

# Cisco **ONS 15454** Multiservice Transport Platform

**The Cisco® ONS 15454 Multiservice Transport Platform sets the industry benchmark for metropolitan and regional dense wavelength-division multiplexing solutions by using proven Cisco Multiservice Provisioning Platform networking technologies to deliver simple, fast, and intelligent DWDM capabilities and lower capital and operating expenditures**

## **Transforming Metro and Regional Networks**

When Cisco Systems® introduced the Cisco Multiservice Provisioning Platform (MSPP) for the metropolitan market in 1999, a clear demarcation was created between what is considered “traditional” optical transport equipment and what is now considered “next-generation.” With its significant leap in technology and product migration, the Cisco MSPP offered traditional time-division multiplexing (TDM) and Synchronous Optical Network/ Synchronous Digital Hierarchy (SONET/ SDH) services ranging from DS1/E1 to OC-192/STM-64, as well as Ethernet and IP services. The platform was scalable and was the fraction of the size of traditional

bit-rate-specific equipment. In addition to providing greater functionality and scalability from a platform that used less space and power, the Cisco MSPP proved to be cost effective, and it uniquely met the requirements for the new market segment. The Cisco ONS 15454 MSPP product line quickly established itself as the market leader.

Continuing with its tradition of innovation and leadership in metro optical networking, Cisco has introduced the Cisco Multiservice Transport Platform (MSTP), which is transforming metropolitan and regional dense-wavelength-division-multiplexing (DWDM) networks. The Cisco ONS 15454 MSTP (Figure 1) allows a metro or regional DWDM system to become as intelligent as the highly successful Cisco MSPP, including wide service interface mix, service transparency, flexible topology, and simplified operations.

## **Wide Service Interface Mix**

A metropolitan network, being close to or on a customer’s premises—unlike its long-haul counterpart—requires support for a great diversity of service interfaces. The service interfaces allow network providers to offer new tariffs and allow enterprise customers to natively transport a

**Figure 1**  
 Cisco ONS 15454  
 Multiservice Transport  
 Platform





wide variety of services over a common transport network without unnecessary conversion stages and equipment. Additionally, a wide service mix simplifies the planning for services. The Cisco ONS 15454 MSTP, with its MSPP capabilities, supports a broad range of standards-based services in a single platform, including:

- Aggregated lower-rate TDM services from DS-1/E-1 over 2.5-Gbps and 10-Gbps wavelengths
- SONET/SDH wavelength and aggregated services: OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, OC-192/STM-64
- Data services: private-line, switched and wavelength-based, including 10/100BASE-T, Gigabit Ethernet, 10-Gigabit Ethernet LAN physical layer, and 10-Gigabit Ethernet WAN physical layer
- Storage services: 1-Gbps and 2-Gbps Fibre Channel, Fiber Connectivity (FICON), and Enterprise Systems Connection (ESCON)
- Video services: D1 and high-definition television (HDTV)

The Cisco ONS 15454 MSTP provides multiple provisionable interface protection options, which enable support for high availability as well as unprotected service delivery to meet the varied service level agreements for metro transport offerings.

### **Service Transparency**

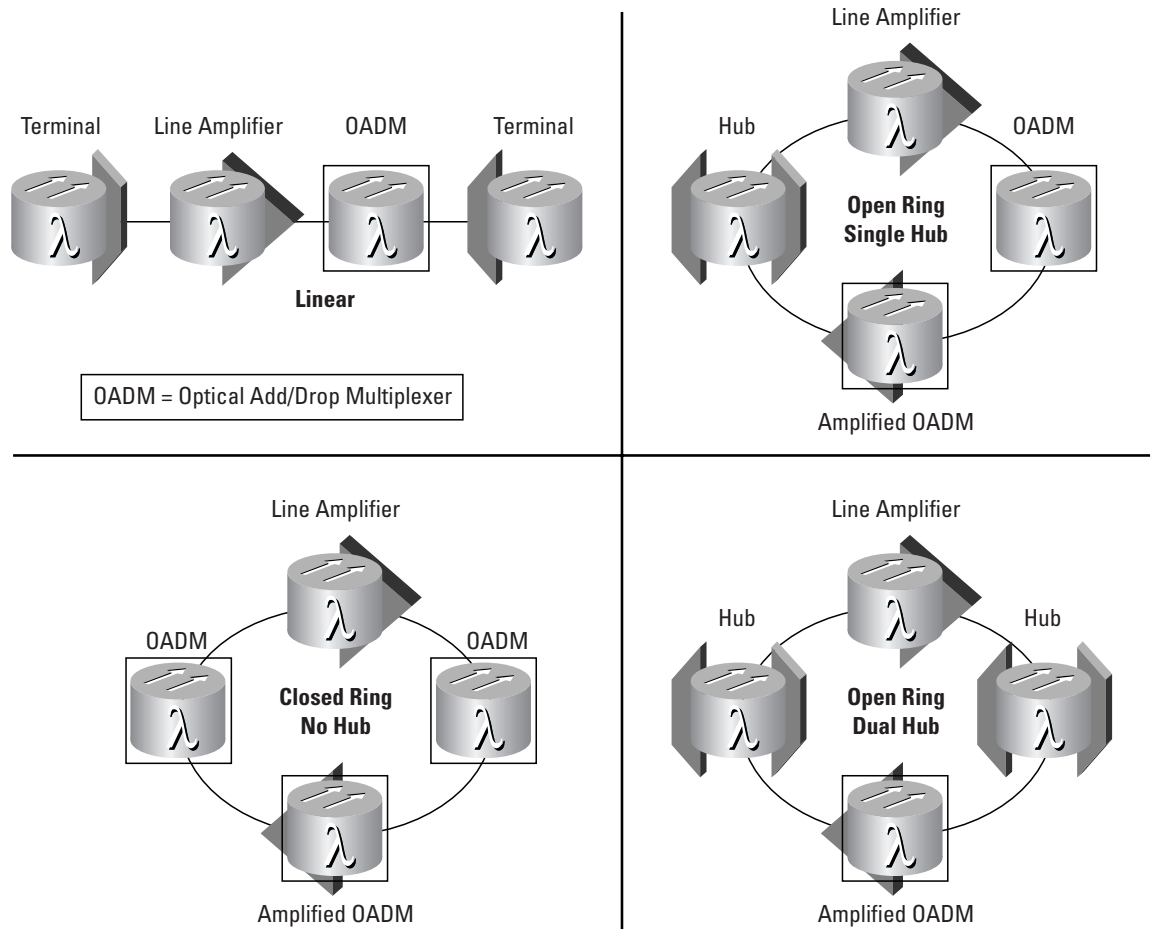
Critical to offering a wide service mix is a DWDM system's ability to offer the level of transparency required by the service. The Cisco ONS 15454 MSTP solution offers the choice of multiservice aggregation, wavelength aggregation, and wavelength transport, combined with integrated, intelligent DWDM transmission, in a single platform to optimize network costs for any mix of service types. Using digital-wrapper technology (defined in ITU-T G.709) enables transparency while still allowing enhanced wavelength management and providing extended optical reach with integrated Forward Error Correction (FEC).

### **Topology Flexibility**

Traditional first-generation metro DWDM solutions were optimized for point-to-point transmission. Metro and regional DWDM networks require the choice of point-to-point as well as ring topologies with more complex traffic patterns. The Cisco ONS 15454 MSTP can be configured to support any metro or regional DWDM topology (Figure 2), enabling a single solution to be provisioned for the network.



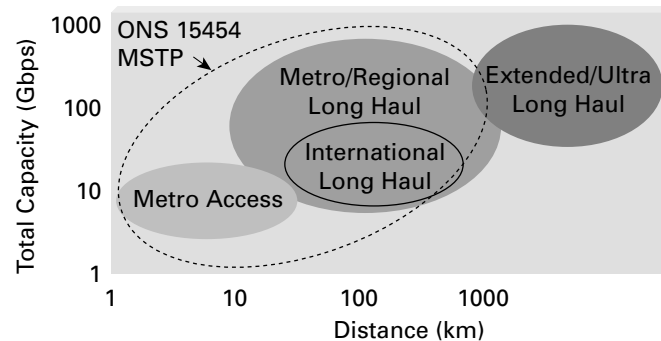
**Figure 2**  
Network Flexibility with Cisco MSTP



In addition to flexibility in network topology, the Cisco ONS 15454 MSTP supports flexibility in reach to enable a common platform to deliver metro access, metro core, as well as regional networking requirements (Figure 3). Coupling Cisco MSPP and MSTP capabilities, the Cisco ONS 15454 helps reduce network deployment complexity by reducing the proliferation of single-application network elements.



**Figure 3**  
Metropolitan and Regional Network Requirements



### **Simplified, Cost-Effective Operation**

The Cisco ONS 15454 MSTP provides capital and operational efficiency by addressing the increasing demand for multiple services, greater transport capacity, networking flexibility, multiple distance options, and management simplicity in a single platform. With innovative technology, a metro-optimized Cisco MSTP introduces intelligence to metro DWDM transmission while addressing the continued need for increased bandwidth.

The Cisco ONS 15454 MSTP uses the operational simplicity introduced in the Cisco MSPP with user features such as multilayer graphical network, node, and card visibility, A-to-Z network-based wavelength service provisioning, and graphical software wizards to simplify and speed user operations for such tasks as initial ring turn-up, service provisioning, and network node and bandwidth upgrades. The Cisco MSTP uses this architecture to introduce a level of operational simplicity unheard of in metro DWDM networks. Using IP in the optical service channel and MSPP-like software, Cisco MSTP supports:

- Scalable wavelengths (1–64) for superior cost-versus-growth trade-off, with in-service growth to 128 wavelengths
- Transport of 150-Mbps to 10-Gbps wavelength services, as well as aggregated TDM and data services, for maximum service flexibility
- Flexible transmission capability up to 372 miles (600 kilometers) through the use of advanced amplification and FEC technologies to support a wide range of networking applications
- “Plug and play” card architecture for complete flexibility in configuring DWDM network elements: terminal nodes, optical add/drop nodes, line amplifiers, and dispersion compensation within amplified or unamplified networks
- High shelf density for high-bandwidth (10-Gbps) wavelength services
- Flexible add/drop capabilities, from 1- to full 64-channel granularity, supporting both band and channel optical add/drop multiplexers (OADMs) for reduced complexity in network planning and service forecasting
- Software-provisionable, small form-factor pluggable (SFP) client optics modules and wavelength tunability for reduced inventory of spares
- Multilevel service monitoring using SONET/SDH and digital wrapper (G.709) technology with an integrated optical service channel for unparalleled service reliability
- Network topology auto-discovery



- Integrated Cisco Transport Controller for network-based, point-and-click setup and regulation for rapid node and network turn-up
- Software-controlled optical power management for fully automated network optical power control, especially during wavelength additions, site additions, and fast transient suppression in the case of a fiber cut
- Support by an advanced, cross-platform optical element management system, the Cisco Transport Manager, for unified network operations and interface to a network management system (NMS) and operations support system (OSS)

In addition to the integrated software features, the Cisco ONS 15454 MSTP is supported by a simple but powerful network design tool, the Cisco MetroPlanner. Cisco MetroPlanner is a user-friendly PC application for modeling Cisco DWDM networks; it optimizes the deployment based on the user's network parameters. In addition to network design, Cisco MetroPlanner also reduces operational expenditures by simplifying network deployments through:

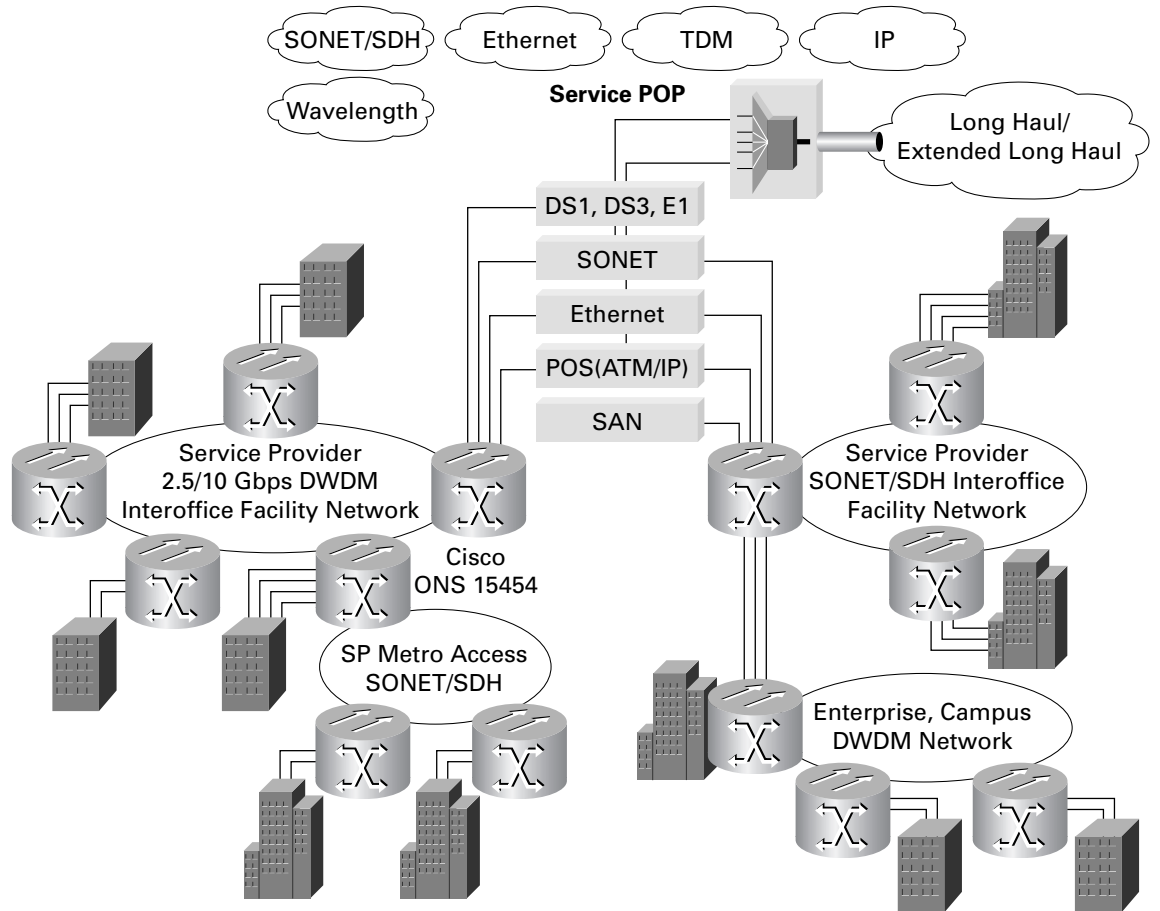
- Simple drag-and-drop user operation
- Flexible network design with default and provisionable optical element parameters
- Automatic equipment selection
- Layered graphical views of network, wavelength services, and node views
- Detailed port-to-port fiber cabling table
- Bill-of-material output
- Exportable configuration files, which can be uploaded to the Cisco Transport Controller craft tool, for automated node provisioning setup for quick network turn-ups

### **Cisco MSTP Migration**

With its multiservice capability, innovative optical technology, automatic optical power management and MSPP-like ease of use, the Cisco ONS 15454 MSTP will transform how metro and regional DWDM networks are built and managed. Combining multiple services and intelligent DWDM, the Cisco ONS 15454 MSTP will significantly reduce both capital expenditures and operational expenses for today's metro and regional networks (Figure 4).



**Figure 4**  
Metro Network



## Cisco MSTP Platform Features

### Node Configurations

- Terminal
- Hub
- Line amplifier
- Optical add/drop multiplexer

### Network Configurations

- Linear point-to-point
- Open ring, single hub
- Open ring, multi-hub
- Closed ring, no hub



### **Advanced Intelligent Software Features**

- Network topology auto-discovery
- Point-and-click node and network setup and regulation
- Automatic network optical power management

### **User Interface: Cisco Transport Controller**

- Integrated node and subnetwork craft graphical user interface (GUI)
- Layered graphical views: network, wavelength, node, card
- User provisionable graphics and fonts
  - Background maps
  - Color schemes
- A-to-Z wavelength circuit routing and creation
- Network auto-discovery with provisionable subnetwork domain control
- System inventory
- PC-based client
- Familiar browser interface—Netscape Navigator or Microsoft Internet Explorer

### **Performance Monitoring**

- Optical signal
- ITU-T G.709 Interface for the optical transport network
- Threshold crossing alerts
- 15-minute (32 entries) and 24-hour (one entry)
- Client interface type specific

### **Alarm Monitoring and Reporting**

- Shelf LEDs—Critical, major, minor, remote
- Card LEDs—Card failure, active/standby state, signal fail
- LCD display for operating wavelength for tunable cards
- Cisco Transport Controller craft interface
  - Layered graphical views with real-time alarm text and coloring: network, wavelength, node, card
  - Multiple technology views including DWDM and SONET/SDH with MSTP integration
- Environmental alarm contacts
  - 4-alarm output contact closures (standard)—Critical, major, minor, remote
  - Up to 48 provisionable alarm contacts in systems equipped with Alarm Interface Controller (AIC-I)

### **Security Features**

- 4-level user control with provisionable timeout durations—Superuser, provisioning, maintenance, retrieve
- Multiple usernames and logged-in users



### Maintenance Features

- Remote software downloads and in-service, hitless activation
- Loopback
- Database backup and restore
- Lamp test

### Timing and Synchronization

- Two external timing source inputs (SONET, T1 and SDH E-1, 2 MHz)
- Line timing
- Two timing source outputs (recovered from line optics)
- Internal Stratum 3 holdover
- Synchronous status messaging support

### Additional Features

- 100-Mbps Optical Supervisory Channel (OSC) user data channel
- Front or rear access shelf assembly options
- A and B monitored DC power inputs

### Compliance and Certifications

- Network Equipment Building Standards (NEBS) Level 3 compliance
- OSMINE certifications
- Storage vendor qualification and certifications
- International Telecommunication Union Telecommunication Standardization Sector (ITU-T) requirements

### Cisco MSTP Technical Specifications

Tables 1–6 provide technical specifications and ordering information for Cisco MSTP elements.

**Table 1** Common Equipment

Module	Model Number
Shelf assembly	SA-ANSI or SA-ETSI version
Fan tray assembly	FTA3-T (ANSI), FTA-48V (ETSI)
Timing, communications, and control card	TCC2
Alarm Interface Controller (AIC) and Alarm Expansion Panel (AEP)	AIC-I (AEP option for ANSI)
Power, Craft, Alarm Mechanical Interface Cards (ETSI)	CTP-MIC48V AP-MIC48V
Air ramp ANSI ETSI	AIR-RAMP





**Table 1** Common Equipment (Continued)

Module	Model Number
<b>Slot filler card</b>	
Interface and control	BLANK
Front Mount Electrical Connection (FMEC) (SDH)	BLANK-FMEC
<b>Fiber Management</b>	
Fiber Patch Panel Shelf	PP-64-LC
Fiber Jumper Storage Shelf	FBR-STRG

**Table 2** Wavelength Interfaces

Modules	Supported Service Interfaces	Protection Supported
<b>2.5-Gbps multirate transponder cards</b> 8 modules, 4-channel tunable for 32-channel, 100-GHz plan, 50-GHz laser stability	ESCON	No protection
	1-Gbps Fibre Channel	Optical path protection
	2-Gbps Fibre Channel	Optical path and equipment protection
	Gigabit Ethernet	
	OC-3/STM-1	
	OC-12/STM-4	
	OC-48/STM-16	
<b>10-Gbps multirate transponder</b> 16 modules, 2-channel tunable for 32-channel, 100-GHz plan, 50-GHz laser stability	10-Gigabit Ethernet LAN	No protection
	10-Gigabit Ethernet WAN	Optical path protection
	OC-192/STM-64	Optical path and equipment protection
<b>4x 2.5-Gbps/10-Gbps muxponder</b> 16 modules, 2-channel tunable for 32-channel, 100-GHz plan, 50-GHz laser stability	OC-48/STM-16	No protection Optical path protection Optical path and equipment protection

**Table 3** Transmission Elements

Module	Description
<b>Multiplexer and demultiplexer filters</b>	
32-wavelength multiplexer, 100 GHz	32MUX-O
32-wavelength demultiplexer, 100 GHz	32DMX-O
4 wavelength multiplexer/demultiplexer, 100 GHz	4MD-xx.x
<b>Optical amplifier</b>	
Preamplifier, 50-GHz capable	OPT-PRE
Booster amplifier, 50-GHz capable	OPT-BST



**Table 3** Transmission Elements (Continued)

Module	Description
<b>Optical add/drop multiplexer</b>	
1-band	AD-1B-xx.x
4-band	AD-4B-xx.x
<b>Optical add/drop multiplexer</b>	
1-channel, 100-GHz	AD-1C-xx.x
2-channel, 100-GHz	AD-2C-xx.x
4-channel, 100-GHz	AD-4C-xx.x
<b>Optical service channel</b>	
Standard	OSCM
Integrated combiner and separator	OSC-CSM
<b>Dispersion Compensation</b>	
Dispersion compensation unit shelf (2 slot)	DCU-SA
Dispersion compensation module	DCM-<value>
<b>Y-Protection</b>	
Splitter/combiner module, single-mode	CS-SM-Y
Splitter/combiner module, multimode	CS-MM-Y
Shelf assembly, splitter/combiner (4 slot)	FL-SA

**Table 4** Targeted Networks

Module	Description
<b>Nodes per network (maximum)</b>	16
<b>Wavelengths</b>	32 + 1 OSC (64 +1 capable)
<b>Wavelength spacing</b>	100 GHz (50 GHz planned)
<b>Optical reach, single span, point to point (amplified)</b>	
32 channels	80 miles (130 km)
16 channels	87 miles (140 km)
8 channels	93 miles (150 km)
<b>Number of spans (maximum)</b>	7 by 22 dB
<b>Ring circumference (maximum)</b>	372 miles (600 km)
<b>Fiber type</b>	Single-mode fiber (SMF) (G.652)
<b>Power requirements</b>	
Hub node	Typical/maximum 296W/388W
OADM node	
Amplified	368W/488W
Passive	250W/334W
Line amplifier node	174W/212W



**Table 5** 32-Channel Wavelength Plan

$\lambda$ (nm)	$\lambda$ (nm)	$\lambda$ (nm)	$\lambda$ (nm)
1530.33	1538.19	1546.12	1554.13
1531.12	1538.98	1546.92	1554.94
1531.90	1539.77	1547.72	1555.75
1532.68	1540.56	1548.51	1556.55
1534.25	1542.14	1550.12	1558.17
1535.04	1542.94	1550.92	1558.98
1535.82	1543.73	1551.72	1559.79
1536.61	1544.53	1552.52	1560.61

**Table 6** SONET/SDH Ordering Information<sup>1, 2</sup>

Product Names	Description
<b>Common equipment</b>	
15454-SA-ANSI 15454E-SA-ETSI	Shelf assembly, Cisco ONS 15454
15454-TCC2 15454E-TCC2	Timing, Communications, and Control Card, Version 2 (TCC2)
15454-FTA3-T 15454E-FTA-48V	Fan tray assembly, includes fan tray filter
15454E-CTP-MIC48V	Mechanical interface card, craft, timing, and power inputs, ETSI
15454E-AP-MIC48V	Mechanical interface card, alarm and power inputs, ETSI
15454-AIR-RAMP 15454E-AIR-RAMP	Air ramp
15454-AIC-I 15454E-AIC-I	Alarm Interface Controller, international card
15454-BLANK 15454E-BLANK 15454E-BLANK-FMEC	Shelf slot filler panel, fits any slot in Cisco ONS 15454 ANSI shelf assembly Shelf slot filler panel, fits any slot in Cisco ONS 15454 ETSI shelf assembly Shelf FMEC slot filler panel, fits Cisco ONS 15454 ETSI shelf assembly
15454-PP-64-LC 15454E-PP-64-LC	Fiber patch panel shelf, LC-to-LC connectors, 32 duplex (64) LC adapters, supports up to 8 ribbon cable assemblies (1 MPO to 8 LC) plus 64 2-mm cable assemblies, includes 2 MPU to 8x LC/PC 2.3-meter cable assemblies (uninstalled)
15454-FBR-STRG 15454E-FBR-STRG	Fiber storage shelf, supports 8 2-meter ribbon cables (8-fiber) plus 40 2-meter 2-mm fiber cables



**Table 6** SONET/SDH Ordering Information<sup>1,2</sup> (Continued)

Product Names	Description
<b>Service interfaces</b>	
15454-MR-L1-xx.x 15454E-MR-1-xx.x	100-Mbps to 2.5-Gbps multirate transponder card, SFP client module slot, 100-GHz ITU wavelength, unprotected DWDM line with LC connector
15454-MRP-L1-xx.x 15454E-MRP-1-xx.x	100-Mbps to 2.5-Gbps multirate transponder card, SFP client module slot, 100-GHz ITU wavelength, protected DWDM line with LC connector
15454-10T-L1-xx.x 15454E-10T-xx.x	10-Gbps multirate transponder card, 10-Gigabit Ethernet LAN physical layer, 10-Gigabit Ethernet WAN physical later, OC-192, STM-64 SFP-based client interface, 100-GHz ITU wavelength (50-GHz laser stability) DWDM line with LC connector
15454-10M-L1-xx.x 15454E-10M-xx.x	4 x OC-48/STM-16—10-Gbps muxponder card, intermediate-reach, 1310-nm client interface with LC connectors, OC-192/STM-64 100-GHz ITU wavelength (50-GHz laser stability) DWDM line with LC connector
<b>Optical transmission elements</b>	
15454-OSCM 15454E-OCSM	Optical service channel card, 1510-nm, LC connector, includes 2 2-meter LC/LC fiber optic cables
15454-OSC-CSM 15454E-OSC-CSM	Optical service channel card, integrated combiner/separator, 1510-nm, LC connector, includes 2 2-meter LC/LC fiber optic cables
15454-OPT-PRE 15454E-OPT-PRE	Optical preamplifier, C-band, 64 channel, 50-GHz compatible, LC connector, midstage access, includes 2 2-meter 5 dB attenuated LC/LC fiber optic cables
15454-OPT-BST 15454E-OPT-BST	Optical booster amplifier, C-band, 64 channel, 50-GHz compatible, LC connector, includes two 2-meter LC/LC fiber optic cables
15454-32MUX-O 15454E-32MUX-O	32-channel multiplexer card, 100-GHz, monitor port, 8-fiber multipath push-on (MPO) connector
15454-32DMX-O 15454E-32DMX-O	32-channel demultiplexer card, 100-GHz, 8-fiber MPO connector, includes 1 2-meter LC/LC fiber optic cable
15454-4MD-xx.x 15454E-4MD-xx.x	4-channel multiplexer and demultiplexer card, 100-GHz, LC connector, includes 2 2-meter LC/LC fiber optic cables
15454-AD-1C-xx.x 15454E-AD-1C-xx.x	1-channel optical add/drop multiplexer, 100-GHz, LC connector, includes 2 2-meter LC/LC fiber optic cables
15454-AD-2C-xx.x 15454E-AD-2C-xx.x	2-channel optical add/drop multiplexer, 100-GHz, LC connector, includes 2 2-meter LC/LC fiber optic cables
15454-AD-4C-xx.x 15454E-AD-4C-xx.x	4-channel optical add/drop multiplexer, 100-GHz, LC connector, includes 2 2-meter LC/LC fiber optic cables
15454-AD-1B-xx.x 15454E-AD-1B-xx.x	1-band optical add/drop multiplexer, 100-GHz, LC connector, includes 2 2-meter LC/LC fiber optic cables
15454-AD-4B-xx.x 15454E-AD-4B-xx.x	4-band optical add/drop multiplexer, 100-GHz, LC connector, includes 2 2-meter LC/LC fiber optic cables
15216-DCU-SA	Dispersion compensation unit shelf, 2 module slots



**Table 6** SONET/SDH Ordering Information<sup>1,2</sup> (Continued)

Product Names	Description
15216-DCM-<value>	Dispersion compensation module, LC connectors, values to -1150ps
15216-CS-SM-Y=	Y-cable splitter/combiner module, single-mode, single-width module, installs in Cisco FlexLayer shelf assembly (15216-FL-SA)
15216-CS-MM-Y=	Y-cable splitter/combiner module, multimode, single-width module, installs in Cisco FlexLayer shelf assembly (15216-FL-SA)
15216-FL-SA=	Shelf assembly, 4 module slots, 1 rack unit high, 19- or 23-inch rack mounting, Cisco FlexLayer platform
<b>Pluggable optics modules</b>	
15454-SFP3-1-IR 15454E-SFP-L.1.1	OC-3/STM-1/D1-SDI SFP, intermediate-reach, 1310-nm, single-mode, LC connector
15454-SFP12-4-IR 15454E-SFP-L.4.1	OC-12/STM-4 SFP, intermediate-reach, 1310-nm, single-mode, LC connector
15454-SFP-OC48-IR 15454E-SFP-L.16.1	OC-48/STM-16 SFP, intermediate-reach, 1550-nm, single-mode, LC connector
15454-SFP-200 15454E-SFP-200	ESCON SFP, short-reach, 1310-nm, multimode, LC connector
15454-SFP-GE+-LX 15454E-SFP-GE+-LX	Gigabit Ethernet, Fibre Channel (1- and 2-Gbps) and HDTV SFP, long-reach, 1310-nm, single-mode, LC connector
15454-SFP-GEFC-SX 15454E-SFP-GEFC-SX	Gigabit Ethernet and Fibre Channel (1- and 2-Gbps) SFP, short-reach, 850-nm, multimode, LC connector
<b>Cable assemblies</b>	
15454-MPO-8LC-2 15454E-MPO-8LC-2	Cable assembly, MPO 8 fiber ribbon to 8x LC/PC, single-mode, 2.3 meters
15454-LC-LC-2 15454E-LC-LC-2	Cable assembly, LC/PC to LC/PC, single-mode, 2.0 meters, 2 mm jacket
<b>Software and user documentation</b>	
15454-R4.5.0SWCD 15454E-R4.5.0SWCD	System software, Release 4.5.0, Cisco ONS 15454, CD-ROM
SF15454-R4.5.0 SF15454E-R4.5.0	System software, Release 4.5.0, Cisco ONS 15454, ordered with TCC2 card (preloaded)
15454-DOC4.5.0PP 15454E-DOC4.5.0PP	User document, Cisco ONS 15454, Release 4.5.0, Cisco ONS 15454, paper version
15454-DOC4.5.0CD 15454E-DOC4.5.0CD	User document, Release 4.5.0, Cisco ONS 15454, CD-ROM version

1. Product names with an "E" (15454E, for example) are for ETSI network elements.

2. Wavelength plan is outlined in Table 5. Cisco online lead-time tool is available for selection of orderable wavelengths.

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