

## Cisco 12000 Series ATM Line Cards

The Cisco® 12000 Series ATM line cards expand the connectivity options for Cisco 12000 Series routers, enabling service providers to attach Cisco 12000 routers directly to existing ATM infrastructures.

### CISCO ISE ATM INTERFACES—DELIVERING ROBUST HIGH-SPEED EDGE FUNCTIONALITY

Service providers face the challenge of meeting customer demand by building scalable, feature-rich networks that can deliver value-added services such as private IP connectivity, integrated data, voice, and video services, and tiered service offerings at all interface rates without compromising density or line-rate performance. The Cisco IP Services Engine (ISE) ATM line cards (Figures 1 and 2) provide the same powerful feature set as the standard ATM line cards and go a step further to accommodate service provider requirements by combining an extensive set of service-enabling edge features with advanced ATM traffic management and sophisticated IP/Multiprotocol Label Switching (MPLS)-to-ATM quality-of-service (QoS) functions, without compromising line-rate performance.

**Figure 1.** Cisco 12000 Series 4-Port OC-12/STM-4 ATM ISE Line Card



**Figure 2.** Cisco 12000 Series 4-Port OC-3/STM-1 ATM ISE Line Card



## PRODUCT FEATURES

Table 1 describes the basic features on the Cisco 12000 Series ATM line cards.

**Table 1.** Product Features

Feature	Description
<b>Performance</b>	<ul style="list-style-type: none"><li>• Up to 3.4-Mpps aggregated line rate for 64-byte packets (ISE cards)</li></ul>
<b>Reliability and Availability</b>	<ul style="list-style-type: none"><li>• Online insertion and removal (OIR), enabling insertion and removal of line cards without impacting traffic</li><li>• Route Processor Redundancy Plus (RPR+)</li><li>• Nonstop forwarding (NSF) and stateful switchover (SSO)</li><li>• Mean time between failure (MTBF) in excess of 80,000 hours</li></ul>
<b>Security</b>	<ul style="list-style-type: none"><li>• Extended access control lists (ACLs) (filtering) per virtual circuit</li><li>• Unicast Reverse Path Forwarding (URPF) (antispoofing checks)</li><li>• NetFlow Version 5 (denial-of-service [DoS] tracking)</li></ul>
<b>Network Management</b>	<ul style="list-style-type: none"><li>• Cisco IOS® Software command-line interface (CLI)</li><li>• Modular QoS CLI</li><li>• Simple Network Management Protocol (SNMP)</li><li>• MIB-II</li><li>• Interim Local Management Interface (ILMI) MIB</li><li>• Modular QoS CLI (MQC) MIB</li><li>• ATM MIB (RFC 1695)</li><li>• Cisco ATM Adaption Layer 5 (AAL5) MIB</li><li>• Cisco ATM EXT MIB</li><li>• IF MIB</li><li>• SONET MIB (RFC 2558)</li><li>• Cisco IETF ATM2 PVCTRAP MIB</li><li>• MPLS Traffic Engineering (MPLS TE) MIB</li><li>• Cisco Class-Based QoS MIB</li></ul>

Feature	Description
<b>Packet Layer</b>	<ul style="list-style-type: none"> <li>• IP Version 4 (IPv4)</li> <li>• IP Version 6 (IPv6) (supported on ISE line cards)</li> <li>• IP Multicast forwarding</li> <li>• Maximum transmission unit (MTU) of 9180 bytes</li> <li>• Basic MPLS switching</li> <li>• MPLS CoS</li> <li>• MPLS/VPN provider edge functions</li> <li>• MPLS VPN: Carrier Supporting Carrier (CsC) with IPv4 Border Gateway Protocol (BGP)-label distribution</li> <li>• MPLS VPN: Interprovider VPN (Inter-AS) with IPv4 BGP-label distribution</li> <li>• Multicast VPN</li> <li>• Any Transport over MPLS (AToM) (Martini draft)—AAL5oMPLS, port, virtual path, and virtual circuit cell relay, cell packing, and ATM Forum TM 4.0 cell policing support</li> <li>• MPLS TE</li> <li>• Committed access rate (CAR)</li> <li>• NetFlow Version 5 (sampled), Version 8 (aggregated), and Version 9</li> <li>• MPLS-aware NetFlow</li> <li>• Layer 2 Tunneling Protocol Version 3 (L2TPv3)</li> </ul>
<b>ATM Layer</b>	<ul style="list-style-type: none"> <li>• Support for up to 2047 virtual circuits per port</li> <li>• Support for up to 8 class-of-service (CoS) queues per virtual circuit, including one Low-Latency Queuing (LLQ) queue per virtual circuit</li> <li>• User-Network Interface (UNI)/Network Node Interface (NNI) cell format—8 UNI virtual-path-identifier (VPI) bits (0–255), 12 NNI VPI bits (0–4000), 16 virtual-channel-identifier (VCI) bits (0-64,000) over any VPI/VCI combination within the full range</li> <li>• Support for up to 255 virtual paths per port</li> <li>• Switched-virtual-circuit (SVC) signaling (point-to-point connections)</li> <li>• SVC signaling (point-to-multipoint connections)</li> <li>• UNI Version 3.0/3.1 (including ILMI)</li> <li>• Multiprotocol Encapsulation over AAL5</li> <li>• Classical IP over ATM; client and Address Resolution Protocol (ARP) server</li> </ul>
<b>SONET/SDH Layer</b>	<ul style="list-style-type: none"> <li>• Standards-compliant SONET/SDH interface</li> <li>• Synchronization, including local (internal) or loop timed (recovered from network); 20-ppm clock accuracy over full operating temperature range; and pointer activity monitoring</li> <li>• Local (diagnostic) and line (network) loopback</li> </ul>

Feature	Description
<b>Traffic Management</b>	<ul style="list-style-type: none"> <li>• Traffic management <ul style="list-style-type: none"> <li>– Constant bit rate (CBR)</li> <li>– Real-time variable bit rate (VBR-rt) and non-real-time variable bit rate (VBR-nrt)</li> <li>– Unspecified bit rate (UBR) (including optional peak cell rate [PCR])</li> <li>– Traffic shaping on a per-virtual circuit/virtual path basis (shaping granularity: minimum of 1 kbps, compliant with I.371 granularity definition)</li> <li>– Per-virtual circuit queuing and buffering</li> <li>– Configurable queue depth</li> <li>– Per-virtual circuit Weighted Random Early Detection (WRED)</li> <li>– Per-virtual circuit Modified Deficit Round Robin (MDRR), including LLQ</li> <li>– Cell-loss-priority (CLP) bit setting</li> <li>– Virtual circuit bundling</li> </ul> </li> </ul>
<b>Operations, Administration, and Maintenance (OAM)</b>	<ul style="list-style-type: none"> <li>• OAM <ul style="list-style-type: none"> <li>– F4 and F5 OAM</li> <li>– Alarm indication signal (AIS) and remote defect indication (RDI) alarms and loopback cell</li> </ul> </li> </ul>
<b>Protocols</b>	<ul style="list-style-type: none"> <li>• Classical IP over ATM; Client and Address Resolution Protocol (ARP) Server (RFCs 1577, 1755, and 1626)</li> <li>• Multiprotocol Encapsulation over AAL5 (RFC 1483) with support for Logical Link Control Protocol (LLC)/Subnetwork Access Protocol (SNAP), IP multiplexer, and Network Layer Protocol Identifier (NLPID) encapsulation</li> <li>• UNI Versions 3.0 and 3.1 (including ILMI)</li> <li>• F4 and F5 OAM AIS and RDI alarms and loopback</li> <li>• OAM continuity check</li> <li>• Default IP MTU for use over ATM AAL5 (RFC 1626)</li> <li>• ATM Signaling Support for IP over ATM (RFC 1755)</li> </ul>

## PRODUCT SPECIFICATIONS

Table 2 provides specifications for the different Cisco 12000 Series ATM line cards.

**Table 2.** Product Specifications

Line Card	Forwarding Engine	Cisco IOS Software Release	Chassis Supported	Per-Chassis Port Densities
<b>4-Port OC-12 ATM ISE</b> <b>4-Port OC-12c/STM-4c ATM ISE</b>	Engine 3	12.0(25)S or higher	Cisco 12816, 12416, and 12016 Cisco 12810, 12410, and 12010 Cisco 12406 and 12006 Cisco 12012 Cisco 12404 Cisco 12008	60 OC-12c/STM-4c ports 36 OC-12c/STM-4c ports 20 OC-12c/STM-4c ports 20 OC-12c/STM-4c ports 12 OC-12c/STM-4c ports 12 OC-12c/STM-4c ports

Line Card	Forwarding Engine	Cisco IOS Software Release	Chassis Supported	Per-Chassis Port Densities
4-Port OC-3 ATM ISE 4-Port OC-3c/STM-1 ATM ISE	Engine 3	12.0(26)S2 or higher	Cisco 12816, 12416, and 12016 Cisco 12810, 12410, and 12010 Cisco 12406 and 12006 Cisco 12012 Cisco 12404 Cisco 12008	60 OC-3c/STM-1c ports 36 OC-3c/STM-1c ports 20 OC-3c/STM-1c ports 20 OC-3c/STM-1c ports 12 OC-3c/STM-1c ports 12 OC-3c/STM-1c ports

### PHYSICAL AND ELECTRICAL SPECIFICATIONS

Table 3 provides details about the physical and electrical specifications of the Cisco 12000 Series ATM line cards.

**Table 3.** Physical and Electrical Specifications

Line Card	Dimensions	Weight	Power	Route Memory	LEDs
4-Port OC-12 ATM ISE	<ul style="list-style-type: none"> <li>Height: 14.5 in. (36.8 cm)</li> <li>Depth: 18.5 in. (45.7 cm)</li> </ul>	11.4 lb (5.17 kg)	150W maximum	<ul style="list-style-type: none"> <li>Route: 512 MB, upgradable to 1 GB</li> <li>Packet: 512 MB</li> </ul>	<ul style="list-style-type: none"> <li>Line-active LED</li> <li>Rx carrier LED</li> <li>Rx cells LED</li> <li>Alphanumeric management display</li> </ul>
4-Port OC-3 ATM ISE	<ul style="list-style-type: none"> <li>Height: 14.5 in. (36.8 cm)</li> <li>Depth: 18.5 in. (45.7 cm)</li> </ul>	11.4 lb (5.17 kg)	150W maximum	<ul style="list-style-type: none"> <li>Route: 512 MB, upgradable to 1 GB</li> <li>Packet: 512 MB</li> </ul>	<ul style="list-style-type: none"> <li>Line-active LED</li> <li>Rx carrier LED</li> <li>Rx cells LED</li> <li>Alphanumeric management display</li> </ul>

### OPTICAL SPECIFICATIONS

Table 4 provides details about the optical specifications of the Cisco 12000 Series ATM line cards.

**Table 4.** Optical Specifications

Line Card	Tx	Power	Rx	Power	Target Distance (km)*	Wavelength (nm)	Fiber Type	Compliance**	
	P <sub>Tmax</sub> (dBm)	P <sub>Tmin</sub> (dBm)	P <sub>Rmax</sub> (dBm)	P <sub>Rmin</sub> (dBm)				Telcordia	ITU
OC-12								GR-253	G.957
OC-12 ATM SM	-8	-15	-7	-28	15	-	Single-mode fabric (SMF)		
OC-12 ATM MM***	-14	-20	-14	-26	2	1300	Multimode fabric (MMF)		

Line Card	Tx	Power	Rx	Power	Target Distance (km)*	Wavelength (nm)	Fiber Type	Compliance**	
	P <sub>Tmax</sub> (dBm)	P <sub>Tmin</sub> (dBm)	P <sub>Rmax</sub> (dBm)	P <sub>Rmin</sub> (dBm)				Telcordia	ITU
<b>OC-3</b>								GR-253	G.957
<b>4OC3X/ATM-MM-SC</b>	-14	-20	-14	-30	2	1310	MMF		
<b>4OC-3/ATM-ISE-IR-SC</b>	-8	-15	-8	-29	15	1310	SMF		

\* Target distances are used for classification only and not for specification.

\*\* Contact your Cisco account team for details about compliance level to these standards.

\*\*\* There are no Telcordia or ITU specifications for multimode SONET/SDH interfaces.

## ENVIRONMENTAL, APPROVALS, AND COMPLIANCE

Table 5 gives standards-compliance information about the Cisco 12000 Series ATM line cards.

**Table 5.** Compliance and Agency Approvals

Feature	Description
<b>Environmental</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>Safety</b>	<ul style="list-style-type: none"> <li>UL 1950</li> <li>CSA 22.2-No. 950</li> <li>EN60950</li> <li>IEC 60950 CB Scheme</li> <li>ACA TS001</li> <li>AS/NZS 3260</li> <li>EN60825/IEC60825 laser safety</li> <li>FDA Code of Federal Regulations (USA) laser safety</li> </ul>
<b>EMI</b>	<ul style="list-style-type: none"> <li>FCC CFR 47-PART 15 1998 Class A</li> <li>ICES 003 Class A</li> <li>AS/NZS 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/CNS 13438:1997 Class A</li> </ul>

Feature	Description
<b>Immunity (Basic Standards)</b>	<ul style="list-style-type: none"> <li>• IEC-1000-3-2 Power Line Harmonics</li> <li>• IEC-61000-3-3 Voltage Fluctuations and Flicker</li> <li>• IEC-1000-4-2 ESD (8-kV contact, 15-kV air)</li> <li>• IEC-1000-4-3 Radiated immunity (10 V/m)</li> <li>• IEC-1000-4-4 EFT (2-kV power port, 1-kV signal port)</li> <li>• IEC-1000-4-5 Surge A/C port (4-kV CM, 2-kV DM)</li> <li>• IEC-1000-4-5 Surge signal port (2-kV CM, 1-kV DM)</li> <li>• IEC-1000-4-5 Surge D/C port (0.5-kV CM, 0.5-kV DM)</li> <li>• IEC-1000-4-6 Low-frequency conductive immunity (10V)</li> <li>• IEC-1000-4-11 Voltage dips and sags</li> <li>• EN55024/CISPR24 ITE Immunity</li> </ul>
<b>ETSI and EN</b>	<ul style="list-style-type: none"> <li>• EN 300 386 /EN 300 386-2 Class B Telecommunications Network Equipment (EMC)</li> </ul>
<b>Network Equipment Building Standards (NEBS)</b>	<p>This product is designed to meet the following requirements:</p> <ul style="list-style-type: none"> <li>• GR-1089-CORE EMC and Safety</li> <li>• GR-63-CORE Physical Protection</li> <li>• SR-3580 NEBS Criteria Levels (Level 3)</li> </ul>

## ORDERING INFORMATION

To place an order, contact your local Cisco representative or visit the ordering page on the Cisco Website. Use the ordering information in Table 6.

**Table 6.** Ordering Information

Product Part Number	Product Name
<b>4OC12X/ATM-IR-SC</b>	4-port OC-12/STM-4 ATM single-mode, intermediate-reach ISE line card with SC Connector
<b>4OC12X/ATM-MM-SC</b>	4-port OC-12/STM-4 ATM multimode ISE line card with SC connector
<b>4OC3X/ATM-IR-SC</b>	Cisco 12000 Series 4-Port OC-3c/STM-1c ATM ISE Line Card, single-mode
<b>4OC3X/ATM-MM-SC</b>	Cisco 12000 Series 4-Port OC-3c/STM-1c ATM ISE Line Card, multimode
<b>4OC3X/ATM-BLANK</b>	Blank faceplate for Cisco 12008 and 12012 chassis

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## FOR MORE INFORMATION

For more information about the Cisco 12000 Series ATM line cards, contact your local Cisco representative or visit <http://www.cisco.com/go/12000>.

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