Data Sheet

Fixed Optical Filter Portfolio for the Cisco ONS 15454 Multiservice Transport Platform

The Cisco® ONS 15454 Multiservice Transport Platform (MSTP) provides a comprehensive, intelligent dense wavelength-division multiplexing (DWDM) solution for expanding metropolitan-area (metro) and regional bandwidth.

Product Overview

The Cisco ONS 15454 MSTP offers a comprehensive selection of fixed optical filters, shown in Figure 1, for delivering the correct amount of bandwidth to each service location in a metro or regional network. The fixed filter cards are part of the Cisco ONS 15454 MSTP intelligent DWDM architecture for reducing DWDM complexity and speeding the deployment of next-generation networking solutions.

Figure 1
Fixed Optical Filter Family

Plug-in modules that deliver flexible access to network bandwidth from a single DWDM channel all the way to 32 channels, Cisco ONS 15454 fixed optical filter cards support the requirements of service provider and enterprise networks. Table 1 outlines the module types available for the Cisco ONS 15454 MSTP with the applications they are designed to support.

Table 1. Optical Filter Cards with Applications

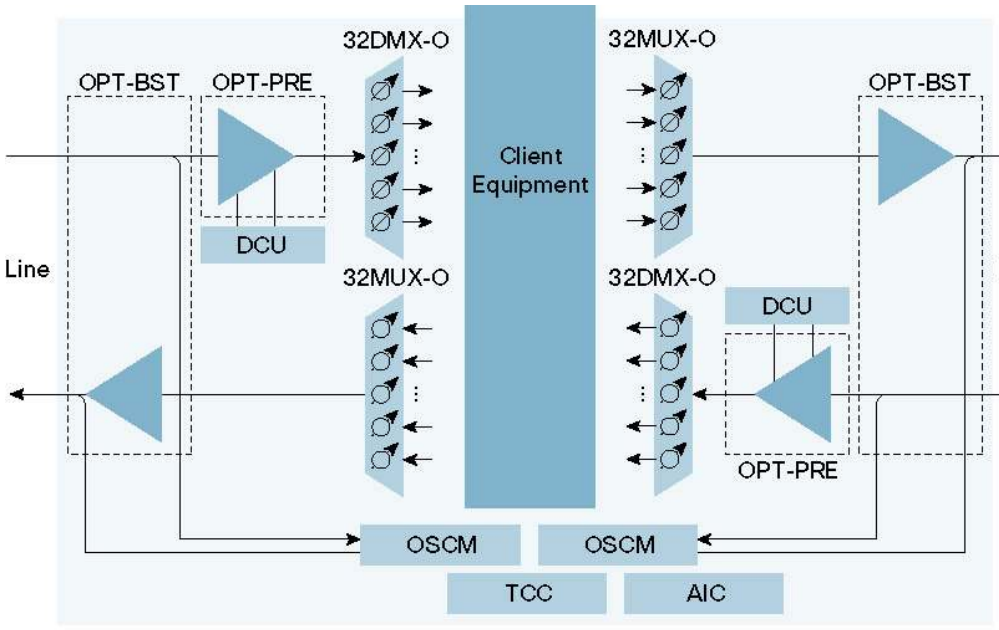
Component	Deployment Application
32-channel multiplexer and demultiplexer	This product provides wavelength access (on or off ramp) for all the channels in a fiber cable. Typical deployment locations are terminal hub sites, including service provider central offices or enterprise telecommunications facilities.
Band-optical add/drop filters (B-OADM)	These filters allow access (add/drop) to a band or bands of frequencies from a fiber cable while passing the remaining frequencies. They are typically deployed at intermediate sites where access to greater bandwidth is required. They can also be inserted where future access to bandwidth may be required.
Channel-optical add/drop filters (C-OADM)	These filters enable access (add/drop) to individual wavelengths from a fiber cable while allowing the remaining frequencies to pass. They are deployed at intermediate sites where access to individual wavelengths is necessary. They can be cascaded to provide from 1- to 32-channel add/drop capabilities.
4-channel multiplexer/demultiplexer (4MD)	This product provides wavelength access (on or off ramp) to four channels from a band-OADM filter. They are deployed at intermediate sites where access to individual wavelengths is necessary.

The Cisco ONS 15454 fixed filter cards are based on the ITU 100-GHz wavelength plan. Each card integrates software-controllable variable optical attenuators (VOAs), providing automatic node- and network-based power level management. The optical cards incorporate LEDs on the faceplate to provide a quick visual check of the card's operational status. An icon on each faceplate is mapped to shelf-slot icons indicating the shelf slot where the card can be installed. The cards are supported by the integrated Cisco Transport Controller craft manager, which provides the user access for operations, administration, maintenance, and provisioning for the system.

All Cisco ONS 15454 fixed optical filter cards can drop and reinsert a wavelength without needing to regenerate the signal (optical bypass). This unique capability is supported at individual channel and band level and allows creation of multiring or mesh traffic matrixes using the available fixed filter cards.

The choice of filters depends on the requirements of the network. The Cisco MetroPlanner optical design tool is available to assist in the engineering, bill-of-material development, and deployment of the DWDM network. Figures 2 through 5 show sample signal-flow diagrams for a selection of Cisco ONS 15454 MSTP node types, outlining the use for each filter type.

Figure 2
MSTP Hub Node



OSCM: Optical Channel Service Module
OPT-BST: Optical Booster Amplifier
OPT-PRE: Optical Pre-Amplifier
TCC: Timing, Communications and Control
32-DMX-O: 32-Channel Demultiplexer – Odd
32-MUX-O: 32-Channel Multiplexer – Odd
DCU: Dispersion Compensation Unit
AIC: Alarm Interface Card

Figure 3
Terminal Node

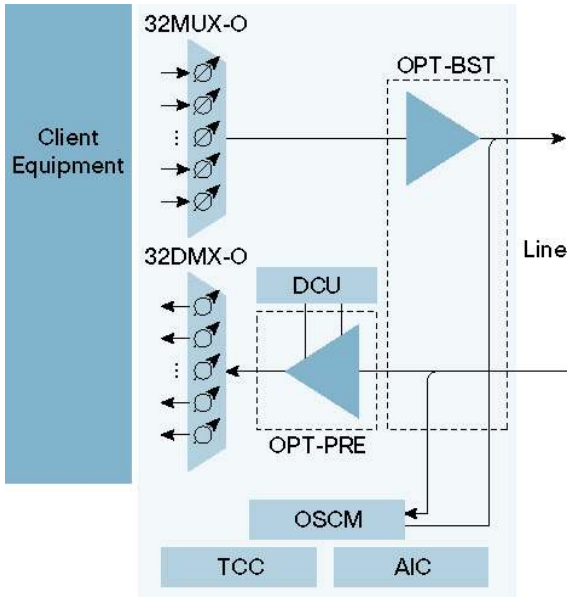
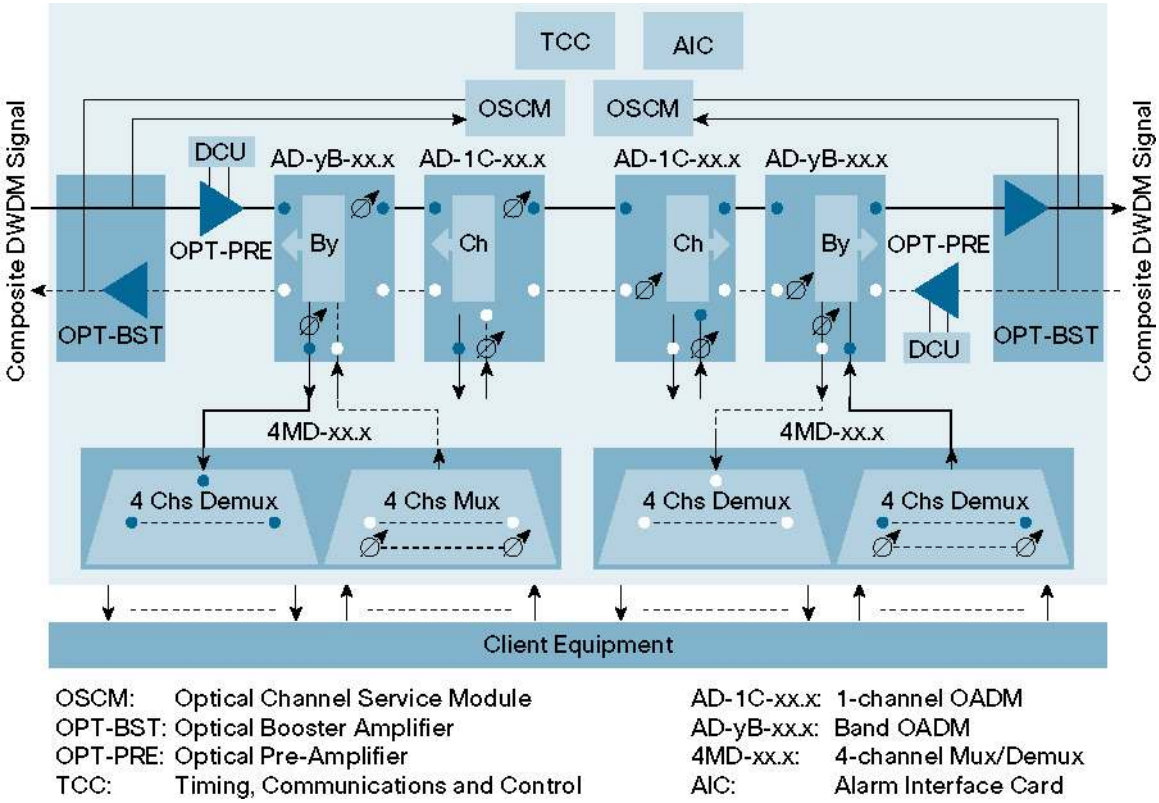


Figure 4

Active Optical Add/Drop Multiplexer (OADM) Node



OSCM: Optical Channel Service Module
OPT-BST: Optical Booster Amplifier
OPT-PRE: Optical Pre-Amplifier
TCC: Timing, Communications and Control

AD-1C-xx.x: 1-channel OADM
AD-yB-xx.x: Band OADM
4MD-xx.x: 4-channel Mux/Demux
AIC: Alarm Interface Card

Product Specifications

Tables 2 through 7 give specifications of the Cisco ONS 15454 fixed optical filters. Figures 5 through 9 are functional diagrams of the fixed optical filters.

Table 2. Regulatory Compliance[1]

ANSI System	ETSI System
Countries	
Canada, United States, Mexico, Korea, Japan, European Union	European Union, Australia, New Zealand, Singapore, China, Mexico, Hong Kong, Korea
EMC emissions (radiated, conducted)	
• ICES-003 • GR-1089-CORE • 47CFR15 • VCCI V-3/2000.04 • CISPR24	• EN 300 386-TC • EN50081-1 • EN55022 • AS/NZS3548, Amendment 1 + 2 1995
EMC immunity	
• GR-1089-CORE • CISPR24 • EN50082-2	• EN300-386-TC • EN55024
Safety	
• CAN/CSA-C22.2 No. 60950-00 Third Ed., 12/1/2002 • GR-1089-CORE • GR-63-CORE • TS001	• UL 60950 Third Ed., 12/1/2000 • EN60950 (to A4) • IEC60950/EN60950, Third Ed. • AS/NZS3260 Supplement 1, 2, 3, 4, 1997
Environmental	
• GR-63-CORE • AT&T Network Equipment Design Specifications (NEDS)	• ETS 300-019 (Class 3.1E) (Note 2)
Structural dynamics	
• GR-63-CORE • AT&T NEDS	• ETS 300-019 (Class 3.1E) (Note 2)
Power and grounding	
• SBC (TP76200MP) • ETS 300-132-1 (DC power)	• ETS 300-253 (grounding)
Optical	
• GR-253-CORE • G.692	
Quality	
• TR-NWT-000332, Issue 4, Method 1 calculation for 20-year mean time between failure (MTBF)	

1 All compliance testing and documentation may not be completed at release of the product. Check with your sales representative for countries outside of Canada, the United States, and the European Union.

Table 3. System Requirements

Component	Cisco ONS 15454 ANSI	Cisco ONS 15454 ETSI
Processor	TCC2P/TCC2	TCC2P/TCC2
Cross-connect	All (not required)	All (not required)
Shelf assembly	15454-SA-HD or 15454-SA-HD-DDR shelf assembly with FTA3 version fan-tray assembly	15454-SA-ETSI shelf assembly with SDH 48V fan-tray assembly
System software	Release 4.6.0 ANSI or later	Release 4.6.0 ETSI or later

Table 4. Common Fixed Optical Filter Specifications

Specification	32-Channel Multiplexer	32-Channel Demultiplexer	4-Channel Multiplexer/ Demultiplexer	Channel OADM Cards	Band OADM Cards
Management					
Card LEDs					
Failure (FAIL)	Red	Red	Red	Red	Red
Active/standby (ACT/STBY)	Green/yellow	Green/yellow	Green/yellow	Green/yellow	Green/yellow
Signal fail (SF)	Yellow	Yellow	Yellow	Yellow	Yellow
Operating environment					
Temperature	–5 to 55℃ 23 to 131℉	–5 to 55℃ 23 to 131℉	–5 to 55℃ 23 to 131℉	–5 to 55℃ 23 to 131℉	–5 to 55℃ 23 to 131℉
Humidity	5 to 95% RH	5 to 95% RH	5 to 95% RH	5 to 95% RH	5 to 95% RH
Storage environment					
Temperature	–40 to 85℃ –40 to 185℉	–40 to 85℃ –40 to 185℉	–40 to 85℃ –40 to 185℉	–40 to 85℃ –40 to 185℉	–40 to 85℃ –40 to 185℉
Humidity	5 to 95% RH	5 to 95% RH	5 to 95% RH	5 to 95% RH	5 to 95% RH

Multiplexer and Demultiplexer Filters

Figure 5

Functional Diagrams of 32-Channel Multiplexer and 32-Channel Demultiplexer

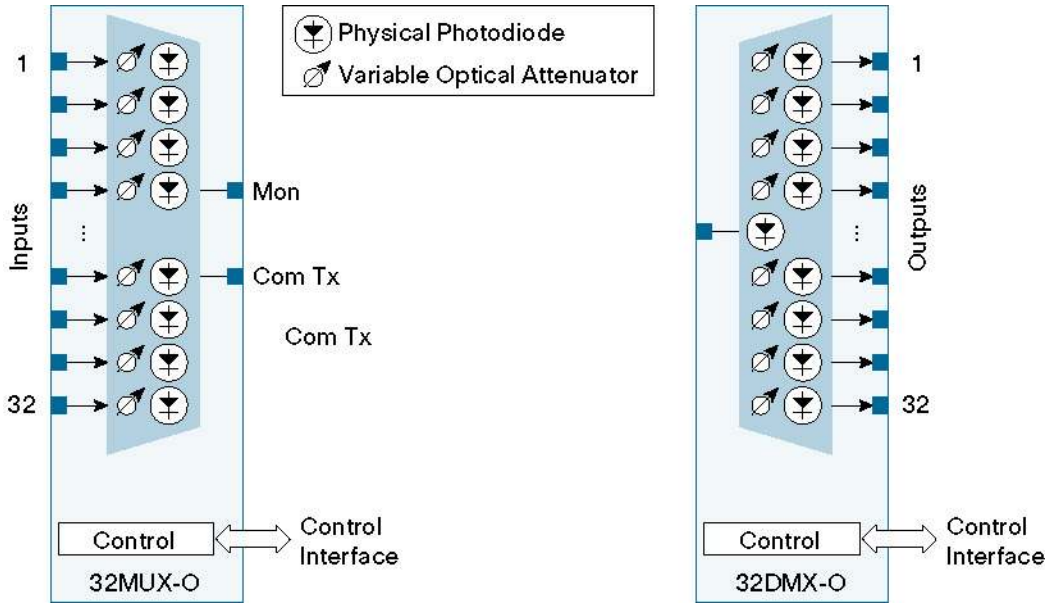


Figure 6

Functional Diagram of 4-Channel Multiplexer/Demultiplexer

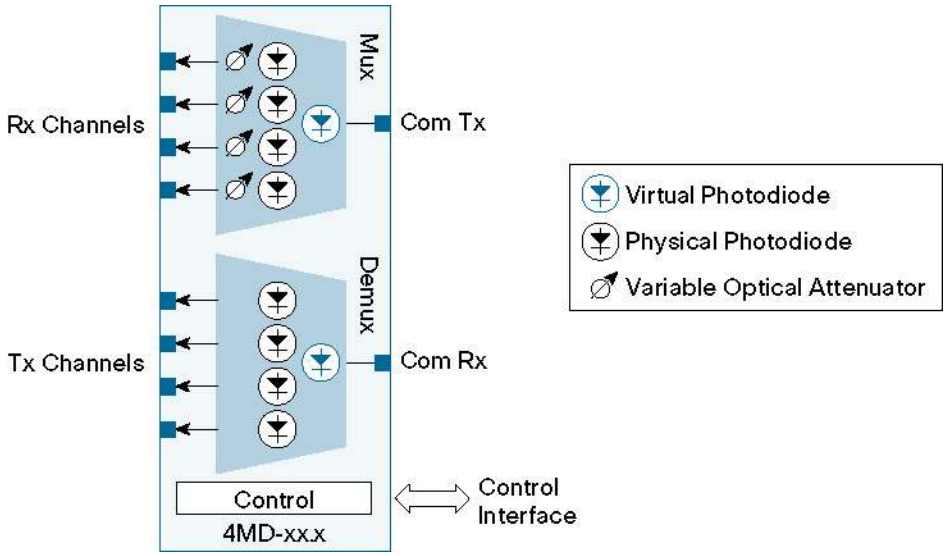


Table 5. Specifications for 32-Channel Multiplexer, 32-Channel Demultiplexer, and 4-Channel Multiplexer/Demultiplexer

Specification	32-Channel Multiplexer	32-Channel Demultiplexer	4-Channel Multiplexer/Demultiplexer
Optical parameters			
Insertion loss (maximum at minimum VOA) Drop or add Monitor	 8.5 dB 29.5 dB	 8.5 dB –	 3.6 (multiplexer), 3.2 (demultiplexer) –
VOA dynamic range	25 dB	25 dB	30 dB
Maximum input power	25 dBm	25 dBm	25 dBm
Filter type	Array wave guide (AWG)	AWG	Interferential
Minimum transmit filter passband (at 0.5 dB resolution bandwidth)	±0.18 nm	±0.18 nm	±0.18 nm
Adjacent crosstalk (all operating conditions and attenuation values)	23 dB	23 dB	25 dB
Non-adjacent crosstalk (all operating conditions and attenuation values)	30 dB	30 dB	38 dB
Total crosstalk	20 dB	20 dB	22 dB
Maximum polarization dependent loss (PDL) (all operating conditions and attenuation values)	1.6 dB	1.6 dB	0.7 dB
Optical power setting accuracy (all operating conditions and attenuation values)	±0.5 dB	±0.5 dB	±0.5 dB
Minimum return loss	40 dB	40 dB	40 dB
Connectors			
Channel input (multiplexer) and output (demultiplexer) ports Composite ports Monitor ports	MPO LC LC	MPO LC –	LC LC –
Power			
Card power draw Typical Maximum	 16W 31W	 16W 31W	 17W 25W
Physical			
Size	2 slots	2 slots	1 slot
Supported shelf slots	1–6, 12–17	1–6, 12–17	1–6, 12–17

Optical Add/Drop Filters

Figure 7

Functional Diagrams for One and Two-Channel OADM

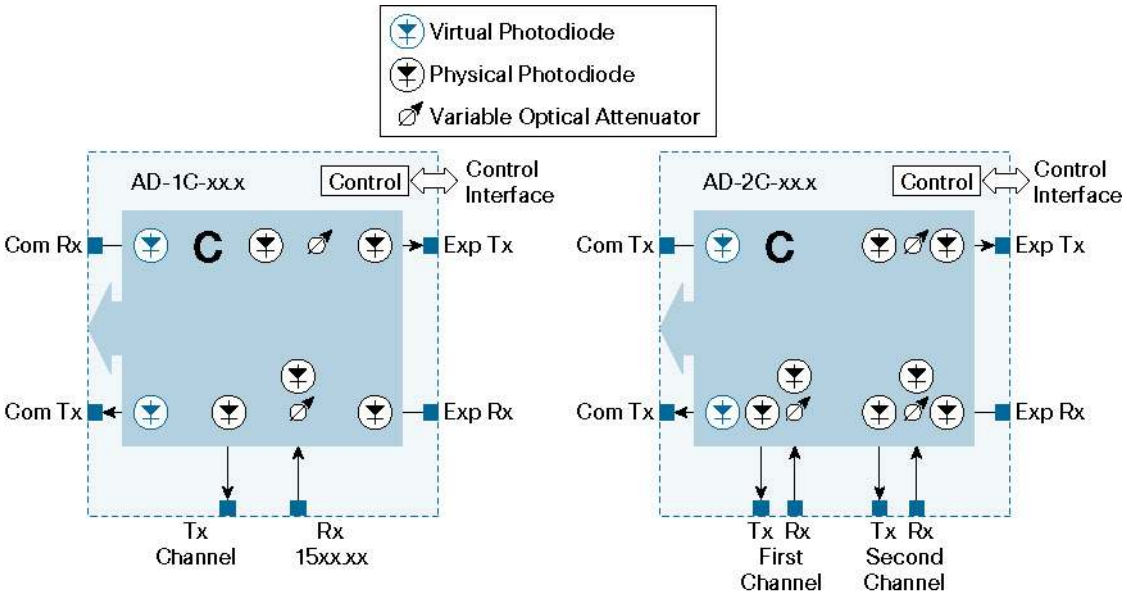


Figure 8

Functional Diagram for Four-Channel OADM Functional Diagrams

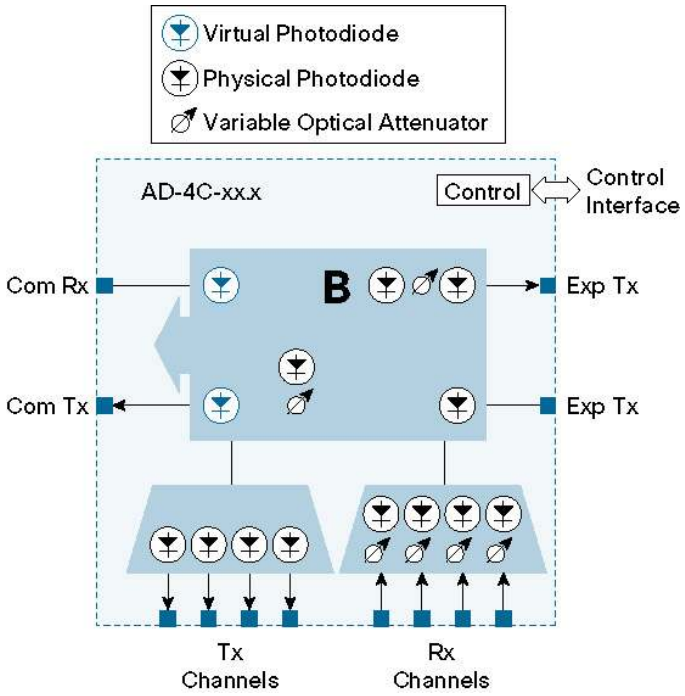


Table 6. Channel OADM Filter Specifications

Specification	One-Channel OADM	Two-Channel OADM	Four-Channel OADM
Optical parameters			
Insertion loss (maximum)			
Drop (maximum)	2 dB	2.4 dB	5.5 dB
Add (at minimum VOA)	2.6 dB	3.1 dB	4.9 dB
Express (maximum from express input to composite output)	1.2 dB	1.6 dB	1.2 dB
Express (maximum from composite input to express output)	2.4 dB	2.7 dB	2.7 dB
VOA dynamic range	30 dB	30 dB	30 dB
Maximum input power	25 dBm	25 dBm	25 dBm
Filter type	Interferential	Interferential	Interferential
Minimum transmit filter passband (at 0.5 dB resolution bandwidth)	+0.18 nm	+0.18 nm	+0.18 nm
Adjacent crosstalk (all operating conditions and attenuation values)	25 dB	25 dB	25 dB
Non-adjacent crosstalk (all operating conditions and attenuation values)	38 dB	38 dB	38 dB
Total crosstalk	22 dB	22 dB	22 dB
Maximum polarization dependent loss (PDL) (all operating conditions and attenuation values)	0.7 dB	0.7 dB	0.7 dB
Optical power setting accuracy (all operating conditions and attenuation values)	+0.5 dB	+0.5 dB	+0.5 dB
Minimum return loss	40 dB	40 dB	40 dB
Connectors			
Input/output ports	LC	LC	LC
Monitor ports	LC	LC	LC
Power			
Card power draw			
Typical	17W	17W	17W
Maximum	25W	25W	25W
Physical			
Size	1 slot	1 slot	1 slot
Supported shelf slots	1–6, 12–17	1–6, 12–17	1–6, 12–17

Figure 9

One- and Four-Band OADM Functional Diagrams

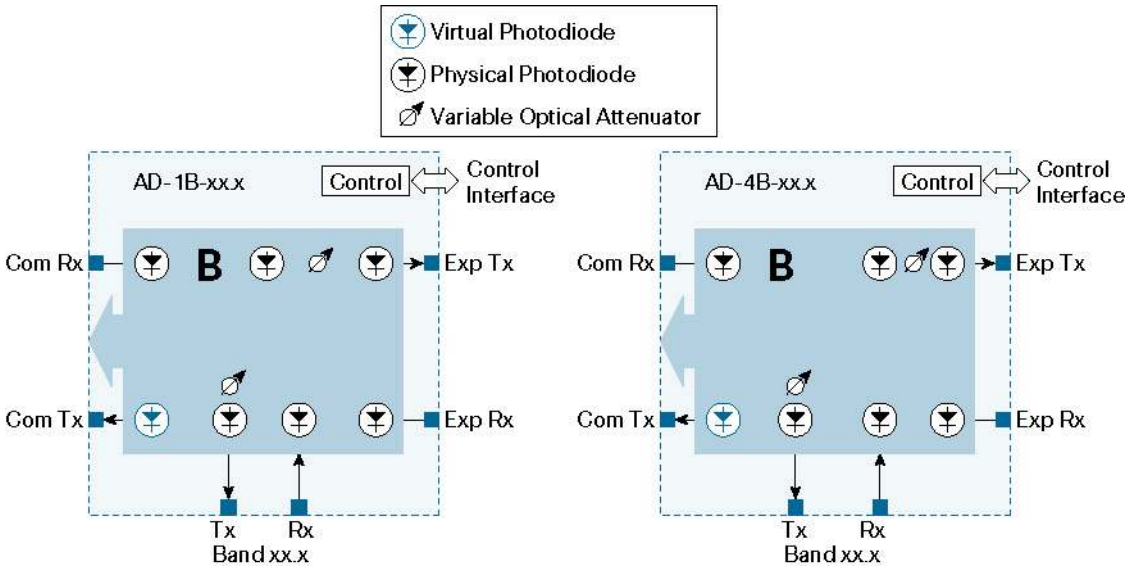


Table 7. Band OADM Filter Specifications

Specification	One-Band OADM	Four-Band OADM
Optical parameters		
Insertion loss (maximum)		
Drop path (at minimum VOA)	3 dB	4.5 dB
Add path	2.2 dB	3.5 dB
Express – From express input to composite output	1.6 dB	3 dB
Express – From composite input to express output (at minmum VOA)	2.9 dB	4.9 dB
VOA dynamic range	30 dB	30 dB
Maximum input power	25 dBm	25 dBm
Filter type	Interferential	Interferential
Minimum filter passband (at –1 dB)	3.49 nm	3.49 nm
Adjacent crosstalk (all operating conditions and attenuation values)	25 dB	25 dB
Non-adjacent crosstalk (all operating conditions and attenuation values)	35 dB	35 dB
Maximum polarization dependent loss (PDL) (all operating conditions and attenuation values)	0.7 dB	0.7 dB
Optical power setting accuracy (all operating conditions and attenuation values)	+0.5 dB	+0.5 dB
Connectors		
Input/output ports	LC	LC
Monitor ports	LC	LC

Specification	One-Band OADM	Four-Band OADM
Power		
Card power draw		
Typical	17W	17W
Maximum	25W	25W
Physical		
Size	1 slot	1 slot
Supported shelf slots	1–6, 12–17	1–6, 12–17

Ordering Information

Tables 8 and 9 give ordering information for the Cisco ONS 15454 MTSP optical fixed filter cards.

Table 8. System Ordering Information[2]

Part Number	Description
15454-32MUX-O=	32-channel multiplexer card, C-band, 100-GHz, MPO connectors for add path, LC connector for interconnection
15454-32DMX-O=	32-channel demultiplexer card, C-band, 100-GHz, MPO connectors for drop path, LC connectors for interconnection, includes one 2-m LC/LC fiber-optic cables
15454-4MD-xx.x=	4-channel multiplexer and demultiplexer card, C-band, 100-GHz, LC connectors, includes two 2-m LC/LC fiber-optic cables
15454-AD-1C-xx.x=	1-channel OADM, C-band, 100-GHz, LC connectors, includes two 2-m LC/LC fiber-optic cables
15454-AD-2C-xx.x=	2-channel OADM, C-band, 100-GHz, LC connectors, includes two 2-m LC/LC fiber-optic cables
15454-AD-4C-xx.x=	4-channel OADM, C-band, 100-GHz, LC connectors, includes two 2-m LC/LC fiber-optic cables
15454-AD-1B-xx=	1-band OADM, C-band, 100-GHz, LC connectors, includes two 2-m LC/LC fiber-optic cables
15454-AD-4B-xx=	4-band OADM, C-band, 100-GHz, LC connectors, includes two 2-m LC/LC fiber-optic cables

Table 9. Wavelength Ordering Information (value to use for part number in Table 8)

Wavelength (nm)	Cisco 32-Channel Plan	AD-1C	AD-2C	AD-4C	AD-1B	AD-4B
1530.33	X	30.3	30.3	30.3	30.3	30.3
1531.12	X	31.1				
1531.90	X	31.9	31.9			
1532.68	X	32.6				
1534.25	X	34.2	34.2	34.2	34.2	
1535.04	X	35.0				
1535.82	X	35.8	35.8			
1536.61	X	36.6				

2 xx.x in the part number indicates the ordering wavelength of the card (example: 1530.33 = 30.3). Refer to Table 9 for wavelength plan.

Wavelength (nm)	Cisco 32-Channel Plan	AD-1C	AD-2C	AD-4C	AD-1B	AD-4B
1538.19	X	38.1	38.1	38.1	38.1	
1538.98	X	38.9				
1539.77	X	39.7	39.7			
1540.56	X	40.5				
1542.14	X	42.1	42.1	42.1	42.1	
1542.94	X	42.9				
1543.73	X	43.7	43.7			
1544.53	X	44.5				
1546.12	X	46.1	46.1	46.1	46.1	46.1
1546.92	X	46.9				
1547.72	X	47.7	47.7			
1548.51	X	48.5				
1550.12	X	50.1	50.1	50.1	50.1	
1550.92	X	50.9				
1551.72	X	51.7	51.7			
1552.52	X	52.5				
1554.13	X	54.1	54.1	54.1	54.1	
1554.94	X	54.9				
1555.75	X	55.7	55.7			
1556.55	X	56.5				
1558.17	X	58.1	58.1	58.1	58.1	
1558.98	X	58.9				
1559.79	X	59.7	59.7			
1560.61	X	60.6				

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