

Cisco 2-Channel SFP WDM Transponder

The Cisco® 2-Channel SFP WDM Transponder expands the range of applications and platforms supported by coarse wavelength-division multiplexing (CWDM) and dense wavelength-division multiplexing (DWDM) pluggable optics solutions from Cisco. It supports any client, any protocol, and any speed between 155 Mbps (OC-3/STM-1) and 2.488 Gbps (OC-48/STM-16).

Product Overview

The Cisco 2-Channel SFP WDM Transponder (Figure 1) is an unmanaged unit that can be used to convert any incoming optical signal into a CWDM or DWDM channel. Its flexibility in terms of data rates, protocols, and wavelength-division multiplexing (WDM) options is provided by Cisco pluggable optics, which reside on both the client side and the trunk side.

In addition, when Small Form-Factor Pluggable (SFP) devices with the same wavelength reside on client and trunk sides, the unit can be simply used as a 3R regenerator (re-amplification, reshaping and retiming) for the uplink data stream (client to network path) and a 2R regenerator (re-amplification and reshaping) for the downlink data stream (network to client path), turning it into a very dynamic and flexible module.

Figure 1. Cisco 2-Channel SFP WDM Transponder



The transponder effectively extends the range of client devices that can connect to the CWDM or DWDM network using pluggable optics: third-party SONET/SDH add/drop multiplexers (ADMs), storage and Ethernet devices, or Cisco platforms that do not support pluggable WDM optics can connect to the WDM network by using this transponder, which operates the wavelength conversion from older 850/1300/1550 nanometer (nm) signals to any CWDM or DWDM channels. This conversion is enabled by the WDM SFP ports sitting on the line side (Figure 2).

Figure 2. SFP Ports on the Transponder



Each transponder supports up to two CWDM or DWDM line SFP optics (plugged into the ports labeled “NTWK1” and “NTWK2”) as well as two client SFP optics (plugged in the ports labeled “EQPT1” and “EQPT2”). The range of Cisco SFP optics on the transponder supports any protocol and speed between 155 Mbps and 2.488 Gbps.

The transponder is compatible with the passive Cisco CWDM chassis (Figure 3) (part number CWDM-CHASSIS-2=). Two transponder devices can coexist together in the two-slot chassis.

There is no limit to the number of chassis that can be stacked in a rack. Alternatively, the transponder can coexist in the same chassis with any Cisco CWDM passive filters.

Figure 3. Cisco CWDM Chassis



Table 1 lists the compatible SFP optics required by each application.

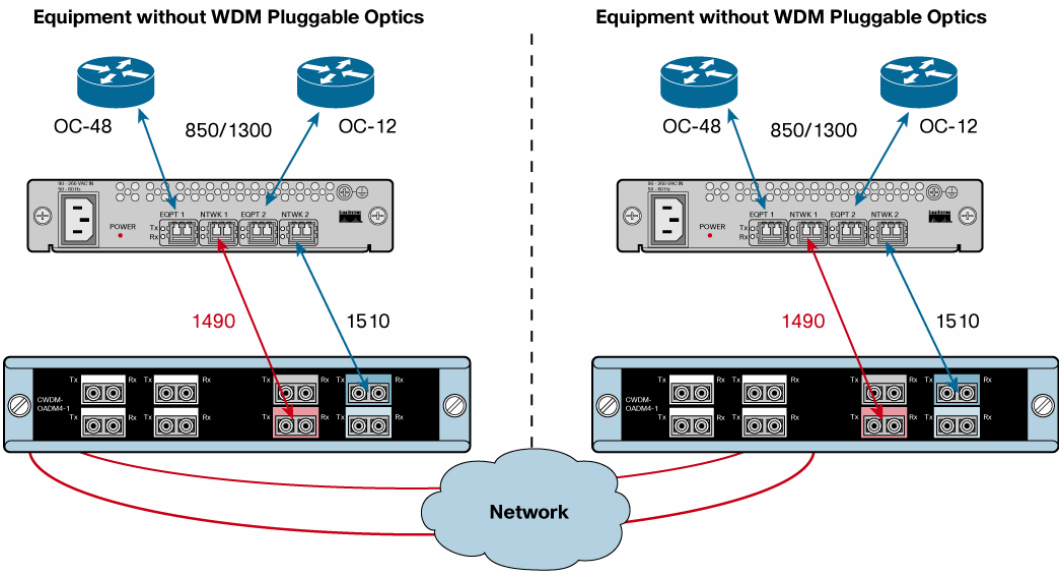
Table 1. Supported SFP Optics and Applications

Client Protocol	Bit Rate (Mbps)	Client SFP (Product Number)	CWDM Line SFP (Product Number)	DWDM Line SFP (Product Number)
SONET/SDH	2488	SFP-OC48-SR SFP-OC48-IR1 SFP-OC48-LR2	<ul style="list-style-type: none"> • CWDM-SFP-1470= • CWDM-SFP-1490= • CWDM-SFP-1510= • CWDM-SFP-1530= • CWDM-SFP-1550= • CWDM-SFP-1570= • CWDM-SFP-1490= • CWDM-SFP-1610= 	32 channels <ul style="list-style-type: none"> • DWDM-SFP-3033= • DWDM-SFP-3112=
	622	SFP-OC12-SR SFP-OC12-IR1 SFP-OC12-LR1 SFP-OC12-LR2 SFP-OC12-MM	<ul style="list-style-type: none"> • CWDM-SFP-1530= • CWDM-SFP-1550= • CWDM-SFP-1570= • CWDM-SFP-1490= • CWDM-SFP-1610= 	– <ul style="list-style-type: none"> • DWDM-SFP-XXXX= • DWDM-SFP-5979= • DWDM-SFP-6061=
	155	SFP-OC3-SR SFP-OC3-IR1 SFP-OC3-LR1 SFP-OC3-LR2 SFP-OC3-MM	<ul style="list-style-type: none"> • ONS-SE-155-1470= • ONS-SE-155-1490= • ONS-SE-155-1510= • ONS-SE-155-1530= • ONS-SE-155-1550= • ONS-SE-155-1570= • ONS-SE-155-1590= • ONS-SE-155-1610= 	–
Gigabit Ethernet	1250	GLC-LH-SM= GLC-SX-MM= GLC-ZX-SM= GLC-BX-D= GLC-BX-U= SFP-GE-L= SFP-GE-S= SFP-GE-Z=	<ul style="list-style-type: none"> • CWDM-SFP-1470= • CWDM-SFP-1490= • CWDM-SFP-1510= • CWDM-SFP-1530= • CWDM-SFP-1550= • CWDM-SFP-1570= • CWDM-SFP-1490= • CWDM-SFP-1610= 	32 channels <ul style="list-style-type: none"> • DWDM-SFP-3033= • DWDM-SFP-3112= • DWDM-SFP-XXXX= • DWDM-SFP-5979= • DWDM-SFP-6061=
Fibre Channel	1063	DS-SFP-FC-2G-LW= ONS-SE-G2F-LX= DS-SFP-FC-2G-SW= ONS-SE-G2F-SX=		
	2125	DS-SFP-FC-2G-LW= ONS-SE-G2F-LX= DS-SFP-FC-2G-SW= ONS-SE-G2F-SX=		

Applications

The transponder is designed for situations where most of the equipment operates directly with pluggable optics, but a few platforms without WDM pluggable optics need to connect to the WDM network. Figure 4 shows an example of two sites connected through SONET links: The transponders at each location take the signals from the SONET equipment and convert them to CWDM channels, which communicate with passive Cisco CWDM devices.

Figure 4. Example Deployment Scenario



Product Specifications

The Cisco 2-Channel SFP WDM Transponder is an unmanaged unit that runs no software. The front-panel LEDs (Figure 5) report various alarm conditions as summarized in Table 2. Tables 3 to 6 list product and optical specifications.

Figure 5. Front-Panel LEDs

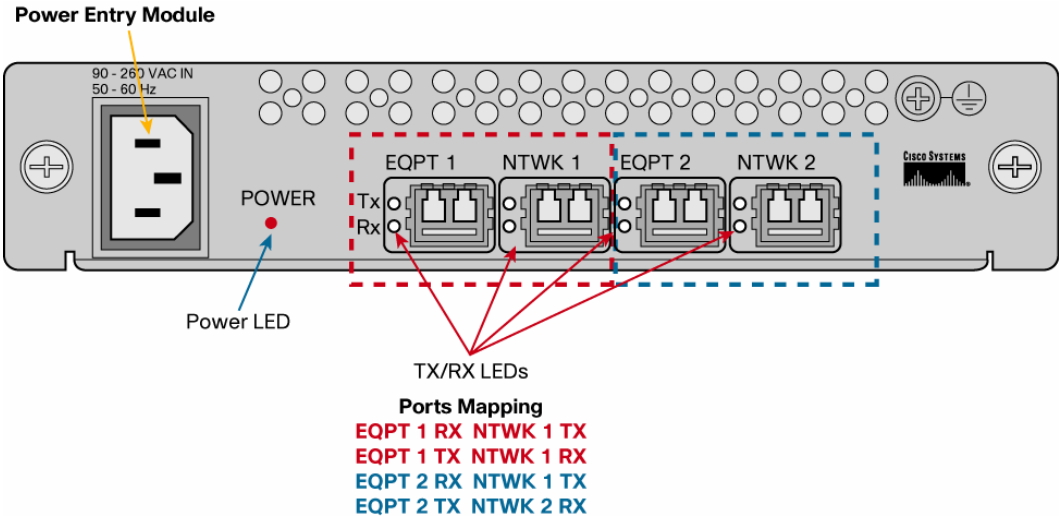


Table 2. LED Descriptions

Led Name	Color	Description
POWER	Green	Power on
	Off	Power off
EQPT1/2 TX	Green	Equipment 1 laser on
	Red	Equipment 1 laser off
	Off	Equipment 1 SFP not present
EQPT1/2 RX	Green	Equipment 1 signal detected
	Red	Equipment 1 loss of signal
	Flashing green	Equipment 1 loss of lock
	Off	Equipment 1 SFP not present
NTWK1/2 TX	Green	Network 1 laser on
	Red	Network 1 laser off
	Off	Network 1 SFP not present
NTWK1/2 RX	Green	Network 1 signal detected
	Red	Network 1 loss of signal
	Off	Network 1 SFP not present

Table 3. Product Specifications

Configuration	Parameter	Specification
Electrical	Supply voltage	90–240VAC
	Max power consumption	9.7W
	Connector type	IEC 60320 C14 inlet plug
Reliability	Mean time between failures (MTBF)	24.68 years
Mechanical	Dimensions	<ul style="list-style-type: none"> 6.91 in. (faceplate 8.25 in.) W 1.6 in. H 10 in. D
	Weight (estimated with 4 SFPs)	4–5 lb
Environmental	Temperature	0–40° C
Performance	Bit rate	100–2500 Mbps
	Regeneration	<ul style="list-style-type: none"> 3R upstream (from client to trunk SFP) 2R downstream (from trunk to client)

Table 4. CWDM SFP Optical Specification (OC-3/STM-4, OC-48/STM-16, 1G Ethernet, 1G Fiber Channel and 2G Fiber Channel)

Parameter	Symbol	Minimum	Maximum	Units	Notes and Conditions
Transmitter Center Wavelength	λ	$(\lambda - 4)$	$(\lambda + 7)$	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	5.0	dBm	Average power coupled into single-mode fiber
Receiver Optical Input Power (BER < 10 ⁻¹² with PRBS 2 ⁷ –1)	P _{in}	–29.0	–7.0	dBm	Data rate below 2000 Mbps
Receiver Optical Input Power (BER < 10 ⁻¹² with PRBS 2 ⁷ –1)	P _{in}	–28.0	–7.0	dBm	Data rate above 2000 Mbps
Receiver Optical Input Wavelength	λ	1450	1620	nm	
Transmitter Extinction Ratio	OMI	9		dB	
Dispersion Penalty at 100 km			2	dB	Data rate below 2000 Mbps

Dispersion Penalty at 100 km			3	dB	Data rate above 2000 Mbps
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Table 5. CWDM SFP Optical Specification (OC-3/STM-1)

Parameter	Symbol	Minimum	Maximum	Units	Notes and Conditions
Transmitter Center Wavelength	λ	$(\lambda - 4)$	$(\lambda + 7)$	nm	Available center wavelengths are 1470, 1490, 1510, 1530, 1550, 1570, 1590, and 1610 nm
Transmitter Optical Output Power	P _{out}	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}	-34.0	-7.0	dBm	at 155 Mbps
Receiver Optical Input Wavelength	λ	1450	1620	nm	
Dispersion Penalty at 100 km			1	dB	at 155 Mbps

Table 6. DWDM SFP Optical Specification (OC-3/STM-4, OC-48/STM-16, 1G Ethernet, 1G Fiber Channel and 2G Fiber Channel)

Parameter	Symbol	Minimum	Maximum	Units	Notes and Conditions
Transmitter					
Spectral Width			0.2	nm	Full width, -20dB from maximum, with resolution bandwidth (RBW) = 0.01 nm
Transmitter Center Wavelength	λ	$\lambda - 100$	$\lambda + 100$	pm	Center wavelengths are in-line with Cisco DWDM channel plan and 100GHz ITU grid
Side-Mode Suppression Ratio	SMSR	30		dB	
Transmitter Extinction Ratio	OMI	8.2		dB	
Transmitter Optical Output Power	P _{out}	0	4.0	dBm	Average power coupled into single-mode fiber
Receiver					
Receiver Optical Input Wavelength	λ	1530	1565	nm	
Receiver Damage Threshold			-1	dBm	
Dispersion Tolerance		-500	1600	ps/nm	
Power-Limited Performance at OSNR of 20 dB (< 2000 Mbps) or 21 dB (> 2000 Mbps) at 0.1-nm RBW					
Optical Input Power	P _{in}	-28.0	-9.0	dBm	
Dispersion Power Penalty < 2000 Mbps			3	dB	-800/+3600 ps/nm
Dispersion Power Penalty > 2000 Mbps			3	dB	-800/+2400 ps/nm
Noise-Limited Performance at OSNR of 18 dB (< 2000 Mbps) or 19 dB (> 2000 Mbps) at 0.1-nm RBW					
Optical Input Power	P _{in}	-22.0	-9.0	dB	
Dispersion OSNR Penalty < 2000 Mbps			2	dB	-800/+3600 ps/nm
Dispersion OSNR Penalty > 2000 Mbps			3		-800/+2400 ps/nm

Ordering Information

To place an order, visit the Cisco ordering homepage. Table 7 lists ordering information for the Cisco 2-Channel SFP WDM Transponder.

Table 7. Ordering Information

Product Name	Part Number
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Cisco 2-Channel SFP WDM Transponder

WDM-SFP-2CH-CONV=

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