Cisco ONS 15216 Metropolitan Dense Wavelength Division Multiplexing 100-GHz **FlexLayer** Filter Solution

The Cisco ONS 15216 Metropolitan Dense Wavelength-Division Multiplexing (DWDM) FlexLayer filter solution is an ultraflexible filter architecture that allows cable multiple system operators and service providers to build "pay-as-you-grow" networks with the flexibility to upgrade in-service without preprovisioning channels that are not required. This approach creates a more desirable per-wavelength cost.

The FlexLayer architecture allows for deployment of point-to-point, point-to-multipoint, ring, bus, and tree-and-branch architectures. These networks can be deployed as unprotected or protected networks, and they may also be deployed in transmit-only applications for broadcast networks. This flexibility is inherent in the design of the FlexLayer architecture.

Cisco ONS 15216 FlexLayer Chassis

All Cisco ONS 15216 FlexLayer modules can be populated in a 1-rack-unit 19- or 23-inch rack-mountable chassis. This unit offers four module slots arranged horizontally. Each slot can accommodate one multiplexer, demultiplexer, combiner, or splitter module. Two slots, either the two rightmost or two leftmost, can accommodate a variable optical attenuator (VOA) module.

Cisco ONS 15216 FlexLayer 8-Channel Filter

The Cisco ONS 15216 8-channel filter assembly (Figure 1) is a passive unit comprising a 100-gigahertz (GHz) 8-x-1 wavelength unidirectional multiplexer or a 100-GHz 1-x-8 wavelength unidirectional demultiplexer. This unit, used either as a multiplexer or demultiplexer, can be upgraded in the field in the desired application. Four independent modules make up a 32-channel C-Band wavelength plan. The multiplexer or demultiplexer module connects independent fibers to the carrier's fiber facilities through the common ports on the chassis faceplate. Additional units can be added in service in multiple methods that offer benefits to each application. Each device incorporates a monitoring port of the composite signal along with an express port that can be used to cascade the filters together. This module is one slot wide in the FlexLayer chassis.
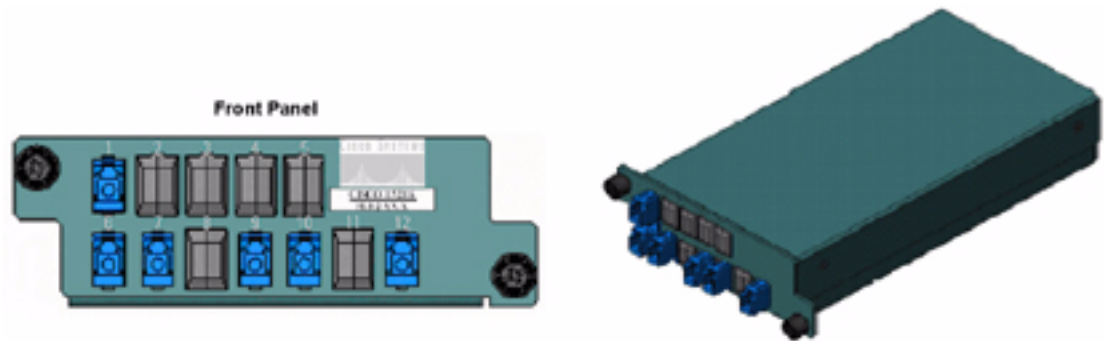
Figure 1
Cisco ONS 15216
8-Channel Filter Module

Cisco ONS 15216 FlexLayer 2-Channel Filter

The Cisco ONS 15216 2-channel filter assembly (Figure 2) is a passive unit comprising a 100-GHz 2-x-1 wavelength unidirectional multiplexer or a 100-GHz 1-x-2 wavelength unidirectional demultiplexer. This unit, used either as a multiplexer or demultiplexer, can be upgraded in the field in the desired application. Sixteen independent modules make up a 32-channel C-Band wavelength plan. The multiplexer or demultiplexer module connects independent fibers to the carrier's fiber facilities through the common ports on the chassis faceplate. Additional units can be added in service in multiple methods that offer benefits to each particular application. Each device incorporates a monitoring port of the composite signal along with an express port that can be used to cascade the filters together. This module is one slot wide in the chassis.
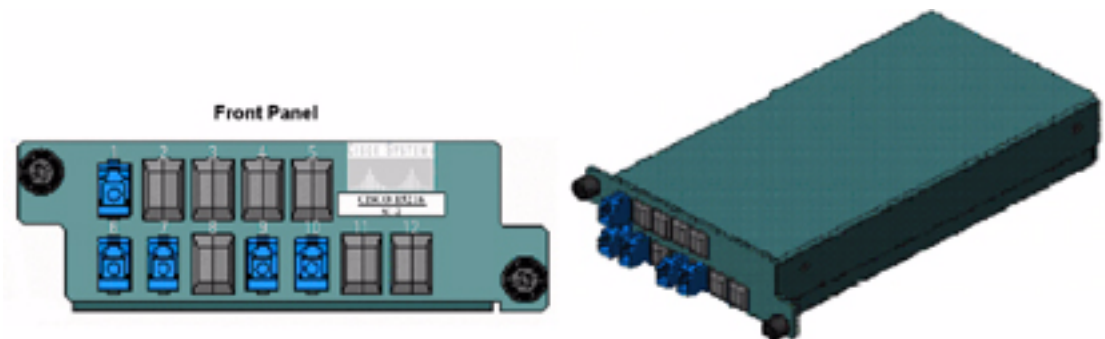
Figure 2
Cisco ONS 15216 2-Channel Optical Add/Drop FlexLayer Module

Cisco ONS 15216 FlexLayer 2-, 3-, or 4--Way Combiner or Splitter

The Cisco ONS 15216 splitter or combiner assembly (Figure 3) is a passive unit comprising a balanced 2-, 3-, or 4-way optical splitter or combiner. This unit, used as a splitter or a combiner, can be upgraded in the field in the desired application. Deployed at different places in the architecture, the unit can function to combine or to split multiple optical paths. Each device incorporates a monitoring port of the composite signal. This module is one slot wide in the chassis.

Figure 3
Cisco ONS 15216 1:2 Splitter or 2:1 Coupler FlexLayer Module

Cisco ONS 15216 Variable Optical Attenuator

The Cisco ONS 15216 Variable Optical Attenuator (VOA) assembly (Figure 4) is a passive unit comprising four discrete VOAs. This unit allows a technician at the faceplate of the unit to control optical power at some point in the network. This module is two slots wide in the chassis.

Figure 4
Cisco ONS 15216 4-Channel Optical Variable Attenuator FlexLayer Module
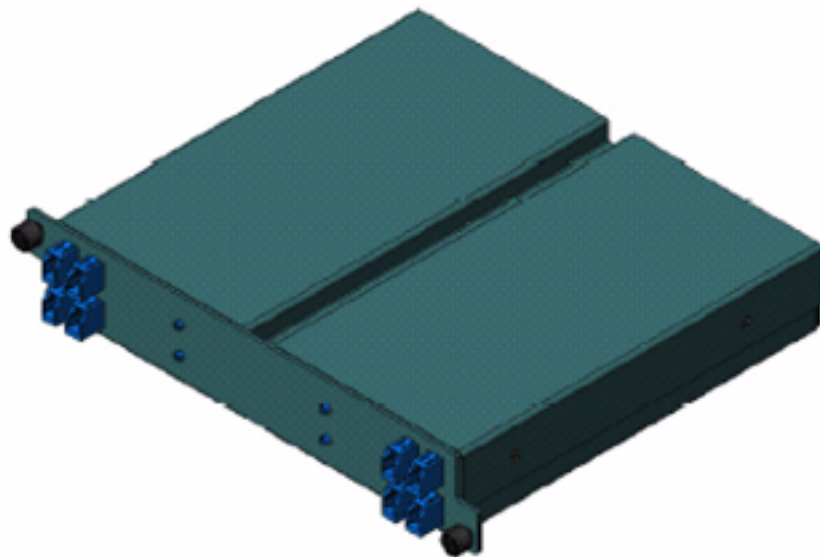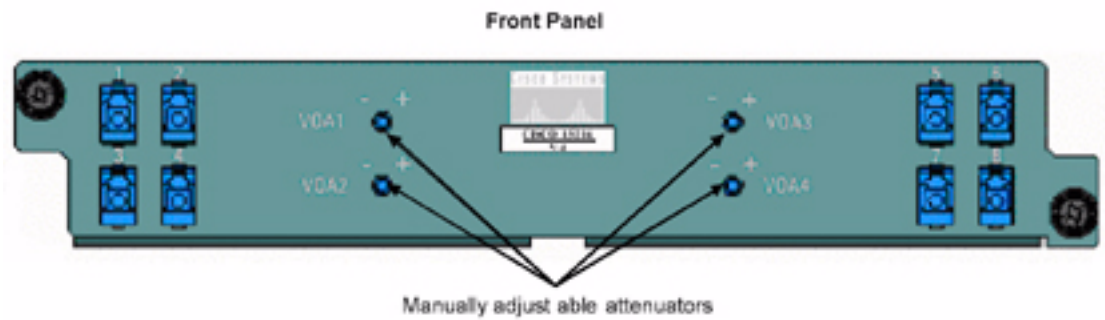
Specifications

Tables 1–4 denote the technical specifications for each of the Cisco ONS 15216 Metropolitan DWDM filter architecture elements.

Table 1 Cisco ONS 15216 8-Channel Optical Add/Drop FlexLayer Module Unit Specifications

Parameter	Condition	Minimum	Maximum	Unit
Channel plan		"4 skip 1": ITU 21-24, 26-29, 31-34, 36-39, 41-44, 46-49, 51-54, 56-59		ITU Ch
Channel spacing		100		GHz
Channel groups	15216-FLA-8-36.6	59, 58, 57, 56, 54, 53, 52, 51		ITU Ch
	15216-FLA-8-44.5	49, 48, 47, 46, 44, 43, 42, 41		ITU Ch
	15216-FLA-8-52.5	39, 38, 37, 36, 34, 33, 32, 31		ITU Ch
	15216-FLA-8-60.6	29, 28, 27, 26, 24, 23, 22, 21		ITU Ch
Pass band	@ 0.5 dB	0.1		nm
Insertion loss	DROP-COM-RX/ADD-COM-TX to DROP-CH-TX/ADD-CH-RX	3.4	4.5	dB
	DROP-COM-RX/ADD-COM-TX to DROP-COM-TX/ADD-COM-RX	0.6	1.7	dB
	DROP-COM-RX to DROP-MON	15.5	20.5	dB
	ADD-COM-TX to ADD-MON	15.5	20.5	dB
Isolation	DROP-COM-RX/ADD-COM-TX to any DROP-CH-TX/ADD-CH-RX @ adjacent channels	25		dB
	DROP-COM-RX/ADD-COM-TX to DROP-COM-TX/ADD-COM-RX @ added/dropped channel wavelengths	14		dB
Ripple	Over pass band		0.5	dB
Directivity	Any-to-any DROP-CH-TX/ ADD-CH-RX	40		dB
Optical return loss	Any port	40		dB
Polarization dependent loss	Any path		0.2	dB
Maximum optical power	Any port		250	mW
Connector type	LC			

Table 2 Cisco ONS 15216 2-Channel Optical Add/Drop FlexLayer Module Unit Specifications

Parameter	Condition	Minimum	Maximum	Unit
Channel plan			"4 skip 1": ITU 21-24, 26-29, 31-34, 36-39, 41-44, 46-49, 51-54, 56-59	ITU Ch
Channel spacing			100	GHz
Channel groups	15216-FLB-2-31.2		59, 58	ITU Ch
	15216-FLB-2-32.6		57, 56	ITU Ch
	15216-FLB-2-35.0		54, 53	ITU Ch
	15216-FLB-2-36.6		52, 51	ITU Ch
	15216-FLB-2-38.9		49, 48	ITU Ch
	15216-FLB-2-40.5		47, 46	ITU Ch
	15216-FLB-2-42.9		44, 43	ITU Ch
	15216-FLB-2-44.5		42, 41	ITU Ch
	15216-FLB-2-46.9		39, 38	ITU Ch
	15216-FLB-2-48.5		37, 36	ITU Ch
	15216-FLB-2-50.9		34, 33	ITU Ch
	15216-FLB-2-52.5		32, 31	ITU Ch
	15216-FLB-2-54.9		29, 28	ITU Ch
	15216-FLB-2-56.5		27, 26	ITU Ch
	15216-FLB-2-58.9		24, 23	ITU Ch
	15216-FLB-2-60.6		22, 21	ITU Ch
Pass band	@ 0.5 dB	0.11		nm
Insertion loss	DROP-COM-RX/ADD-COM-TX to DROP-CH-TX/ADD-CH-RX	1.4	2.5	dB
	DROP-COM-RX/ADD-COM-TX to DROP-COM-TX/ADD-COM-RX	0.5	1.6	dB
	DROP-COM-RX to MON	15.5	20.5	dB
	ADD-COM-RX to MON	15.5	20.5	dB
Isolation	DROP-COM-RX/ADD-COM-TX to any DROP-CH-TX/ADD-COM-RX @ adjacent channels	25		dB
	DROP-COM-RX/ADD-COM-TX to DROP-COM-TX/ADD-COM-RX @ added/dropped channel wavelengths	14		dB
Ripple	Over pass band		0.5	dB
Directivity	Any to any DROP-CH- TX/ADD-CH-RX	40		dB

Table 2 Cisco ONS 15216 2-Channel Optical Add/Drop FlexLayer Module Unit Specifications

Parameter	Condition	Minimum	Maximum	Unit
Optical return loss	Any port	40		dB
Polarization dependent loss	Any path		0.2	dB
Maximum optical power	Any port		250	mW
Connector type	LC			

Table 3 Cisco ONS 15216 Optical Splitter or Coupler FlexLayer Modules Unit Specifications

Parameter	Condition		Minimum	Maximum	Unit
Operating wavelength range	SC-2, SC-3, SC-4		1529	1565	nm
	SC-Y-SM[1]		1260/1430	1360/1580	
	SC-Y-MM[2]		770/1260	860/1380	
Insertion loss	SPL-RX/CPL-TX to any SPL-TXn/CPL-RXn	1:2/2:1	3.5	4.3	dB
		1:3/3:1	5.7	6.6	dB
		1:4/4:1	7.3	8.2	dB
		1:2 and 2:1SM	3.4	4.6	dB
		1:2 and 2:1MM	3.4	4.8	dB
	CPL-TX to CPL-MON		15.5	20.5	
	SPL-RX to SPL-MON		15.5	20.5	
Ripple	Over pass band			0.5	dB
Directivity	Any to any SPL-TXn/CPL-RXn		40		dB
Optical return loss	Any port		40		dB
Polarization dependent loss	Any path	1:2/2:1		0.25	dB
		1:3/3:1		0.3	
		1:4/4:1		0.4	
		1:2 and 2:1		0.25	
Maximum optical power	Any port			250	mW
Connector type	LC				

1. Dual Window
2. Dual Window

Table 4   Cisco ONS 15216 4-Channel VOA FlexLayer Module Unit Specifcations

Parameter	Condition	Minimum	Maximum	Unit
Operating wavelength range		1529	1565	nm
Attenuation tilt	Attenuation 0 dB		0.4	dB
	Attenuation 15 dB		0.6	dB
	Attenuation 30 dB		0.8	dB
Attenuation ripples	Attenuation 0 dB		0.35	dB
	Attenuation 15 dB		0.45	dB
	Attenuation 30 dB		0.55	dB
Minimum insertion loss			2.6	dB
Attenuation range		30		dB
Number of turns for 10-dB attenuation	Typically 1 turn			dB
Optical return loss		45		dB
Polarization dependent loss	Attenuation < 0 dB		0.35	dB
	Attenuation < 15 dB		0.5	dB
	Attenuation < 30 dB		0.6	dB
Connector type	LC			

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