

CWDM-xxxxxCR-B

Mux/Demux and Optical Add/Drop Multiplexer Modules



User Guide

- Increase bandwidth on existing fiber infrastructure
- Alleviate fiber exhaustion
- Transmit multiple protocols over existing duplex fiber link by combining fiber outputs of multiple media converters
- Provide scalable bandwidth of up to 10 Gbps per channel over existing fiber links
- Plug-and-Play, no configuration of CWDM components
- Use existing standard optical ports on switches and routers (utilize Optical Line Converter as transponder)

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Introduction

Transition Networks CWDM products use a passive technology that allows for any protocol to be transported over the fiber link, as long as it is at a specific wavelength. Transition Networks' CWDM Mux/Demux and Add/Drop Mux can provide a simple and affordable method to maximize existing fiber capacity with little or no increased cost.


Passive optical CWDM devices utilize thin-film filter technology. They are available in various wavelength combinations based on the entire wavelength spectrum (1270nm–1610nm in 20nm increments) defined by the [ITU-T G.694.2 CWDM](#) standard. These CWDM devices are available in two main configurations: Multiplexer/Demultiplexer (Mux/Demux) modules and Optical Add/Drop Multiplexer (OADM) modules.

Each module is a pluggable device that slides into a one rack unit (1RU) chassis that can hold 2 modules and mount into a 19" equipment rack.

Ordering Information

#	Model	Description
CWDM-MXxxLCR-B Series		Coarse Wavelength Division Multiplexing (CWDM) Mux/Demux
1	CWDM-M551LCR-B	4 Channels + OSC,1510/1530/1550/1570nm, Duplex LC Mux/Demux
2	CWDM-M947LCR-B	8 Channels + OSC,1470-1610nm, Duplex LC Mux/Demux
3	CWDM-M1631LCR-B	16 Channels ,1310-1610nm, Duplex LC Mux/Demux
CWDM-A2A8xxLCR-B Series		Add/Drop Mux (CWDM); 1 Channel with E/W Lines
4	CWDM-A2A831LCR-B	1 Channel 1310nm port with E/W lines (wideband (+/- 50nm))
5	CWDM-A2A833LCR-B	1 Channel 1330nm port with E/W lines
6	CWDM-A2A835LCR-B	1 Channel 1350nm port with E/W lines
7	CWDM-A2A837LCR-B	1 Channel 1370nm port with E/W lines
8	CWDM-A2A839LCR-B	1 Channel 1390nm port with E/W lines
9	CWDM-A2A841LCR-B	1 Channel 1410nm port with E/W lines
10	CWDM-A2A843LCR-B	1 Channel 1430nm port with E/W lines
11	CWDM-A2A845LCR-B	1 Channel 1450nm port with E/W lines
12	CWDM-A2A847LCR-B	1 Channel 1470nm port with E/W lines
13	CWDM-A2A849LCR-B	1 Channel 1490nm port with E/W lines
14	CWDM-A2A851LCR-B	1 Channel 1510nm port with E/W lines
15	CWDM-A2A853LCR-B	1 Channel 1530nm port with E/W lines
16	CWDM-A2A855LCR-B	1 Channel 1550nm port with E/W lines
17	CWDM-A2A857LCR-B	1 Channel 1570nm port with E/W lines
18	CWDM-A2A859LCR-B	1 Channel 1590nm port with E/W lines
19	CWDM-A2A861LCR-B	1 Channel 1610nm port with E/W lines

Optional Accessories (Sold Separately)

Model	Description
 <p>CWDM-MB19R2</p>	19" Rack Mount chassis, 1RU High, holds 2 CWDM Modules
SFP Modules	Transition Networks offers a full line of small form factor pluggable (SFP) modules. See our SFP product webpage for more information.

Family Portrait

	
 <p>CWDM-A2A855LCR-B Add/Drop Mux (CWDM)</p>	 <p>CWDM-M1631LCR-B (16-Ch. Mux/Demux)</p>
CWDM-M551LCR-B (4-Ch. Mux/Demux)	CWDM-M947LCR-B (8-Ch. Mux/Demux)

Connections



CWDM-xxxxxCR-B Mux/Demux



Optical Add/Drop Multiplexer Modules

Figure 1: CWDM-xxxxxCR-B Mux/Demux and Optical Add/Drop Multiplexer Modules

Application Examples

The figure below shows an existing copper switch at a Central Office or Point-of-Presence (POP) converting the electrical signal to the appropriate optical wavelength. The signals are then multiplexed together and sent across the fiber infrastructure. At the remote side the signals are de-multiplexed and sent to the customer location.

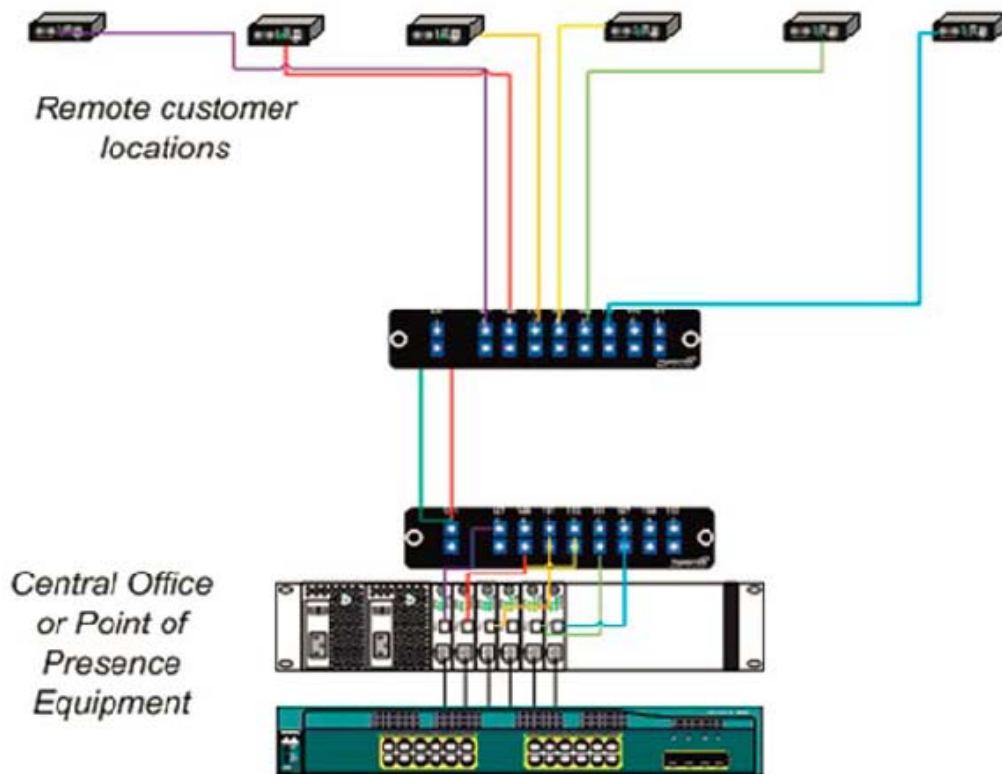
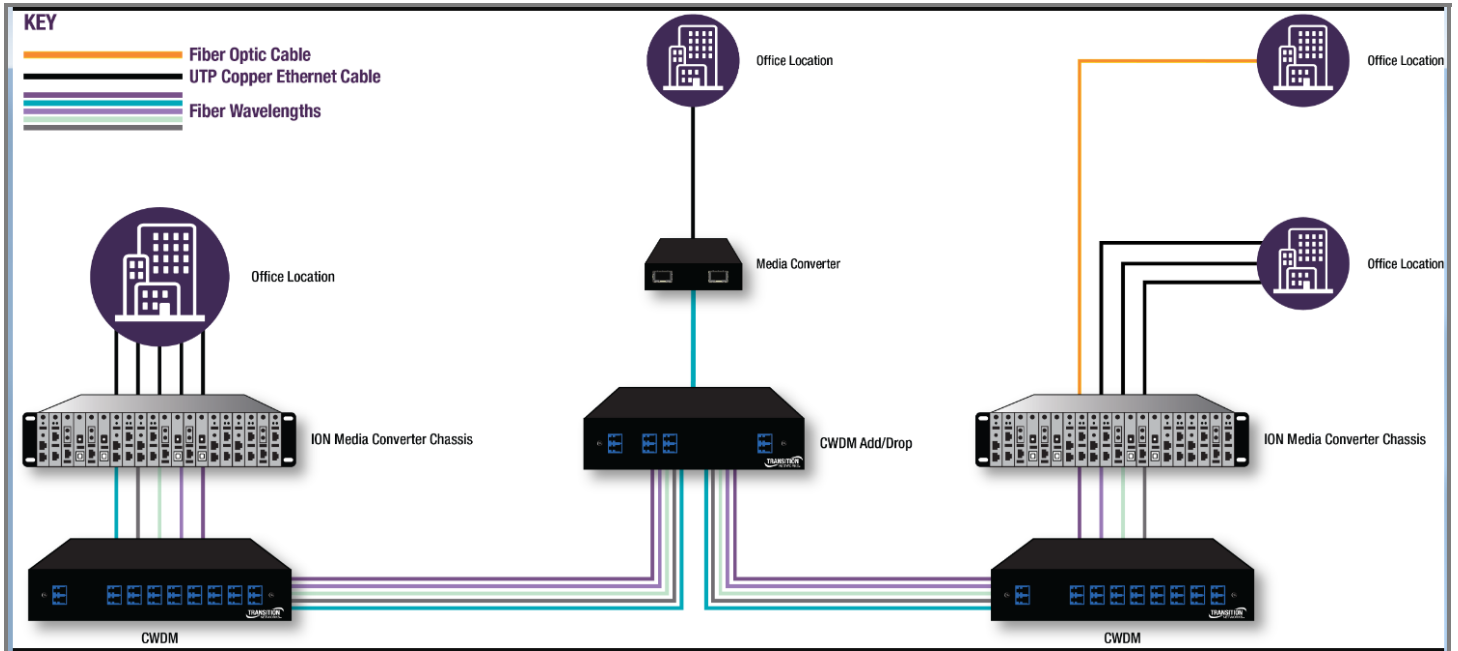
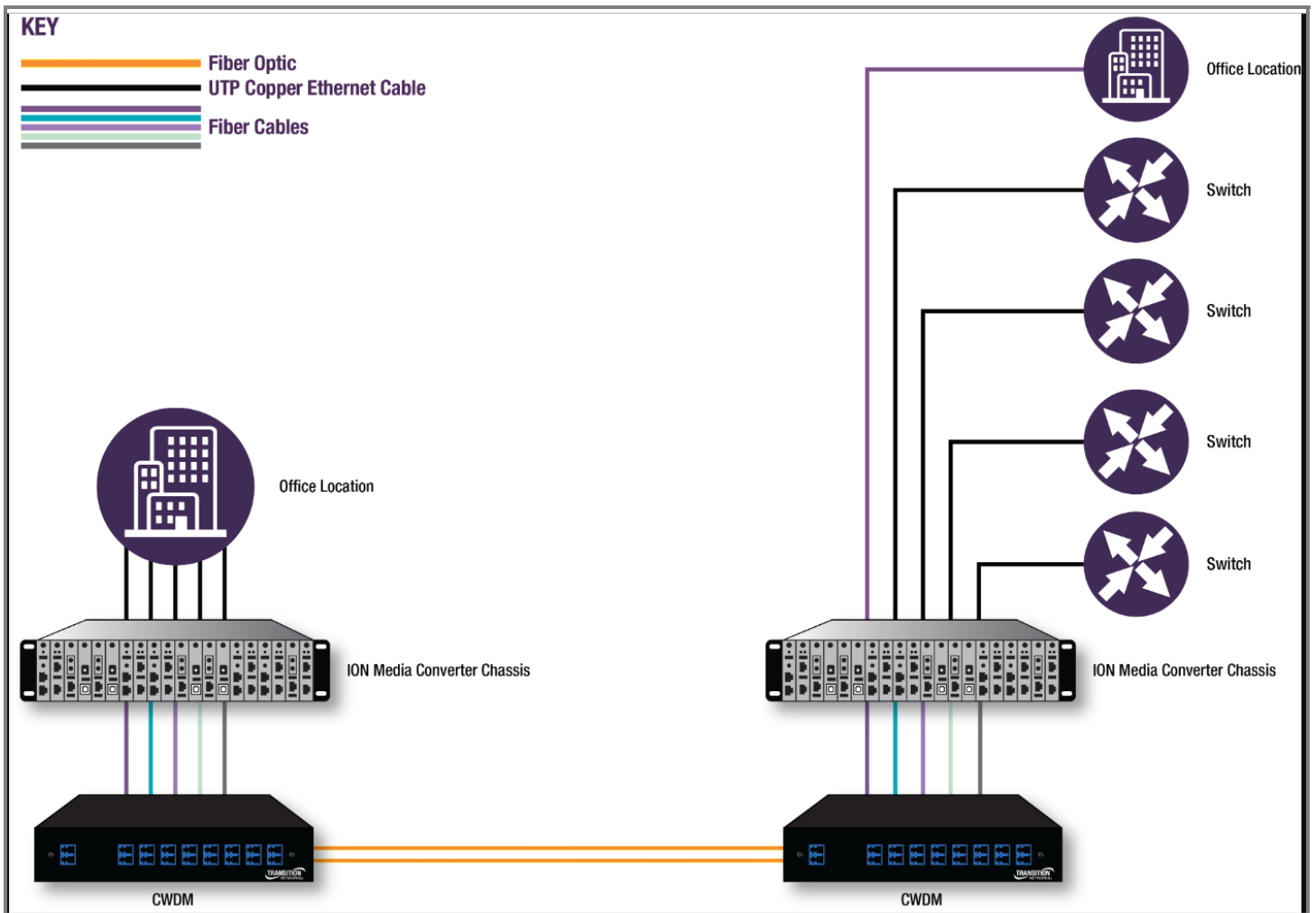


Figure 2: CWDM-xxxxxCR-B Application Example

CWDM-Add-Drop Mux Example



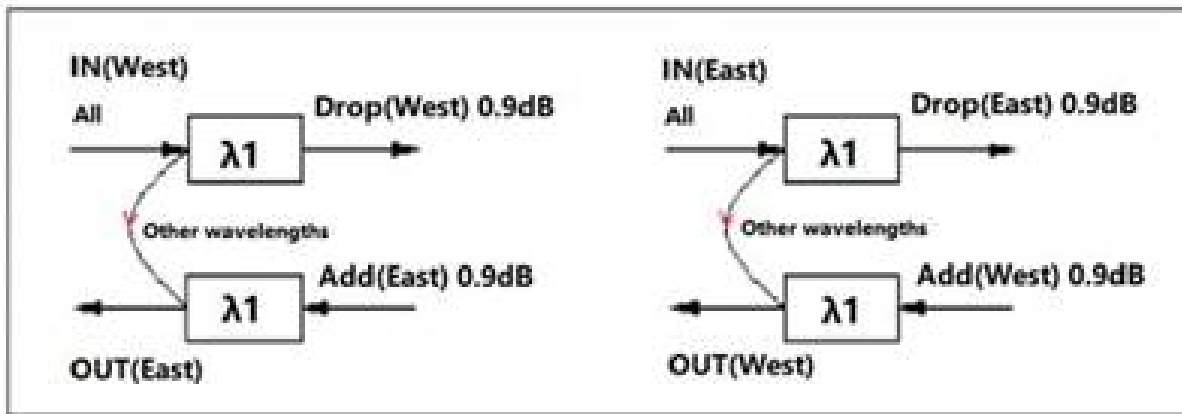
CWDM-Mux-Demux Example



CWDM Add/Drop Mux Connections

The figure below shows Transition Networks CWDM Mux/Demux & Add/Drop Mux modules. In the figure, $\lambda 1$ indicates Lambda 1 (for one particular wavelength).

1CH OADM Dual



Unpacking

Carefully unpack the CWDM-xxxxxCR-B. Verify that you have received:

- One CWDM-xxxxxCR-B
- One Documentation Postcard
- One printed Quick Start Guide, 33793

Please save the packaging for possible future use.



Installation

Safety Instructions for Rack Mount Installations

The instructions below (or similar) are intended for rackmount installation environments:

1. **Elevated Operating Ambient Temperature:** if installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may exceed room ambient. Install the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified.
2. **Reduced Air Flow:** install the equipment in a rack so that the amount of air flow required for safe operation is not compromised.
3. **Mechanical Loading:** Mount the equipment in the rack so that a hazardous condition does not occur due to uneven mechanical loading (weight distribution/rack balance).
4. **Circuit Overloading:** give consideration to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Consider all equipment nameplate ratings when addressing this concern.
5. **Reliable Earthing:** maintain reliable earthing of rack-mounted equipment; pay particular attention to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

Rack Mount Install Procedure

The CWDM modules install into the optional CWDM-MB19R2 Rack Mount chassis for installation in a free-standing rack. To install the bracket and CWDM module into a rack, do the following:

1. Locate the CWDM module and bracket. See Figure 3.

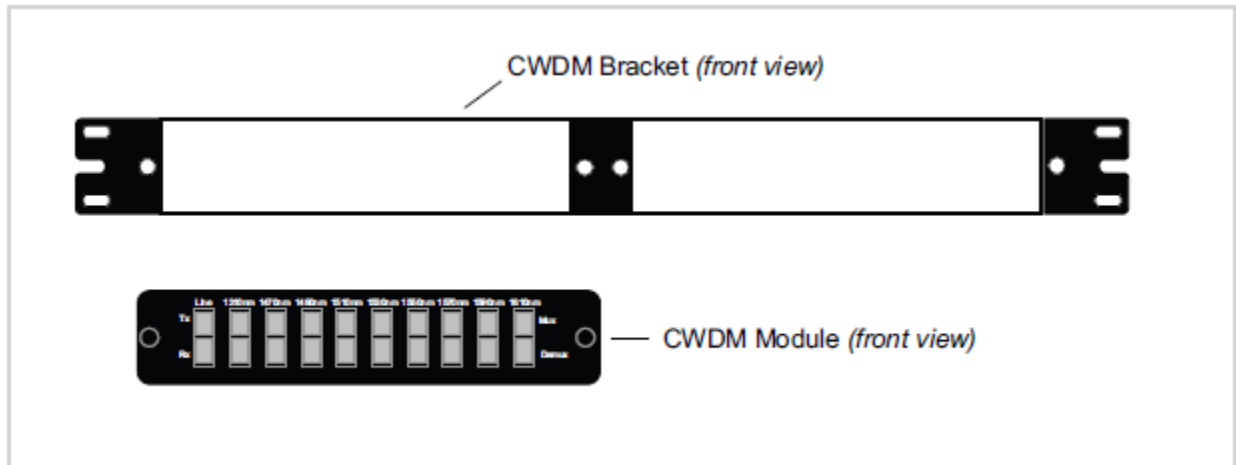


Figure 3: Bracket and CWDM Module

2. Mount the Bracket to the equipment rack, using four screws as shown in Figure 4.

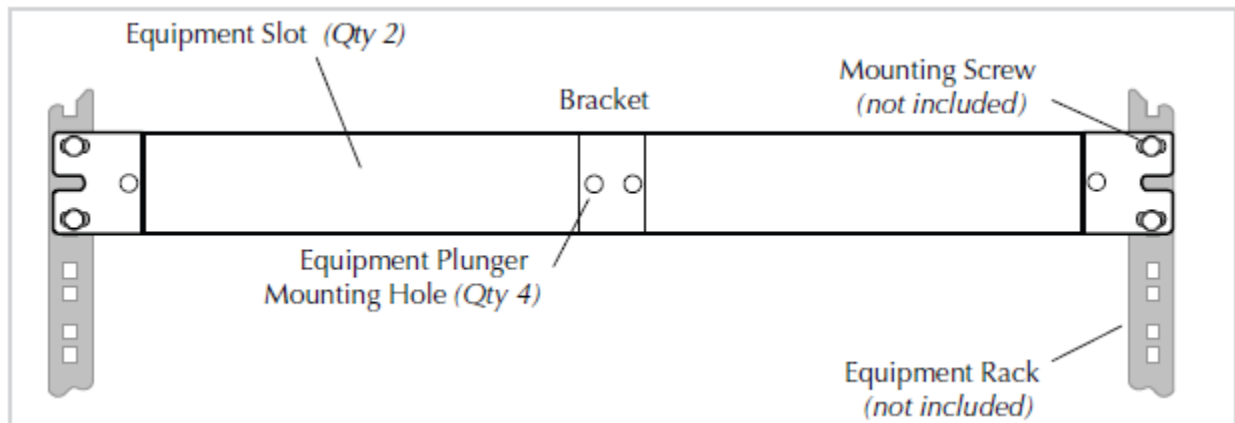


Figure 4: Bracket Installation

3. Pull the CWDM mounting plungers fully out, as shown in Figure 5.
4. Slide the CWDM module into one of the slots, as shown in Figure 5.

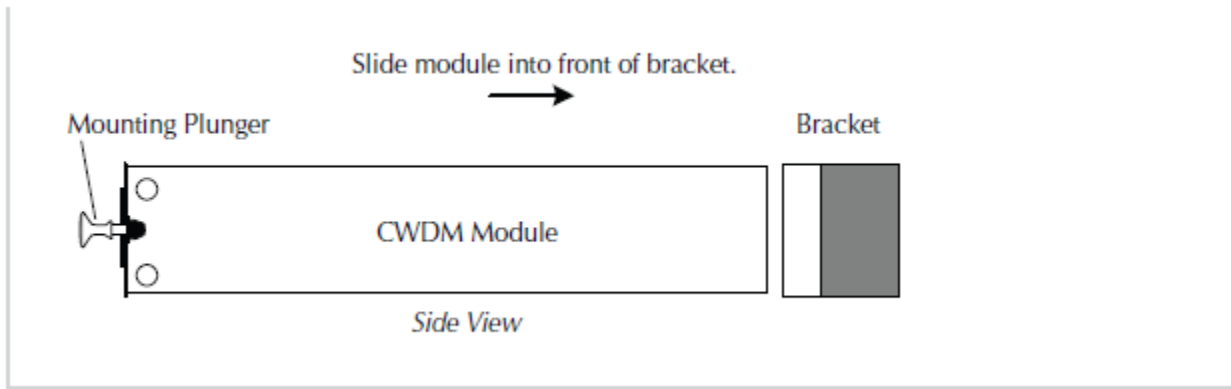


Figure 5: Slide CWDM Module into Front of Bracket

5. Secure the CWDM module to the bracket, as shown in Figure 6.

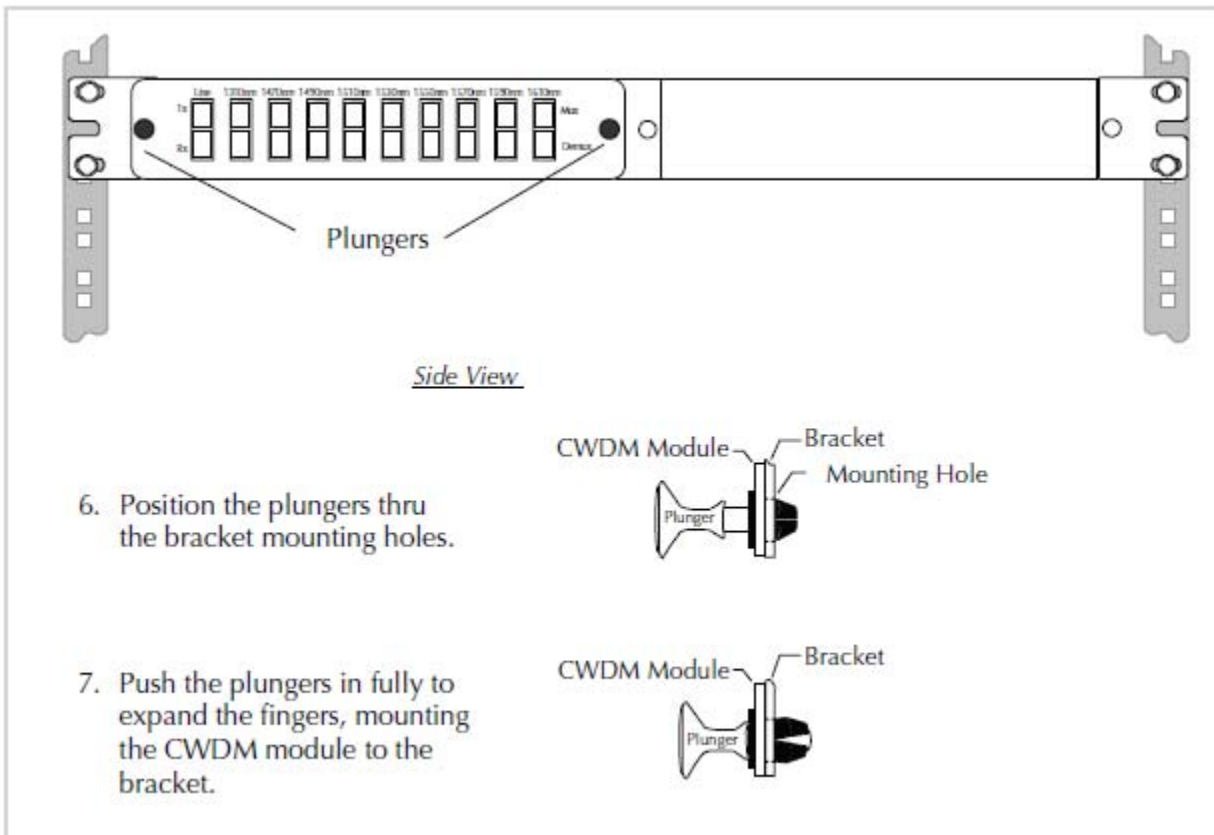


Figure 6: CWDM Module Installation into Bracket

Front Panels

Add/Drop Mux Front Panel

The Add/Drop Mux Front Panel is shown in Figure 7.



Figure 7: Add/Drop Mux Front Panel

CWDM Mux Front Panels

The CWDM modules have no LEDs as it does not require power. The front panels are shown in Figures 8a, 8b, and 8c.

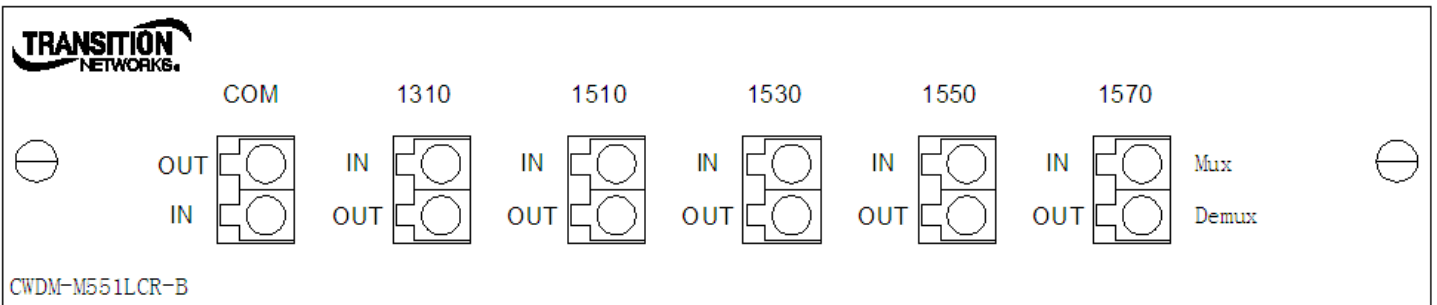


Figure 8a: 4-Channel CWDM Mux Front Panel (CWDM-M551LCR-B)

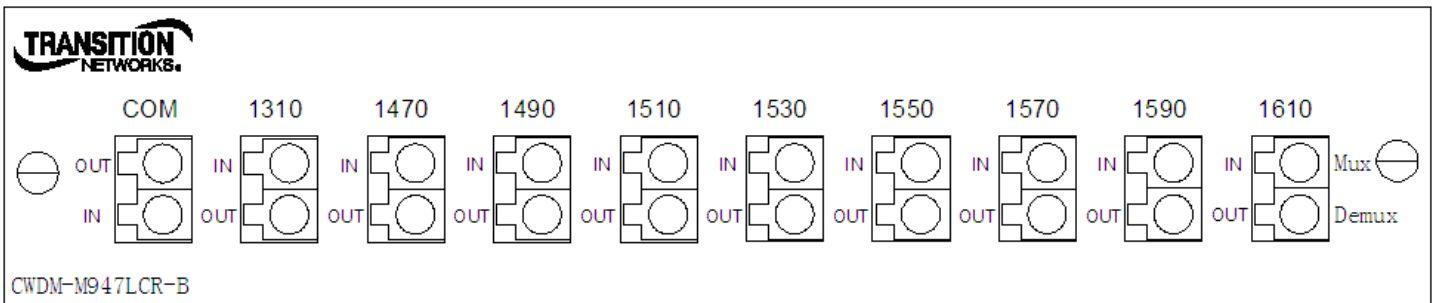


Figure 8b: 8-Channel CWDM Mux Front Panel (CWDM-M947LCR-B)

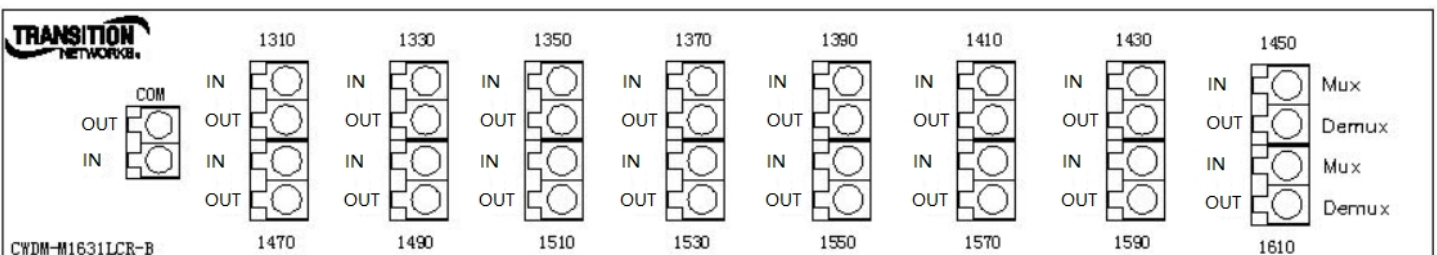


Figure 8c: 16-Channel CWDM Mux Front Panel (CWDM-M1631LCR-B)

Fiber Cable Handling & Installation

Handling Fiber Cables

Accurate and repeatable data transmissions require clean fiber-optic connections; therefore, inspect the ends of all connectors for dust or imperfections. To achieve the best possible performance, follow these guidelines:

- To prevent damage, keep the connectors' protective cover on when not in use.
- Use care in handling all fiber-optic connectors.
- Visually inspect fiber ends for signs of damage.
- Always clean and inspect fiber connectors prior to making a connection.

Installing Fiber Cables

To install the fiber cables, do the following:

1. Remove the protective cover from the port. See Figure 9.

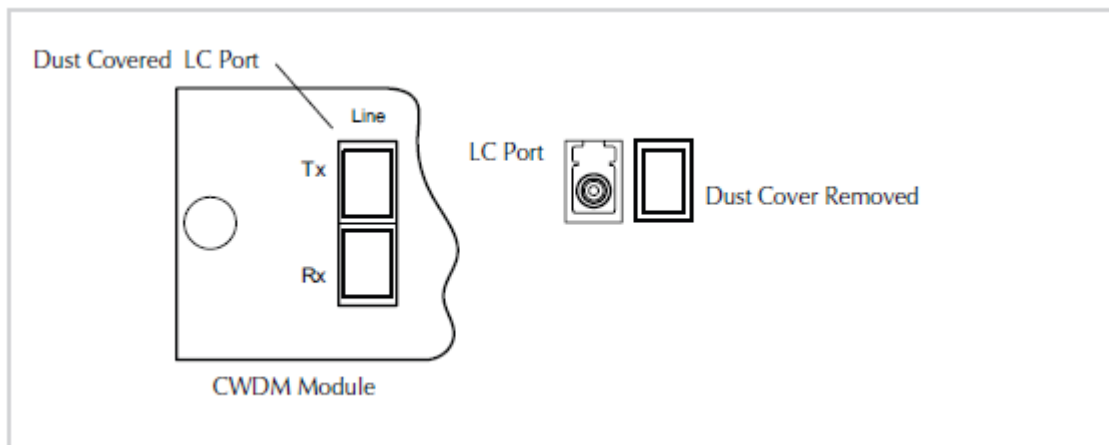


Figure 9: LC Port and Dust Cover

2. Locate a 2-strand fiber cable with the appropriate male connectors installed on both ends.
3. Carefully insert the fiber cable into the CWDM and the device, as shown in Figure 10.



Figure 10: Fiber Cable Connections

Theory of Operation

Coarse Wave Division Multiplexing

CWDM can be briefly described as a method of transmitting multiple signals over a fiber optic link through the use of separate, distinct wavelengths, based on the entire wavelength spectrum (1270nm – 1610nm in 20nm increments) defined by the [ITU-T G.694.2 CWDM](#) standard. In general, CWDM components multiplex the optical signal outputs from '4' or more electronic devices. These signals are sent over a single optical fiber. The signals are then demultiplexed into separate, distinct signals for input into electronic devices at the other end of the fiber optic link. See Figure 11.

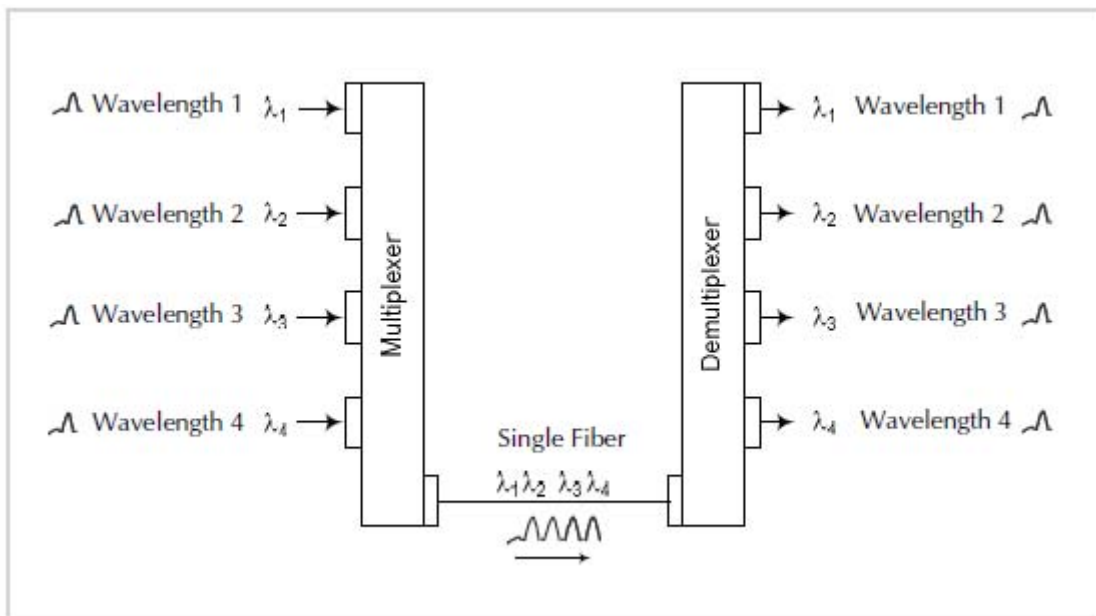


Figure 11: Coarse Wave Division Multiplexing

Transition Networks CWDM devices utilize thin-film filter technology. Since the CWDM devices are entirely passive, they can be used in conjunction with lower-cost, noncooled laser sources. These CWDM devices are available in two main configurations: Multiplexer/Demultiplexer (Mux/Demux) modules, and Optical Add/Drop Multiplexer (OADM) modules.

Optical Add/Drop Multiplexer (OADM)

The optical add/drop multiplexer module provides the ability to add or drop a single wavelength or multi-wavelengths from a fully multiplexed optical signal. This allows intermediate locations between remote sites to access the common, point-to-point fiber segment linking them. Wavelengths that are not dropped pass through the OADM and continue on in the direction of the remote site. See Figure 12.

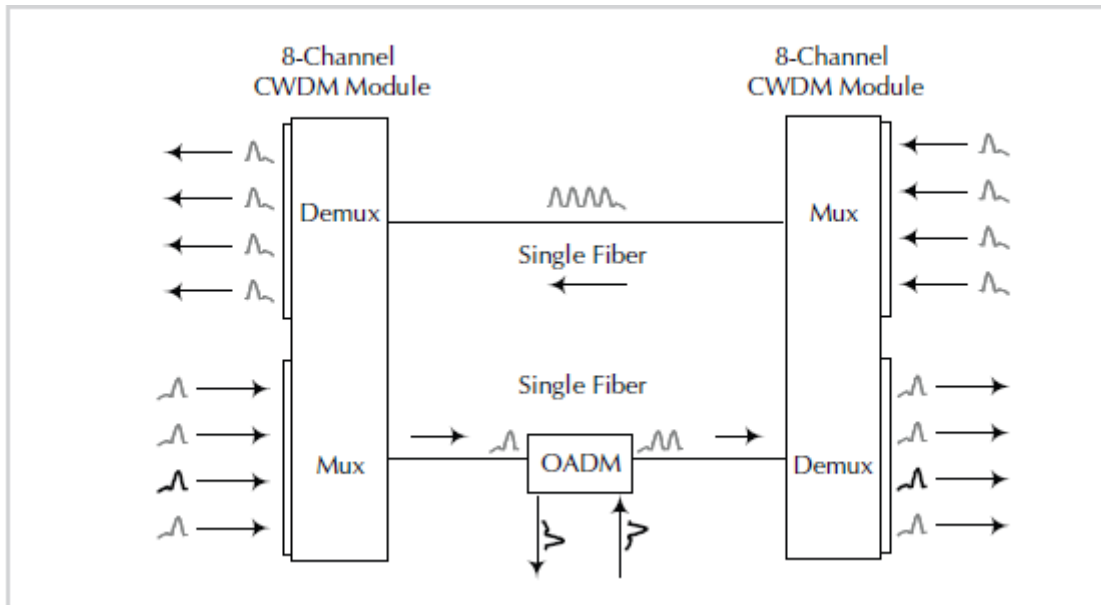


Figure 12: Add/Drop Module

CWDM Wavelength-specific Optical Transceivers

Transition Networks full line of media converters and switches can incorporate CWDM wavelengths with the addition of wavelength-specific small form-factor pluggable (SFP) optical transceivers or traditional fixed optical ports. CWDM SFPs comply with [ITU-T G.694.2 CWDM](https://www.itu.int/ITU-T/g/694.2) standard and are available for Fast Ethernet, Gigabit Ethernet, OC-3/STM-1, OC-12/STM-4, and OC-48/STM-16 data rates. Fixed optical ports are available in Fast Ethernet and Gigabit Ethernet, and in the same CWDM ITU wavelengths.

Technical Specifications

Add/Drop Mux Specifications

Channel Wavelength	ITU & ITU+1 (1260-1620nm)
Center Wavelength Accuracy	+0.5 (nm)
Channel Spacing	20 (nm)
Channel Passband bandwidth (nm)	+6.5 (nm)
Channel Ripple	0.3dB
Isolation Adjacent	> 30dB
Non-Adjacent	> 40dB
Insertion Loss Temperature Sensitivity	<= 0.005dB/°C
Wavelength Temperature Shifting	<0.002 nm/°C
Polarization Dependent Loss	<0.1dB
Polarization Mode Dispersion	<0.1 PS
Directivity	>50dB
Return Loss	>50 dB
Fiber Type	Corning SM28E
Connector	LC/PC
Mounting	19" Rack Mount
Dimensions (Unit)	Width: 8.46" [215 mm] x Depth: 7.68" [195 mm] x Height: 1.24" [31.5 mm]
Dimensions (with Chassis)	Width: 17.44" [443 mm] x Depth: 9.84" [250 mm] x Height: 1.73" [44 mm]
Operating Temperature:	-20°C to +70°C
Storage Temperature:	-40°C to +85°C
Weight	0.88 lbs [0.40 kg]
Warranty	Lifetime

CWDM Mux Specifications

CWDM-M551LCR-B Specifications

Channel Wavelength	ITU & ITU+1 (nm)
Center Wavelength Accuracy	+0.5 (nm)
Channel Spacing	20 (nm)
Channel Passband bandwidth (nm)	+6.5 (nm)
Insertion Loss with connector	<= 1.6dB
Channel Ripple	0.3dB
Isolation Adjacent	> 30dB
Non-Adjacent	> 40dB
Insertion Loss Temperature Sensitivity	<= 0.005dB/°C
Wavelength Temperature Shifting	<0.002 nm/°C
Polarization Dependent Loss	<0.1dB
Polarization Mode Dispersion	<0.1 PS
Directivity	>50dB
Return Loss	>50 dB
Mounting	19" Rack Mount
Dimensions (Unit)	Width: 8.46" [215 mm] x Depth: 7.68" [195 mm] x Height: 1.24" [31.5 mm]
Dimensions (with Chassis)	Width: 17.44" [443 mm] x Depth: 9.84" [250 mm] x Height: 1.73" [44 mm]
Operating Temperature:	-20°C to +70°C
Storage Temperature:	-40°C to +85°C
Weight	0.88 lbs [0.40 kg]
Warranty	Lifetime

CWDM-M947LCR-B Specifications

Channel Wavelength	ITU & ITU+1 (nm)
Center Wavelength Accuracy	+/-0.5 (nm)
Channel Spacing	20 (nm)
Channel Passband bandwidth (nm)	+/-6.5 (nm)
Insertion Loss with connector	<= 2.5dB
Channel Ripple	0.3dB
Isolation Adjacent	> 30dB
Non-Adjacent >	40dB
Insertion Loss Temperature Sensitivity	<= 0.005dB/°C
Wavelength Temperature Shifting	<0.002 nm/°C
Polarization Dependent Loss	<0.1dB
Polarization Mode Dispersion	<0.1 PS
Directivity	>50dB
Return Loss	>50 dB
Mounting	19" Rack Mount
Dimensions (Unit)	Width: 8.46" [215 mm] x Depth: 7.68" [195 mm] x Height: 1.24" [31.5 mm]
Dimensions (with Chassis)	Width: 17.44" [443 mm] x Depth: 9.84" [250 mm] x Height: 1.73" [44 mm]
Operating Temperature:	-20°C to +70°C
Storage Temperature:	-40°C to +85°C
Weight	0.9 lbs [0.41 kg]
Warranty	Lifetime

CWDM-M1631LCR-B Specifications

Channel Wavelength	ITU & ITU+1 (nm)
Center Wavelength Accuracy	+/-0.5 (nm)
Channel Spacing	20 (nm)
Channel Passband bandwidth (nm)	+/-6.5 (nm)
Insertion Loss with connector	<= 3.2dB
Channel Ripple	0.3dB
Isolation Adjacent	> 30dB
Non-Adjacent	> 40dB
Insertion Loss Temperature Sensitivity	<= 0.005dB/°C
Wavelength Temperature Shifting	<0.002 nm/°C
Polarization Dependent Loss	<0.1dB
Polarization Mode Dispersion	<0.1 PS
Directivity	>50dB
Return Loss	>50 dB
Mounting	19" Rack Mount
Dimensions (Unit)	Width: 8.46" [215 mm] x Depth: 7.68" [195 mm] x Height: 1.24" [31.5 mm]
Dimensions (with Chassis)	Width: 17.44" [443 mm] x Depth: 9.84" [250 mm] x Height: 1.73" [44 mm]
Operating Temperature:	-20°C to +70°C
Storage Temperature:	-40°C to +85°C
Weight	1 lb [0.46 kg]
Warranty	Lifetime

Troubleshooting

1. Make sure the fiber connectors are clean; see the FOA.org termination cleaning webpage.
2. Make sure your model supports the feature or function attempted; see [Ordering Information](#) on page 2.
3. Verify the install process; see [Installation](#) on page 6.
4. Troubleshoot connected network devices to pinpoint the problem to the switch. See the related documentation.
5. When calculating optical loss, ensure that the total loss, plus a safety factor (typically 3dB) does not exceed the optical power budget (the difference between the transmitter optical output power and the receiver’s optical sensitivity). See the equipment manufacturers’ documentation for the transmitter optical output power and receiver optical sensitivity values.
6. See the [FOA.org Testing & Troubleshooting Fiber Optic Systems](http://FOA.org) webpage.
7. Record device information (see below) and Contact Tech Support (see below).

Product Label and Box Label

You can find device information on the box label and product label as shown in Figure 13.



Figure 13: Box Label and Product Label

Record System and Device Information

After performing the troubleshooting steps, and before calling or emailing Technical Support, please record as much information as possible in order to help the Transition Networks Tech Support Specialist.

1. Record P/N: _____ S/N: _____ Date: _____

2. Record Port Configuration and Status: _____

3. Provide additional information to your Tech Support Specialist. See the “Troubleshooting” section above.

Your Transition Networks service contract number: _____

Describe the failure: _____

Describe any action(s) already taken to resolve the problem (e.g., changing mode, rebooting, etc.): _____

The model and serial numbers of other Transition Networks devices in the network: _____

Describe your network environment (layout, cable type, etc.): _____

Any previous Return Material Authorization (RMA) numbers: _____

Contact Us

Technical Support: is available 24-hours a day. US and Canada: 1-800-260-1312. International: 00-1-952-941-7600.

Main Office: tel: +1.952.941.7600 | toll free: 1.800.526.9267 | fax: 952.941.2322 | sales@transition.com | techsupport@transition.com | customerservice@transition.com

Address: Transition Networks | 10900 Red Circle Drive | Minnetonka, MN 55343, U.S.A.

Web: <https://www.transition.com>

Record of Revisions

Rev	Date	Notes
A	6/26/19	Initial release.

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