

Cisco ONS 15454 2-Port CFP Line Card

Product Overview

The Cisco® ONS 15454 Multiservice Transport Platform (MSTP) supports a 2-port C Form-Factor Pluggable (CFP) line card, which simplifies the integration and transport of 100-Gigabit interfaces and services into enterprises or service provider optical networks (Figure 1).

Release 9.6 of the Cisco ONS 15454 MSTP extends the total data transport capacity by a factor of three, allowing dense wavelength-division multiplexing (DWDM) transmission of up to 9.6 Tbps (96 wavelengths at 100 Gbps) in the C-band.

Figure 1. Cisco ONS 15454 2-Port CFP Line Card



Challenge and Solution

The bandwidth carried on core and metropolitan DWDM networks is growing exponentially, while operators' revenues are not keeping pace. The Cisco ONS 15454 100-Gbps solution can dramatically lower the cost to carry bandwidth, helping to maintain and improve customers' profitability. Internet growth is still exponential, mainly due to demand for next-generation services such as quadruple play (data, voice, video, and mobility), video distribution, Internet Protocol Television (IPTV), and other high-bandwidth services.

Due to advanced modulation techniques, the ability to transmit 100-Gbps wavelengths on existing or new DWDM systems maximizes return on investment by increasing the overall capacity per fiber pair without impacting the unregenerated transmission distance supported by the system. Scaling from 10 Gbps to 40 Gbps and now 100 Gbps multiplies by a factor of 10 the bandwidth that can be transported over existing fiber networks.

The new coherent polarization-multiplexing differential quadrature phase shift keying (CP-DQPSK) modulation scheme supports 9.6 Tbps capacity transmission over Ultra-Long-Haul (ULH) networks of up to 3,000 km of unregenerated optical spans.

The Cisco ONS 15454 2-Port CFP Line Card is designed to provide 100-Gbps services over 100-Gbps DWDM wavelengths generated by the Cisco ONS 15454 100 Gbps Coherent DWDM Trunk Card.

Product Features and Benefits

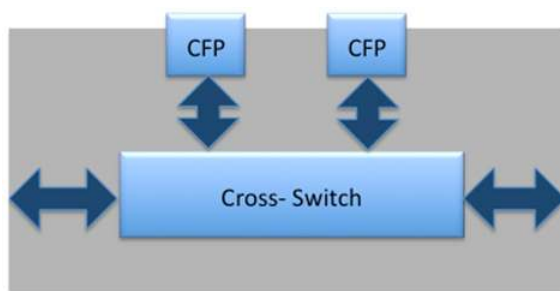
The Cisco ONS 15454 2-Port CFP Line Card consists of two ports capable of hosting a CFP transceiver. Each port can support following services:

- 40 Gigabit Ethernet
- 100 Gigabit Ethernet
- OTU-3
- OTU-4

Client ports can be equipped with a large variety of pluggable CFPs.

The Cisco ONS 15454 2-Port CFP Line Card provides the carrier-class features and advanced capabilities necessary to deliver 100-Gbps services, including protocol transparency, flexible protection mechanisms, flow-through timing, and management and performance monitoring capabilities (Figure 2).

Figure 2. Cisco ONS 15454 2-Port CFP Line Card Block Diagram



Operating Modes

The Cisco ONS 15454 2-Port CFP Line Card supports multiple applications.

100-Gbps LR4 Transponder Application

The Cisco ONS 15454 2-Port CFP Line Card can be coupled with the Cisco ONS 15454 100 Gbps Coherent DWDM Trunk Card to support a 100GBASE-LR4 client interface for the 100-Gbps transponder. The 100-Gbps CXP pluggable available on the Cisco ONS 15454 100 Gbps Coherent DWDM Trunk Card currently supports only 100GBASE-SR10, while 100GBASE-LR4 currently requires a CFP form factor.

The Cisco ONS 15454 2-Port CFP Line Card can be connected through the ONS 15454 M6 or M2 backplane with up to two 100-Gbps coherent DWDM trunk cards placed in the slots above or below the same shelf to provide the functionality of two 100-Gbps transponders, with 100GBASE-LR4 CFP pluggables as the client interface.

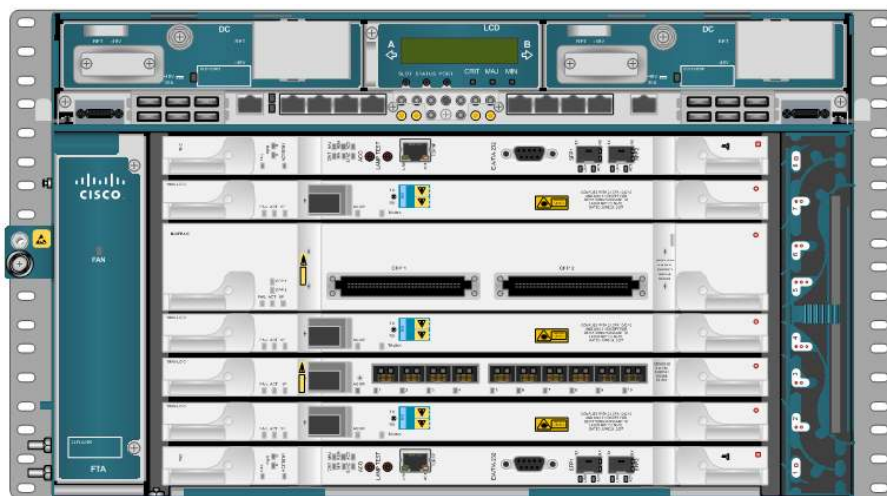
2-Port 40-Gbps Muxponder Application

The Cisco ONS 15454 100 Gbps Coherent DWDM Trunk Card can be coupled with the Cisco ONS 15454 2-Port CFP Line Card to support 40-Gbps muxponder applications. The trunk card can be connected through the Cisco ONS 15454 M2 or M6 chassis backplane to the Cisco ONS 15454 2-Port CFP Line Card to provide Optical Transport Network (OTN) multiplexing of the two 40-Gbps data streams into a single 100-Gbps DWDM OTU-4 wavelength (Figure 3).

Supported client signals are any combination of 40 Gigabit Ethernet LAN-PHY or OTU-3 data rates.

Please refer to the [Cisco ONS 15454 100Gbps Coherent DWDM Trunk Card data sheet](#) for additional information

Figure 3. Two 100-Gbps LR4 Transponders Plus One 10-Port 10-Gbps Muxponder in an M6 Chassis



Protocol Transparency

The Cisco ONS 15454 2-Port CFP Line Card can transparently deliver any 40-Gbps or 100-Gbps service for cost-effective, point-to-point transport using the Cisco ONS 15454 MSTP platform.

In the 100-Gbps muxponder application, clients are mapped into an OTU-4 DWDM wavelength using the methods listed in Table 1.

Table 1. Client Configurations and Mapping

Client		Mapping	Trunk		
Format	Rate (Gbps)		Format	Rate with 7% GFEC or EFEC OH (Gbps)	Rate with 20% UFEC OH (Gbps)
100GE LAN-PHY	101.125	Bit transparent through standard G.709v3 mapping	OTU4	111.809	124.964
OTU-4	111.809	Transparent G.709 standard			
40 GE LAN-PHY	41.250	1024b/1027b transc + OPU4 GMP G709 Appendix VIII			
OTU-3	43,018	Transparent G.709 standard			

Flexible Protection Mechanism Support

The Cisco ONS 15454 2-Port CFP Line Card supports multiple protection mechanisms commonly used in optical transport networks. Table 2 outlines the available protection options and the associated service-level agreements (SLAs) that can be provided.

Table 2. Protection Formats

Protection Type	Capabilities
Unprotected	No client terminal interface, transponder card, or DWDM line protection. The client signal is transported over a single unprotected transponder card or optical path.
Y-cable protection	Provides transponder card and DWDM line protection without requiring client terminal interface protection. Uses Y-protection devices to optically split a single client interface to two transponder cards. The Cisco ONS 15454 system controls the transponder card active or standby status to provide a single signal feed to client equipment.

Flow-Through Timing

The Cisco ONS 15454 2-Port CFP Line Card allows the timing to flow through from client to line optical interface. The received timing from the client interface is used to time the line transmitter interface. This flow-through timing allows multiple 2-port CFP line cards to be placed in the same shelf but be timed independent of the network element timing.

Management

The Cisco ONS 15454 MSTP provides comprehensive management capabilities to support the Operations, Administration, Maintenance, and Provisioning (OAM&P) capabilities through the integrated Cisco Transport Controller craft interface with support from the Cisco Prime™ Optical element management system.

Far-End-Laser-Off Behavior

The Cisco ONS 15454 2-Port CFP Line Card can provision the far-end-laser-off behavior in case of OTN payloads. Customers can use the Cisco Transport Controller to configure how the remote client interface will behave following a fault condition. It is possible to configure the remote client to Squelch or to send an Alarm Indication Signal (AIS).

For 100- or 40-Gigabit Ethernet signals, the default behavior is Squelching.

Performance Monitoring

Performance monitoring for the Cisco ONS 15454 2-Port CFP Line Card takes into account the fact that the line card is a host board supporting CFP client equipment while the digital monitoring of the incoming client is implemented on the companion Cisco ONS 15454 100 Gbps Coherent DWDM Trunk Card. A virtual port connection displays the digital wrapper monitoring according to G.709 (OTN) as well Remote Monitoring (RMON) for Ethernet signals, while the optical performance monitoring is directly available on the 2-Port CFP Line Card. Calculation and accumulation of the performance monitoring data are supported in 15-minute and 24-hour intervals as per G.7710.

A detailed list of performance monitors is given in Table 5.

The Cisco ONS 15454 2-Port CFP Line Card incorporates faceplate-mounted LEDs to provide a quick visual check of the operational status of the card. An orange circle is printed on the faceplate, indicating the shelf slot in which the card can be installed.

Application Description

The Cisco ONS 15454 2-Port CFP Line Card provides the ability to cost-effectively transport 100-Gbps services within the Cisco ONS 15454 MSTP platform.

Two main applications supported are:

- 100-Gbps single-mode client handoffs of up to 10 Km where a 100GBASE-SR10 interface cannot be used
- Aggregation of multiple 40-Gbps services to interconnect OTN switches, Ethernet switches, and routers

Product Specifications

Compact Design

- Double-slot card design for high-density 40-Gbps and 100-Gbps solutions
- Up to two 2-port CFP line cards per Cisco ONS 15454 M6 shelf assembly, allowing support for up to twenty-eight 40-Gbps or fourteen 100-Gbps interfaces per 42-rack unit (RU) bay frame

Flexible Restoration Options

- Client Y-protection
- Unprotected (0+1)

Tables 3 and 4 list regulatory compliance information and system requirements for the Cisco ONS 15454 2-Port CFP Line Card. Table 5 provides the performance monitoring parameters, Table 6 provides card specifications, and Table 7 gives ordering information for the card.

Regulatory Compliance

Important: All compliance documentation may not be completed at the time of product release. Please check with your Cisco sales representative for countries other than Canada, the United States, and the European Union.

Table 3. Regulatory Compliance

ANSI System	ETSI System
Countries Supported	
• Canada • United States • Korea • Japan • European Union	• European Union • Africa • CSI • Australia • New Zealand • China • Korea • India • Saudi Arabia • South America
EMC (Class A)	
• ICES-003, 2004 • GR-1089-CORE Issue 4, NEBS EMC and Safety, June 2006 • FCC 47CFR15, 2007	• ETSI EN 300 386 V1.4.1 (2008-04) Telecommunication network equipment EMC requirements (Note: EMC-1) • CISPR22:2008 and EN55022:2006/A1:2007 Information Technology Equipment (Emissions) (EMC-2) • CISPR24: 1997/ A1:2001/A2:2002 and EN55024:1998/A1:2001/A2:2003: Information Technology Equipment – Immunity characteristics – Limits and Methods of Measurement (test levels)
Safety	
• CSA C22.2 #60950-1 – Edition 7, March 2007 • UL 60950-1 – Edition 2, March 2007 • GR-1089-CORE Issue 4, NEBS EMC and Safety, June 2006	• UL 60950-1 – Edition 2, March 2007 • IEC 60950-1 Information technology equipment Safety Part 1: General requirements – Edition 2, 2005 and National Differences as per CB Bulletin 112A • IEC/EN 60950-1 (2006/10) with Amendment 11:2004 to EN 60950-1:2001, 1st Edition and National Differences as per CB Bulletin 112A. • EN 60950-1, Edition 2 (2006) Information technology equipment – Safety – Part 1: General requirements • CE Safety Directive: 2006/95/EC

ANSI System	ETSI System
Laser	
- UL 60950-1 – Edition 2, March 2007 - IEC 60825-1: 2001 Ed.1.2 (incl. am1+am2) Safety of laser products Part 1: Equipment classification, requirements and user guide - IEC60825-2 Ed.3 (2004) Safety of laser products Part 2: Safety of optical fiber communication systems + A1:2006	- IEC 60825-1: 2001 Ed.1.2 (incl. am1+am2) Safety of laser products Part 1: Equipment classification, requirements and users guide - IEC60825-2 Ed.3 (2004) Safety of laser products Part 2: Safety of optical fibre communication systems + A1:2006 21CFR1040 (2008/04) (Accession Letter and CDRH Report) Automatic Laser Shutdown and restart (ALS) according to ITU-T G.664 (03/06). Guidance for Industry and FDA Staff (Laser Notice No. 50) , June 2007 - Laser products: Conformance with IEC 60825-1 and IEC 60601-2-22; Guidance for Industry and FDA Staff (Laser Notice No. 50), June 2007
Environmental	
GR-63-CORE Issue 3, NEBS Physical Protection, March 2006	- ETS 300-019-2-1 V2.1.2 (Storage, Class 1.1) - ETS 300-019-2-2 V2.1.2 (1999-09): Transportation, Class 2.3 - ETS 300-019-2-3 V2.2.2 (2003-04):Operational, Class 3.1E
Optical	
- GR-253-CORE – Issue 04 - ITU-T G.691	- ITU-T G.709 - ITU-T G.975
Quality	
TR-NWT-000332, Issue 4, Method 1 calculation for 20-year mean time between failure (MTBF)	
Miscellaneous	
- GR-1089-CORE Issue 4, NEBS EMC and Safety (June 2006) (Note: NEBS-1) - GR-63-CORE Issue 3, NEBS Physical Protection (March 2006) (Note: NEBS-2) - ATT-TP-76200 : 2008 - ANSI T1.315-2001 - GR-499: 2004 Transport Systems Generic Requirements (TSGR): Common Requirements	

Table 4. System Requirements

Component	Cisco ONS 15454 M6
Processor	TNC/TSC/TNC-E/TSC-E
Shelf assembly	Cisco ONS 15454 M6-SA shelf assembly with FTA2
System software	Release 9.6 ANSI/ETSI or later
Slot compatibility	3/4 and 5/6

Table 5. Performance Monitoring Parameters

Area	Parameter Name	Description
Client optical PM	OPT	Transmitter optical power
	LBC	Transmitter laser bias current
	OPR	Receiver optical power

Table 6. Card Specifications

Management	
Card LEDs	
Failure (FAIL)	Red
Active/standby (ACT/STBY)	Green/yellow
Signal fail (SF)	Yellow
Client port LEDs (per port)	
Active input signal	Green

Management	
Power (including pluggable)	
Typical	79W (25C & –48VDC)
Maximum	84W (55C & –38VDC)
Physical	
Dimensions	Occupies 2 slots
Weight	1.62 kg (3.57 lb)
Reliability and availability	
Mean time between failures (MTBF)	224,829 hrs
Latency (card level)	< 1 microseconds
All configuration	–40°C to 70°C (–40°F to 158°F)
Storage temperature	
Operating temperature	
Normal	0°C to 40°C (32°F to 104°F)
Short-term ¹	–5°C to 55°C (23°F to 131°F)
Relative humidity	
Normal	5% to 85%, noncondensing
Short-term ¹	5% to 90% but not to exceed 0.024 kg water/kg of dry air
¹ Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year (a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period). The values shown are valid for M6 or M2 chassis.	

Table 7. Ordering Information

Part Number	Description
15454-M-CFP-LC=	Cisco ONS 15454 2-Port CFP Line Card
ONS-CC-100G-LR4=	100GE Multi-Rate CFP – LR4 – Commercial temp
ONS-CC-100GE-LR4=	100GE Single Rate CFP – LR4 – Commercial temp
ONS-CC-40G-LR4=	40-Gbps Multirate CFP – LR4 – Commercial temp
ONS-CC-40G-FR=	40-Gbps Multirate CFP – FR – Commercial temp
CFP-40G-SR4=	40-Gbps Multirate CFP – SR – Commercial temp

For More Information

For more information about the Cisco ONS 15454 MSTP, visit

www.cisco.com/en/US/products/hw/optical/ps2006/ps5320/index.html.



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