Data Sheet

Cisco MDS 9000 Family
Small Form-Factor Pluggable Devices

The Cisco® Small Form-Factor Pluggable (SFP) devices for use on the Cisco MDS 9000 Family are industry-standard, hot-swappable input/output devices that plug into a port on any of the Cisco MDS 9000 multilayer directors and fabric switches. The SFPs allow enterprise companies and service providers to make multilayer storage-area networks (SANs) a reality by providing scalable and easy-to-deploy Fibre Channel and Gigabit Ethernet connectivity within a data center and over long distances between multiple data center deployments.

Cisco SFPs for the Cisco MDS 9000 Family are available to work in conjunction with the Cisco MDS 9000 Fibre Channel switching modules, the Cisco MDS 9000 IP Storage Services Module, and any of the fixed ports on the MDS 9200 and 9100 platforms, enabling cost-effective multiprotocol connectivity within a SAN. Table 1 lists the various options for optics on the Cisco MDS 9000 platform.

Table 1 SFPs Available for the Cisco MDS 9000 Modules

Part Number	Description	Protocol	Cisco MDS 9000 Module/Platform
DS-SFP-FC-2G-SW	2 / 1 Gbps Fibre Channel-Short Wave, SFP, LC	Fibre Channel	DS-X9016 DS-X9032 DS-C9216-K9 DS-C9120-K9 DS-C9140-K9
DS-SFP-FC-2G-LW	2 / 1 Gbps Fibre Channel-Long Wave, SFP, LC	Fibre Channel	DS-X9016 DS-X9032 DS-C9216-K9 DS-C9120-K9 DS-C9140-K9
DS-SFP-FCGE-SW	2 / 1 Gbps Fibre Channel and Gigabit Ethernet-Short Wave, SFP, LC	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9
DS-SFP-FCGE-LW	2 / 1 Gbps Fibre Channel and Gigabit Ethernet-Long Wave, SFP, LC	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9

Table 1 SFPs Available for the Cisco MDS 9000 Modules

Part Number	Description	Protocol	Cisco MDS 9000 Module/Platform
CWDM-SFP-1470=	1470 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9
CWDM-SFP-1490=	1490 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9
CWDM-SFP-1510=	1510 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9
CWDM-SFP-1530=	1530 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9
CWDM-SFP-1550=	1550 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9
CWDM-SFP-1570=	1570 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9
CWDM-SFP-1590=	1590 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9

Table 1 SFPs Available for the Cisco MDS 9000 Modules

Part Number	Description	Protocol	Cisco MDS 9000 Module/Platform
CWDM-SFP-1610=	1610 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Fibre Channel Gigabit Ethernet	DS-X9016 DS-X9032 DS-X9308-SMIP DS-C9216-K9 DS-C9120-K9 DS-C9140-K9

Cisco Fibre Channel SFPs

The Cisco Fibre Channel SFPs are designed to provide cost-effective Fibre Channel connectivity for the Cisco MDS 9000 Fibre Channel switching modules. There are two types of Fibre Channel SFPs: the Fibre Channel Short Wave SFP (part number DS-SFP-FC-2G-SW) and the Fibre Channel Long Wave SFP (part number DS-SFP-FC-2G-LW). The Fibre Channel Short Wave SFP operates on ordinary multimode fiber optic link spans of up to 500 meters in length for 1 Gbps Fibre Channel and up to 300 meters in length for 2 Gbps Fibre Channel. This SFP is ideal for Fibre Channel connectivity within an individual data center or department. The Fibre Channel Long Wave SFP operates on ordinary single-mode fiber optic link spans of up to 10,000 meters in length. This SFP is ideal for Fibre Channel connectivity within a campus network or between data centers in close proximity.

Figure 1
Cisco MDS 9000 Fibre Channel SFPs

Platform Support

The Cisco Fibre Channel SFPs are supported across all Cisco MDS 9000 platforms including the following:

- Cisco MDS 9509 Multilayer Director
- Cisco MDS 9506 Multilayer Director
- Cisco MDS 9216 Multilayer Fabric Switch
- Cisco MDS 9120 Multilayer Fabric Switch
- Cisco MDS 9140 Multilayer Fabric Switch

Connectors and Cabling

Connectors: Dual LC connector

Table 2 SFP Port Cabling Specifications

SFP	Wavelength (nanometer)	Fiber Type	Core Size (micron)	Baud Rate (GBd)	Cable Distance
DS-SFP-FC-2G-SW	850	MMF	62.5 62.5 50.0 50.0	1.0625 2.125 1.0625 2.125	300 m (984 ft) 150 m (492 ft) 500 m (1640 ft) 300 m (984 ft)
DS-SFP-FC-2G-LW	1310	SMF	9.0 9.0	1.0625 2.125	10 km (3281 ft) 10 km (3281 ft)

Note: The minimum cable distance for all SFPs listed (multimode fiber [MMF] and single-mode fiber [SMF]) is 6.5 feet (2 m).

Dimensions

Dimensions (H x W x D): 8.5 mm x 13.75 mm x 55.2 mm

Environmental Conditions and Power Requirements

Table 3 Fiber Loss Budgets

SFP	Transmit (dBm)		Receive (dBm)	
	Max	**Min**	**Max**	**Min**
DS-SFP-FC-2G-SW	–1.5	–10.0	0	—
DS-SFP-FC-2G-LW	–3	–9.5	0	—

Table 4 Operating and Storage Temperature Ranges

SFP	Operating		Storage	
	Max	**Min**	**Max**	**Min**
DS-SFP-FC-2G-SW	85 C	0 C	100 C	–40 C
DS-SFP-FC-2G-LW	70 C	–10 C	85 C	–40 C

Table 5 Electrical Power Interface

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Current	I_S	—	133	200	mA
Input Voltage	V_{CC}	3.135	3.3	3.465	V

Ordering Information

Table 6 Ordering Cisco Fibre Channel SFPs

Part Number	Description
DS-SFP-FC-2G-SW	2 / 1 Gbps Fibre Channel-Short Wave, SFP, LC
DS-SFP-FC-2G-SW=	2 / 1 Gbps Fibre Channel-Short Wave, SFP, LC, Spare
DS-SFP-FC-2G-LW	2 / 1 Gbps Fibre Channel-Long Wave, SFP, LC
DS-SFP-FC-2G-LW=	2 / 1 Gbps Fibre Channel-Long Wave, SFP, LC, Spare

Regulatory and Standards Compliance

- Compliant with Fibre Channel FC-PI 200-M5-SN-I and 200-M6-SN-I 2.125 GBd specifications
- Compatible with Fibre Channel FC-PI 100-M5-SN-I and FC-PI 100-M6-SN-I, FC-PH2 100-M5-SN-I, and the FC-PH2 100-M6-SN-I 1.0625 GBd specifications
- Laser Class I 21CFR1040

Triple-Rate Multiprotocol SFPs

The Cisco MDS 9000 Family offers multiprotocol functions and transport options to take advantage of a customer's existing environment and optimize ongoing connectivity requirements. Today, customers may choose from two types of 2 / 1 Gbps Fibre Channel switching modules (part number DX-X9016 and part number DS-X9032) or a 1 Gbps IP Storage Services Module (part number DS-X9308-SMIP). To ease management and sparing concerns, Cisco offers multiple distance SFPs that can be used in both Fibre Channel and Gigabit Ethernet ports. The Cisco MDS 9000 Triple-Rate Multiprotocol SFPs can run at 1 Gbps Fibre Channel, 2 Gbps Fibre Channel, and 1 Gbps Ethernet, thus allowing a customer to simply buy one type of SFP for all the ports on the Cisco MDS 9000 platform.

There are two types of Triple-Rate Multiprotocol SFPs: the Triple-Rate Multiprotocol Short Wave SFP (part number DS-SFP-FCGE-SW) and the Triple-Rate Multiprotocol Long Wave SFP (part number DS-SFP-FCGE-LW). The Triple-Rate Multiprotocol Short Wave SFP operates on ordinary multimode fiber optic link spans of up to 500 meters in length for 1 Gbps Fibre Channel and Ethernet and up to 300 meters in length for 2 Gbps Fibre Channel. This SFP is ideal for Fibre Channel or Ethernet connectivity within an individual data center or department, including connecting departmental midrange servers to a Fibre Channel SAN using iSCSI. The Triple-Rate Multiprotocol Long Wave SFP operates on ordinary single-mode fiber optic link spans of up to 10,000 meters in length. This SFP is ideal for Fibre Channel or Ethernet connectivity within a campus network or between data centers in close proximity, including connecting remote data centers through FCIP.

Figure 2
Cisco Triple-Rate Multiprotocol SFPs

Technical Specifications

Platform Support

The Cisco MDS 9000 Triple-Rate Multiprotocol SFPs are supported across all Cisco MDS 9000 platforms including the following:

- Cisco MDS 9509 Multilayer Director
- Cisco MDS 9506 Multilayer Director
- Cisco MDS 9216 Multilayer Fabric Switch
- Cisco MDS 9120 Multilayer Fabric Switch
- Cisco MDS 9140 Multilayer Fabric Switch

Connectors and Cabling

Connectors: Dual LC connector

Table 7 SFP Port Cabling Specifications

SFP	Wavelength (nanometer)	Fiber Type	Core Size (micron)	Baud Rate (GBd)	Cable Distance
DS-SFP-FCGE-SW	850	MMF	62.5 62.5 50.0 50.0	1.0625 2.125 1.0625 2.125	300 m (984 ft) 150 m (492 ft) 500 m (1640 ft) 300 m (984 ft)
DS-SFP-FCGE-LW	1310	SMF	9.0 9.0	1.0625 2.125	10 km (3281 ft) 10 km (3281 ft)

Note: The minimum cable distance for all SFPs listed (multimode fiber [MMF] and single-mode fiber [SMF]) is 6.5 feet (2 m).

Table 8 Fiber Loss Budgets

SFP	Transmit (dBm)		Receive (dBm)	
	Max	**Min**	**Max**	**Min**
DS-SFP-FCGE-SW	–1.5	–9.5	0	—
DS-SFP-FCGE-LW	–3	–9.5	0	—

Dimensions

Dimensions (H x W x D): 8.5 mm x 13.75 mm x 55.2 mm

Environmental Conditions and Power Requirements

Table 9 Operating and Storage Temperature Ranges

SFP	Operating		Storage	
	Max	**Min**	**Max**	**Min**
DS-SFP-FCGE-SW	85 C	0 C	100 C	–40 C
DS-SFP-FCGE-LW	85 C	–40 C	100 C	–40 C

Table 10 Electrical Power Interface

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Current	I_S	—	133	200	mA
Input Voltage	V_{CC}	3.135	3.3	3.465	V

Warranty

Standard warranty: One year

Ordering Information

Table 11 Ordering Cisco Triple-Rate Multiprotocol SFPs

Part Number	Description
DS-SFP-FCGE-SW	2 / 1 Gbps Fibre Channel and Gigabit Ethernet-Short Wave, SFP, LC
DS-SFP-FCGE-SW=	2 / 1 Gbps Fibre Channel and Gigabit Ethernet-Short Wave, SFP, LC, Spare
DS-SFP-FCGE-LW	2 / 1 Gbps Fibre Channel and Gigabit Ethernet-Long Wave, SFP, LC
DS-SFP-FCGE-LW=	2 / 1 Gbps Fibre Channel and Gigabit Ethernet-Long Wave, SFP, LC, Spare

Regulatory and Standards Compliance

- Compliant with Fibre Channel FC-PI 200-M5-SN-I and 200-M6-SN-I 2.125 GBd specifications and the IEEE 802.3 Gigabit Ethernet (1.25 GBd) 1000BASE-SX specification
- Compatible with the Fibre Channel and FC-PI 100-M6-SN-I, FC-PH2 100-M5-SN-I, and the FC-PH2 100-M6-SN-I 1.0625 GBd specifications
- Laser Class I 21CFR1040

CWDM Extended Distance SFP Solution

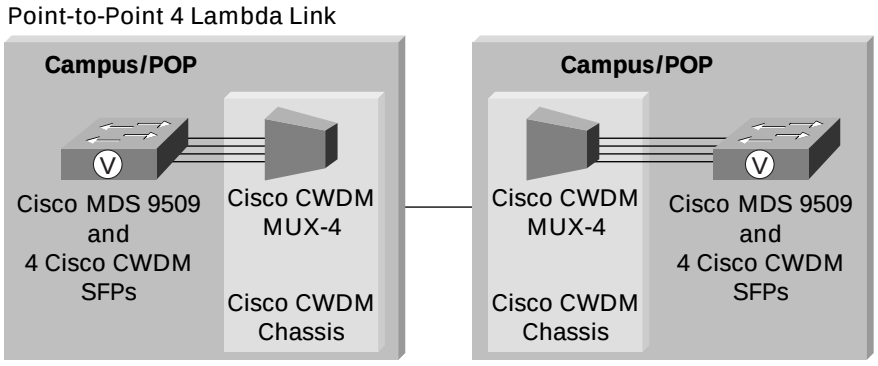
The Cisco MDS 9000 Family offers cost-effective multiprotocol extended distance connectivity that optimizes use of a customer's existing optical infrastructure through the Cisco Coarse Wavelength-Division Multiplexing (CWDM) SFP solution. The Cisco CWDM SFP solution has two main components: a set of eight different wavelength-specific SFPs and a set of different Cisco CWDM optical add-drop modules (OADMs). A Cisco CWDM chassis enables rack-mounting up to two of the Cisco CWDM OADMs. The Cisco CWDM OADMs are passive and require no power. Neither the Cisco CWDM SFPs nor the Cisco CWDM OADMs require configuration.

Figure 3
Cisco Multiprotocol CWDM Extended Distance SFP Solution

The Cisco CWDM SFP solution enables the transport of up to eight channels over one pair of single-mode fiber strands. This enables enterprises to increase the bandwidth of an existing optical infrastructure without adding new fiber strands. The solution can be used in parallel with other Cisco SFP devices on the same platform.

Figure 3 illustrates a common point-to-point deployment scenario for the Cisco MDS 9000 Family using the Cisco CWDM solution. Two endpoints are directly connected through a fiber link. The Cisco CWDM SFP solution enables customers to add or drop as many as eight channels (Gigabit Ethernet or Fibre Channel) into a pair of single-mode fiber strands. As a result, the need for additional fiber is minimized. Redundant point-to-point links are possible by adding or dropping redundant channels into a second pair of single-mode fiber strands.

Figure 4
Point-to-Point Architecture (Dual-Fiber Link)



Platform Support

The Cisco CWDM SFPs are supported across all Cisco MDS 9000 platforms including the following:

- Cisco MDS 9509 Multilayer Director
- Cisco MDS 9506 Multilayer Director
- Cisco MDS 9216 Multilayer Fabric Switch
- Cisco MDS 9120 Multilayer Fabric Switch
- Cisco MDS 9140 Multilayer Fabric Switch

Connectors and Cabling

Equipment: Standard SFP interface

Network: Dual LC connector

Dimensions

Dimensions (H x W x D): 8.5 mm x 13.75 mm x 55.2 mm

Environmental Conditions and Power Requirements

Operating temperature range: 32 to 122 F (0 and 50 C)

Storage temperature range: –40 to 185 F (–40 to 85 C)

Table 12 Electrical Power Interface Data

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Current	I_S	—	220	300	mA
Surge Current	I_{Surge}	—	—	+30	mA
Input Voltage	Vmax	3.1	3.3	3.6	V

Table 13 Optical Parameters

Parameter	Symbol	Minimum	Typical	Maximum	Units	Notes/Conditions
Transmitter center wavelength	$lambda_c$	(x–4)	—	(x+7)	nm	Available center wavelengths are 1470, 1490, 1510, 1530, 1550, 1570, 1590, and 1610 nm
Side-mode suppression ratio	SMSR	30	—	—	dB	—
Transmitter optical output power	P_{out}	0.0		5.0	dBm	Average power coupled into single-mode fiber
Receiver optical input power (BER <10^{-12} with PRBS 2^{-7}–1)	P_{in}	–28.0	—	–7.0	dBm	at 2.12 Gbps, 140 F (60 C) case temperature

Table 13 Optical Parameters

Parameter	Symbol	Minimum	Typical	Maximum	Units	Notes/Conditions
Receiver optical input power (BER <10^{-12} with PRBS 2^{-7}–1)	P_{in}	–29.0	—	–7.0	dBm	at 1.25 Gbps, 140 F (60 C) case temperature
Receiver optical input wavelength	$lambda_{ins}$	1450	—	1620	nm	—
Transmitter extinction ratio	OMI	9	—	—	dB	—
Dispersion penalty at 100 km	—	—	—	3	dB	at 2.12 Gbps
Dispersion penalty at 100 km	—	—	—	2	dB	at 1.25 Gbps

Note: Parameters are specified over temperature and at end of life unless otherwise noted.

Note: When shorter distances of single-mode fiber are used, it may be necessary to insert an in-line optical attenuator in the link to avoid overloading the receiver.

Ordering Information

Table 14 Cisco CWDM SFP Product Information

Product Number	Description	Color
CWDM-SFP-1470=	1470 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Gray
CWDM-SFP-1490=	1490 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Violet
CWDM-SFP-1510=	1510 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Blue
CWDM-SFP-1530=	1530 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Green
CWDM-SFP-1550=	1550 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Yellow
CWDM-SFP-1570=	1570 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Orange
CWDM-SFP-1590=	1590 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Red
CWDM-SFP-1610=	1610 nm CWDM Gigabit Ethernet and 2 / 1 Gbps Fibre Channel SFP	Brown
CAB-SM-LCSC-1M	Fiber Optic Cable, Single mode, LC/SC, 1 Meter	—
CAB-SM-LCSC-5M	Fiber Optic Cable, Single mode, LC/SC, 5 Meter	—

Regulatory and Standards Compliance

- Compatible with 1000BASE-X standard as specified in IEEE 802.3z
- Compatible with Fibre Channel Draft Physical Interface Specification (FC-PI 10.0)
- Laser Class I 21CFR1040

Technical Specifications for Cisco CWDM OADMs

The Cisco CWDM OADMs are passive devices that provide the ability to multiplex and demultiplex, or add and drop wavelengths from multiple fibers onto one fiber. The OADM connectors are interfaced to the color-matching Cisco CWDM SFPs on the equipment side. All modules are the same size. The Cisco CWDM chassis enables rack mounting for up to two Cisco CWDM OADMs in a single rack unit.

Cisco provides four different types of CWDM OADMs:

- Dual Fiber Single-Channel OADM (CWDM-MUX-AD-xxxx=)

  This device allows you to add and drop two channels of the same wavelength into two directions of an optical ring (Figure 4). The other wavelengths are passed through the OADM. Dual fiber is used for both network and SFP connections. Eight options of this OADM are available, one for each wavelength: 1470, 1490, 1510, 1530, 1550, 1570, 1590, and 1610 nanometers (nm).

- Dual Fiber 4-Channel OADM: (CWDM-MUX-4=)

  This device allows you to add and drop four channels (with different wavelengths) into one direction of an optical ring (Figure 5). The other wavelengths are passed through the OADM. Dual fiber is used for both network and SFP connections. The four wavelengths are set to 1470, 1510, 1550, and 1590 nm.

- Dual Fiber 8-Channel Multiplexer/Demultiplexer (CWDM-MUX-8=)

  This device allows you to multiplex and demultiplex eight separate channels into one pair of fiber (Figure 6). Dual fiber is used for both network and SFP connections. The eight wavelengths are set to 1470, 1490, 1510, 1530, 1550, 1570, 1590, and 1610 nm.

- Single Fiber 4-Channel Multiplexer/Demultiplexer (CWDM-MUX-4-SFx=)

  This device allows you to multiplex and demultiplex up to four separate channels into one strand of fiber (Figure 7). Dual fiber is used for the SFP connections; single fiber is used for the network connections. The two existing models (CWDM-MUX-4-SF1= and CWDM-MUX-4-SF2=) have to be used to create a four-channel single fiber point-to-point link.

Table 15 OADM Type Comparison

OADM Type	No. of Fiber Strands/Network	Maximum No. of Links	OADM vs. Multiplexer/ Demultiplexer	Architecture Options
CWDM-MUX-AD-xxxx=	2	8	OADM (dual add/drop)	Ring (point-to-point possible)
CWDM-MUX-4=	2	8	OADM	Ring, point-to-point
CWDM-MUX-8=	2	8	Multiplexer/demultiplexer	Ring, point-to-point
CWDM-MUX-4-SFx=	1	4	Multiplexer/demultiplexer	Point-to-point only

Figure 5
Dual Single-Channel Cisco CWDM OADM (CWDM-MUX-AD-1470= Is Pictured)

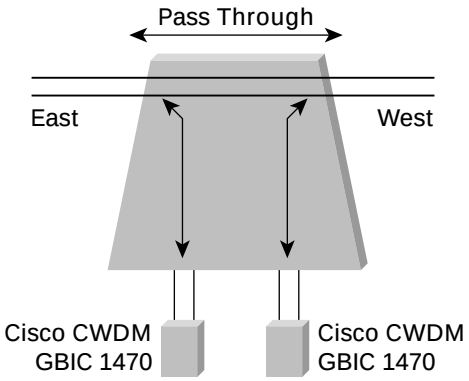


Figure 6
4-Channel Cisco CWDM OADM

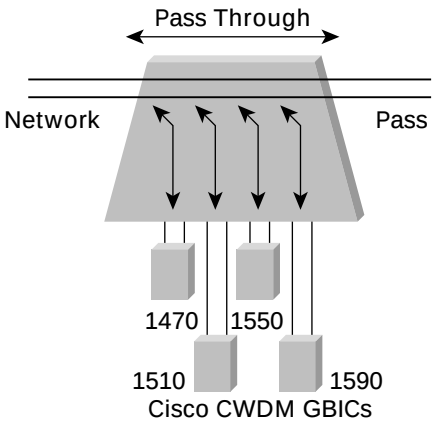


Figure 7
8-Channel Cisco CWDM Multiplexer/Demultiplexer

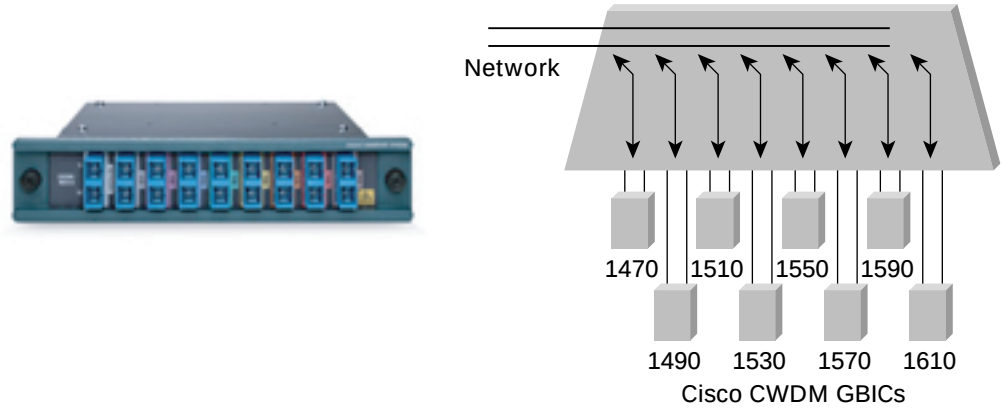
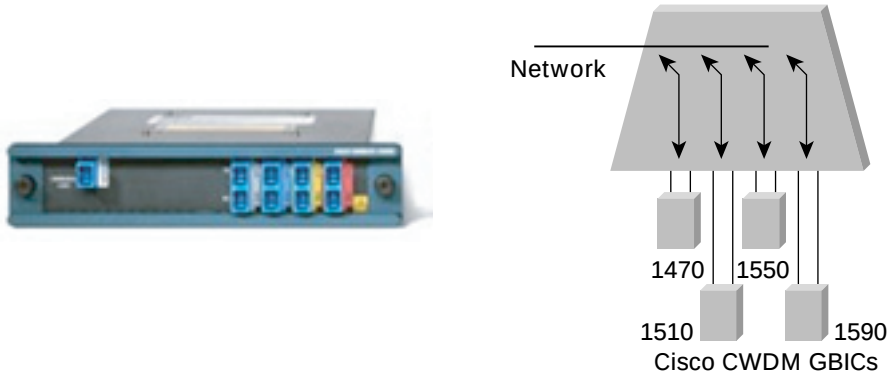


Figure 8
Single Fiber 4-Channel Cisco CWDM Multiplexer/Demultiplexer (CWDM-MUX-4-SF1= Is Pictured)



Connectors and Cabling

Equipment: Dual SC connector per channel

Network:

Dual SC connector—CWDM-MUX-AD-xxxx=, CWDM-MUX-4=, CWDM-MUX-8=

Single SC connector—CWDM-MUX-4-SF1=, CWDM-MUX-4-SF2=

Environmental Conditions and Power Requirements

The operating temperature range is between 0 and 60 C(32 to 140 F),storage temperature range is –40 to 85 C(–40 to 185 F).

The Cisco CWDM OADMs and the Cisco CWDM chassis are passive components that do not require power.

Dimensions and Weight

All the different Cisco CWDM OADMs have the same dimensions—W x D x H: 21.2 cm x 3.0 cm x 26.5 cm. Two of these modules fit into one Cisco CWDM chassis. The Cisco CWDM chassis is 1-RU in height and fits in a standard 19 in. rack.

Warranty

Standard warranty: One year

Optical Specifications

Table 16 Optical Parameters for Cisco CWDM OADMs

	Max Insertion Loss (dB)			Typical Insertion Loss (dB)			Isolation (dB)		
	Add	Drop	Pass	Add	Drop	Pass	Add	Drop	Pass
CWDM-MUX-AD-xxxx=	1.9	2.3	2.0	1.2	1.6	1.5	>25	>50	>28
CWDM-MUX-4=	4.0	5.0	2.6	3.0	4.0	2.0	>8	>50	—
CWDM-MUX-8=	4.0	5.0	—	3.0	4.0	—	>8	>50	—
CWDM-MUX-4-SF1=	3.0	3.0	—	3.0	3.0	—	>30	>30	—
CWDM-MUX-4-SF1=	3.0	3.0	—	3.0	3.0	—	>30	>30	—

Ordering Information

Table 17 Cisco CWDM OADM and Cisco CWDM Chassis Ordering Information

Product Number	Description
CWDM-MUX-AD-1470=	1470 nm OADM
CWDM-MUX-AD-1490=	1490 nm OADM
CWDM-MUX-AD-1510=	1510 nm OADM
CWDM-MUX-AD-1530=	1530 nm OADM
CWDM-MUX-AD-1550=	1550 nm OADM
CWDM-MUX-AD-1570=	1570 nm OADM
CWDM-MUX-AD-1590=	1590 nm OADM
CWDM-MUX-AD-1610=	1610 nm OADM
CWDM-MUX-4=	4-channel OADM
CWDM-MUX-8=	8-channel multiplexer/demultiplexer
CWDM-CHASSIS-2=	2-slot chassis for Cisco OADM and multiplexer/demultiplexer
CWDM-MUX-4-SF1=	Single Fiber 4-channel multiplexer/demultiplexer
CWDM-MUX-4-SF2=	Single Fiber 4-channel multiplexer/demultiplexer

Regulatory and Standards Compliance

- Network Equipment Building Standards (NEBS) Level 3

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