

# Cisco 12000 Series Eight-Port OC-48c/STM-16c POS Line Card

Service providers face the challenge of scaling IP/Multiprotocol Label Switching (MPLS) packet infrastructures to meet ever-growing demands for higher capacity and service availability. The Cisco® 12000 Series Eight-Port OC-48c/STM-16c POS Line Card (8-Port OC-48 POS) delivers state-of-the-art technology to cost-effectively scale carrier-class IP/MPLS packet infrastructures to 50 Mpps per line card. The Cisco 8-Port OC-48 POS Line Card is supported by the Cisco 12800 Routers. The Cisco 12000 Series offers the industry's only field-upgradeable routing solutions that scale from 2.5 Gbps (2.5G)/slot to 40 Gbps (40G)/slot capacity without a forklift upgrade.

## Product Overview

An important profitability factor for service providers is the ability to cost-effectively scale to higher network capacities while continuing to expand next-generation IP/MPLS service offerings. The Cisco 8-Port OC-48 POS Line Card (Figure 1), in conjunction with 40 Gbps/slot Cisco 12800 Routers, scales the Cisco 12000 Series Router to 50 Mpps per slot of forwarding capacity. It maximizes return on investment in the Cisco 12000 Series, providing full interoperability with all existing Cisco 12000 Series line cards.

The Cisco 8-Port OC-48 POS Line Card features a dedicated Layer 3 forwarding engine that offers a comprehensive IP/MPLS feature set, including advanced quality of service (QoS), accounting (sampled NetFlow), security and traffic control, and committed access rate (CAR)—all at 50 Mpps. Enabling service providers to keep pace with next-generation service expansion, the line card supports more than one million prefixes, up to 256,000 multicast groups, and more than 32,000 lines of access control lists (ACLs), both ingress and egress, at wire speed.

For maximum flexibility, the Cisco 8-Port OC-48 POS Line Card is equipped with third-generation pluggable optics for improved component integration, power consumption, and maximum versatility. It is fully interoperable with standard OC-48c and STM-16c optical interfaces. Available pluggable optics include short reach (SR), intermediate reach (IR), and long reach (LR); optics of different types can be combined.

Figure 1  
 Cisco 8-Port OC-48 POS  
 Line Card





## Applications

With its enhanced feature set, the Cisco 8-Port OC-48 POS Line Card provides a cost-effective, scalable solution for the following network applications:

- *Backbone or intra-point of presence (POP) connectivity (Figure 2)*—With its dedicated Layer 3 forwarding engine providing a rich IP/MPLS feature set at wire speed, the Cisco 8-Port OC-48 POS Line Card provides the forwarding performance and interface density required for backbone and intra-POP applications.
- *High-speed peering (Figure 3)*—The Cisco 8-Port OC-48 POS Line Card is ideally suited for high-speed peering points that require wire-speed performance with features such as deep ACLs, accounting, traffic shaping, policing, and security features such as Unicast Reverse Path Forwarding (uRPF)

Figure 2

Cisco 8-Port OC-48 POS Line Card Applications in a Service Provider POP

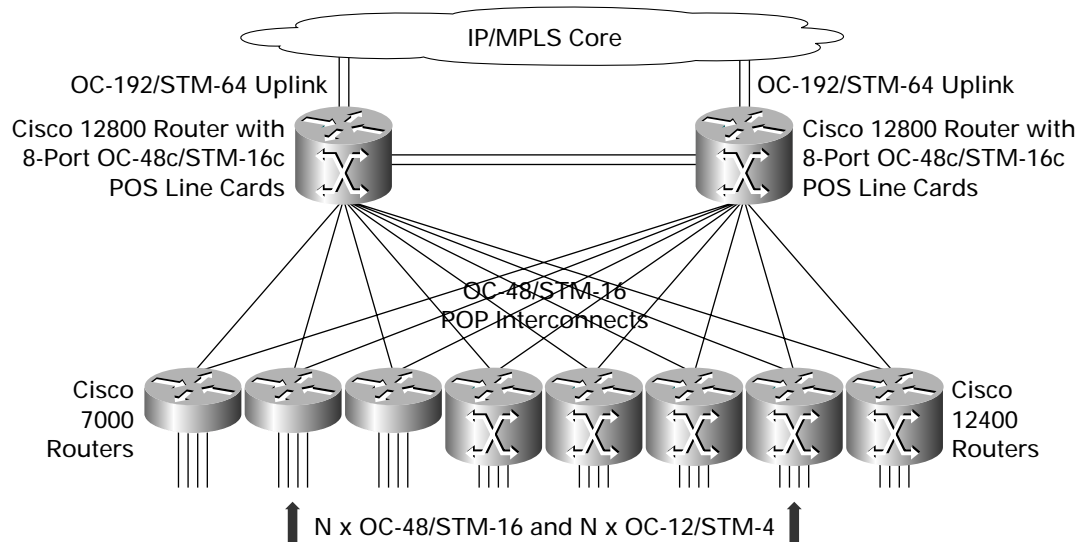
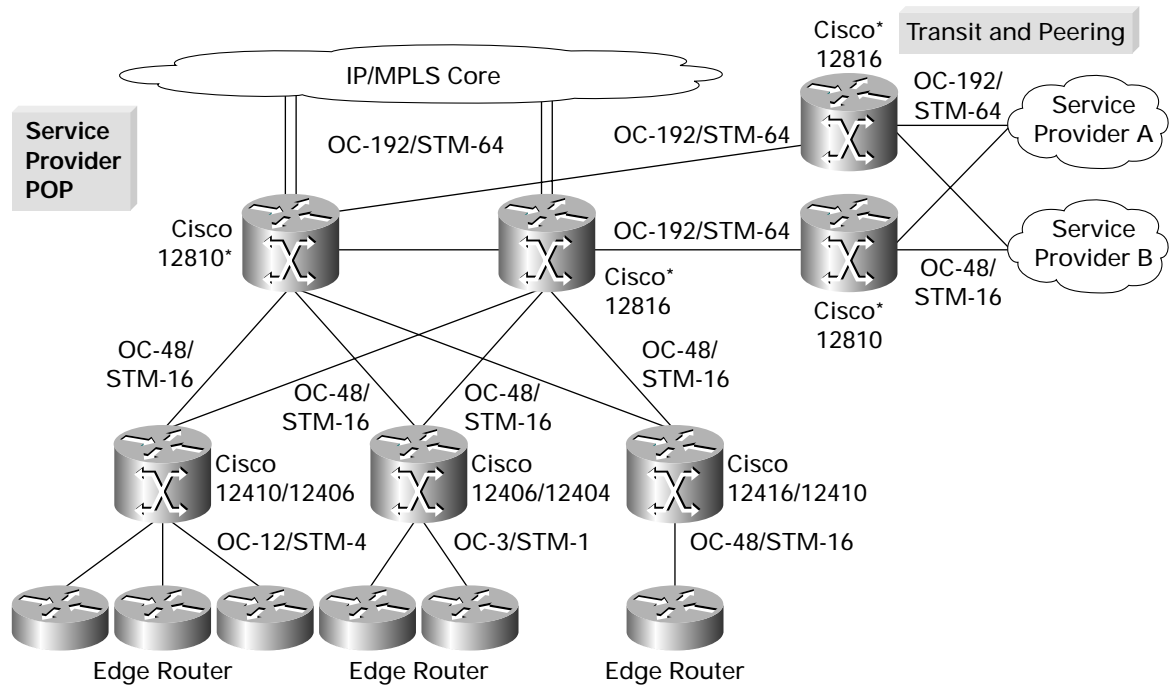




Figure 3  
Cisco 8-Port OC-48 POS Line Card Application—High-Speed Peering



\*With 8-port OC-48c/5TM-16c POS line cards and 2-port OC-192c/STM-64c POS line cards

## Features and Benefits

The Cisco 8-Port OC-48 POS Line Card provides the following benefits to service providers:

- *Leading-edge application-specific integrated circuit (ASIC) and memory technologies*—Delivers 50 Mpps per slot forwarding capacity while allowing service providers to use their existing power and cooling infrastructures and prior investments in Cisco 12000 Series chassis and line cards.
- *Wire-speed performance with a rich set of IP/MPLS features*—Allows service providers to maximize the delivery of revenue-generating services through consistent and predictable throughput and service density per slot.
- *Maximum service availability*—Cisco Nonstop Forwarding (NSF) and Stateful Switchover (SSO) provide full and automatic recovery from catastrophic route processor failures without affecting traffic.
- *Priority packet delivery*—The Cisco 8-Port OC-48 POS Line Card, in combination with the Cisco 12000 Series distributed architecture and Cisco IOS® Software, provides the tools to increase revenue through next-generation IP/MPLS real-time and data services. Supported features include:
  - Extended ACLs for more than 32,000 entries on both ingress and egress. Filtering is provided on source or destination IP addresses and transport protocols.
  - Enhanced scalability for VPN and multicast applications, with hardware support for more than one million IP prefixes and up to 256,000 multicast groups.



- Rate limiting, classification, and bandwidth management using CAR, which allows service providers to control access to internal network resources, provides protection against denial of service (DoS) attacks, and delivers tiered services such as “pay-as-you-grow” bandwidth usage models.
- Precedence marking (packet coloring), which allows the class of service (CoS) field in IP or the EXP field in MPLS to be marked to the specified QoS for different classes of service.
- Weighted Random Early Detection (WRED) congestion control/query management, which allows selective discard of low-priority flows before dropping packets from higher-priority flows.
- Modified Deficit Round Robin (MDRR) with low-latency queuing, which provides class-based packet queuing that controls the packet dequeuing process to guarantee transit latency for differentiated flows.
- Traffic shaping, which helps service providers build tiered service models by absorbing “bursty” traffic in both the ingress and egress directions, to present smooth flows to both internal network resources and customer networks.
- Link bundling, which enables load sharing over multiple links.
- *Comprehensive MPLS capabilities*—Supports the deployment of advanced MPLS services, while MPLS traffic engineering and fast-reroute help service providers to maximize network utilization and deliver strict service-level agreements (SLAs).

The Cisco 12000 Series is the industry’s leading portfolio of routing solutions that seamlessly scales from 2.5Gbps/slot to 40Gbps/slot capacity to service-enable carrier IP/MPLS core and edge networks. This portfolio leverages state of the art silicon and intelligent software technologies, delivering uncompromising routing performance, superior QoS capabilities, proven high availability support, comprehensive Layer 2/Layer 3 services and a fully integrated core and edge feature set. With its upgradeable switch fabric, the Cisco 12000 Series provides the industry’s only proven investment protection and lowest total cost of ownership. Based on years of innovation and a global installed base of over 23,000 systems, the Cisco 12000 Series is uniquely positioned for carriers worldwide to build the most sophisticated and competitive IP/MPLS service delivery infrastructure.



## Product Specifications

Table 1 Product Specifications

<b>Chassis compatibility</b>	Cisco 12810, 12816 Routers
<b>Software compatibility</b>	Cisco IOS Software Release 12.0(27)S or later
<b>Protocols</b>	<ul style="list-style-type: none"> <li>• POS</li> <li>• IETF RFC 1490, Frame Relay encapsulation</li> <li>• RFC 1619/2615, Point-to-Point Protocol (PPP) over SONET/SDH</li> <li>• RFC 1662, PPP in High-Level Data Link Control (HDLC)-like framing</li> <li>• RFC 2615, PPP over SONET/SDH</li> <li>• HDLC</li> <li>• Layer 3 routing protocols, including Border Gateway Protocol Version 4, Open Shortest Path First, Intermediate System-to-Intermediate System, Enhanced Interior Gateway Routing Protocol, Routing Information Protocol, Distributed Forwarding Information Base, IP switching, Cisco Discovery Protocol, Internet Message Protocol, and Routing with Resource Reservation (RRR)</li> <li>• Multicast forwarding with support for source and shared distribution trees and the following protocols: Protocol Independent Multicast dense mode (PIM-DM), PIM sparse mode (PIM-SM), Internet Group Management Protocol Versions 1 and 2 (IGMPv1/v2), Cisco Group Management Protocol, Multicast BGP, and Multicast Source Discovery Protocol (MSDP)</li> <li>• Comprehensive MPLS support, including Any Transport over MPLS (AToM), CSC, IAS, and MPLS VPNs</li> <li>• Traffic engineering using RRR</li> <li>• IP load balancing with per-flow path selection for up to eight paths</li> </ul>
<b>Port density</b>	<p>One Cisco 8-Port OC-48 POS Line Card per chassis slot</p> <ul style="list-style-type: none"> <li>• Up to 64 interfaces per Cisco 12810 chassis</li> <li>• Up to 120 interfaces per Cisco 12816 chassis</li> </ul> <p>The Cisco 8-Port OC-48 POS Line Card uses pluggable optics modules. Optics of different reaches may be used concurrently on a single line card.</p>
<b>Memory</b>	<ul style="list-style-type: none"> <li>• 512 MB of route table memory (default, no options)</li> <li>• 512 MB of packet buffer memory in both receive and transmit directions (default, no options)</li> </ul>
<b>Performance</b>	<ul style="list-style-type: none"> <li>• Line-rate throughput for IP forwarding and MPLS switching</li> <li>• Dedicated 50 Mpps Layer 3 lookup per line card</li> <li>• Multicast forwarding at wire speed for 68-byte packets</li> <li>• Performance sustained in fully loaded system</li> <li>• Performance sustained for all IP prefix sizes</li> <li>• No performance drops as QoS, feature or security ACLs, policy-based routing, CAR, or accounting features are enabled</li> </ul>
<b>Layer 1/Layer 2 feature summary</b>	<ul style="list-style-type: none"> <li>• Supports a maximum transmission unit (MTU) of up to 9188 bytes</li> <li>• POS channel is supported (up to eight interfaces in hardware)</li> <li>• Layer 2 encapsulations: HDLC, PPP, Frame Relay; no subinterface support</li> </ul>



Table 1 Product Specifications (Continued)

<b>Layer 3 feature summary</b>	<ul style="list-style-type: none"><li>• Ingress and egress standard and extended ACLs<ul style="list-style-type: none"><li>– Up to 32,000 entries per direction at wire speed. The entries can be used for either features (such as CAR) or for security ACLs.</li><li>– Match criteria supported: IP protocol type, source/destination IP address and TCP/User Datagram Protocol (UDP) port numbers (with less than, equal to, greater than, not equal to, and range operations), IP Differentiated Services Code Point (DSCP), TCP flags, Internet Control Message Protocol (ICMP) type, Internet Group Management Protocol (IGMP) type, fragment.</li><li>– Actions supported: permit, deny, send to CPU</li><li>– ACL counters supported when security and feature ACLs are applied to the same interface.</li></ul></li><li>• Output Traffic Shaping (OTS)</li><li>• Loose uRPF (performance is 39 Mpps)</li><li>• Strict uRPF (performance is 39 Mpps)</li><li>• Up to 32 CAR rules supported per direction:<ul style="list-style-type: none"><li>– Matching supported on the following fields: IP DSCP, MPLS experimental field, IPv4 protocol type</li><li>– Actions supported: conform, deny, color (QoS remarking)</li><li>– The following counters are supported: conform, exceed, packet type, IP DSCP, MPLS EXP</li></ul></li><li>• OTS is supported in the egress direction on both a per-output-queue basis (up to 128 queues) and at the physical port level. Exceed traffic will be shaped to the user-configured rate. Shaping bandwidth is configurable from 1 Kbps up to 10 Gbps in 1-Kb increments.</li><li>• Traffic destined for the line-card CPU is rate-limited to pre-set rates to ensure maximum prioritization of control traffic while minimizing the impact of denial of service.</li><li>• IPv6 supported (software forwarding path)</li></ul>
<b>MPLS feature summary</b>	<ul style="list-style-type: none"><li>• AToM<ul style="list-style-type: none"><li>– Imposition for HDLC, PPP, and Frame Relay</li><li>– Disposition for PPP, HDLC, Frame Relay, Ethernet port-tunnel mode, Ethernet VLAN, ATM Adaptation Layer 5 (AAL5) for Ethernet VLAN and Frame Relay, VLAN Priority/data-link connection identifier (DLCI) replacement (not supported if the egress card is a channelized POS or 4-port Gigabit Ethernet card).</li></ul></li><li>• Unicast switching supported for (i) up to six label push operations, (ii) two label POP operations, or (iii) one label swap with up to five label push operations, at each MPLS switch node.</li><li>• Explicit Null Label (ENL), both as top and intermediate label. Allows MPLS experimental bits in ENL to determine CoS queuing at provider edge router for packets headed to customer premises equipment (CPE), instead of IP type of service (ToS) bits.</li><li>• Packet fragmentation (packets that require packet fragmentation are forwarded by the line-card CPU).</li><li>• Mapping of IP ToS (or DSCP) bits to MPLS experimental.</li><li>• CoS transparency: MPLS tunnel mode, 1-to-1 mapping of IP ToS (or DSCP) to MPLS experimental bits.</li><li>• Rate limiting (CAR) based on MPLS experimental.</li><li>• Source-based VRF selection.</li><li>• WRED/MDRR is implemented based on MPLS experimental.</li><li>• Traffic engineering is supported to enable the MPLS packet flow to be constrained to predetermined, configured routes.</li><li>• Support for 600 tunnel headends or 10,000 tunnel midpoints.</li><li>• Fast-reroute is supported to enable MPLS traffic traveling across a given label switched path to be forwarded to a backup path (that is, link protection).</li><li>• 50-ms switchover time.</li><li>• Comprehensive statistics collection.</li></ul>



Table 1 Product Specifications (Continued)

<b>MQC support</b>	<p><b>Note:</b> The MQC support for this line cards is constantly being expanded. Please refer to the product documentation for a full list of supported MQC capabilities.</p> <p>Layer 3 services</p> <ul style="list-style-type: none"><li>match ip precedence &lt;list of ip-precedence-values&gt;</li><li>match ip dscp &lt;list of ip-dscp-values&gt;</li><li>match mpls exp &lt;list of exp-values&gt;</li></ul> <p>All services</p> <ul style="list-style-type: none"><li>match qos-group &lt;0-7&gt;</li><li>class-map match-any &lt;name&gt;</li></ul> <p>Police</p> <p>Single rate policing (RFC-2697 compliant)</p> <p>Police cir &lt;bps&gt; bc &lt;bc&gt; be &lt;be&gt; conform &lt;conform-action&gt; exceed &lt;exceed-action&gt;</p> <p>Police cir &lt;bps&gt; bc &lt;bc&gt; pir &lt;bps&gt; be &lt;be&gt; conform &lt;conform-action&gt; exceed &lt;exceed-action&gt;</p> <p>Police cir percent &lt;%&gt; bc &lt;bc in msec&gt; pir percent &lt;%&gt; be &lt;be in msec&gt; conform &lt;conform-action&gt; exceed &lt;exceed-action&gt;</p> <p>Police actions (conform and exceed)</p> <ul style="list-style-type: none"><li>All interfaces<ul style="list-style-type: none"><li>Transmit</li><li>Drop</li></ul></li><li>IP interfaces<ul style="list-style-type: none"><li>Set-prec-transmit</li><li>Set-dscp-transmit</li></ul></li><li>MPLS interfaces<ul style="list-style-type: none"><li>Set-mpls-exp-transmit</li><li>set-mpls-exp-imposition-transmit</li><li>set-mpls-exp-topmost-transmit</li></ul></li></ul> <p>Shape</p> <ul style="list-style-type: none"><li>shape average &lt;bps&gt; &lt;bc&gt; &lt;be&gt;</li><li>shape average percent &lt;%&gt; &lt;y&gt; ms &lt;z&gt; ms</li></ul> <p>Set (marking)</p> <ul style="list-style-type: none"><li>All interfaces<ul style="list-style-type: none"><li>set qos-group &lt;0-99&gt;</li><li>set discard-class &lt;0-99&gt;</li></ul></li><li>IP interfaces<ul style="list-style-type: none"><li>set ip precedence</li><li>set dscp</li></ul></li><li>MPLS interfaces<ul style="list-style-type: none"><li>set mpls-exp</li><li>set mpls-exp-imposition</li><li>set mpls-exp-topmost</li></ul></li></ul> <p>Congestion management</p> <ul style="list-style-type: none"><li>Bandwidth (egress only)<ul style="list-style-type: none"><li>bandwidth &lt;x Kbps&gt;</li><li>bandwidth percent &lt;x percent&gt;</li><li>bandwidth remaining</li></ul></li><li>Priority<ul style="list-style-type: none"><li>priority (LL/HP queue)</li></ul></li><li>Queue-limit (egress only)<ul style="list-style-type: none"><li>queue-limit &lt;queue size&gt;</li></ul></li><li>Random-detect (egress only)<ul style="list-style-type: none"><li>random-detect precedence &lt;0-7&gt; &lt;min-threshold&gt; &lt;max-threshold&gt; &lt;1&gt;</li><li>random-detect discard-class-based</li></ul></li></ul>
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Table 1 Product Specifications (Continued)

<b>Scalability highlights</b>	<ul style="list-style-type: none"> <li>• Supports more than one million IP prefixes</li> <li>• Supports up to 256,000 multicast groups (software limited)</li> </ul>
<b>Reliability and availability</b>	<ul style="list-style-type: none"> <li>• Online insertion and removal (OIR) enables insertion and removal of line cards without affecting traffic</li> <li>• Mean time between failure (MTBF): 105,000 hours</li> </ul>
<b>Network management</b>	<ul style="list-style-type: none"> <li>• Cisco IOS Software command-line interface (CLI)</li> <li>• Cisco 12000 Manager for configuration, fault, and performance element management</li> <li>• MIBs:             <ul style="list-style-type: none"> <li>– SONET/SDH MIB RFC 2558</li> <li>– MIB-II</li> </ul> </li> </ul>
<b>Statistics and accounting</b>	<ul style="list-style-type: none"> <li>• Byte and packet counting per ingress port for IP and MPLS packets</li> <li>• Byte and packet counting per ingress port for IP and MPLS ToS bits</li> <li>• Packet counting for MDRR and WRED functions</li> <li>• Packet and byte counting for CAR feature</li> <li>• Counting per ingress port for IP prefixes and Cisco Express Forwarding adjacencies</li> <li>• Source and destination based BGP Policy Accounting (Destination Sensitive Billing)</li> <li>• MPLS-aware Sampled Netflow (ingress and egress)</li> </ul>
<b>SONET functions supported</b>	<ul style="list-style-type: none"> <li>• Error counts for B1, B2, B3</li> <li>• Threshold crossing alerts (TCAs), far end block error path (FEBE) for B1, B2, B3 with threshold that can be set</li> <li>• Loss of signal, loss of frame, line alarm indicator signal, path alarm indicator signal, loss of pointer, line remote defect indicator, path remote defect indicator, signal failure, signal degrade, line remote error indicator (Line FEBE), path remote error indicator (Path FEBE)</li> <li>• Performance monitoring: Error counts for B1, B2, B3, TCAs; FEBE for B1, B2, B3 with threshold that can be set</li> <li>• Synchronization             <ul style="list-style-type: none"> <li>– Local (internal) or loop timed (recovered from network)</li> <li>– Stratum 3 clock accuracy over full operating temperature</li> <li>– Pointer activity monitoring</li> </ul> </li> <li>• Local (diagnostic) and line (network) loopback</li> <li>• Payload mapping             <ul style="list-style-type: none"> <li>– 1 + X<sup>43</sup> self-synchronous scrambler</li> </ul> </li> </ul>
<b>Visual status indicators (LEDs)</b>	<ul style="list-style-type: none"> <li>• Enable</li> <li>• Receive carrier</li> <li>• Receive packets</li> <li>• Alphanumeric management display</li> </ul>
<b>Power</b>	<ul style="list-style-type: none"> <li>• 174W maximum</li> </ul>
<b>Physical specifications</b>	<ul style="list-style-type: none"> <li>• Occupies one line-card slot</li> <li>• Weight: 9.51 lb (4.32 kg)</li> <li>• Height: 14.5 in. (36.5 cm)</li> <li>• Depth: 17.5 in. (44.5 cm)</li> </ul>



Table 1 Product Specifications (Continued)

<b>Environmental conditions</b>	<ul style="list-style-type: none"><li>• Operating temperature: 32 to 104 F (0 to 40 C)</li><li>• Storage temperature: -4 to 149 F (-20 to 65 C)</li><li>• Relative humidity:<ul style="list-style-type: none"><li>- 10 to 90%, noncondensing, operating conditions</li><li>- Up to 95%, noncondensing, nonoperating conditions</li></ul></li></ul>
<b>Compliance and agency approvals</b>	<p>Safety</p> <ul style="list-style-type: none"><li>• UL 1950</li><li>• CSA 22.2-No. 950</li><li>• EN60950</li><li>• EC 60950 CB Scheme</li><li>• ACA TS001</li><li>• AS/NZS 3260</li><li>• EN60825/IEC60825 laser safety (SR, IR-Class 1) (VSR-Class 1M)<sup>1</sup></li><li>• FDA—Code of Federal Regulations (U.S.) laser safety (SR, IR-Class 1) (VSR-Class 1M)<sup>2</sup></li></ul> <p>EMI</p> <ul style="list-style-type: none"><li>• FCC Class A</li><li>• ICES 003 Class A</li><li>• AS/NRZ 3548 Class A</li><li>• EN55022 Class B (up to 1 GHz)</li><li>• VCCI Class A</li><li>• CISPR 22 Class B (up to 1 GHz)</li><li>• BSMI Class A</li><li>• IEC-1000-3-3 power line harmonics</li><li>• IEC 61000-3-3 voltage fluctuations and flicker</li></ul> <p>Immunity</p> <ul style="list-style-type: none"><li>• IEC-1000-4-2 ESD (8kV contact, 15kV air)</li><li>• IEC-1000-4-3 radiated immunity (10V/m)</li><li>• IEC-1000-4-4 EFT (2kV power port, 1kV signal port)</li><li>• IEC-1000-4-5 surge AC port (4kV CM, 2kV DM) [EXPAND CM/DM?]</li><li>• IEC-1000-4-5 surge signal port (2kV CM, 1kV DM)</li><li>• IEC-1000-4-5 surge DC port (0.5kV CM, 0.5kV DM)</li><li>• IEC-1000-4-6 low-frequency conducted immunity (10V)</li><li>• IEC-1000-4-11 voltage dips and sags</li><li>• EN55024/CISPR24ITE immunity</li></ul> <p>Network Equipment Building System (NEBS):</p> <p>This product meets the following requirements (official qualification may be in progress):</p> <ul style="list-style-type: none"><li>• SR-3580—NEBS: criteria levels (Level 3 compliant)</li><li>• GR-63-Core—NEBS: physical protection</li><li>• GR-1089-Core—NEBS: EMC and safety</li></ul> <p>European Telecommunications Standard Institute (ETSI)</p> <ul style="list-style-type: none"><li>• EN300 386/EN300 386-2 Class B</li></ul>

1. For diverging beams, viewing the laser output with certain optical instruments within a distance of 100 mm may pose an eye hazard.  
2. For collimated beams, viewing the laser output with certain optical instruments designed for use at a distance may pose an eye hazard.



Table 2 Optical Specifications

Parameter	Short-Reach 1310 nm (SR-1)	Intermediate-Reach 1310 nm (IR-1)	Long-Reach 1550 nm (LR-2)
<b>Optics</b>	Small form-factor pluggable (SFP)	SFP	SFP
<b>Connector type</b>	LC	LC	LC
<b>Target distance</b>	2 km	15 km	80 km
<b>Transmitter</b>			
<b>Power out (maximum)</b>	-3 dBm	0 dBm	3 dBm
<b>Power out (minimum)</b>	-10 dBm	-5 dBm	-2 dBm
<b>Extinction ratio</b>	8.2 dB	8.2 dB	8.2 dB
<b>Side mode suppression</b>	-	30 dB	30 dB
<b>Source type</b>	MLM	SLM	SLM
<b>Receiver</b>			
<b>Power in (minimum)</b>	-18 dBm	-18 dBm	-28 dBm
<b>Power in (maximum)</b>	-3 dBm	0 dBm	-9 dBm
<b>Maximum reflectance</b>	-27 dB	-27 dB	-27 dB
<b>Optical link</b>			
<b>Fiber type</b>	Single-mode fiber (SMF) 9/125 micron	SMF 9/125 micron	SMF 9/125 micron
<b>Maximum dispersion</b>	12 ps/nm	N/A	1600 ps/nm
<b>Maximum attenuation</b>	7 dB	12 dB	24 dB
<b>Maximum optical path penalty</b>	1 dB	1 dB	2 dB
<b>Maximum reflectance</b>	-27 dB	-27 dB	-27 dB
<b>Compliance</b>	GR-253, ITU-T G.957	GR-253, ITU-T G.957	GR-253, ITU-T G.957
<b>Optical receiver power monitoring</b>	+/-3 dB accuracy	+/-3 dB accuracy	+/-3 dB accuracy



## Availability and Ordering Information

Table 3 Ordering Information

Product Description	Part Number
Cisco 12000 Series Eight-Port OC-48c/STM-16c POS Line Card	<b>8OC48/POS-SFP</b>
Cisco 12000 Series 1-Port OC-48c/STM-16c Pluggable Optic Module, 1310 nm SM-SR-LC	<b>POM-OC48-SR-LC</b>
Cisco 12000 Series 1-Port OC-48c/STM-16c Pluggable Optic Module, 1310 nm SM-IR1-LC	<b>POM-OC48-IR1-LC</b>
Cisco 12000 Series 1-Port OC-48c/STM-16c Pluggable Optic Module, 1550 nm SM-LR2-LC	<b>POM-OC48-LR2-LC</b>

### Service and Support

Cisco Systems offers numerous service and support offerings for its service provider customers. Cisco has earned the highest customer satisfaction ratings in the industry by providing the world-class service and support necessary to deploy, operate, and optimize service provider networks. Whether the goal is speed to market, maximizing network availability, or enhancing customer satisfaction and retention, Cisco is committed to the success of its service provider customers.

### For More Information

For more information about Cisco service and support programs and benefits, visit:

[http://www.cisco.com/public/Support\\_root.shtml](http://www.cisco.com/public/Support_root.shtml)

For more information about the Cisco 12000 Series Router, visit:

<http://www.cisco.com/go/12000>

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