-1 support single-fiber bidirectional transmission for a 2-degree OADM configuration, where two identical CWDM filters are used. The supported SFC types are (E)SFC2 and (E)SFC4. Band pass-through and channel loop connections are allowed in this node.

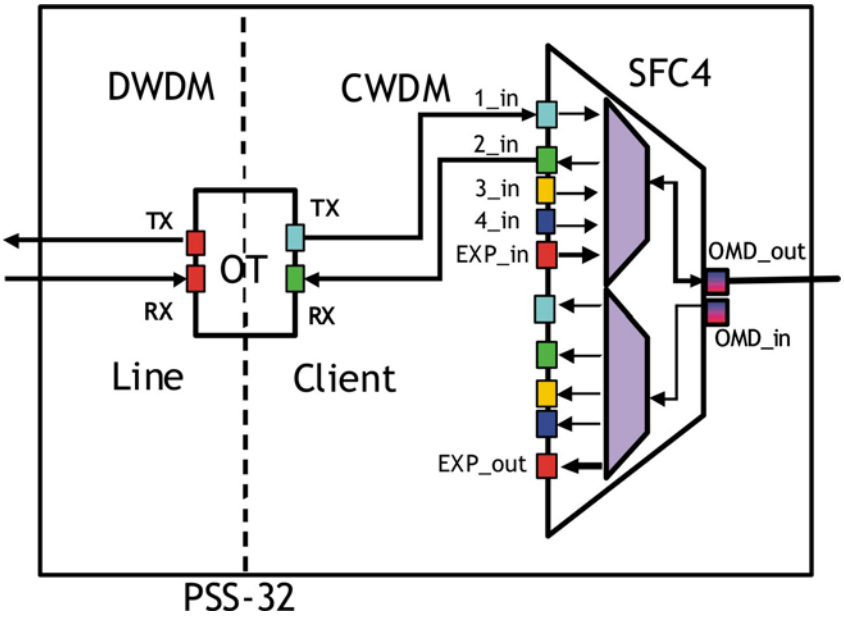
Figure 17-163 Single-fiber bidirectional 2-degree OADM



Single-fiber CWDM bidirectional to dual-fiber DWDM regeneration

Bidirectional DWDM operation is not supported. However, configuration for CWDM bidirectional transmission with CWDM-DWDM (dual-fiber) regeneration is supported, where regeneration OTs are equipped. The supported SFC types are SFC2, SFC4 and SFC8. Unidirectional connections are supported on the OT client ports, as shown in the following figure.

Figure 17-164 Single Fiber bidirectional CWDM-DWDM regeneration



Inventory configurations

Configurations and connections for 100GHz networks

Supported inventory connections for nodes with 100 GHz channel spacing is shown in the following figures.

Note: An OSCT card may be used in place of the LD card for FOADM configurations.

Figure 17-165 44-channel TOADM

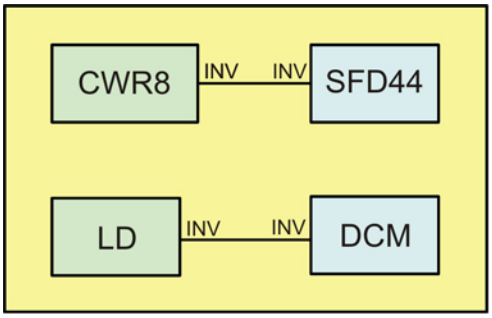


Figure 17-166 FOADM/DCM/SFD40/SFD44

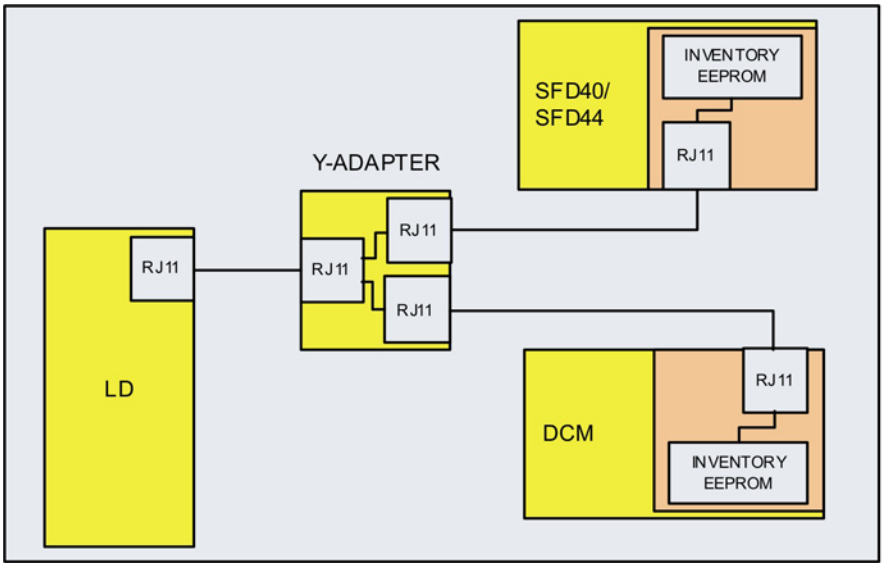


Figure 17-167 FOADM without DCM on LD

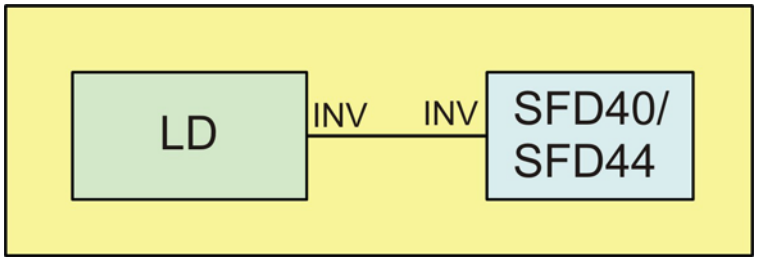


Figure 17-168 FOADM without SFD40/SFD44

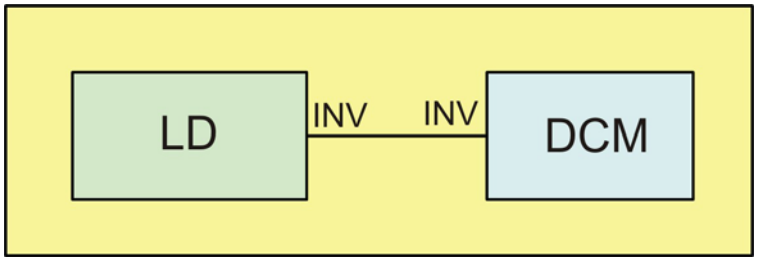
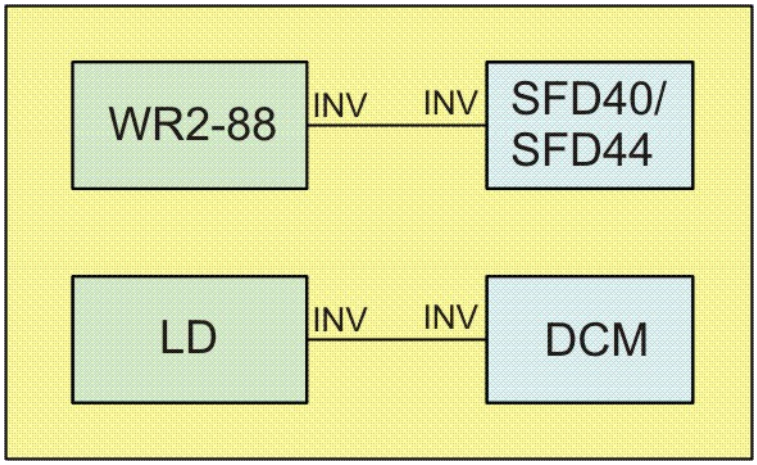


Figure 17-169 44-channel ROADM



Configurations and connections for 50GHz networks

Because SFD40, SFD40B, SFD44, SFD44B, DCM and ITLB and ITLU modules EEPROM data is read by other cards, the electrical connections for these modules must be cascaded. LD, WR2-88, WR8-88A, WR8-88AF and CWR8-88 cards support daisy chaining. (CWR8 does not support daisy chaining.)

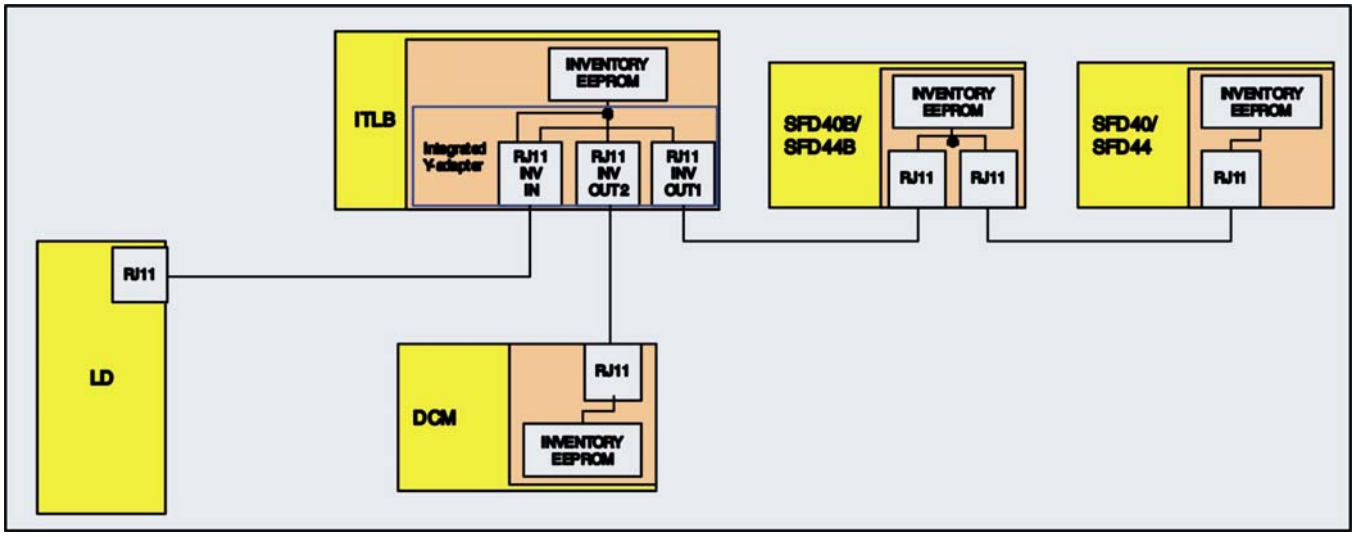
The SFD40, SFD40B, SFD44B ITLB and ITLU have multiple inventory ports to facilitate daisy chaining. However, the SFD44 and DCM only have one inventory port, and so can only be at the ends of the daisy chain. CWR8-88 hardware will only support a daisy chained device that is attached to INV OUT1. There is no electrical connection between the CWR8-88 driver and any device attached to INV OUT2.

Note: The WTOCM/WTOCMA card also has an inventory connector for reading the EEPROM data from the modules noted above. None of the configurations required currently need the additional connectivity this extra inventory port offers, therefore its usage is not required.

Note: An OSCT card may be used in place of the LD card for FOADM configurations.

There are many possible combinations of inventory configurations. The following will be supported by EPT and verified by SVT.

Figure 17-170 FOADM with DCM, SFD40/SFD44, SFD40B/SFD44B



Note: An OSCT card may be used in place of the LD card for FOADM configurations.

Figure 17-171 FOADM without a DCM on the LD

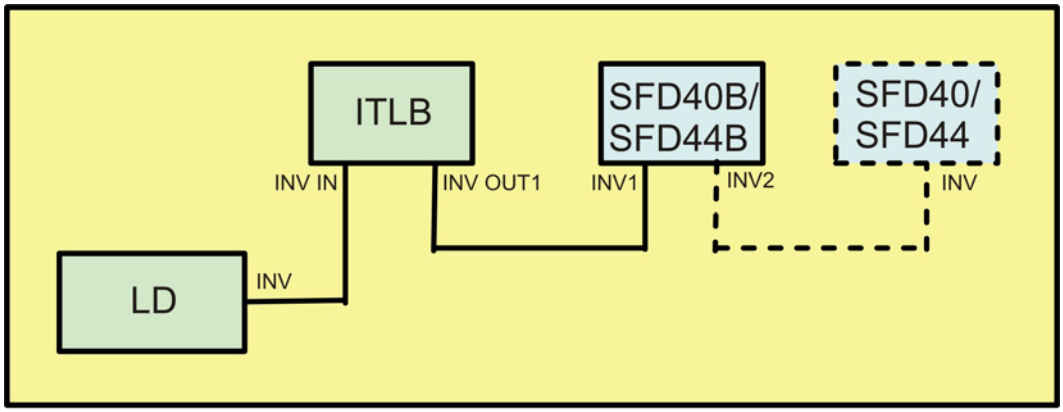


Figure 17-172 FOADM without a DCM or SFD40B/SFD44B

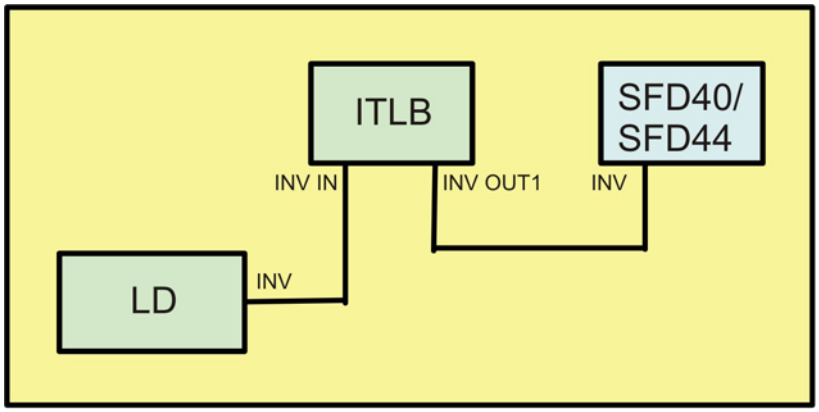


Figure 17-173 88-channel TOADM with optional SFD44

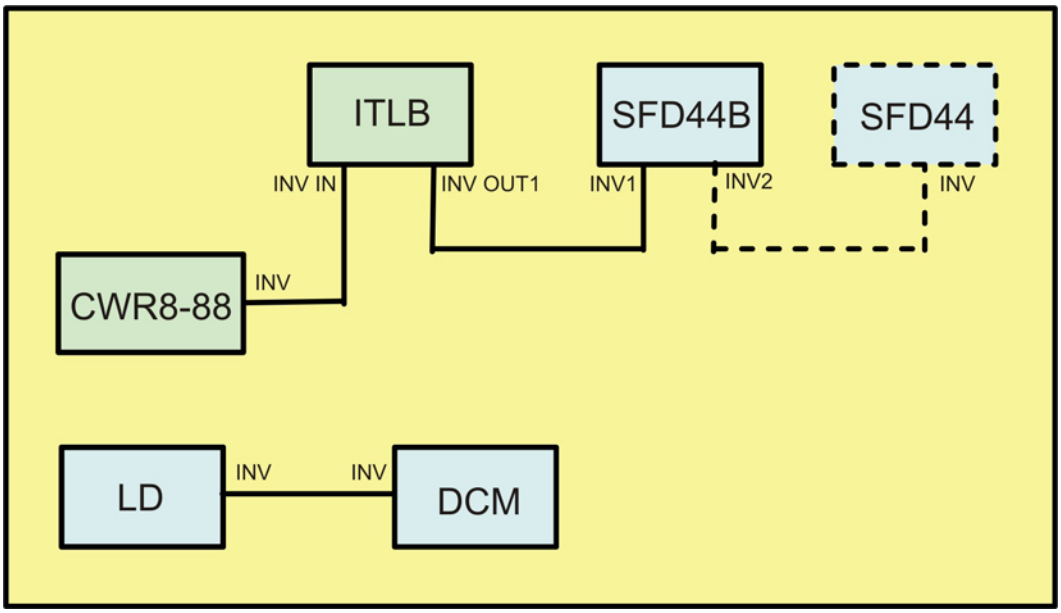


Figure 17-174 88-channel TOADM without SFD44B

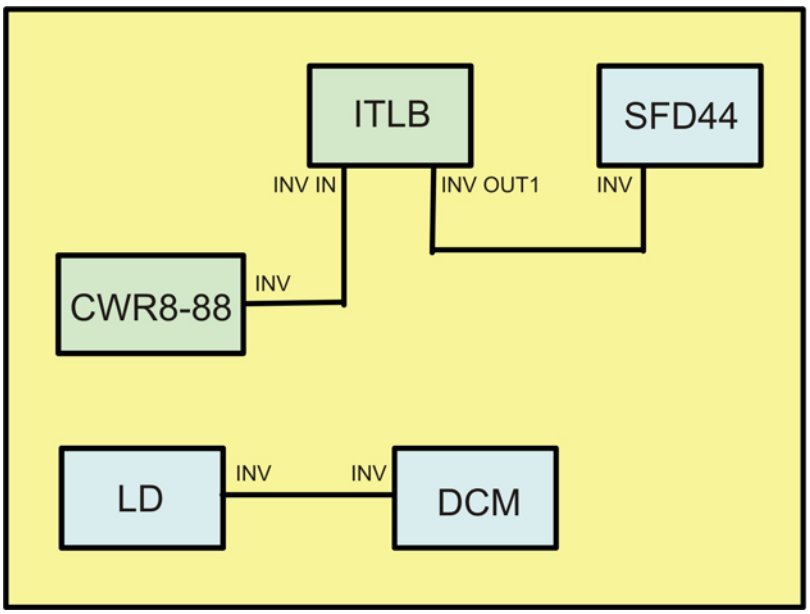


Figure 17-175 WR2-88 with optional SFD40/SFD44

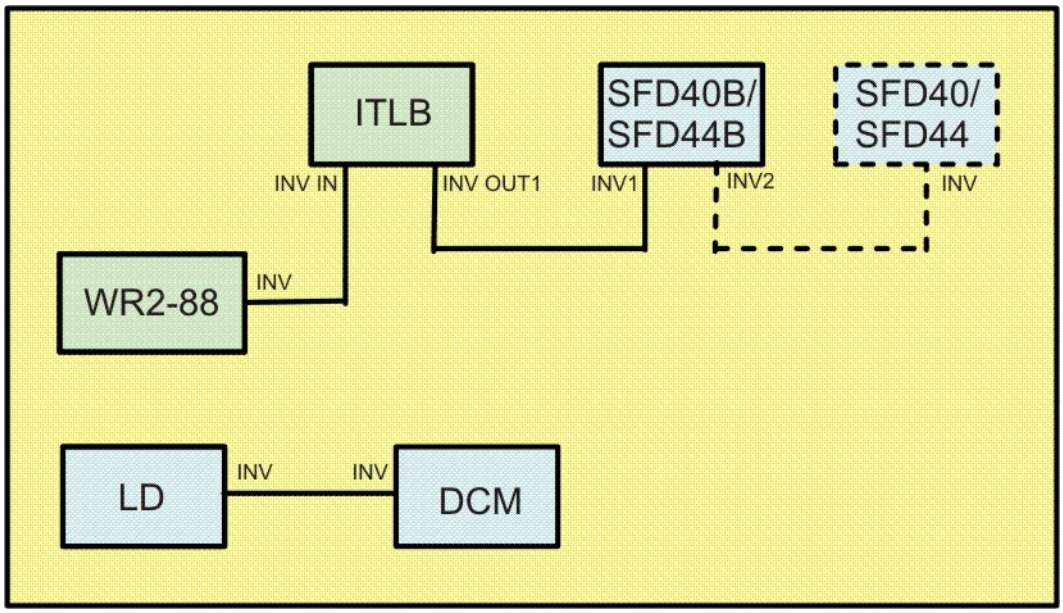


Figure 17-176 WR2-88 FOADM without SFD40B/SFD44B

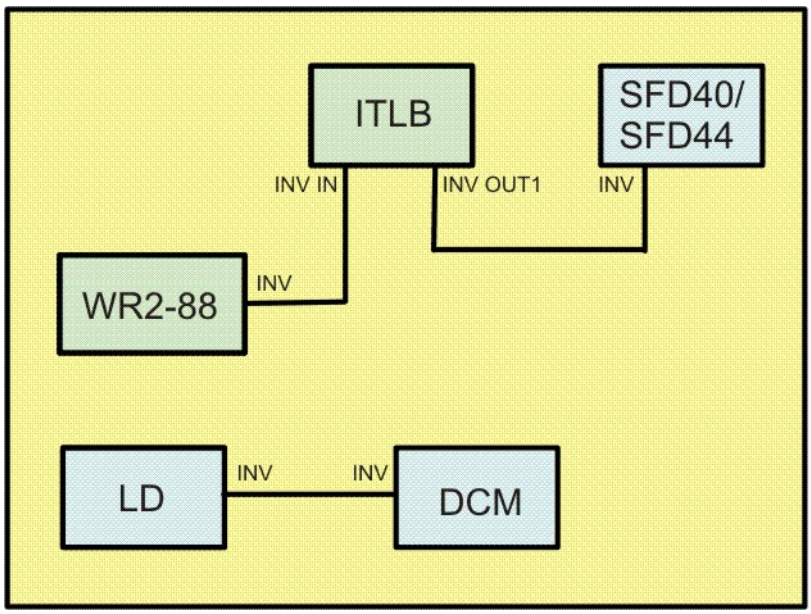


Figure 17-177 WR8-88A with optional SFD44

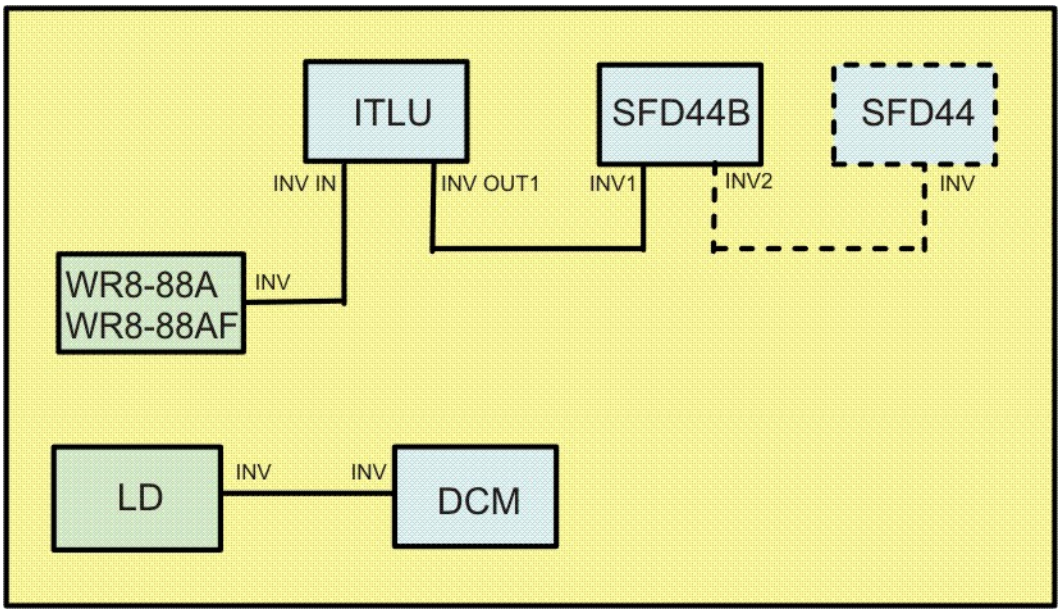
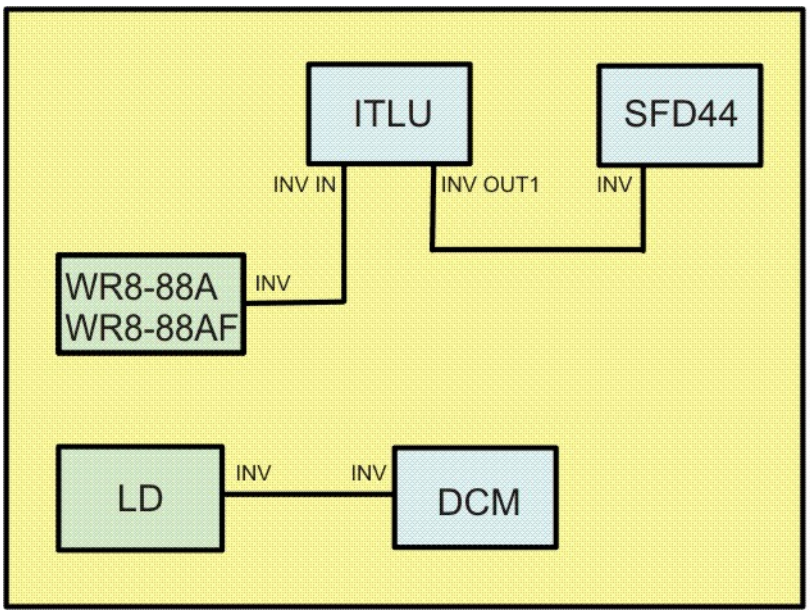


Figure 17-178 WR8-88A without SFD44B



Note: The maximum distance between the inventory port at the LD/WR faceplate and the location of the furthest inventory port is 40m.

Inventory connectivity with iROADM nodes

The supported inventory connections for iROADM nodes is shown in the following figures.

Figure 17-179 Inventory connectivity - iROADM with DCM

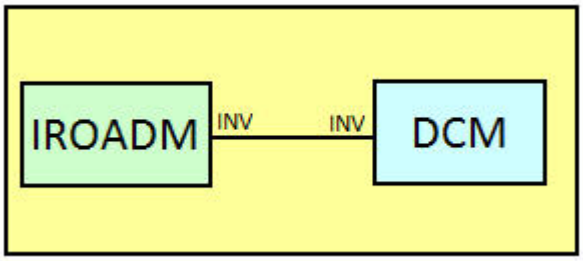


Figure 17-180 Inventory connectivity - iROADM with SFD44

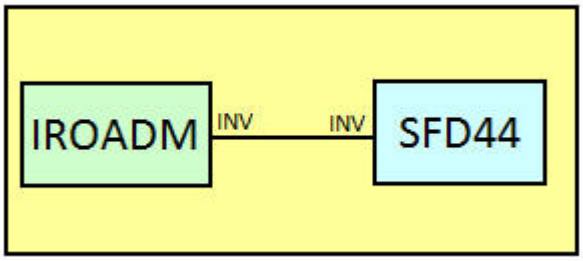


Figure 17-181 Inventory connectivity - iROADM with DCM and SFD44

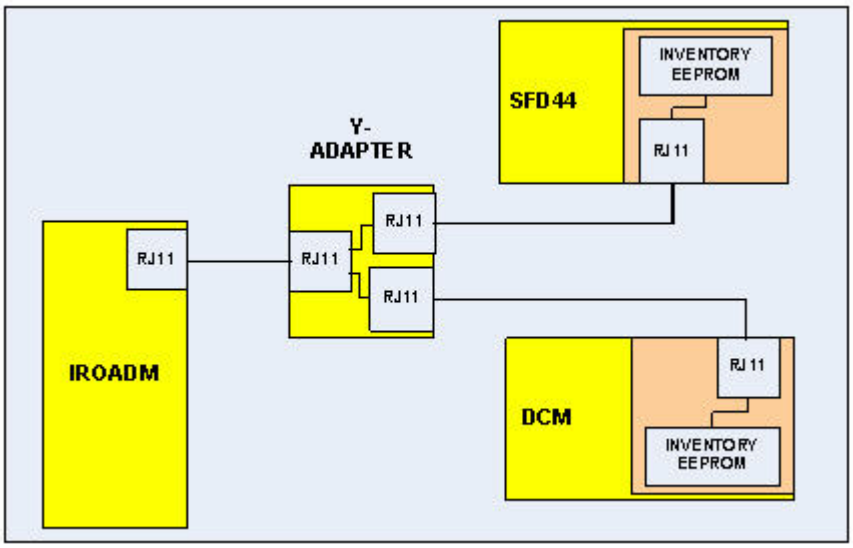


Figure 17-182 Inventory Connectivity - iIROADM with ITLB+SFDs and no DCM

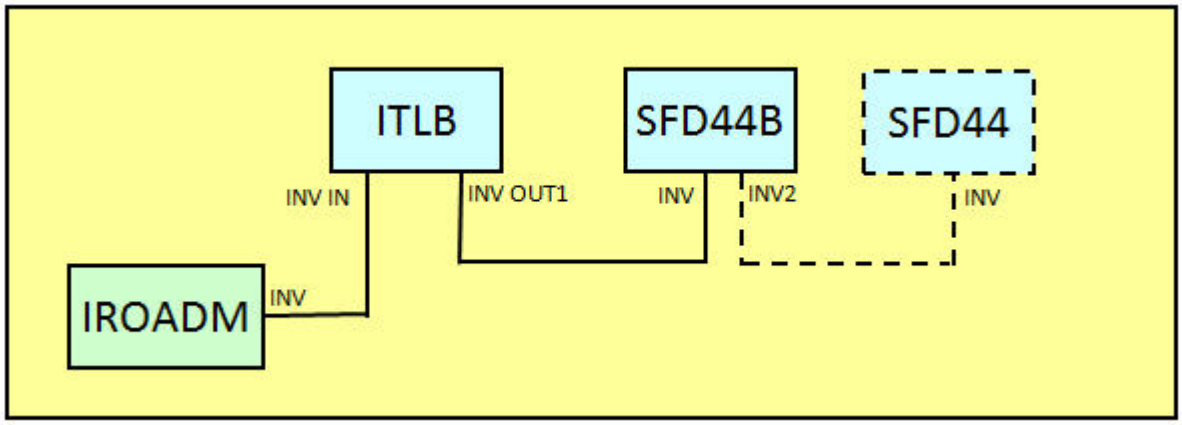
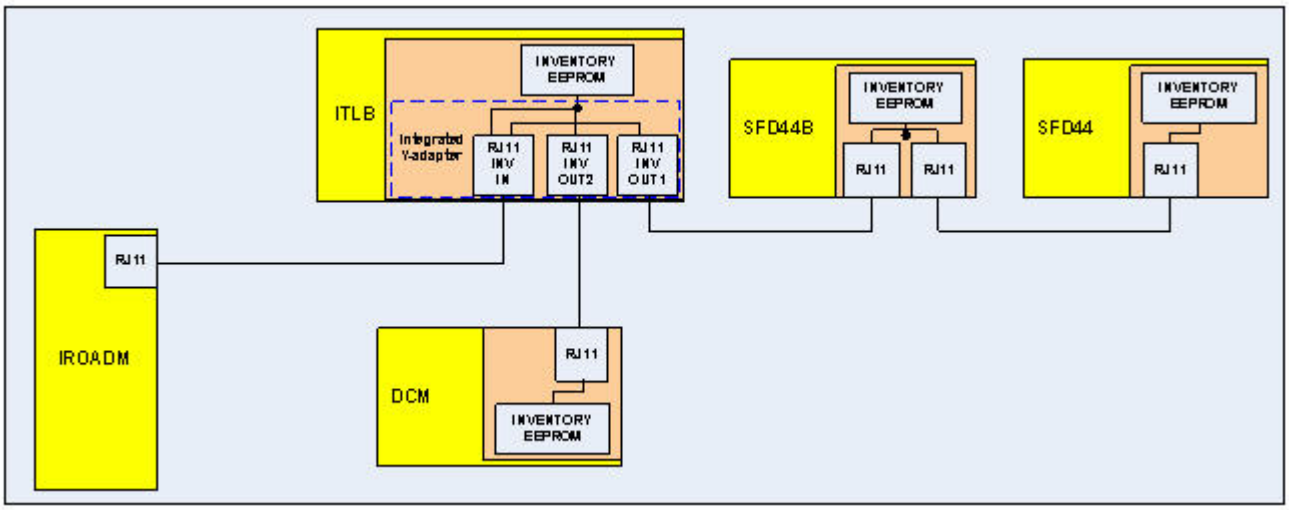


Figure 17-183 Inventory Connectivity - iROADM with ITLB+SFDs and DCM



The supported inventory connectivity for WR20-TF ROADM nodes is shown in the following figures.

Note: Since the WR20-TF ROADM configuration supports up to 4 PSC1-6 modules, the ability to daisy chain the electrical connections of these modules is required. The PSC1-6 module has 2 inventory ports to facilitate daisy chaining.

Figure 17-184 Inventory Connectivity - WR20-TF with PSC1-6

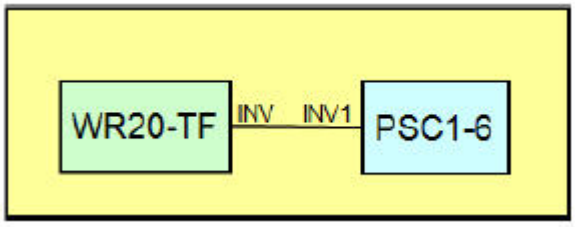
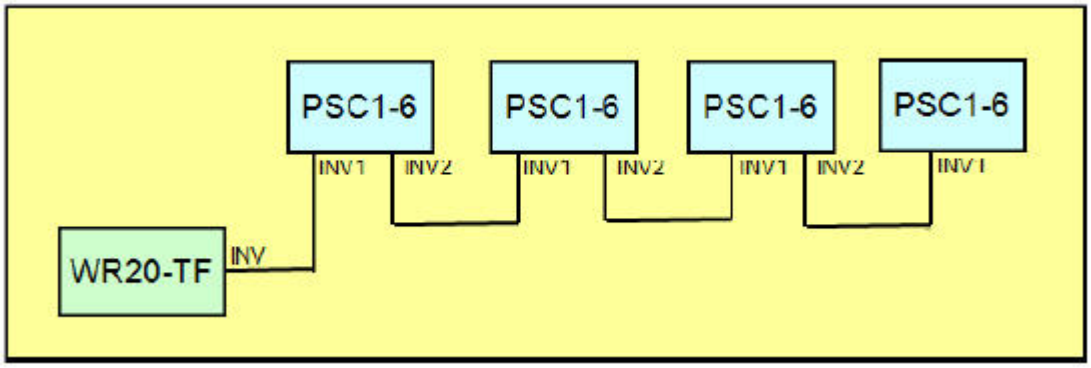


Figure 17-185 Inventory Connectivity - WR20-TF with multiple PSC1-6s



Mate port backplane support

Overview

The data cards support backplane connectivity to provide protection across two adjacent cards.

The following data cards support this functionality:

- 11OPE8
- 11QCE12X

The following are the valid OT slot pairs for the mate port backplane connectivity.

Table 17-30 slot pairs for backplane connectivity

PSS-32 Universal Shelf	
OT#1	**OT#2**
Slot 2	Slot 3
Slot 4	Slot 5
Slot 6	Slot 7
Slot 8	Slot 9
Slot 10	Slot 11
Slot 12	Slot 13
Slot 14	Slot 15
Slot 16	Slot 17

Variable Attenuator Cards in OADM configurations

Overview

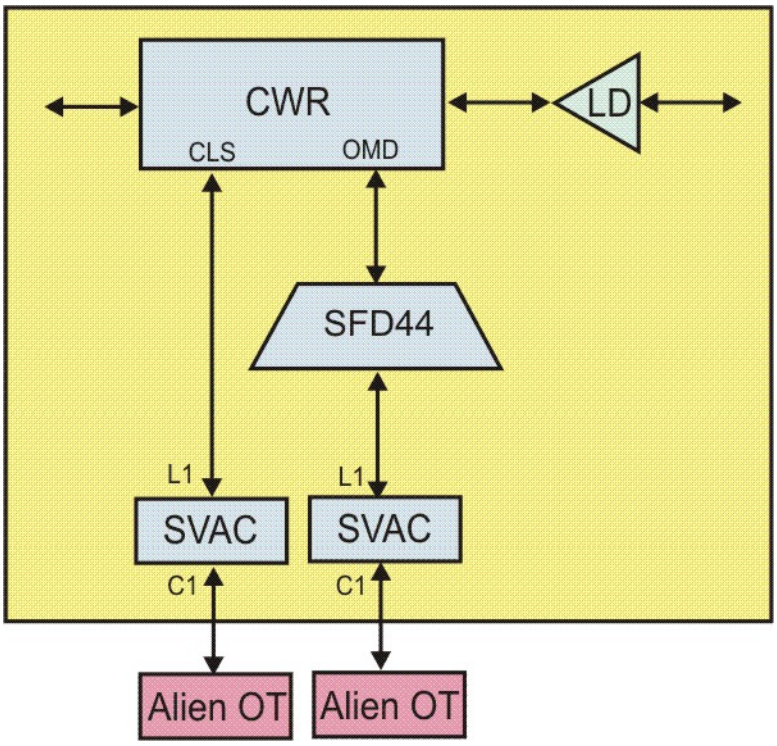
Variable Attenuator Card (VAC) type packs are used to control the power level and insert WaveTracker keys onto optical signals from client equipment.

- The Single Variable Attenuator Card (SVAC) contains a fast optical VOA and WaveTracker encoder to condition a single alien wavelength to pass through a TOADM system. The SVAC is a bidirectional pack.
- The Multiple Variable Attenuator Card (MVAC/MVAC8B)
  - MVAC: contains an array of eight fast optical VOA and WaveTracker encoders to condition up to eight alien wavelengths to pass through a TOADM, ROADM, or FOADM system. The MVAC is a unidirectional pack.
  - MVAC8B: used for adding and dropping alien wavelengths. The MVAC8B supports 8 bidirectional line ports and 8 bidirectional client ports. Each line/client pair is independent of the other line/client pairs, so may connect to the same or different SFD/CWR/optical line. For a TOADM, it is recommended that a MVAC be connected to a SFD, though the software will not prevent a configuration where the MVAC is connected directly to a CWR colorless port.

SVAC cards

An SVAC is used to add or drop alien wavelengths. Although an SVAC could be connected directly to a CWR colorless port, in a TOADM, configuration it is recommended that an SVAC be connected to an SFD.

Figure 17-186 SVAC in TOADM



MVAC cards

An MVAC is used for adding and dropping alien wavelengths. Although an MVAC could be connected directly to a CWR colorless port, in a TOADM, configuration it is recommended that an MVAC be connected to an SFD.

Figure 17-187 MVAC in TOADM

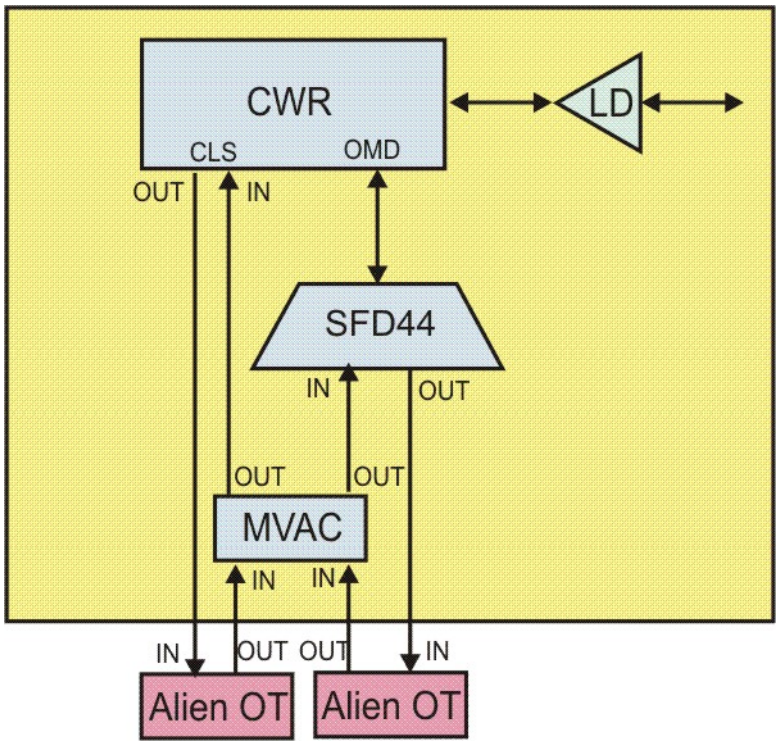


Figure 17-188 MVAC8B in TOADM

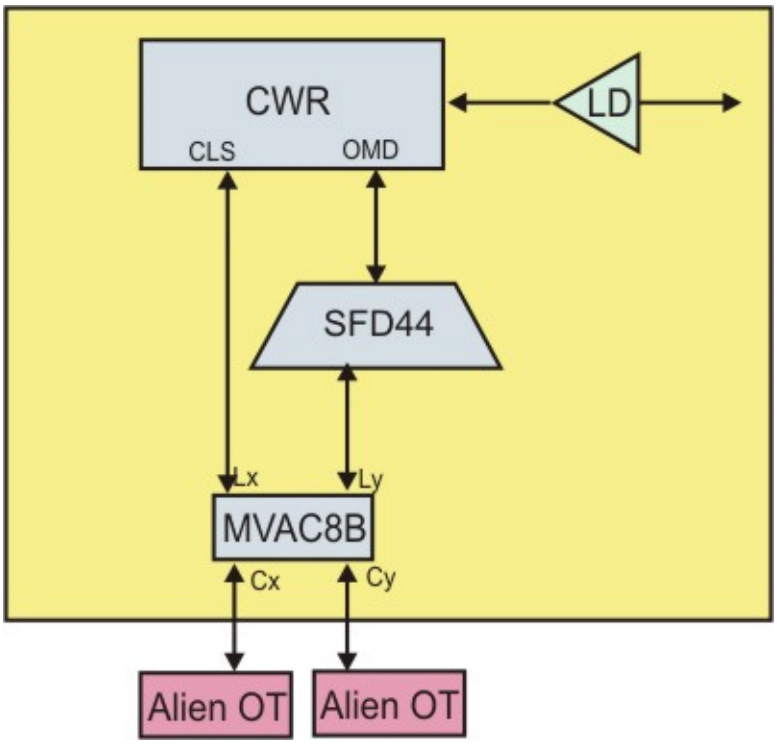


Figure 17-189 MVAC in FOADM

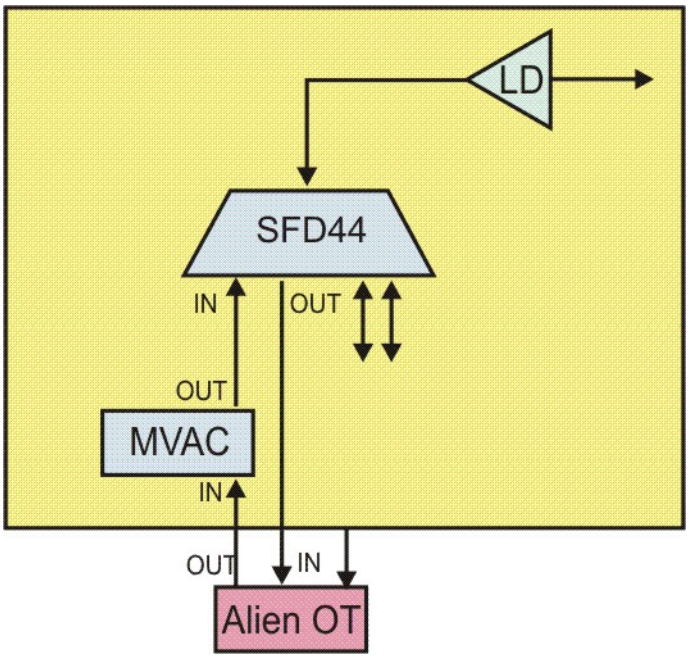


Figure 17-190 MVAC8B in FOADM

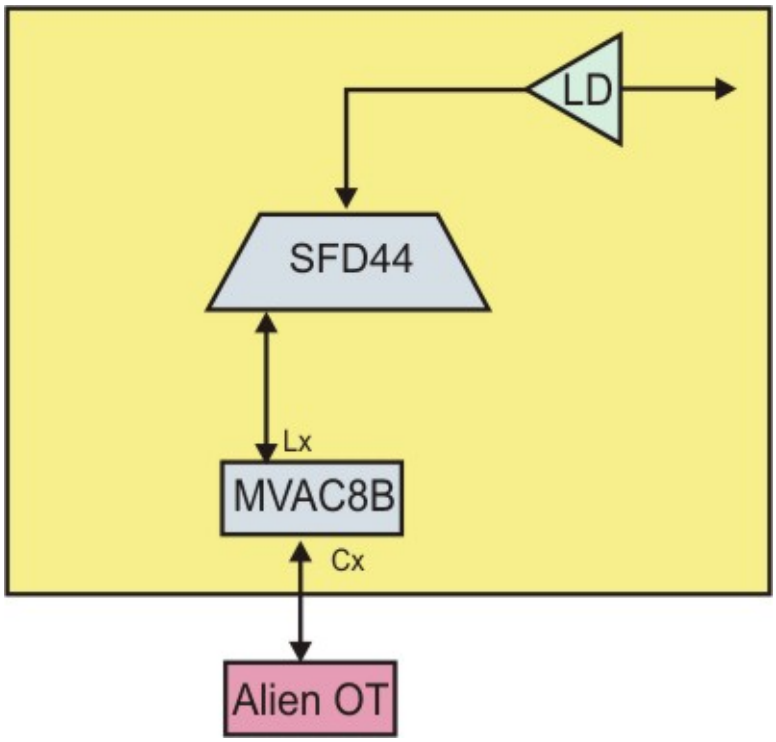


Figure 17-191 MVAC in ROADM

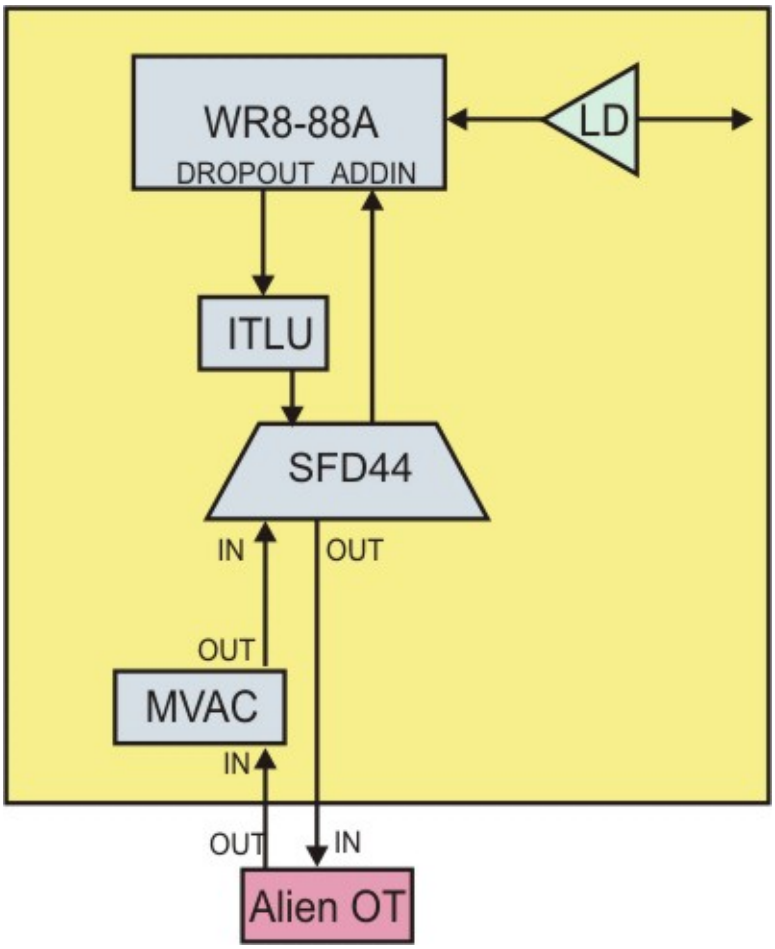
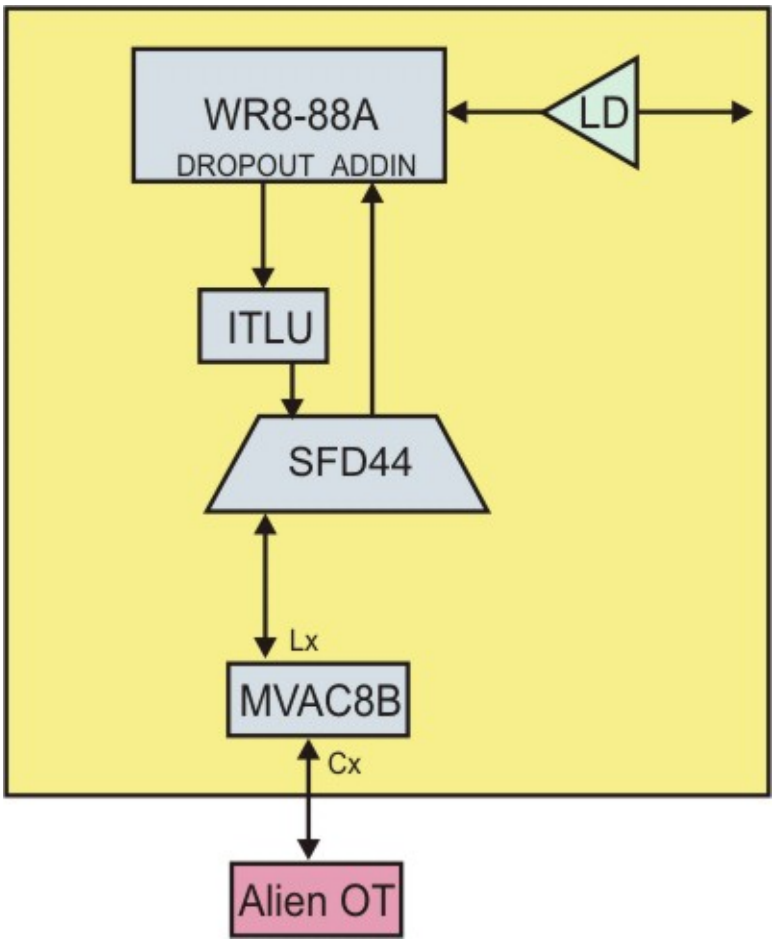


Figure 17-192 MVAC8B in ROADM



MVAC configurations under attenuation mode

In R6.0.6, MVAC card ports G{1-8} can be configured to Attenuation mode. In this mode slow VOA are used to add additional optical power margin in the receiver end of fiber link. Under attenuation mode the slow VOA's attenuation can be set from 0 to 10 dB in 0.1 dB steps.

An MVAC, equipped with slow VOA for additional optical power margin, is supported in the following NE node types:

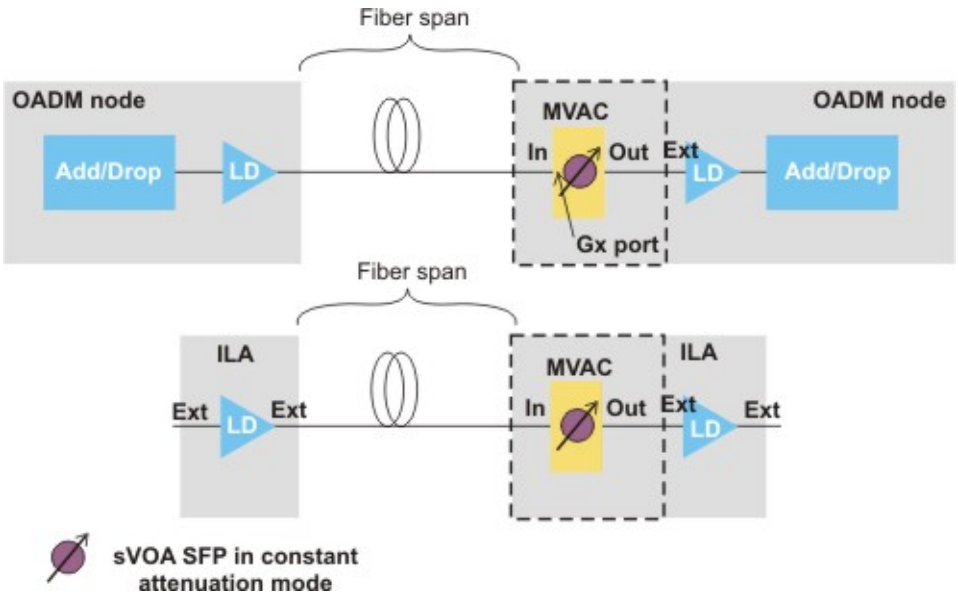
- FOADM
- ROADM
- TOADM
- ILA

MVAC G ports, equipped with slow VOA, are connected in front of an ingress LD, the following LDs are supported as an associated ingress LD:

- AHPHG
- AHPLG
- A2325A
- AM2125A
- AM2125B

Figure 17-193, “MVAC configuration under attenuation mode ” (p. 17-213) illustrates the configuration for an MVAC when used under attenuation mode for Line power margin. Only Unidirectional LDs are shown, but the same principal applies for bidirectional LD types.

Figure 17-193 MVAC configuration under attenuation mode



Note: The VOA is only connected in front of the ingress LD, regardless of the egress LD type.

The use of MVAC under the attenuation mode has the following impacts:

- Link span loss

  The slow VOA has upto 2.5dB intrinsic insertion loss within 1525nm to 1570nm, which means even the attenuation of VOA is set to 0dB, the fiber link will still have up to 2.5dB loss added in the end from channel perspective.

- OSC SFP module planning

Similar to additional insertion loss in the C-band, adding a slow VOA at the end of fiber link will introduce up to 2.8 dB of intrinsic insertion loss for the 1510nm band. Because the attenuation accuracy of the 1510nm band is +/-1.6dB, once a slow VOA is placed as an additional span loss margin, the OSC SFP span loss will be as shown in Table 17-31, “OSC SFP span loss for attenuation mode” (p. 17-214).

Table 17-31 OSC SFP span loss for attenuation mode

OSC SFP	Span loss range (dB)[1]
Short reach	1 - 13
Long reach	8- 23
Ultra-long reach	11 - 30
Extended ultra-long reach	12 - 37

Notes:

1. Span loss is measured at 1545nm, and does not include slow VOA.

Long Haul Wavelength Tracker (WTOCM/WTOCMA) configurations

WTOCM/WTOCMA LD support and configurations

The following descriptions of WTOCM support include both WTOCM and WTOCMA cards. Except for the additional OSNR capabilities of the WTOCMA, both cards have similar capabilities and support the same configurations.

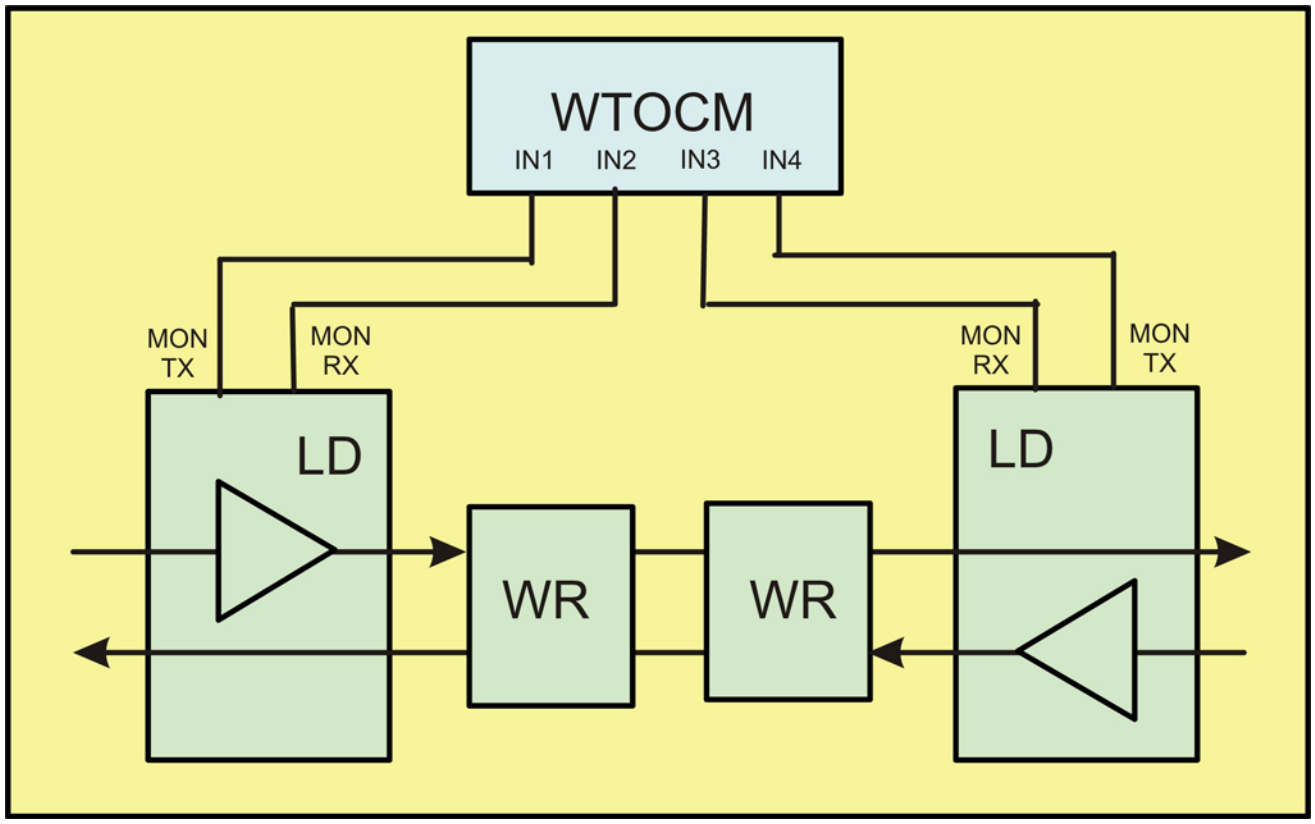
The WTOCM is supported with the following LDs:

- A2325A
- AM2032A
- AM2625A
- AHPHG
- AHPLG
- ALPHG
- AM2125A
- AM2125B
- AM2318A
- A2P2125

Bidirectional LDs

The WTOCM is connected to the external facing ingress LD on an optical line, as shown in Figure 17-194, “WTOCM/LD Connectivity with Bidirectional LDs” (p. 17-216). Each WTOCM can provide LH-WT for two LDs. The connectivity between the WTOCM IN port and LD MON RX or TX port will be specified as an attribute(s) on the WTOCM port (topological links are not created for this connection). The MON TX and RX ports on an LD must connect to the same WTOCM.

Figure 17-194 WTOCM/LD Connectivity with Bidirectional LDs



Unidirectional LDs

The WTOCM is connected to the external facing ingress LD and egress LD on an optical line, as shown in Figure 17-195, “ROADM WTOCM/LD connectivity with unidirectional LDs” (p. 17-217). Each WTOCM can provide LH-WT for four uni-directional LDs, or two uni-directional LDs and one bi-directional LD. The connectivity between a WTOCM IN port and a LD MON port will be specified as an attribute on the WTOCM port (topological links are not created for this connection). The MON ports for each LD on an optical line must connect to the same WTOCM.

Note: On an A2P2125 the connection is to the MON OUT port.

Figure 17-195 ROADM WTOCM/LD connectivity with unidirectional LDs

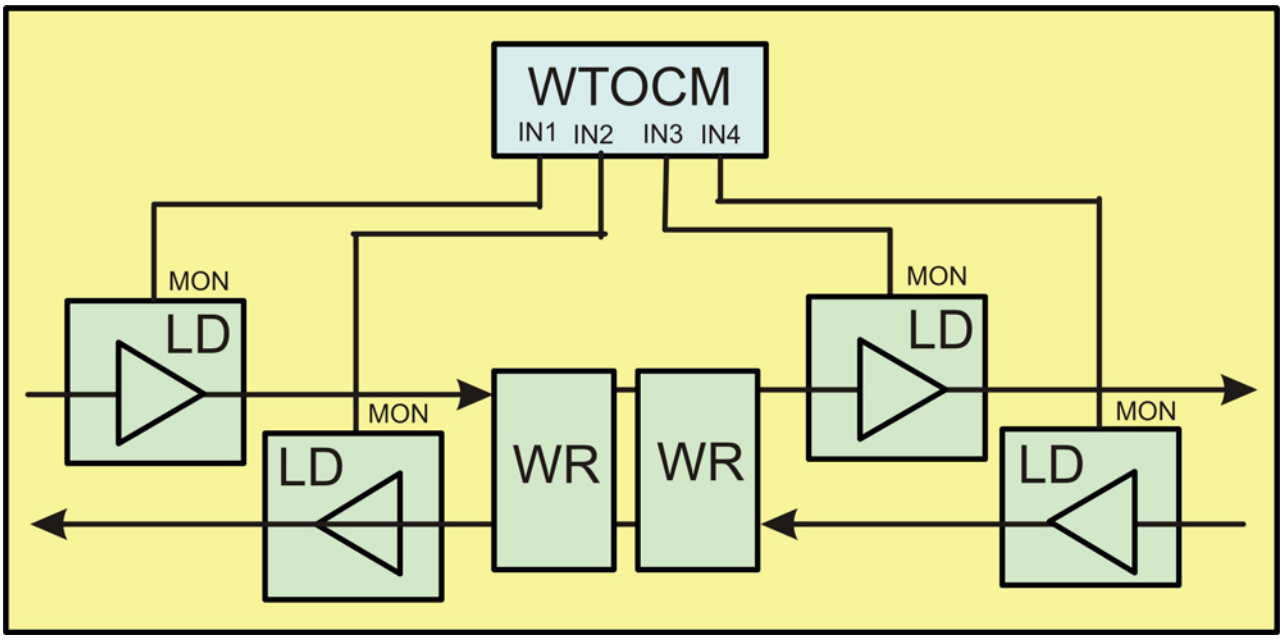
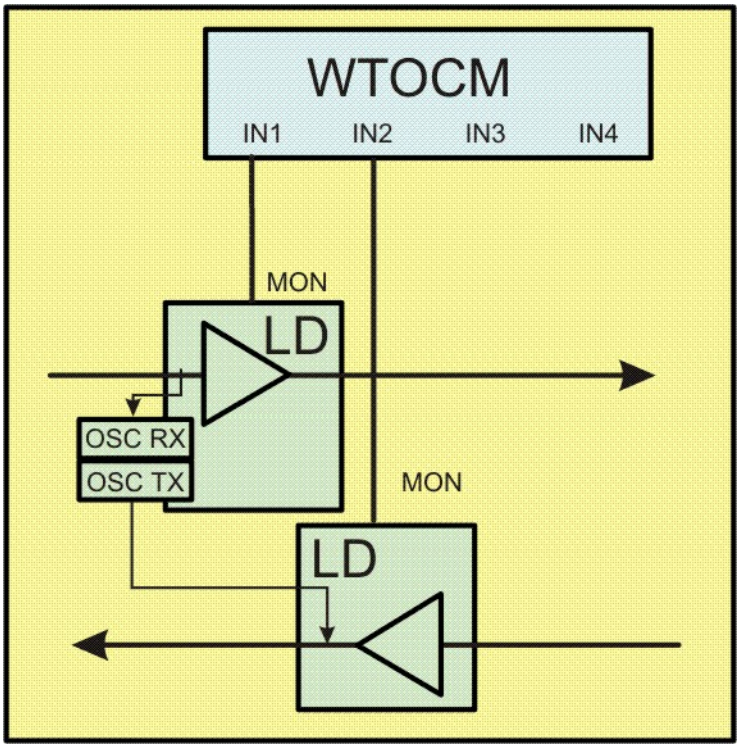


Figure 17-196 ILA WTOCM/LD connectivity with unidirectional LDs



Long haul WTOCM configurations

The WTOCM is used on the following node types for long haul configurations:

- TOADM
- FOADM end-terminal, when DGE in path

WTOCM is optional for the following node types:

- 2D+ FOADM
- FOADM end-terminal, with no DGE in path
- ILA

  Each ILA on an OMS span may be optionally equipped with a WTOCM when each endpoint of the span uses WTOCM.

On an OMS span, each endpoint must be configured with the same WT capability.

Note: The numbers of ILAs in the configurations below are for illustration purposes only and are not a requirement for the number of ILAs between OADMs.

Figure 17-197 ROADM/TOADM Configurations

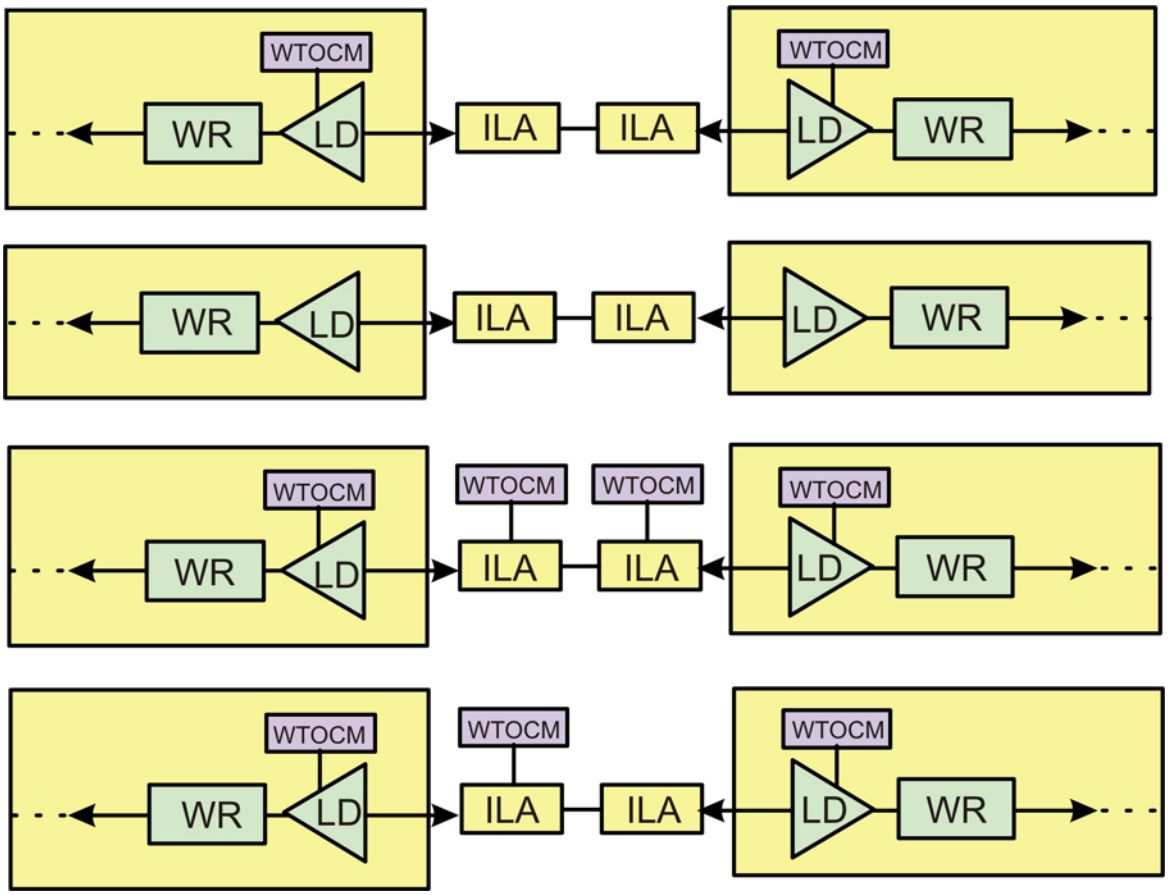


Figure 17-198 FOADM configurations

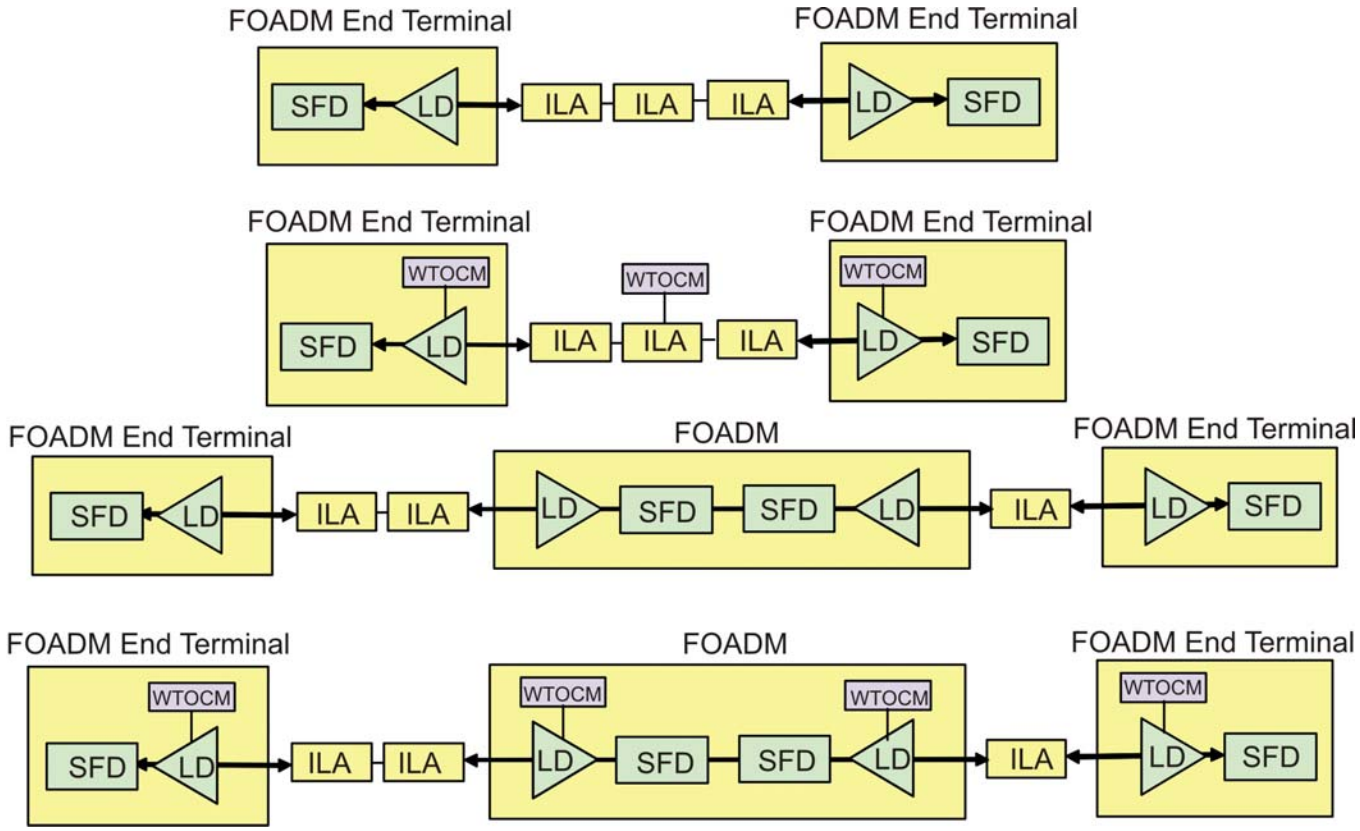
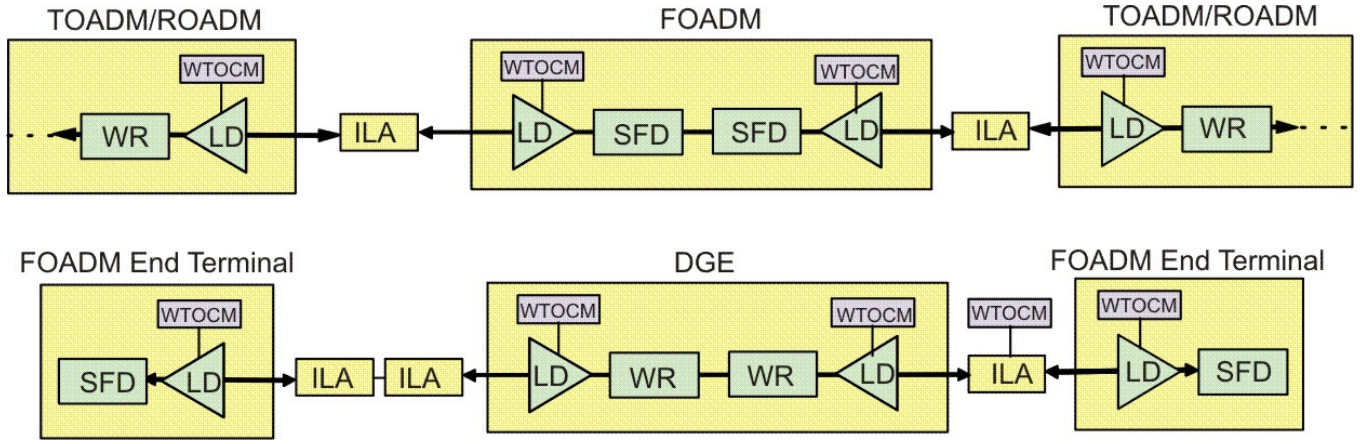


Figure 17-199 FOADM/ROADM/TOADM configurations



LD and OSCT configurations

In order to provide OSC support, one of the following is required for all DWDM optical lines:

- A2325A
- AM2032A
- AM2625A
- AHPHG
- AHPLG
- ALPHG
- A2P2125
- AM2125A
- AM2125B
- AM2318A
- OSCT card

  Note: All unidirectional LD's require both an ingress and an egress LD if at an OADM site.

Use of one of the following amplifiers in the ingress position is only supported in WR8-88A/WR8-88AF ROADM, WR2-88 ROADM, TOADM and ILA nodes. it is not supported in FOADM configurations.

- A2325A
- AM2625A
- AM2125A
- AM2125B
- AM2318A
- A2P2125 (Not supported for TOADM)

The NE will trigger APR for this configuration. (See, "Automatic power reduction (APR)" (p. 14-32).)

The following constraints and requirements apply:

- An A2325A, AM2125A, AM2125B, or AM2318A amplifier in the ingress position is supported in ROADM, TOADM and ILA nodes. It is not supported in FOADM configurations.
- LD and OSCT cards are not used for CWDM optical lines.
- With an A2325A, AHPHG, ALPHG and AHPLG ingress LD, an egress amplifier is optional.
- With an AM2017B or AM2325B ingress LD, an egress amplifier (AM2017B or AM2325B) is optional.

- With an AM2318A, AM2125A, AM2125B, or A2P2125 ingress LD, an egress AM2125A, AM2125B, or AM2318A amplifier is required.
- A2P2125 cannot be used as an egress LD at an add/drop node.

For details describing valid LD combinations, see "Supported LD combinations for OADM and ILA configurations" (p. 22-128).

The following figures show how these LDs are configured for ingress/egress applications. Note that the ingress LD is facing the external line.

Note: In the following configuration illustrations, the label "AxPyG" is used to indicate that an AHPHG, ALPHG, or AHPLG can be used.

Figure 17-200 AxPyG Ingress LD with optional egress LD (TOADM/ROADM/FOADM)

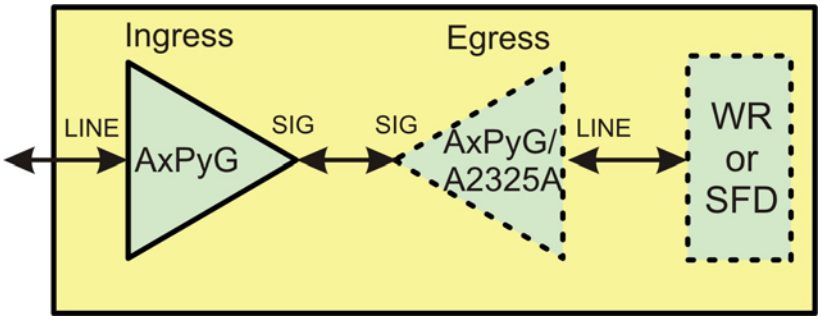


Figure 17-201 A2325A ingress LD with optional egress LD (TOADM/ROADM only)

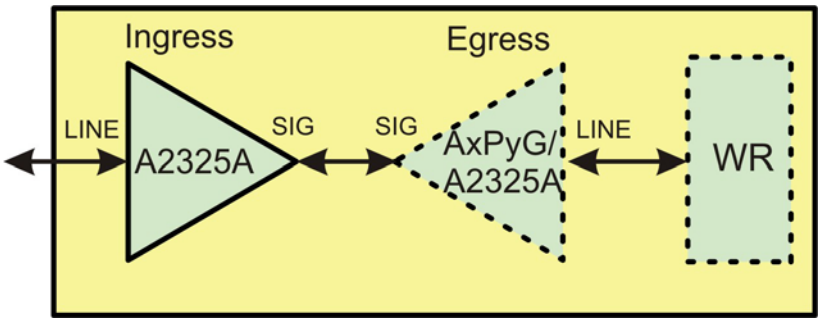


Figure 17-202 AM2125A ingress LD with AM2125A or AM2318A egress LD (TOADM/ROADM only)

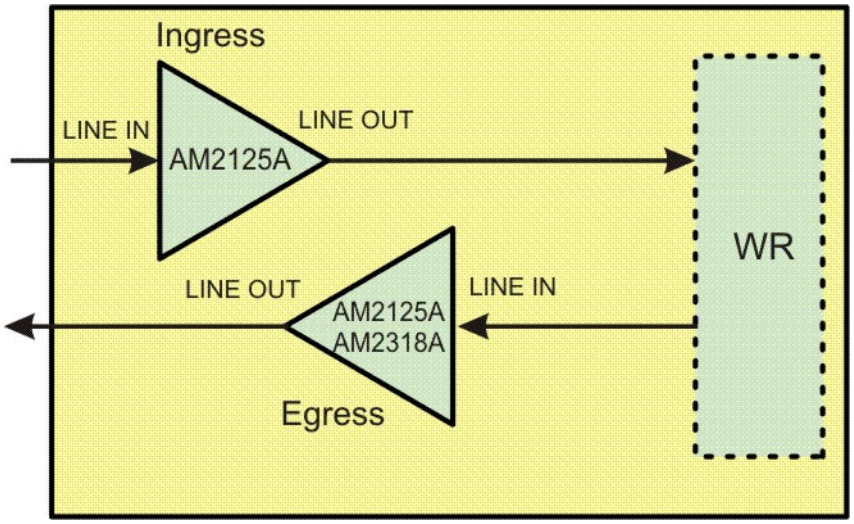


Figure 17-203 AM2125B ingress LD with AM2125B or AM2318A egress LD (TOADM/ROADM only)

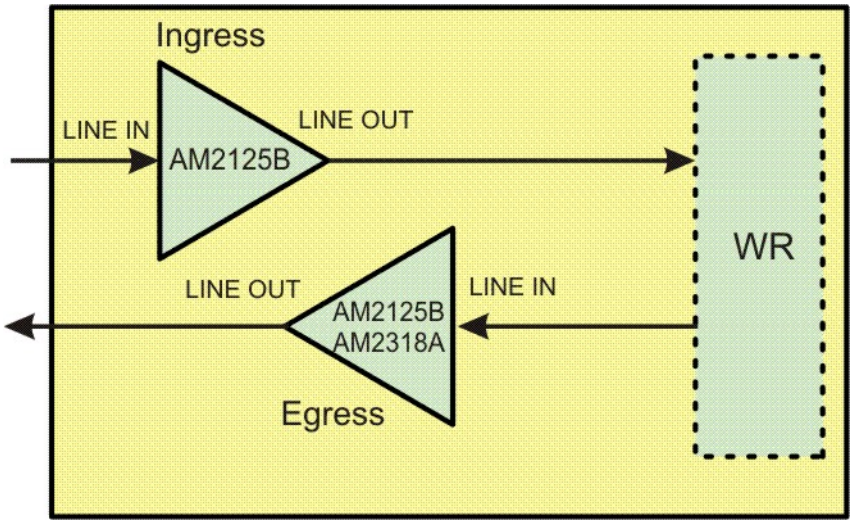
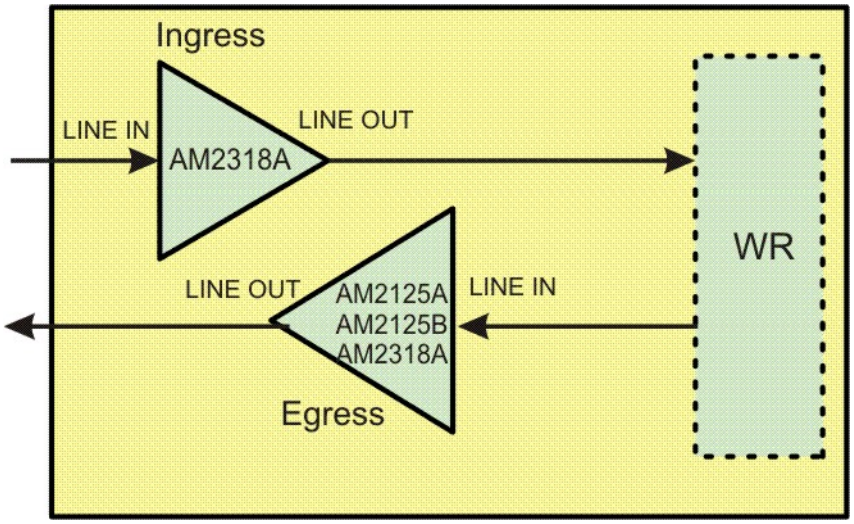
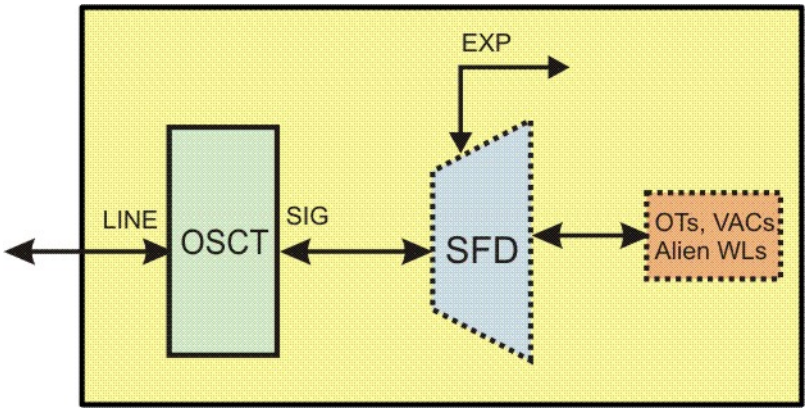


Figure 17-204 AM2318A ingress LD with AM2125A, AM2125B, or AM2318A egress LD (TOADM/ROADM only)



An ingress or egress LD is not supported with an OSCT card.

Figure 17-205 OSCT card (FOADM only)



An RA2P Raman amplifier card is optional on the ingress line with the following LDs: A2325A, AHPHG, AHPLG, ALPHG, AM2125A, AM2125B, AM2318A

Figure 17-206 RA2P card with bidirectional LDs (TOADM/ROADM/FOADM)

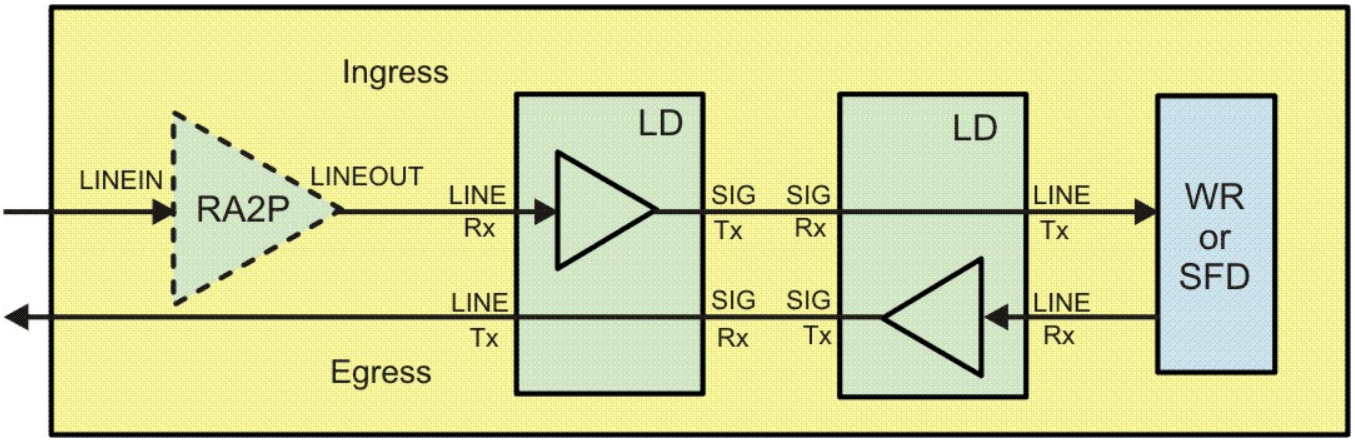


Figure 17-207 RA2P card with unidirectional LDs (TOADM/ROADM only)

