CISCO SYSTEMS

DATA SHEET

CISCO WDM SERIES OF CWDM PASSIVE DEVICES

Cisco Systems® introduces its second generation of coarse wavelength-division multiplexing (CWDM) passive devices boasting increased functions and improved performance to extend the reach of CWDM metropolitan networks (Figure 1).

Figure 1. Cisco WDM Series

PRODUCT OVERVIEW

The Cisco® WDM series comprises a set of 11 new CWDM passive modules mechanically compatible with the Cisco CWDM chassis (part number CWDM-CHASSIS-2=) and a 1300/1550 nm splitter cable. Compared to the previous 1000BASE-CWDM series of passive filters, this new set of devices sports a greatly reduced insertion loss (up to 50 percent), "power-tap" ports to allow live monitoring and troubleshooting of the CWDM signals, as well as the mixing of 1300-nm CWDM signals on the same fiber infrastructures.

The Cisco WDM series of passive devices are replacements for all the product numbers of the Cisco 1000BASE-CWDM series except for the modules listed in Table 1.

Table 1. Cisco 1000BASE-CWDM Products Not Replaced by the New WDM Series of Passive Devices

Product Number	Description
CWDM-CHASSIS-2=	2-slot CWDM chassis
CWDM-MUX-4-SF1=	4 channels (1470, 1510, 1550, and 1590) single-fiber multiplexer/demultiplexer to be deployed always in conjunction with CWDM-MUX4-SF2=
CWDM-MUX-4-SF2=	4 channels (1490, 1530, 1570, and 1610) single-fiber multiplexer/demultiplexer to be deployed always in conjunction with CWDM-MUX4-SF1=

PRODUCT DETAILS

Table 2 lists the product name and the associated description of the new CWDM modules.

Table 2. Product Description

Product Number	Description
CWDM-MUX8A=	8-channel (1470, 1490, 1510, 1530, 1550, 1570, 1590, and 1610) multiplexer/demultiplexer with monitor ports and LC connectors (this product replaces CWDM-MUX-8).
CWDM-OADM4-1=	4 channels (1470, 1490, 1510, and 1530) optical add/drop multiplexer (OADM) with monitor ports and LC connectors (this product replaces CWDM-MUX-4=)
CWDM-OADM4-2=	4 channels (1550, 1570, 1590, and 1610) OADM with monitor ports and LC connectors (this product replaces part number CWDM-MUX-4=)
CWDM-OADM1-1470=	Single-wavelength (1470) dual-channel OADM with monitor ports and LC connectors (this product replaces part number CWDM-MUX-AD-1470=])
CWDM-OADM1-1490=	Single-wavelength (1490) dual-channel OADM with monitor ports and LC connectors (this product replaces CWDM-MUX-AD-1490=)
CWDM-OADM1-1510=	Single-wavelength (1510) dual-channel OADM with monitor ports and LC connectors (this product replaces CWDM-MUX-AD-1510=)
CWDM-OADM1-1530=	Single-wavelength (1530) dual-channel OADM with monitor ports and LC connectors (this product replaces part number CWDM-MUX-AD-1530=)
CWDM-OADM1-1550=	Single-wavelength (1550) dual-channel OADM with monitor ports and LC connectors (this product replaces part number CWDM-MUX-AD-1550=)
CWDM-OADM1-1570=	Single-wavelength (1570) dual-channel OADM with monitor ports and LC connectors (this product replaces part number CWDM-MUX-AD-1570=)
CWDM-OADM1-1590=	Single-wavelength (1590) dual-channel OADM with monitor ports and LC connectors (this product replaces part number CWDM-MUX-AD-1590=)
CWDM-OADM1-1610=	Single-wavelength (1610) dual-channel OADM with monitor ports and LC connectors (this product replaces part number CWDM-MUX-AD-1610=)
WDM-1300-1550-S=	Y-cable WDM filter with a 1300-nm port, a CWDM 1550-nm port, and a network port to multiplex or demultiplex 1300-nm channels with CWDM or any 1550-nm channels

CISCO CWDM SOLUTION APPLICATIONS

The Cisco CWDM solution based on CWDM gigabit interface converters (GBICs) and Small Form-Factor Pluggables (SFPs) and passive modules allows enterprise companies and service providers to provide scalable and easy-to-deploy Gigabit Ethernet and Fibre Channel services in their networks. The product set helps enable the flexible design of highly available and scalable multiservice networks.

The Cisco CWDM GBIC SFP solution is a convenient and cost-effective solution for the adoption of Gigabit Ethernet and Fibre Channel in campus, data-center, and metropolitan-area access networks.

Because of the flexibility of the passive devices, Cisco CWDM solution helps enable the deployment of a variety of topologies to multiplex up to eight different wavelengths on the same pair of fibers in protected or unprotected configurations. A connection between two endpoints is protected when it is associated with two channels (typically of the same wavelength) traveling on diverse fiber routes (for example, clockwise and counterclockwise in ring configurations or on separate fibers in point-to-point scenarios). Single-wavelength OADMs are equipped with two channels traveling different network paths (east and west) to offer redundancy or protection in rings. On the other hand, because CWDM-MUX8A= and CWDM-OADM4-x= have only a single network port (that is, one fiber path), two CWDM-MUX8A= or two CWDM-MUX4-x= are required to connect to redundant (protected) fiber routes.

Figures 2 through 11 illustrate the numerous protected and unprotected deployment scenarios of the Cisco CWDM solution with the Cisco WDM series of passive devices. The following conventions are adopted in the figures:

- Colored circles represent transceivers (GBIC or SFP) at the corresponding color-coded wavelength connected to the filter equipment port.
- N indicates the network port on the CWDM-MUX8A= and CWDM-OADM4-x=.
- P indicates the pass port on the part number CWDM-OADM4-x=.
- E and W indicate the network east and network west ports on the CWDM-OADM1-xxxx=.

Figure 2. Point-to-Point Configurations with 4- and 8-Channel Passive Devices
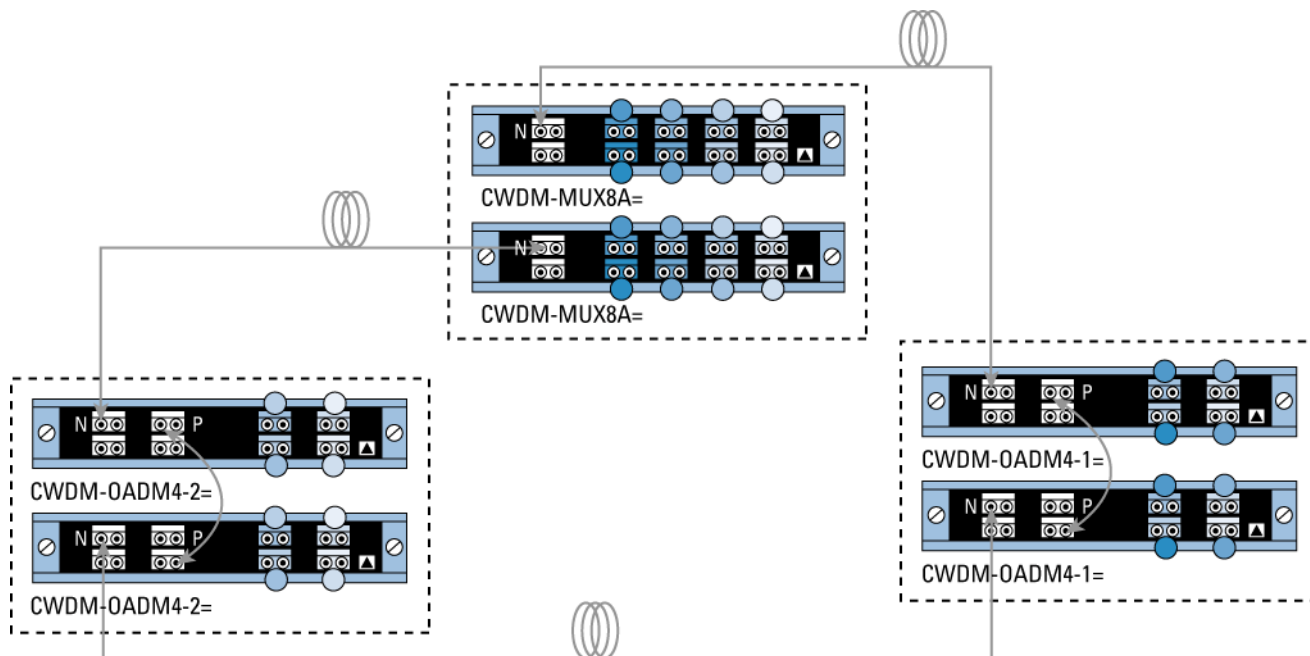

N = Network Port
P = Pass Port (OADM4 only)
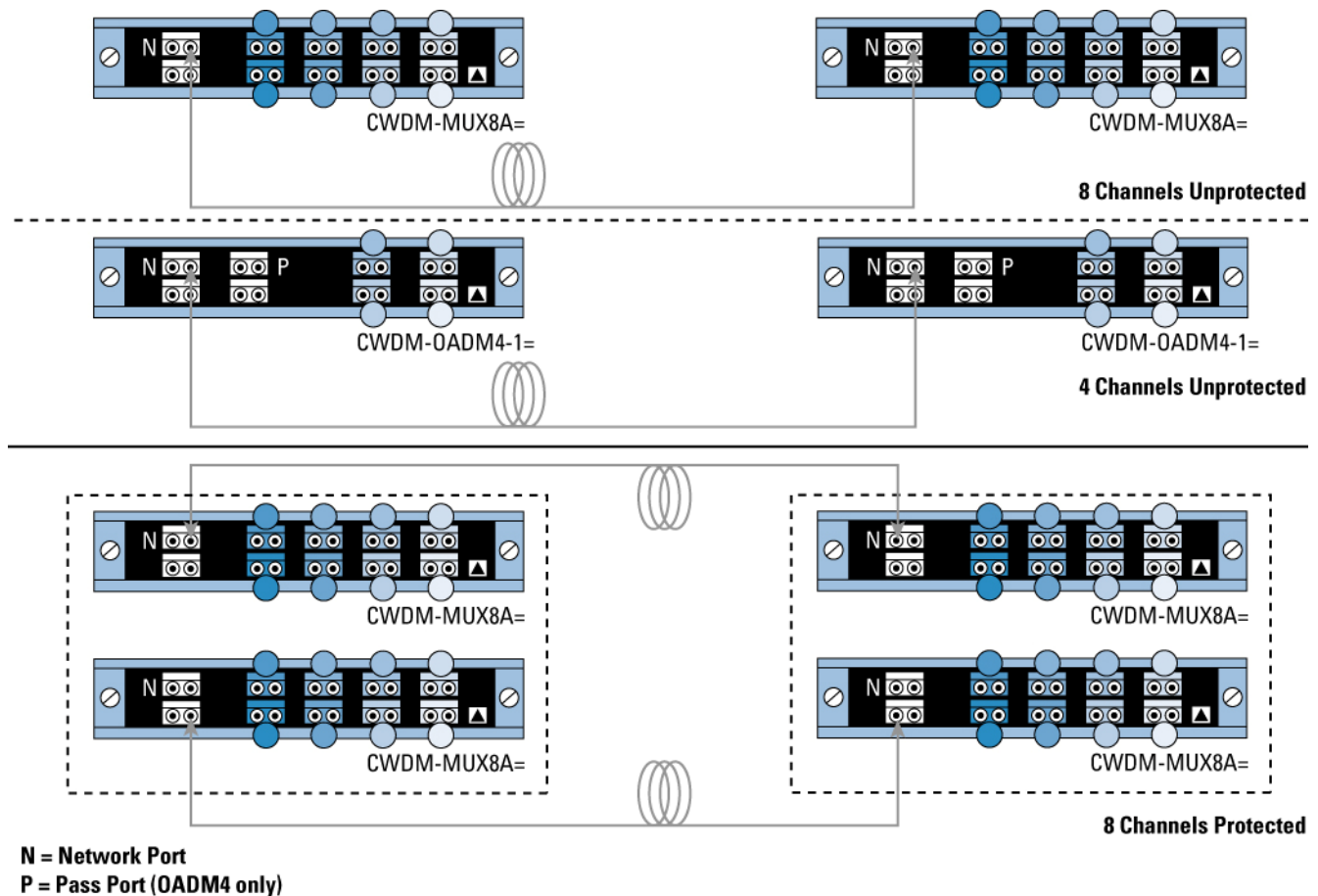
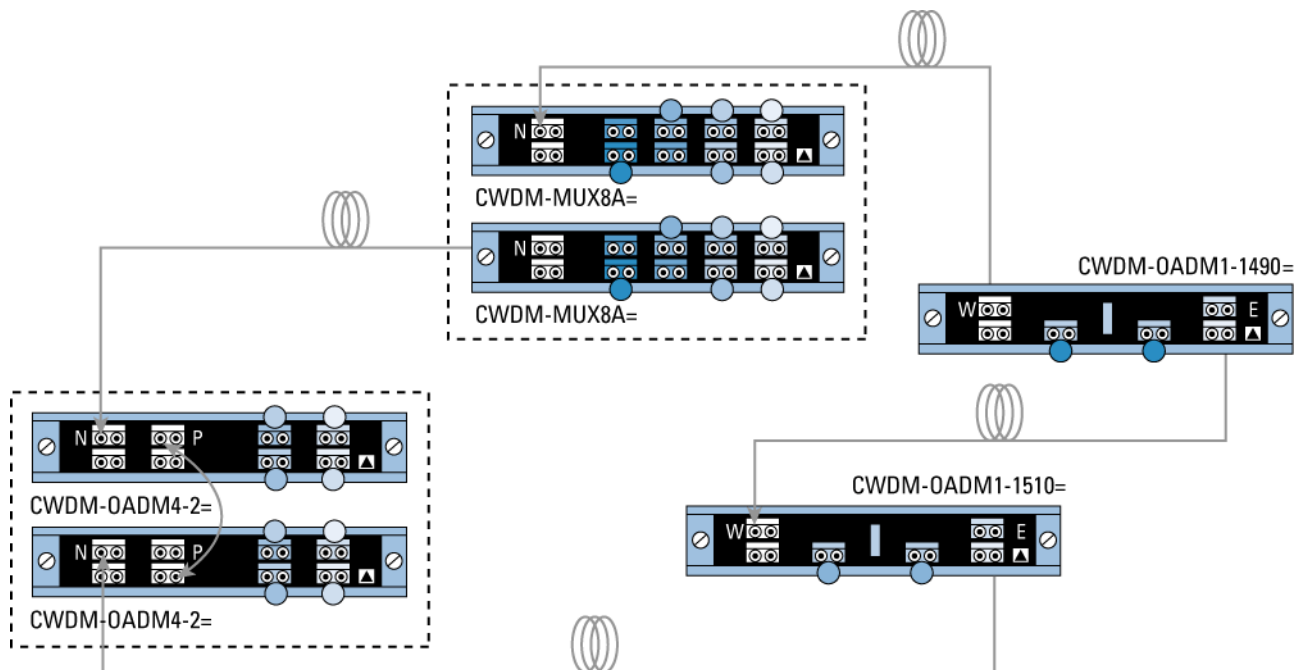**Figure 3.** Point-to-Point Configuration with 4-Channel OADMs and Regeneration
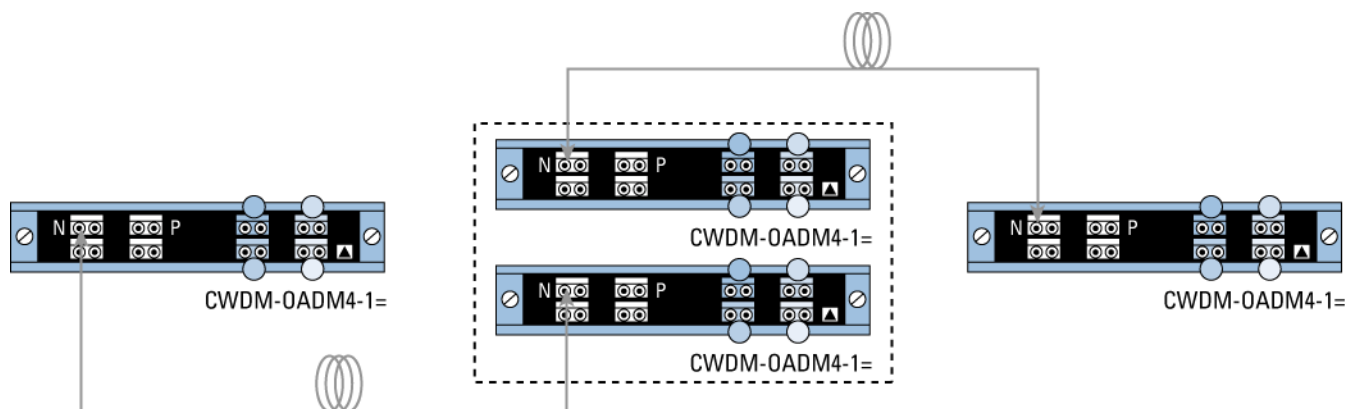
Figure 4. Unprotected Bus Configurations with 4- and 1-Channel OADMs With and Without Regeneration
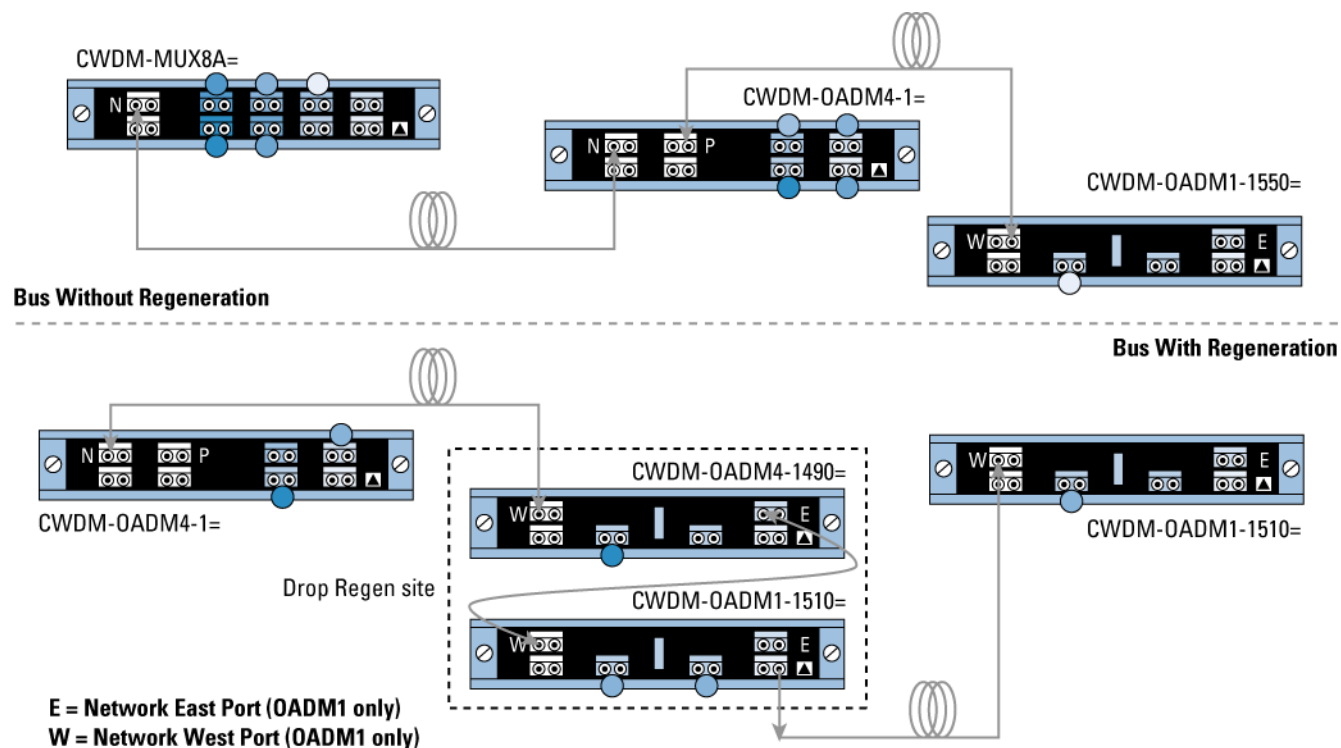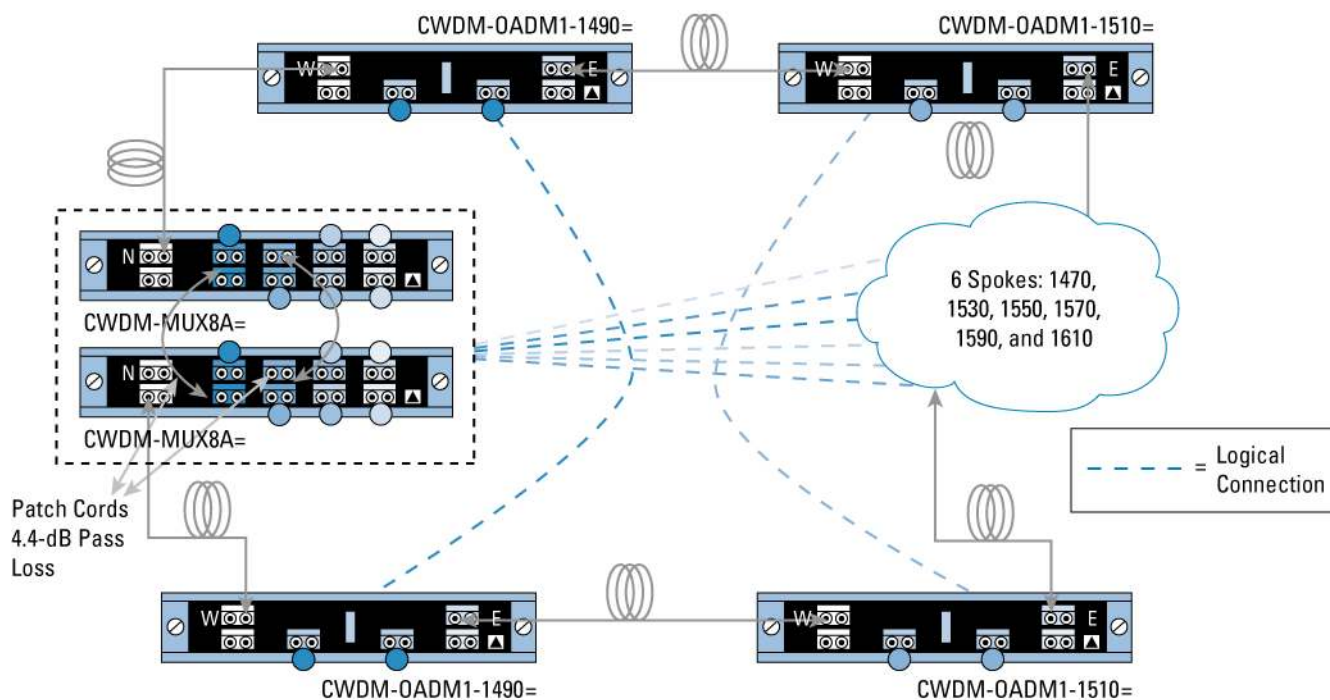
Figure 5.   Protected Hub-and-Spoke Configuration with 8-Channel Multiplexer/Demultiplexer and 4-Channel OADMs
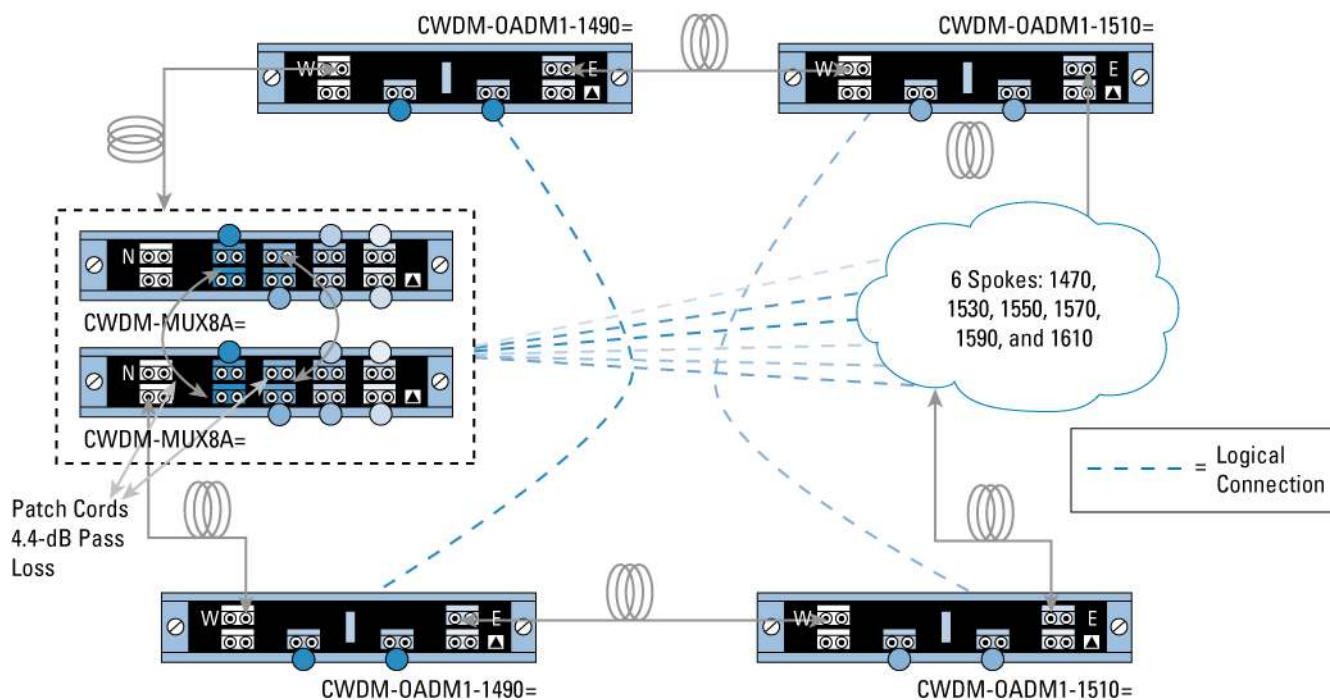

Figure 6.   Protected Hub-and-Spoke Configuration with 8-Channel Multiplexer/Demultiplexer and 4- and 1-Channel OADMs
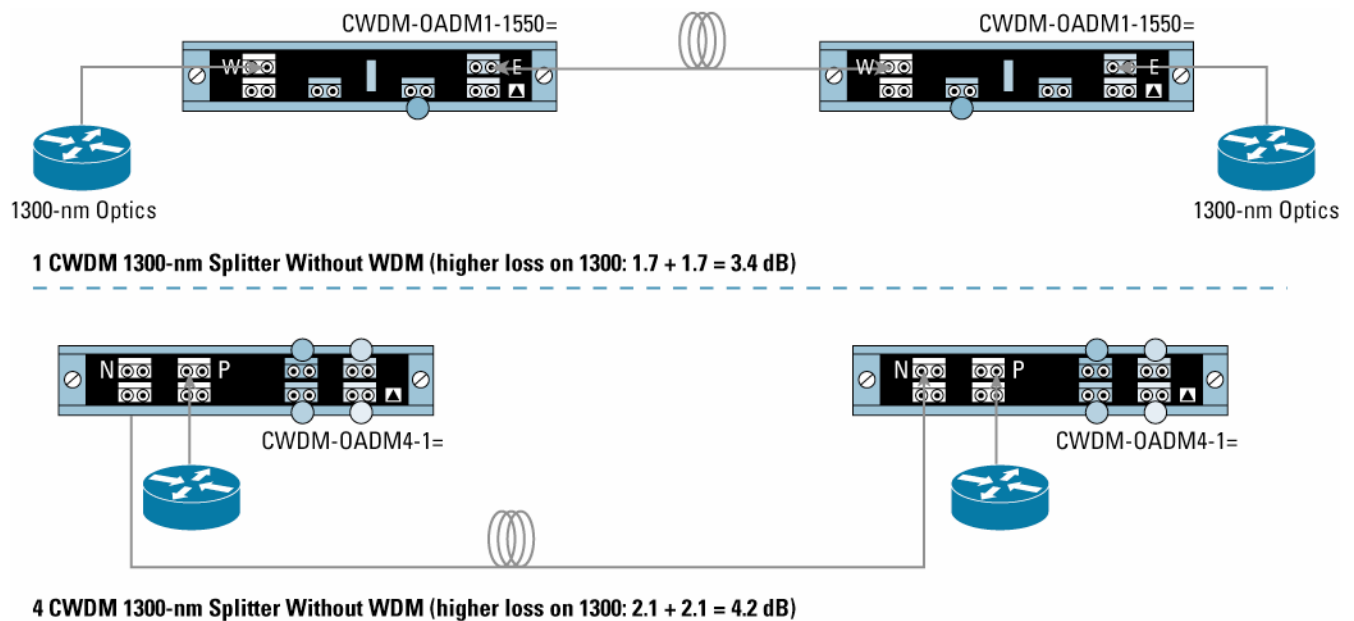
Figure 7. Protected Meshed-Ring Configuration with 4- and 1-Channel OADMs

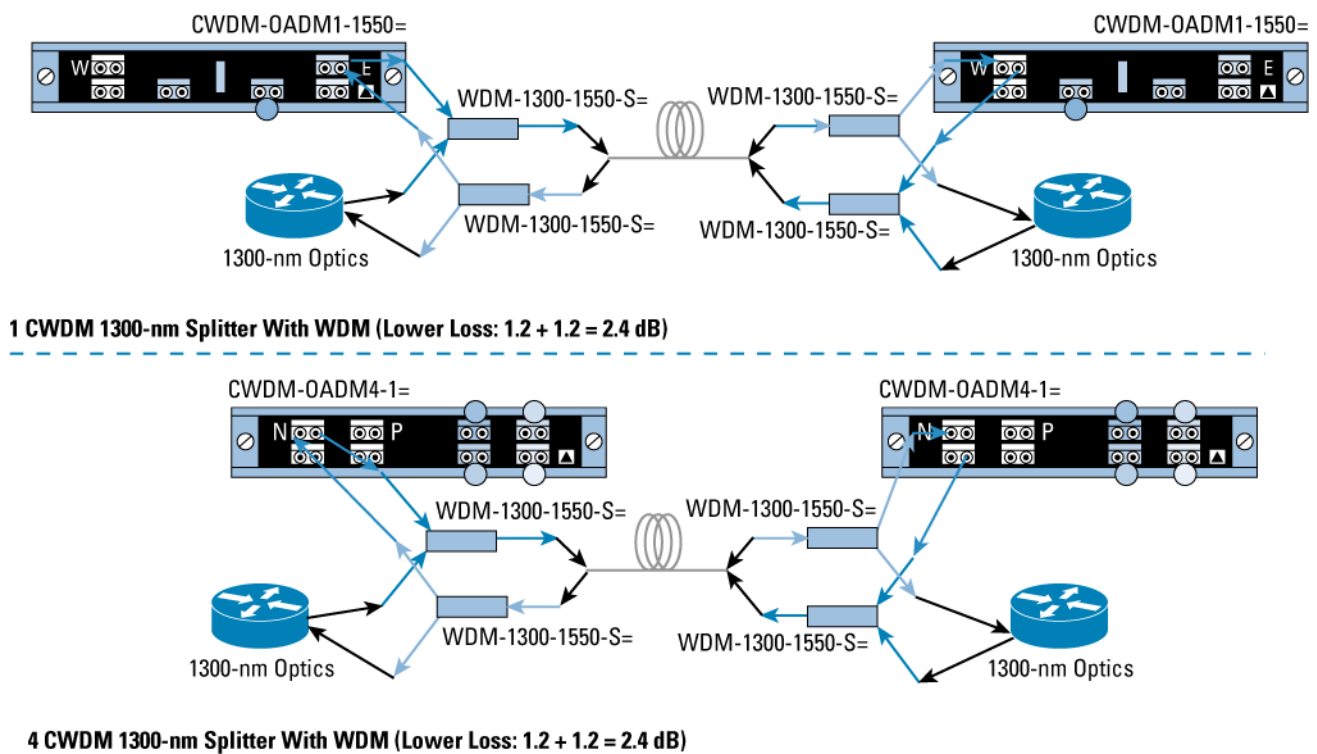**Figure 8.** Protected Meshed-Ring Configuration with 8-Channel Multiplexer/Demultiplexer and 1-Channel OADMs
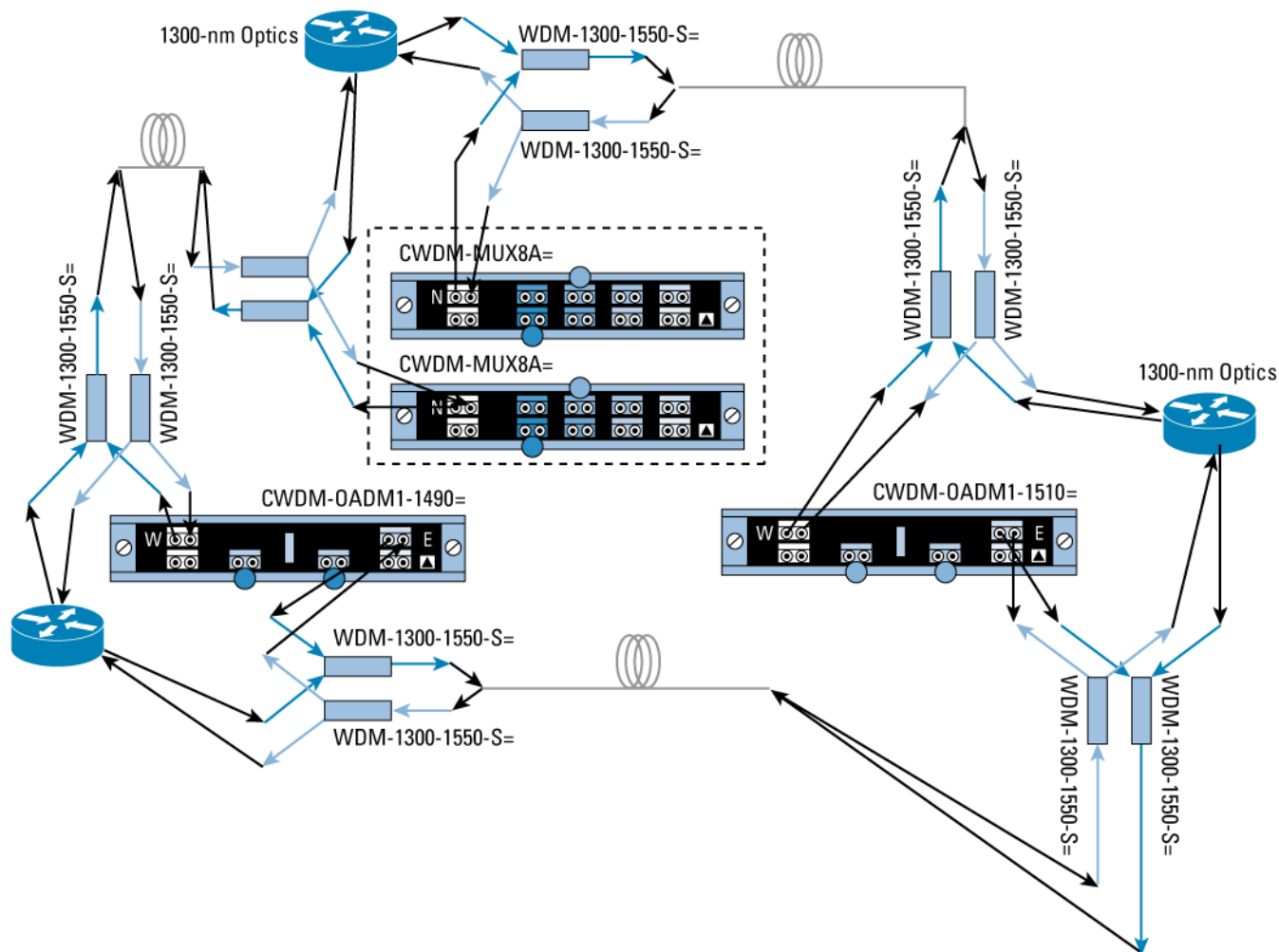
Figure 9. Mixing 1300-nm and CWDM in Point-to-Point Configuration with 1300-nm OADM Transparency


CWDM-OADM1-1550=   CWDM-OADM1-1550=

1300-nm Optics   1300-nm Optics

1 CWDM 1300-nm Splitter Without WDM (higher loss on 1300: 1.7 + 1.7 = 3.4 dB)

CWDM-OADM4-1=   CWDM-OADM4-1=

4 CWDM 1300-nm Splitter Without WDM (higher loss on 1300: 2.1 + 2.1 = 4.2 dB)

Figure 10. Mixing 1300-nm and CWDM in Point-to-Point Configuration with WDM Splitter Cable

CWDM-OADM1-1550=   CWDM-OADM1-1550=

WDM-1300-1550-S=   WDM-1300-1550-S=

WDM-1300-1550-S=   WDM-1300-1550-S=

1300-nm Optics   1300-nm Optics

1 CWDM 1300-nm Splitter With WDM (Lower Loss: 1.2 + 1.2 = 2.4 dB)

CWDM-OADM4-1=   CWDM-OADM4-1=

WDM-1300-1550-S=   WDM-1300-1550-S=

WDM-1300-1550-S=   WDM-1300-1550-S=

1300-nm Optics   1300-nm Optics

4 CWDM 1300-nm Splitter With WDM (Lower Loss: 1.2 + 1.2 = 2.4 dB)

Figure 11. Mixing 1300-nm and CWDM in Protected Rings with WDM Splitter Cable

Figure 12. WDM Splitter Cable for Non-CWDM Applications
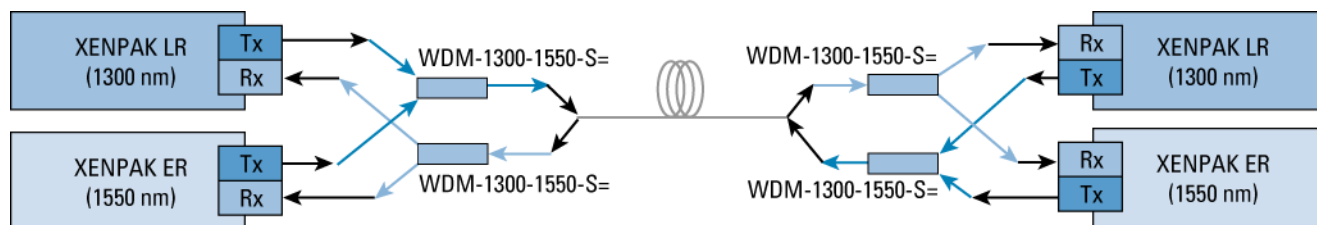
- There are 20 Gbps on a single fiber with standard optics.
- The same configuration works with LX/LH and ZX GBICs or SFPs.

KEY FEATURES AND BENEFITS

Features and Benefits

The Cisco WDM series of CWDM devices offer numerous improvements over the previous generation of devices:

1. Lowest optical insertion loss (refer to Table 2 for details)—Compared to the previous generation of CWDM filters, the insertion loss is reduced up to 50 percent, depending on the model. This translates into much longer distances in both point-to-point and ring configurations.

2. Addition of "monitor" ports on every network port of multiplexers and OADMs as well as on the pass port on OADM4-x to simplify turn-up operations of CWDM networks—The monitor ports also can be used for in-service monitoring of the CWDM signals by means of an optical spectrum analyzer or a power meter.

3. Addition of two 4-channel OADM types for added flexibility: part number CWDM-OADM4-1 to cover the 1470, 1490, 1510, and 1530 channels and part number CWDM-OADM4-2 to cover the 1550, 1570, 1590, and 1610 channels.

4. LC/UPC connectors

5. 1300-nm transparency—OADMs are now transparent to "traditional" 1300-nm channels. In other words, the 1300-nm signals can pass through the OADMs with a well-controlled loss. This feature helps enable configurations where CWDM can share the same fiber with traditional SONET/SDH services running on the 1300-nm wavelength.

6. Addition of a WDM splitter (or Y-cable) to multiplexer and demultiplexer channels in the 1300- and 1550-nm ranges—The WDM splitter cable can be used with CWDM optics or with standard 1550 optics. This Y-cable is another tool to integrate on the same fiber infrastructure CWDM with traditional SONET/SDH services running on the 1300-nm wavelength.

HIGH-LEVEL PRODUCT SPECIFICATIONS

**Table 3.** Maximum Insertion Loss in dB for each passive CWDM filter (standard temperature range, -5 to 55℃)

Model	Maximum Insertion Loss (dB)			
	Add/Drop Multiplexer	Pass 1550	Pass 1300	Monitor
CWDM-MUX8A=	2.2	–	–	23
CWDM-OADM4-x=	1.8	2.1	2.1	23
CWDM-OADM1-xxxx=	1.5	1.5	1.7	23
CWDM-MUX4-SFx=	3.0	-	-	-

Table 4. Maximum Insertion Loss in dB for each passive CWDM filter (extended temperature range, -20 to 75℃)

Model	Maximum Insertion Loss (dB)			
	Add/Drop Multiplexer	Pass 1550	Pass 1300	Monitor
CWDM-MUX8A=	2.4	–	–	23
CWDM-OADM4-x=	2.4	2.5	2.5	23
CWDM-OADM1-xxxx=	1.8	1.7	1	23

**Figure 13.** Front-Panel Port Configurations of the CWDM-MUX8A, CWDM-OADM4-x, and CWDM-OADM1-xxxx)
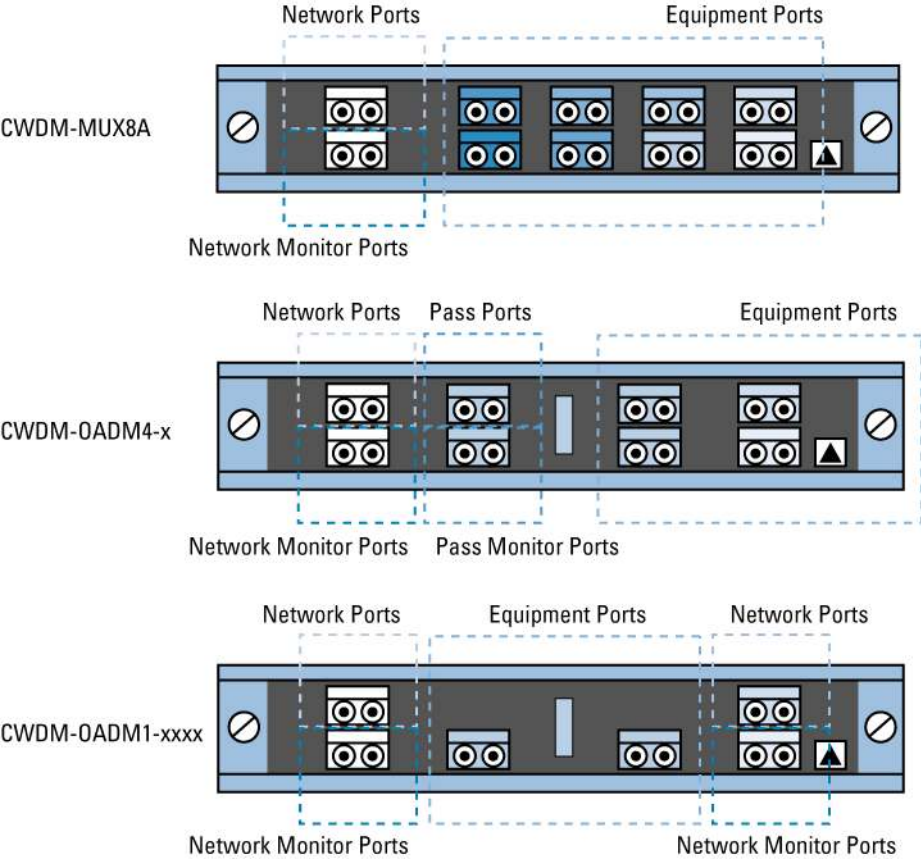
Table 5. WDM Splitter Optical Specification (standard temperature range, -5 to 55°C)

Model	Maximum Insertion Loss (dB)		Wavelength Range (nm)	
	1550	1300	1550	1300
WDM-1300-1550-S=	0.8	1.2	1460–1620	1260–1360

Table 6. WDM Splitter Optical Specification (extended temperature range, -20 to 75°C)

Model	Maximum Insertion Loss (dB)		Wavelength Range (nm)	
	1550	1300	1550	1300
WDM-1300-1550-S=	0.9	1.2	1460–1620	1260–1360

Figure 14. WDM Splitter Cable
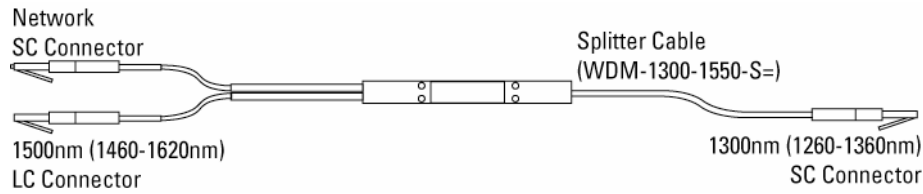
AVAILABILITY

The Cisco WDM series is available now.

ORDERING INFORMATION

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