Data Sheet

Cisco XR 12000 and 12000 Series Gigabit Ethernet Line Cards

For service providers who need to cost-effectively scale their Ethernet IP infrastructures in response to growing high-bandwidth and service demands, the Cisco® XR 12000 and 12000 Series Gigabit Ethernet line cards deliver a comprehensive range of features that enable Layer 2 and Layer 3 Ethernet edge applications such as Metro Ethernet aggregation, peering, and Cisco IPv6 services without compromising performance. The advanced features include industry-leading quality of service (QoS), which is ideal for customer service-level agreements (SLAs); packet filtering and Reverse Path Forwarding (RPF); rate limiting to help ensure that all customers are served according to the SLAs; a comprehensive set of Multiprotocol Label Switching (MPLS) features for high-level services to customers; and Ethernet features such as VLANs, source and destination MAC accounting, and jumbo frames.

The Cisco XR 12000 and 12000 Series 4-Port Gigabit Ethernet ISE Line Card (4-port GE ISE card) offers four physical ports that support three types of Small Form-Factor Pluggable (SFP) transceivers (Figure 1).

The Cisco 12000 Series Modular Gigabit Ethernet Line Card offers a baseboard with one fixed Gigabit Ethernet port and the flexibility to configure up to three 3-port Gigabit Ethernet port adapters (EPAs) (Figure 2).

The transceivers are all hot-swappable and 802.3z-compliant, and they operate in full-duplex mode. Each of the Gigabit Ethernet interfaces can be configured with:

- **1000BASE-SX**—850-nanometer (nm) serial, multimode fiber for 550-meter (m) transmission
- **1000BASE-LH**—1310-nm serial, single-mode fiber for 10-kilometer (km) transmission
- **1000BASE-ZX**—1550-nm serial, single-mode fiber for 70-km transmission

Figure 1. Cisco XR 12000 and 12000 Series 4-Port Gigabit Ethernet ISE Line Card

Figure 2. Cisco 12000 Series Modular Gigabit Ethernet Line Card

The Cisco 12000 Series 1-Port 10-Gigabit Ethernet Line Card provides one dedicated 10-Gigabit Ethernet port that offers 10-Gigabits-per-second (Gbps) line-rate performance for IP and MPLS traffic (Figure 3).

Figure 3. Cisco 12000 Series 1-Port Gigabit Ethernet Line Card

PRODUCT FEATURES

Table 1 describes the basic features on the Cisco XR 12000 and 12000 Series Gigabit Ethernet line cards.

Table 1. Product Features

Feature	Description
Performance	• Line-rate throughput for IP forwarding and MPLS switching • Dedicated Layer 3 forwarding engine that provides line-rate throughput for all Ethernet frame sizes • Sustained performance in fully loaded system • Sustained performance for all IP prefix sizes • No performance drops as QoS, accounting features, committed access rate (CAR), and access control lists (ACLs) are enabled
Reliability and Availability	• Online insertion and removal (OIR), enabling insertion and removal of line cards and SFP modules without impacting traffic
Network Management	• Cisco IOS® Software command-line interface (CLI) • Cisco 12000 Manager for configuration, fault, and performance element management • Simple Network Management Protocol (SNMP)
Protocols	• Layer 3 routing protocols: Border Gateway Protocol Version 4 (BGPv4), Open Shortest Path First (OSPF), Intermediate System-to-Intermediate System (IS-IS), Enhanced Interior Gateway Routing Protocol (EIGRP), Routing Information Protocol (RIP), Distributed Forwarding Information Base (FIB) IP switching, Cisco Discovery Protocol, Internet Control Message Protocol (ICMP), Routing with Resource Reservation (RRR), and others • 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 1 (IGMPv1/v2); Cisco Group Management Protocol (GMP); Multiprotocol Border Gateway Protocol (MBGP); Multicast Source Discovery Protocol (MSDP); and others • Comprehensive MPLS support • Traffic engineering using RRR
IP and MPLS Traffic Engineering (MPLS TE)	• IP and MPLS load balancing • MPLS, VPN mapping, and Ethernet over MPLS (EoMPLS)
Statistics and Accounting	• Byte and packet counting per ingress port for IP and MPLS packets • Packet counting for Modified Deficit Round Robin (MDRR) and Weighted Random Early Detection (WRED) • Sampled NetFlow (v5 and v8)

Feature	Description
Security	• 15,000 xACLs in the ingress side per port and per VLAN; 20,000 entries on ingress and egress at line rate supported on 4-port GE ISE line card • 1024 ACLs on the egress side on per-port basis
QoS	• 8 queues per port, WRED and MDRR per port and queue • Rate limiting on the ingress and egress side • Traffic shaping on the egress side
Ethernet	• 802.1q VLAN support, 1024 VLANs, and jumbo frames • Source and destination MAC accounting and VLAN accounting
Cisco IPv6	• Provider edge router without compromising performance (supported on 4-port GE ISE line cards)

PRODUCT SPECIFICATIONS

Table 2 provides specifications for the different Cisco XR 12000 and 12000 Series Gigabit Ethernet line cards.

Table 2. Product Specifications

Line Card Description	Forwarding Engine	Cisco IOS Software Release	Chassis Supported	Port Densities
4-Port GE ISE Line Card	Engine 3 (ISE)	12.0(25)S or higher	• Cisco 12404 • Cisco 12006 • Cisco 12406 • Cisco 12010 • Cisco 12410 • Cisco 12810 • Cisco 12016 • Cisco 12416 • Cisco 12816	• Cisco 12404: 12 ports • Cisco 12006 and 12406: 20 ports • Cisco 12010, 12410, and 12810: 36 ports • Cisco 12016, 12416, and 12816: 60 ports
3-Port Modular GE Line Card	Engine 4+	12.0(23)S or higher	• Cisco 12404 • Cisco 12406 • Cisco 12410 • Cisco 12810 • Cisco 12416 • Cisco 12816	• Cisco 12404: 30 ports • Cisco 12406: 50 ports • Cisco 12410 and 12810: 80 ports • Cisco 12416 and 12816: 150 ports
1-Port 10-GE Line Card	Engine 4+	12.0(23)S or higher	• Cisco 12404 • Cisco 12406 • Cisco 12410 • Cisco 12810 • Cisco 12416 • Cisco 12816	• Cisco 12404: 3 ports • Cisco 12406: 5 ports • Cisco 12410 and 12810: 8 ports • Cisco 12416 and 12816: 15 ports

PHYSICAL AND ELECTRICAL SPECIFICATIONS

Table 3 provides details about the physical and electrical specifications of the different Cisco XR 12000 and 12000 Series Gigabit Ethernet line cards.

Table 3. Physical and Electrical Specifications

Line Card	Dimensions	Weight	Power	Route Memory (default, max)	LEDs
4-Port GE ISE Line Card	• Height: 14.5 in. (36.8 cm) • Depth: 17.5 in. (44.45 cm) • Width (occupies single thin slot): 1.25 in. (3.2 cm)	6 lb (2.7 kg)	106W maximum	• Default: 512 MB • Maximum: 1 GB	At each port: • Link • Active (port) • Rx activity
3-Port Modular GE Line Card	• Height: 14.5 in. (36.8 cm) • Depth: 17.5 in. (44.45 cm) • Width (occupies single wide slot): 1.75 in. (4.5 cm)	9 lb (4.08 kg) with 3 GE EPAs installed	198W maximum	• Default: 512 MB • Maximum: 1 GB	At each port: • Link • Active (port) • Rx activity
1-Port 10-GE Line Card	• Height: 14.5 in. (36.8 cm) • Depth: 17.5 in. (44.45 cm) • Width (occupies single wide slot): 1.75 in. (4.5 cm)	9 lb (4.08 kg)	196W maximum	• Default: 512 MB • Maximum: 1 GB	At each port: • Link • Active (port) • Rx activity

OPTICAL SPECIFICATIONS

Table 4 provides details about the optical specifications of the different Cisco XR 12000 and 12000 Series Gigabit Ethernet line cards.

Table 4. Optical Specifications

Line Cards	Tx Power	Rx Power	Connector Type	Target Distance*	Wave-length (nm)	Fiber Type	Core Size
	P_{Tmax} (dBm)	**P_{Tmin} (dBm)**	**P_{Rmax} (dBm)**	**P_{Rmin} (dBm)**					
1000BASE-SX	–4	–9.5	0	–17	LC-duplex	550 m	850	Multimode fiber (MMF)	50.0 microns
1000BASE-LH	–3	–9.5	–3	–19	LC	10 km	1300	Single-mode fiber (SMF)	9/10 microns
1000BASE-ZX	5	0	–3	–23	LC	70 km	1550	SMF	9/10 microns
1x10GE-LR-SC	0.5	–8.2	0.5	–14.4	SC	10 km	1260–1355	SMF	9/10 microns
1x10GE-ER-SC	4	–4.7	–1	–15.8	SC	40 km	1530–1565	SMF	9/10 microns

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

ENVIRONMENTAL APPROVALS AND COMPLIANCE

Table 5 gives standards-compliance information about the Cisco XR 12000 and 12000 Series Gigabit Ethernet line cards.

Table 5. Compliance and Agency Approvals

Feature	Description
Environmental	• Operating temperature: 41 to 104°F (5 to 40°C) • Operating temperature (short-term): 23 to 131°F (–5 to 55°C) • Storage temperature: –4 to 149°F (–20 to 65°C) • Relative humidity: – 5 to 85%, noncondensing, operating conditions – 5 to 90%, noncondensing, operating conditions (short-term) – Up to 95%, noncondensing, nonoperating conditions • Operating altitude: –60 to 4000m
Safety	• UL 1950 • CSA 22.2-No. 950 • EN60950 • IEC 60950 CB Scheme • ACA TS001 • AS/NZS 3260 • EN60825/IEC60825 laser safety (supported on 1-port 10-GE line card) • FDA—Code of Federal Regulations (USA) laser (supported on 1-port 10-GE line card)
EMI	• FCC CFR 47-Part 15 1998 Class A • ICES 003 Class A • AS/NRZ 3548 Class A • EN55022 Class B (up to 1 GHz) • VCCI Class A • CISPR 22 Class B (up to 1 GHz) • BSMI/CNS 13438: 1997 Class A • IEC-1000-3-2 Power line harmonics • IEC 61000-3-3 Voltage fluctuations and flicker

Feature	Description
Immunity (Basic Standards)	• IEC-1000-4-2 ESD (8-kV contact, 15-kV air) • IEC-1000-4-3 Radiated immunity (10 V/m) • IEC-1000-4-4 EFT (2-kV power port, 1-kV signal port) • IEC-1000-4-5 Surge AC port (4-kV CM, 2-kV DM) • IEC-1000-4-5 Surge Signal port (2-kV CM, 1-kV DM) • IEC-1000-4-5 Surge DC port (0.5-kV CM, 0.5-kV DM) • IEC-1000-4-6 Low Frequency Conductive Immunity, (10V) • IEC-1000-4-11 Voltage dips and sags • EN55024\CISPR24 ITE Immunity
ETSI and EN	• EN 300 386
Network Equipment Building Standards (NEBS)	This product is designed to meet the following requirements: • SR-3580—NEBS criteria levels (Level 3-compliant) • GR-1089-Core—NEBS EMC and safety • GR-63-Core—NEBS Physical protection

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
4GE-SFP-LC	Cisco XR 12000 and 12000 Series 4-Port Gigabit Ethernet ISE Line Card
EPA-GE/FE-BBRD	Cisco 12000 Series Gigabit Ethernet Modular Baseboard
EPA-3GE-SX/LH-LC	Cisco 12000 Series 3-Port Gigabit Ethernet Port Adapter
GLC-SX-MM**	Cisco 12000 Series 1000BASE-SX Short-Reach/Short-Wavelength SFP (mini-GBIC) Module with Multimode Fiber Interface, LC connector (for 3-port GE EPA)
GLC-LH-SM**	Cisco 12000 Series 1000BASE-LH Long-Haul/Long-Wavelength SFP (mini-GBIC) Module with Single-Mode Fiber Interface, LC connector (for 3-port GE EPA)
GLC-ZX-SM**	Cisco 12000 Series 1000BASE-ZX Very Long Reach SFP (mini-GBIC) Module with Single-Mode Fiber Interface, LC connector
1x10GE-LR-SC	Cisco 12000 Series 1-Port 10-Gigabit Ethernet Line Card with 10-km reach optics
1x10GE-ER-SC	Cisco 12000 Series 1-Port 10-Gigabit Ethernet Line Card with 40-km reach optics

** SFP (mini-GBIC) modules can be inserted in 4-Port Gigabit Ethernet ISE Line Card (part number 4GE-SFP-LC) or 3-Port Gigabit Ethernet Port Adapter (part number EPA-3GE-SX/LH-LC).

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FOR MORE INFORMATION

For more information about the Cisco XR 12000 and 12000 Series Gigabit Ethernet line cards, contact your local Cisco representative or visit: http://www.cisco.com/go/12000

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