Cisco ONS 15454 SONET/SDH Multiservice Provisioning Platform

The industry-leading Cisco® ONS 15454 Multiservice Provisioning Platform (MSPP) delivers next-generation SONET/SDH features, advanced intelligent wavelength-division multiplexing (WDM) transmission capabilities, high-density multiservice aggregation and transport, and a wide service interface selection. With its advanced multinetwork termination capability, the platform helps reduce the number of deployed network elements, lowering capital expenditures (CapEx) and operating expenses (OpEx).

Product Overview

The Cisco ONS 15454 MSPP (Figures 1 and 2) helps enable service provider and enterprise customers to build robust, scalable, multiservice transport networks to support their metropolitan-area (metro) or regional, public, and private communication needs (Figure 3). The Cisco ONS 15454 is the first in its class to consolidate SONET/SDH, dense WDM (DWDM) transmission, Layer 2 and Layer 3 packet-processing functions, and storage area network (SAN) transport with the intelligence of an IP-based management plane in a single, cost-effective platform. Designed for metro and regional networks, the Cisco ONS 15454 offers a wide mixture of data, voice, and video service interfaces, efficient bandwidth aggregation, and scalable transport bandwidth from 155 Mbps (OC-3/STM-1) to 10 Gbps (OC-192/STM-64) and integrated DWDM transmission for continued network scalability. The Cisco ONS 15454 provides operational simplicity by taking advantage of an integrated, network-based GUI, the Cisco Transport Controller, to simplify the setup, provisioning, and maintenance of the transport network. A powerful element management system (EMS), the Cisco Transport Manager assists with monitoring the optical network's health and allows integration to operations support systems (OSSs) and network management systems (NMS). In addition, the Cisco Transport Planner DWDM network design tool streamlines the formerly manual task of system modeling with a simple-to-use GUI with time-saving network-activation capabilities such as cabling diagrams and network element parameter uploads to the Cisco Transport Controller. With such advanced capabilities plus the management and planning tools, the Cisco ONS 15454 will provide the foundation for growing your communications infrastructure (Figure 3).

Figure 1. Cisco ONS 15454 ANSI/SONET System

**Figure 2.** Cisco ONS 15454 ETSI/SDH System

Best of SONET/SDH

The Cisco ONS 15454 MSPP uses the proven resiliency, performance monitoring capabilities, and deployment ubiquity of SONET and SDH protocols to create a transport platform designed to metro market requirements. SONET and SDH provide carrier-class circuit protection with sub-50-millisecond (ms) restoration and multilayer performance-monitoring statistics, enabling proactive maintenance and reduced communication downtime. Integration of the Cisco ONS 15454 into today's network is simplified because of the adherence to telecom industry standards.

Flexible Optical Networking

Networks are not all architected the same. Many factors, including access to physical media (that is, fiber, coaxial, etc.), CapEx budget, time to market, etc., may influence the final design of a network. To accommodate the wide deployment needs, the Cisco ONS 15454 was designed with a flexible, plug-and-play card architecture and comprehensive optical operating software, helping enable support for multiple capabilities from a single platform type, including:

- **Flexible bandwidth and restoration options** – Network bandwidth can be matched to user demand with plug-in optical cards, with support from 155 Mbps to 10 Gbps for SONET/SDH and 1.5 Mbps to 1 Gbps for Ethernet cards. In-service bandwidth upgrades help ensure that the network will meet current and future demands. The platform is easily provisioned to support all SONET/SDH protection protocols, including unidirectional path switched ring/subnetwork connection protection (UPSR/SNCP), 2- and 4-fiber bidirectional line switched ring/multiplex section-shared protection ring (BLSR/MS-SPR), 1+1 automatic protection switching/linear multiplex section protection (APS/LMSP), as well as Japan APS.

Figure 3.   Metropolitan/Regional Network
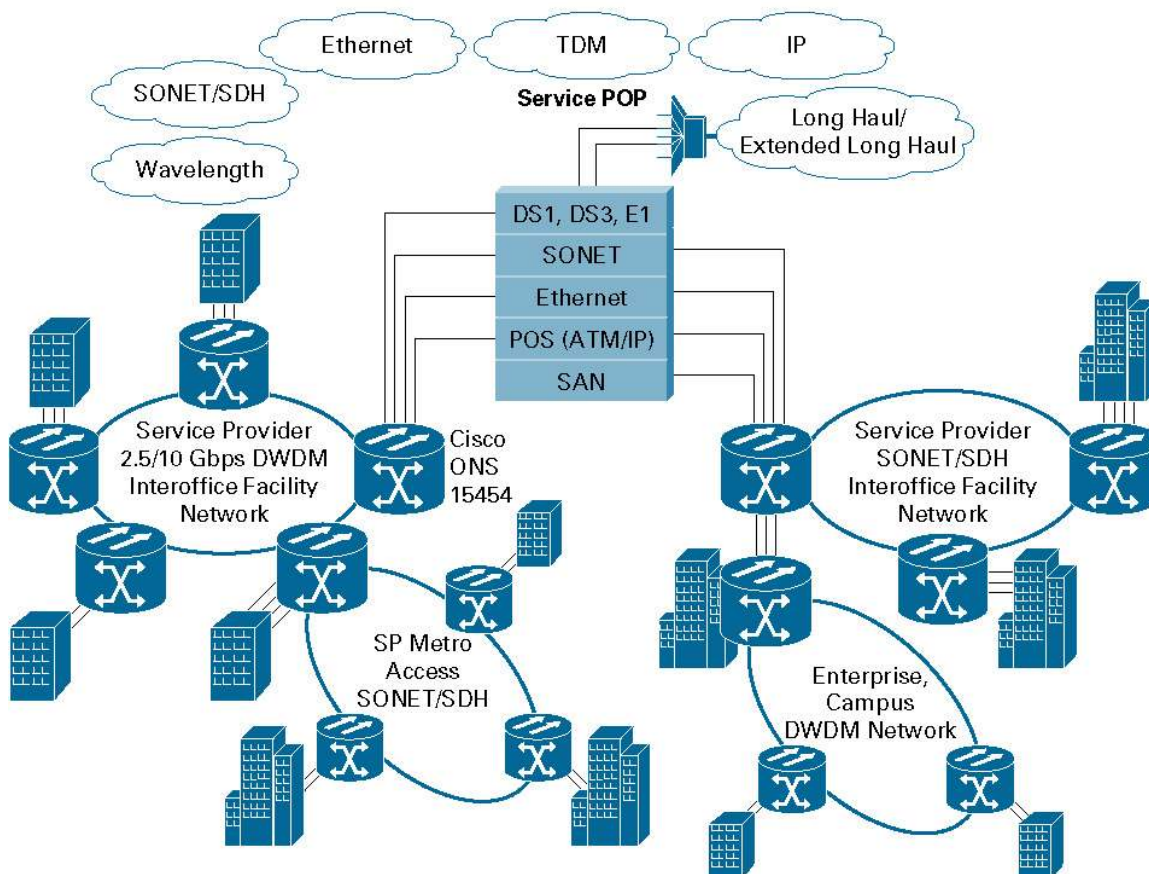
- **Network topology** – The platform supports ring, linear, and mesh topologies or a combination of these topologies from a single network element. To simplify engineering, ordering, and sparing, the optical transport interface cards are not topology-type-specific, as is the case with many transport platforms, allowing a single card type to be software provisioned to support any of the network topologies.

- **Intelligent WDM** – The Cisco ONS 15454 provides best-in-class metro DWDM using its multiservice-transport-platform (MSTP) qualities, providing integrated, intelligent WDM capabilities, including automatic power sensing and control, optical filters including industry-leading reconfigurable optical add/drop multiplexer (ROADM), optical amplifiers, optical service channel, narrowband optical interfaces, and IP-enabled network operations. Taking advantage of the MSTP configuration, the platform allows simple, fast, and easy network bandwidth scalability from 2.5 to 320 Gbps and beyond as well as a comprehensive selection of wavelength services. The platform is easily configured to support multiple DWDM node types, including hub, terminal, amplifier, and add/drop. The MSTP solution simplifies DWDM deployments by providing automated network-level power control, ROADMs, downloadable node turn-up settings and fiber cabling diagrams generated by the Cisco MetroPlanner DWDM network design tool, and A-to-Z wavelength provisioning. More information regarding the Cisco ONS 15454 MSTP can be found at: http://cisco.com/en/US/products/hw/optical/ps2006/ps5320/index.html.

These flexible optical networking capabilities allow deployment of a single platform type in a wider range of customer applications, simplifying training, equipment sparing, and OSS and NMS integration.

Integrated Multiservice Aggregation

Metro and regional networks, when compared to long-haul networks, reach closer to the end-user equipment, and thus require a broad mix of service interfaces and high-density service aggregation to accommodate all the data, voice, storage, and video data services. The Cisco ONS 15454 supports a comprehensive selection of service interface types, including synchronous, asynchronous, electrical, optical, data, and storage. Efficient bandwidth use is supported through the central cross-connect fabric, supporting TDM in multiple bandwidth increments including VT1.5, VC-11, VT2, VC-12, STS-N/VC-3, and VC-4 levels.

The Cisco ONS 15454 builds on the integration of Layer 2 and Layer 3 packet processing in an optical transport platform. The Cisco ONS 15454 also provides advanced quality of service (QoS) as well as Resilient Packet Ring (RPR) technology that helps enable more efficient use of the network transport resources to lower CapEx requirements and improve the network return on investment (ROI).

The growing demand for remote database backup is necessitating the transport of storage interfaces, such as 1- and 2-Gbps Fibre Channel/Fiber Connection (FICON) and Enterprise Systems Connection (ESCON). The Cisco ONS 15454 provides the option to transport storage traffic over a SONET/SDH or DWDM network. The platform takes advantage of a distance-extension protocol to extend the reach of the storage network as well as its service bandwidth subrating to allow the transport bandwidth to better match the service requirements.

Service flexibility is further strengthened by the transponder solution, which is part of the system's MSTP function that can transparently transport a wide range of service types with advanced networking capabilities using G.709 digital wrapper and forward error correction.

CapEx and OpEx Savings

Reducing CapEx and OpEx can be achieved through better equipment use as well as a simplified network-element user interface. The small form-factor chassis design of the Cisco ONS 15454, its high-density multiservice interface cards, and its advanced multinetwork termination capability help reduce the number of deployed network elements, reducing footprint, power, and the cabling required for service aggregation and transport. The core of the Cisco ONS 15454 is built upon an IP-powered management system – the Cisco Transport Controller – that brings network-based intelligence to the transport infrastructure. The Cisco Transport Controller (Figure 4) helps enable such advanced features as A-to-Z, source-to-destination circuit and wavelength provisioning – helping to accelerate circuit activations, eliminate manual provisioning of intermediate network elements, and reduce provisioning mistakes. The embedded software wizards of Cisco Transport Controller, including bandwidth upgrade and BLSR/MS-SPR network setup tools, simplify and speed common operational tasks and procedures. All these features help decrease the cost to deploy and maintain the transport network.

Figure 4. Cisco Transport Controller Craft Interface Tool
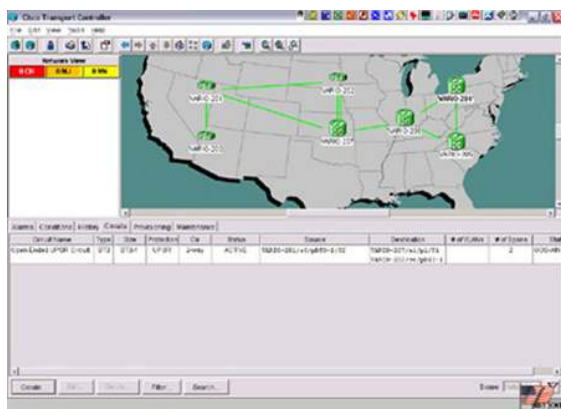
Element Management System – Cisco Transport Manager

Cisco Transport Manager, the industry's most advanced optical transport domain manager, delivers the full power of the Cisco ONS 15000 Series Optical Networking System to the operations personnel and back-office systems of today's network operators (Figure 5). As competition intensifies, operators of optical transport networks will increasingly focus on time to revenue, service velocity, flexible service-level agreements (SLAs), preemptive service assurance, and continuous reduction in the cost of operations.

Cisco Transport Manager delivers GUI-controlled management of Layer 1, Layer 2, and Layer 3 connections that are aligned to service offerings based on a unified, wizard-driven approach. It also offers unified alarm management and a Common Object Request Broker Architecture (CORBA) API to allow flow-through management based on the TeleManagement Forum 814 standard (TMF.814).

Figure 5.   Cisco Transport Manager EMS
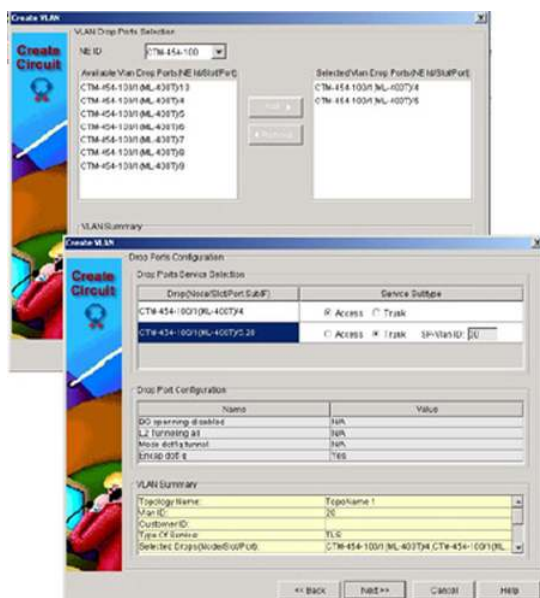
Applications

The capabilities of the Cisco ONS 15454 help enable it to satisfy the needs of many types of applications found in service provider and enterprise networks.

Service Provider Networks

The Cisco ONS 15454 MSPP gives service providers a common platform to meet the demanding needs of their metro and regional networking applications, including:

- Multiservice, SONET/SDH/WDM intra-office networks
- Business access networks
- Managed services networks
- Bandwidth manager at interexchange carrier (IXC) offices
- Voice switch interface
- DSL access multiplexer (DSLAM) trunk aggregation and transport
- High-speed router or ATM switch link extender
- Wireless cell site traffic aggregation and transport
- Cable TV backbone data and voice network
- Storage transport networks

The Cisco ONS 15454 helps enable service providers to deliver next-generation services and quickly activate the new services so they can generate revenue more quickly. The platform easily integrates with existing service provider SONET networks and OSSs, including inventory, provisioning, or service management systems.

Enterprise Networks

Enterprises require a reliable communications network to support all their data, voice, video, and storage service needs. The Cisco ONS 15454 MSPP allows these services to be aggregated onto a common network infrastructure, simplifying operations, maintenance, and training, as well as providing a scalable network to support future, bandwidth-hungry applications.

Summary/Conclusion

Today's vastly increased level of data traffic compels enterprises and service providers alike to search for solutions that lower costs for existing services yet provide greater overall bandwidth capacity and flexibility for newer applications and services. The Cisco optical portfolio of network solutions, of which the Cisco ONS 15454 MSPP is part, excels in satisfying these primary requirements, from the metro edge to the long-haul network.

Product Specifications

Tables 1 through 5 provide system specifications and equipment components for the Cisco ONS 15454 platform.

Table 1. System Specifications

Parameter	Specification
Physical dimensions	ANSI shelf assembly: • 19- or 23-in. EIA rack-mounting • H x W x D: 18.5 x 17.6 x 12.0 in. (470 x 445 x 305 mm) ETSI shelf assembly: • ETSI and 19-in. rack-mounting • H x W x D: 24.3 x 17.5 x 11.0 in. (616.5 x 445 x 280 mm)
Power	Dual power input terminal block, voltage monitored with threshold crossing alarms (TCAs) Voltage: • –48 VDC nominal • –40.5 to –56.7 operating range Current: • 5 amps minimum • 22 amps maximum @ nominal voltage[1]
Weight	ANSI: • 55 to 80 lb (25 to 36.3 kg) ETSI: • 80 to 110 lb (36.2 to 49.8 kg)

1. Maximum current draw based upon shipping system configuration, not equipment design limits.

Table 2. Mechanical Systems – ANSI Chassis

Card Type	Description
Chassis	17 front access common and interface card slots, integrated fan-tray slot
Fan-tray assembly	6-fan module assembly, integrated liquid crystal display
Electrical interface options	Rear access, A-side + B-side
• BNC	DS-3 and EC-1; 96 Tx/Rx (maximum)
• Subminiature B (SMB)	DS-3 and EC-1, DS-1 with balun; 168 Tx/Rx (maximum)
• AMP CHAMP	DS-1; 168 Tx/Rx (maximum)
• Wire wrap	DS-1; 168 Tx/Rx (maximum), SMB EIA required
• UBIC	DS-1; 224 Tx/Rx (maximum) DS-3 and EC-1; 192 Tx/Rx (maximum)

Table 3.   Mechanical Systems – ETSI Chassis

Card Type	Description
Chassis	17 front access common and interface card slots, 12 front access electrical, power, and timing slots, integrated fan-tray slot
Fan-tray assembly	6 fans, integrated liquid crystal display
Electrical interface options	Front access
• T54 (1.0/2.3)	E1; 336 Tx/Rx (maximum)[1] E3, DS-3; 120 Tx/Rx (maximum) E4: 32 Tx/Rx (maximum)
• Low-force helix (LFH) connector	E1: 336 Tx/Rx (maximum)

1. Requires 120- to 75-ohm breakout panel.

Table 4.   Common Cards

Card Type	Description
Timing, Communications, and Control (TCC)	
TCC2-Series	68 data-communications-channel (DCC) terminations, 1+1 operation
Cross-Connect	
Cross-connect with virtual tributary (XC-VT)	288 x 288 synchronous transport signal level 1 (STS-1), 672 x 672 VT1.5
10-Gbps cross-connect with virtual container and virtual tributary (XC-VXC-10G)	SONET: 1152 x 1152 STS-1, 2688 x 2688 VT1.5, 2016 x 2016 VT2 SDH: 384 x 384 VC-4, 384 x 384 VC-3, 2016 x 2016 VC-12, 2016 x 2016 VC-11
Alarm Interface Controller (AIC)	
AIC-I	Local and express order wire support Environmental Alarms: ANSI/SONET: • 12 inputs + 4 provisionable inputs/outputs • 32 inputs + 12 outputs (alarm-expansion-panel [AEP] equipped) Environmental Alarms: SDH/ETSI: • 16 inputs + 4 provisionable inputs/outputs

Table 5.   Multiservice Interface Cards

Interface or Card Type	No. of Ports per Card (Tx/Rx)	Protection	Shelf Port Density (maximum)
Electrical Interfaces (SONET/ANSI)			
DS-1	14	0:1, 1:1, 1:N	140 (protected)
DS-1/E-1	56	0:1, 1:N	224 (protected)
DS-3	12	0:1, 1:1, 1:N	120 (protected)
DS-3/EC-1	48	0:1, 1:N	192 (protected)
DS-3 transmultiplexer with portless capabilities	12	0:1, 1:1, 1:N	120 (protected)
EC-1	48	0:1, 1:1	192 (protected)
Electrical Interfaces (SDH/ETSI)			
E-1	42	0:1, 1:1, 1:N	252 (protected)
E-3	12	0:1, 1:1, 1:N	48 (protected)
DS-3	12	0:1, 1:N	96 (protected)
STM-1E	12	0:1, 1:1	48 (protected)
Data Interfaces			
10/100BASE-T Ethernet, Layer 1, CE-Series	10 – Small Form Factor Pluggable (SFP)	0:1	120
10/100BASE-T Ethernet, Layers 2 and 3, ML-Series	12	0:1, 1:1	144
100BASE-FX Ethernet, Layers 2 and 3, ML-Series	10 – SFP	0:1, 1:1	120
Gigabit Ethernet, Layer 1, CE-Series	10[3] – SFP	0:1	120[3]

Interface or Card Type	No. of Ports per Card (Tx/Rx)	Protection	Shelf Port Density (maximum)
Gigabit Ethernet, Layer 1, G-Series	4 – GBIC	0:1[1]	48
Gigabit Ethernet, Layers 2 and 3, ML-Series	10[3] – SFP	0:1[2], 1:1	120[3]
Gigabit Ethernet, 2.5-Gbps multirate transponder, DWDM, 32 wavelengths, 50 GHz, protected line option	1 client SFP, 1 line	0:1, Y-cable, 1+1	12
Gigabit Ethernet, 2.5-Gbps data muxponder, 2x Gigabit Ethernet or Fibre Channel, 1x 2-Gbps Fibre Channel, DWDM, 32 wavelengths, 50 GHz, protected line option	8 clients, 1 line	0:1, Y-cable, splitter	24 (line protected)
Gigabit Ethernet Xponder	20 clients, 2 lines	0:1, Y-cable, 1+1, GR[3]	120
10-Gigabit Ethernet/OC-192/STM-64 multirate transponder, DWDM, 32 wavelengths, 50 GHz	1 client, 1 line	0:1, Y-cable	12
10 Gigabit Ethernet Xponder	2 clients, 2 lines	0:1, Y-cable, 1+1, GR[3]	24
10-Gbps multirate OTU2 Xponder	2 clients, 2 lines	0:1, Y-cable, 1+1, splitter	24
SAN Interfaces			
Fibre Channel/FICON, 1 or 2 Gbps, SL-Series	4	0:1	48 subrate 1-Gbps Fibre Channel 24 subrate 2-Gbps Fibre Channel
ESCON/Fibre Channel/FICON, 2.5-Gbps multirate transponder, DWDM, 32 wavelengths, 50 GHz, protected line option	1 client SFP, 1 line	0:1, Y-cable, splitter	12
Fibre Channel, 2.5-Gbps data muxponder, 2x Gigabit Ethernet or Fibre Channel, 1x 2-Gbps Fibre Channel, DWDM, 32 wavelengths, 50 GHz, protected line option	8 clients, 1 line	0:1, Y-cable, splitter	24 Gigabit Ethernet or 1-Gbps Fibre Channel (line protected) 12 2-Gbps Fibre Channel (line protected)
10G Fiber Channel	2 clients, 2 lines	0:1, Y-cable, 1+1, splitter	24
Video Interfaces			
D1-video/DV6000/HGTV, 2.5-Gbps multirate transponder, DWDM, 32 wavelengths, 50 GHz, protected line option	1 client SFP, 1 line	0:1, Y-cable, splitter	12 (line protected)
Optical Interfaces			
Multirate optics, SFP-based, 12-port and 4-port	Low-/high-speed slots provision up to		
• OC-3/OC-3c/STM-1 SR, IR, LR and CWDM	12 / 12 – SFP	0:1, 1+1	72 (protected)
• OC-12/OC-12c/STM-4 SR, IR, LR and CWDM	4 / 12 – SFP	0:1, 1+1	40 (protected)
• OC-48/OC-48c/STM-16 SR, IR, LR and DWDM	1 / 4 – SFP	0:1, 1+1	12 (protected)
4 x OC-48/OC-48c/STM-16 muxponder, DWDM, 32 wavelengths, 50 GHz	4 client, 1 line	0:1, 1+1	48
OC-192/OC-192c/STM-64 XFP-based optics			
• Short reach, intra-office, 1310 nm	1 – XFP	0:1, 1+1	2 (protected)
• Intermediate reach, short haul, 1550 nm	1 – XFP	0:1, 1+1	2 (protected)
• Long reach, long haul, 1550 nm	1 – XFP	0:1, 1+1	2 (protected)
• DWDM, 40 wavelengths and tunable, 50 GHz	1 – XFP	0:1, 1+1	2 (protected)
OC-192/STM-64/10 Gigabit Ethernet multirate transponder, DWDM, 32 wavelengths, 50 GHz	1 client, 1 line	0:1, Y-cable	12
Wavelength Service Interfaces			
2.5-Gbps multirate transponder, ESCON/1 and 2-Gbps Fibre Channel/FICON/D1 video/DV6000/DVB-SDI, DWDM, 32 wavelengths, 50 GHz, protected line option	1 client SFP, 1 line	0:1, Y-cable, splitter	12 (line protected)
2.5-Gbps data muxponder, 2x Gigabit Ethernet or Fibre Channel, 1x 2-Gbps Fibre Channel, DWDM, 32 wavelengths, 50 GHz, protected line option	8 client, 1 line	0:1, Y-cable, splitter	24-Gigabit Ethernet or 1-Gbps Fibre Channel (line protected) 12 2-Gbps Fibre Channel (line protected)
10-Gbps multirate transponder, OC-192/STM-64, 10 Gigabit Ethernet DWDM, 32 wavelengths, 50 GHz	1 client, 1 line	0:1, Y-cable	12
4 x OC-48/OC-48c/STM-16 muxponder, DWDM, 32 wavelengths, 50 GHz	4 client, 1 line	0:1, 1+1	48

Interface or Card Type	No. of Ports per Card (Tx/Rx)	Protection	Shelf Port Density (maximum)
10-Gbps multirate OTU2 Xponder	2 clients, 2 lines	0:1, Y-cable, 1+1, splitter	24

1. Gigabit Ethernet port and card protection can be supported using Link Aggregation Control Protocol between attached client Ethernet devices.

2. Protection can be provided using multiple cards running spanning tree or hot standby routing protocol (HSRP), or link aggregation to attached client equipment.

3. Multirate Ethernet cards are limited to 2.5-G bandwidth on slots 1–4 and 14–17 and therefore would yield a total of 2 GE line-rate ports per slot and 56 GE line-rate ports per chassis.

Features

Protection Options

- SONET
    - UPSRs – Telcordia GR-1400-CORE
    - Dual ring interconnect (DRI) for UPSR – GR-1400-CORE
    - Two- and four-fiber BLSRs – Telcordia GR-1230-CORE
    - DRI for BLSR – GR-1230-CORE
    - 1+1 APS – Telcordia GR-253-CORE
    - Path protected mesh networks (PPMNs)
- SDH
    - Subnetwork connection protection (SNCP) – ITU-T G.841
    - DRI for SNCP – ITU-T G.841
    - Two- and four-fiber MS-SPR – ITU-T G..841
    - DRI for MS-SPR – ITU-T G.841
    - 1+1 linear multiplex section protection (LMSP) – ITU-T G.841
- Data
    - RPR with dual RPR interconnect (DRPRI) for inter-ring protection
    - Spanning Tree Protocol and Rapid Spanning Tree Protocol (RSTP)
    - GR[3] (G.709 Rapid Resilient Ring) protection for Gigabit Ethernet and 10 Gigabit Ethernet XPonders
- Transparent services
    - Fiber-protected transponders
    - Y-cable client protection

Node Configurations

- SONET/SDH
    - Terminal
    - Linear add/drop multiplexer (ADM)
    - Regenerator
    - Ring

User Interfaces

- Cisco Transport Controller craft interface
    - Integrated node and subnetwork GUI
    - PC-based client with familiar web browser interface
    - Layered graphical views – Network, node, and card level

- Network autodiscovery with provisionable subnetwork domain control
- Integrated software wizards
  - Circuit creation
  - BLSR/MS-SPR network setup
  - Span upgrades
- A-to-Z circuit and wavelength provisioning
  - Point-and-click source port to destination port
    - Automatic internode cross-connect provisioning
  - Detailed circuit-level map
  - Provisionable routing parameters
    - Circuit protection
    - Nodal diversity
    - Balanced traffic
    - Batch circuit creation
- System inventory
- User-customizable options
  - Background map
  - Color schemes
- Data export
- Online help
- Transaction Language One (TL-1) command line
- Cisco IOS® Software command-line interface (CLI)

Security
- Four user levels – Superuser, provisioning, maintenance, and retrieve
- Provisionable timeout durations
- Multiple usernames and simultaneous logins
- RADIUS
- SSL, SSH, HTTPS

Maintenance
- Loopbacks – Facility, payload, and terminal
- BLSR/MS-SPR exerciser
- Database backup and restore
- Lamp test
- Test access circuit creation
- Path trace
- Bridge and roll

Performance Monitoring
- SONET – Line, section, and path

- SDH – Multiplex section, regenerator section, and path

- Ethernet port and subport (VLAN)

- Fibre Channel/FICON – Frame counters, compliant, and errored blocks

- Fifteen minute (32 entries), 24 hour (1 entry)

- Near- and far-end reporting

- Provisionable threshold crossing alarms (TCAs)

- Intermediate path performance monitoring (IPPM)

- Simple Network Management Protocol (SNMP) Remote Monitoring (RMON)

Alarm Monitoring and Reporting

- Shelf LEDs – Critical, major, minor, and remote

- Card LEDs – Fail, active/standby, signal fail, link, and activity

- Cisco Transport Controller craft tool

- Cisco Transport Manager EMS

- Environmental alarm contact closures

- Near- and far-end reporting

- User-provisionable alarm profiles

System Upgrades

- Optical span

- Network protection

- Software release – Local and remotely

- Electrical and optical cards – Low density to high density

Data Features

- Layer 1 Ethernet features

  - Jumbo packet support (10,000 bytes)

  - Link aggregation (Cisco EtherChannel technology) transparency

- Layer 2 Ethernet features

  - RPR

  - Ethernet bridging (802.1D)

  - Ethernet Priority (802.1P)

  - Spanning Tree Protocol (802.1D), Rapid Spanning Tree Protocol (802.1w)

  - VLANs (802.1Q and 802.1Q in 802.1Q)

  - Point-to-point, point-to-multipoint, or RPR

  - Dedicated or shared bandwidth

  - Fast Ethernet and Gigabit Ethernet EtherChannel technology (link aggregation)

  - Flexible packet classification – Dual leaky bucket supporting committed-information-rate (CIR) and peak-information-rate (PIR) models

  - Per-class queuing with weighted-deficit-round-robin (WDRR) scheduling

  - Priority marking for end-to-end QoS support

- Layer 3 features

- IP switching
- Static routing
- Routing protocols
  - Routing Information Protocol Version 2 (RIPv2)
  - Open Shortest Path First (OSPF)
  - Border Gateway Protocol (BGP)
  - Enhanced Interior Gateway Routing Protocol (EIGRP)
  - Intermediate System-to-Intermediate System (IS-IS)
  - Hot Standby Router Protocol (HSRP)
  - Virtual Route Forwarding Lite (VRF-Lite)
- QoS
- IP Multicast
- IP service-level agreement (IP SLA) monitoring

- Other
  - General framing procedure (GFP)
  - Virtual concatenation (VCAT)
  - Link capacity adjustment scheme (LCAS)

Timing and Synchronization

- Building Integrated Timing Supply (BITS)
  - Two inputs
    - SONET:

      DS-1 (1.544 MHz), 100 ohm

      64 kHz + 8 kHz composite
    - SDH:

      E-1 (2048 kHz/2048 kbps), configurable with 75 and 120 ohms

      64 kHz + 8 kHz composite
  - Two outputs recovered from optical line
    - SONET:

      DS-1 (100 ohm)

      8 MHz
    - SDH:

      E-1 2048 kHz/2048 kbps (configurable with 75 and 120 ohms)

      8 MHz
- Line timing
- Stratum Level 3/G.813 internal holdover oscillator
- Synchronization status messaging (SSM)

Network Management Interface Support

- SNMP Versions 1 and 2c
- TL-1 (GR-189-CORE and GR-833-CORE)

- CORBA Version T1M1.5 through Cisco Transport Manager EMS northbound interface

System Access

- 10BASE-T LAN, RJ-45 or wire-wrap pins
- TL-1 through DB-9 connector or wire-wrap pins
- Remote
  - SONET section data communications channel (SDCC); SDH regenerator section data communications channel (RSDCC)
  - G.709 general communications channel (GCC)

Other Features

- Drop and continue
- Hairpinning
- DCC tunneling
- SDH transport over SONET

Regulatory and Standards

Industry Requirements

- Network Equipment Building Standards (NEBS) Level 3 (GR-1089-CORE and GR-63-CORE)
- SONET (GR-253-CORE, GR-1400-CORE, and GR-1230-CORE)
- SDH (G.703, G.704, G.707, G.781, G.782, G.783, G.813, G.841 G.957, and G.691)
- IEEE (802.1)

Safety

- CAN/CSA-C22.2 No. 950-95 Third Edition, Dec. 1, 2002
- GR-1089-CORE Level 3
- UL60950 Third Edition
- EN60950 (to A4)
- IEC60950/EN60950, Third Edition
- IEC 60950-1 /EN 60950-1, 1st Ed. (CB Report/Certificate with all country deviations)
- UL and cUL / CSA 60950-1 1st Ed.

EMC Emissions (Radiated, Conducted)

- ICES-003
- GR-1089-CORE Level 3
- 47CFR15
- CISPR22
- EN 300 386-TC
- EN55022

EMC Immunity

- GR-1089-CORE Level 3
- CISPR24

- EN300-386-TC
- EN55024

Environmental

- GR-63-CORE
- ETS 300 019-2-1 (storage, class 1.1)
- ETS 300 019-2-2 (transportation, class 2.3)
- ETS 300 019-2-3 (operational, class 3.1E) with extended air temperature (Class 3.4)

Ordering Information

To place an order, visit the Cisco Ordering Home Page. Table 6 gives ordering information for the Cisco ONS 15454 MSPP.

Table 6.   Ordering Information for Cisco 15454 MSPP

Product Name	Part Number
Cisco ONS 15454 SONET/ANSI Multiservice Provisioning Platform	15454-<various>
Cisco ONS 15454 SDH/ETSI Multiservice Provisioning Platform	15454E-<various>

Service and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Cisco services, refer to Cisco Technical Support Services or Cisco Advanced Services.

For More Information

For more information about the Cisco ONS 15454 platform, visit http://cisco.com/en/US/products/hw/optical/ps2006/index.html or contact your local Cisco account representative.

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