Cisco 7600 Series Routers
Cisco 7600 Series: Ethernet Services 20G Line Cards for Carrier Ethernet

The Cisco® 7600 Series Ethernet Services 20 Gbps (ES20) Line Cards utilize an extensible design that enables service prioritization for voice, video, data, and wireless mobility services. Service provider and enterprise customers benefit from the improved economics, density, advanced Carrier Ethernet features, and the high performance of the ES20 fixed-configuration line cards.

The ES20 programmable interface processors protect network investments and reduce total cost of ownership. The design maximizes connectivity options and offers superior service intelligence through programmable interface processors operating at line rate. This data sheet contains the specifications for the Cisco 7600 ES20 Line Cards as shown in Figure 1.

Figure 1. Cisco 7600 Series Ethernet Services 20 Gbps (ES20) Line Cards, 2-port 10 GE and 20-port GE

Product Overview

Designed for Carrier Ethernet, IP/Multiprotocol Label Switching (MPLS) Provider Edge in mid-size and smaller service provider and enterprise WAN applications, the Cisco 7600 Series Ethernet Services 20G (7600-ES20) supports up to 20 Gbps of bandwidth with 20 ports of Gigabit or 2 ports of 10 G Ethernet interface models. The cards feature hierarchical quality of service (QoS), locally significant VLANs, and up to 16 K VLAN IDs per line card for rich services at scale. The 7600-ES20 Line Cards provide the unique ability to combine both Layer 2 and Layer 3 services on the same line card. The combination of native Ethernet Layer 2 switching, bridging, VPLS, Ethernet over MPLS (EoMPLS), and Layer 3 IP/MPLS routing distinguishes this line card among other products on the market, particularly in Carrier Ethernet applications.

The innovative architecture of these industry-leading, premium Ethernet services line cards is designed to deliver cost-effective, high-touch features, combining both application-specific integrated circuit (ASIC) and Network Processor technology for an optimal combination of performance and flexibility. The 7600-ES20s provide distributed forwarding with proven ASIC technology in the forwarding path (routing, switching, Netflow, access control lists [ACLs]), as well as for queuing and shaping functions to provide the maximum performance for these foundational features. Additionally, two (2) programmable network processors are included in the forwarding plane to facilitate flexibility and feature growth. This ideal technology combination provides customers with the necessary flexibility for future service deployments and allows them to scale the system capacity as required.

Key Features and Benefits

Feature	7600-ES20	Benefit
Line card form factor	2-port 10 GE or 20-port GE	Offers economical, high-density, high-performance, premium Carrier Ethernet services with excellent scalability
Performance	Line rate with services enabled	Provides line-rate forwarding performance of 64-byte Ethernet frames on GE and 10 GE interfaces with services enabled
Packet memory	512 MB	Up to 200 ms combined bidirectional buffering
Switch fabric connectivity	Two (2), 20-Gbps fabric channels	Utilizes the 7600 Series 720-Gbps switch fabric for data forwarding; two (2) fabric channels are utilized that are not present in slots 1 through 8 on 7613 chassis
Online insertion and removal (OIR)I	Supports OIR of ES20 Line Cards	Provides hitless OIR to minimize impact of add/change/remove operations

XFP and SFP Modules

ES20 10 GE XFP	Wavelength	Mode	Distance
XFP-10GZR-OC192LR, LAN-PHY	1550 nm	SM	49.7 miles (80 km)
XFP-10GER-OC192IR, LAN-PHY	1550 nm	SM	24.8 miles (40 km)
XFP-10GLR-OC192SR, LAN-PHY	1310 nm	SM	6.2 miles (10 km)
ES20 GE SFP	**Wavelength**	**Mode**	**Distance**
SFP-GE-S	850 nm	MM	1804 ft (550 m)
SFP-GE-L	1310 nm	SM	6.2 miles (10 km)
SFP-GE-Z	1550 nm	SM	43.5 miles (70 km)
SFP-GE-T (requires Cisco IOS 12.2(33)SRC or later)	N/A	N/A	328 ft (100 m)

Product Specifications

Table 1. Product Specifications

Description	Specification
Chassis compatibility	All Cisco 7600 Series Router chassis, except the Cisco 7603, which is end of sale/end of life. The 7603-S is fully supported.
Central forwarding engine compatibility	• Supervisor Engine 720-3B, 720-3BXL, Route Switch Processor 720 (RSP720) and later. • ES20 requires dual-channel switch fabric connectivity; therefore, the 7600-ES20 is not supported with the Supervisor 32 or in slots 1 through 8 of the 7613 chassis.
Distributed Forwarding Card (DFC)	• Choice of DFC-3C or DFC-3CXL • Line-rate distributed forwarding with services enabled, up to ~30 mpps per line card • DFC-3C • Designed for Carrier Ethernet-based infrastructures • Up to 256K hardware-based forwarding entries with DFC-3C • Up to 128K Netflow entries with DFC-3C • DFC-3CXL • Optimized for IP/MPLS PE mid-size and small service providers offering multiple IP services such as Layer 3 VPNs, IPv6, and triple- or quad-play services • Up to 1 million hardware-based forwarding entries with DFC-3CXL • Up to 256K Netflow entries with DFC-3CXL
Minimum software	Cisco IOS® Software Release 12.2(33)SRB or later Cisco IOS Software releases
Packet memory	512 Megabytes for 200 ms of combined input and output buffering at 10 Gbps
Link encapsulations	Ethernet II and IEEE 802.1q encapsulations
Hardware queues	• 16,000 queues dynamically shared between ingress and egress processing • Hierarchical QoS (H-QoS)
MAC addresses	• Up to 96,000 MAC Addresses per ES20 Line Card • 16 K VLAN IDs per line card (within Flexible QinQ configuration guidelines) • Hardware-based MAC learning at wire rate

Description	Specification
Environmental conditions	Operating temperature: 32 to 104°F (0 to 40°C) Storage temperature: –40 to 167°F (–40 to 75°C) Relative humidity: 10 to 90 percent, noncondensing Operating altitude: –60 to 2000 m
MIBs	• Cisco Entity MIB (CISCO-ENTITY-MIB) • Cisco Entity Asset MIB • Cisco Entity Field-Replaceable Unit (FRU) Control MIB • Cisco Entity Alarm MIB • Interface IF MIB (RFC 2233) • Definitions of Managed Objects for Bridges (RFC 1493) • Evolution of Interfaces Group of MIB-II (RFC 1573) • Simple Network Management Protocol (SNMP) MIB II (RFC 1213) • Remote Monitoring (RMON) MIB (RFC 1757) • Switch Monitoring (SMON) MIB Details on the MIBs above can be found at this link: http://www.cisco.com/univercd/cc/td/doc/product/core/cis7600/7600mibs/ Operating temperature: 32 to 104°F (0 to 40°C) Storage temperature: –40 to 167°F (–40 to 75°C) Relative humidity: 10 to 90 percent, noncondensing Operating altitude: –60 to 2000 m
Network management	Supported with CiscoWorks, CiscoView and CiscoWorks Resource Manager Essentials (RME) • Integrated Solution Center (ISC) • Cisco Entity MIB (CISCO-ENTITY-MIB) • Cisco Entity Asset MIB • Cisco Entity Field-Replaceable Unit (FRU) Control MIB • Cisco Entity Alarm MIB • Interface IF MIB (RFC 2233) • Definitions of Managed Objects for Bridges (RFC 1493) • Evolution of Interfaces Group of MIB-II (RFC 1573) • SNMP MIB II (RFC 1213) • Remote Monitoring (RMON) MIB (RFC 1757) • Switch Monitoring (SMON) MIB • IEEE 802.1ag, Connectivity Fault Management Details on the MIBs above can be found at this link: http://www.cisco.com/univercd/cc/td/doc/product/core/cis7600/7600mibs/
Physical specifications	• Occupies one slot in a Cisco 7600 Series • Up to eight (8) ES20s in a Cisco 7609 or 7609-S 9-slot chassis • Requires Supervisor 720-3B, or 3BXL, RSP720 or later • Dimensions (H x W x D): 1.75 x 15.375 x 16 in. • Weight: 16 lbs. • Mean Time Between Failure (MTBF) 80,000 hours
Power	340.2 W
Indicators	Status: green (operational); orange (faulty)
Regulatory compliance	CE Marking
Safety	• UL 60950 • CSA C22.2 No. 60950 • EN60950 • TS001 • IEC 60950 • AS/NZS3260

Description	Specification	
Electromagnetic compatibilty	• FCC Part 15 Class A • ICES-003 Class A • VCCI Class A • EN55022 Class A • CISPR22 Class A • AS/NZS3548 Class A • EN61000-3-2 • EN61000-3-3 • EN61000-3-1 • EN55024 • EN50082-1 • EN300 386 • FCC Part 15 Class A • ICES-003 Class A • VCCI Class A	• EN55022 Class A • CISPR22 Class A • AS/NZS CISPR 22 Class A • EN61000-3-2 • EN61000-3-3 • EN61000-6-1 • EN55024 • EN50082-1 • EN300 386 • UL 60950 • CSA C22.2 No. 60950 • EN60950 • TS001 • IEC 60950 • AS/NZS3260
Telecommunications standards	• ITU-T G.691 • ITU-T G.707 • ITU-T G.783 Sections 9-10 • ITU-T G.784 • ITU-T G.803 • ITU-T G.813 • ITU-T G.825 • ITU-T G.826 • ITU-T G.841 • ITU-T G.957 Table 3 • ITU-T G.958FCC Part 15 Class A • ICES-003 Class A • VCCI Class A • EN55022 Class A • CISPR22 Class A • AS/NZS3548 Class A • EN61000-3-2	• EN61000-3-3 • EN61000-3-1 • EN55024 • EN50082-1 • EN300 386 • FCC Part 15 Class A • ICES-003 Class A • VCCI Class A • EN55022 Class A • CISPR22 Class A • AS/NZS CISPR 22 Class A • EN61000-3-2 • EN61000-3-3 • EN61000-6-1 • EN55024 • EN50082-1 • EN300 386

Table 2. Feature Support

Description	Specification
Carrier Ethernet and IP/MPLS network protocols	• IPv4 unicast and multicast • IPv6 unicast and multicast • Multiprotocol Label Switching (MPLS) Provider Edge (PE) L2 and L3 VPNs • Multiprotocol Label Switching Traffic Engineering (MPLS-TE) • Multiprotocol Label Switching (MPLS) Fast Reroute (FRR) • Diff-Serv aware MPLS TE • GRE and IP-in-IP tunneling • Ethernet Bridging and Ethernet Multipoint Bridging (E-MPB) • Ethernet switching • Ethernet over MPLS (EoMPLS) • Switch port: access and trunk • QinQ termination • Selective QinQ • Flexible QinQ • VLAN translation • Private VLAN • VPLS and H-VPLS • VLAN and Spanning Tree Protocols • Per VLAN Spanning Tree (PVST) • Virtual Switch Tagging (VST) • Rapid Spanning Tree Protocol (RSTP) • Multiple Spanning Tree (MST) Protocol: IEEE 802.1s • VACL and VTP

Description	Specification
QoS	• Modular QoS CLI (MQC) • Policing granularity down to ingress, egress, physical interfaces, and VLAN • Access control lists • Classification, marking, policing, and queuing • Diff-Serv Code Point (DSCP) • Complex re-marking of Ethernet and IP/MPLS headers
Congestion avoidance	Weighted Random Early Detection (WRED) based on IP Prec, DSCP, MPLS EXP
Queuing and shaping	• Enhanced Class-based Weighted Fair Queuing (CBWFQ) • Egress low-latency queuing (LLQ); Traffic inside LLQ may be shaped • Two levels of queuing hierarchy • Egress Shaping
Traffic classification and bandwidth policing	Classification based on: • Extended ACL • IP Precedence/IP DSCP • MPLS Experimental Bits (EXP) • VLAN • Input VLAN • Policer: Ingress single and dual-rate, three color
ACLs and security	• Up to 32,000 access list entries with no forwarding degradation • HW counters for ACL hits
Layer 2 and Layer 3 VPNs	• Layer 2 VPNs • EoMPLS with MAC learning • H-VPLS (MPLS Edge or IEEE 802.1ad Edge) • Flexible QinQ • Layer 3 VPNs • MPLS VPN (RFC 2547-bis) • Inter-AS and Carrier-Supporting-Carrier • Multicast VPN
Protection and bundling	• MPLS Fast Reroute • IEEE 802.3ad and EtherChannel®

Licensing Information

The 7600-ES20 Series Line Cards have two feature license options. These are 76-ES20-BASIC-LIC (basic license, including IPv6) and 76-ES20-ADVIP-LIC (advance IP license).

The basic license entitles the customers to use the CISCO IOS 12.2SR functionality on the 7600-ES20 Line Cards with the following exceptions:

- MVPN
- 6VPE
- Layer 3 IP/MPLS VPN

The advance IP license entitles the customer to use the functionality within CISCO 12.2SR functionality without the restrictions listed above. An advance IP license is needed for all 7600-ES20 Line Cards in the system if any of the functionality above is enabled within the system.

Ordering Information

Table 3. Ordering Information

Product Name	Part Number
Cisco 7600 Series Ethernet Services 20 G Line Card, 2-port 10 GE XFP and DFC-3C	7600-ES20-10G3C
Cisco 7600 Series Ethernet Services 20 G Line Card, 2-port 10 GE XFP and DFC-3CXL	7600-ES20-10G3CXL
Cisco 7600 Series Ethernet Services 20 G Line Card, 20-port GE SFP and DFC-3C	7600-ES20-GE3C
Cisco 7600 Series Ethernet Services 20 G Line Card, 20-port GE SFP and DFC-3CXL	7600-ES20-GE3CXL
Cisco 7600 Series Ethernet Services 20 G Basic License	76-ES20-BASIC-LIC
Cisco 7600 Series Ethernet Services 20 G Advance License	76-ES20-ADVIP-LIC

To Download the Software

Visit the Cisco Software Center to download Cisco IOS Software.

Product Name/Description
Cisco IOS Software Release 12.2(33)SRB used with Supervisor Engine 720 or RSP720

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 to protect your network investment, optimize network operations, and prepare the network for new applications to extend network intelligence and the power of your business. For more information about Cisco Services, see Cisco Technical Support Services or Cisco Advanced Services.

For More Information

For more information about the Cisco 7600 Services Ethernet Services 20 G Line Cards, visit http://www.cisco.com/en/US/products/hw/modules/ps2706/ps4221/index.html or contact your local account representative.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

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