Cisco Catalyst 6900 Series Ethernet Interface Module for Cisco Catalyst 6500 Series Switches

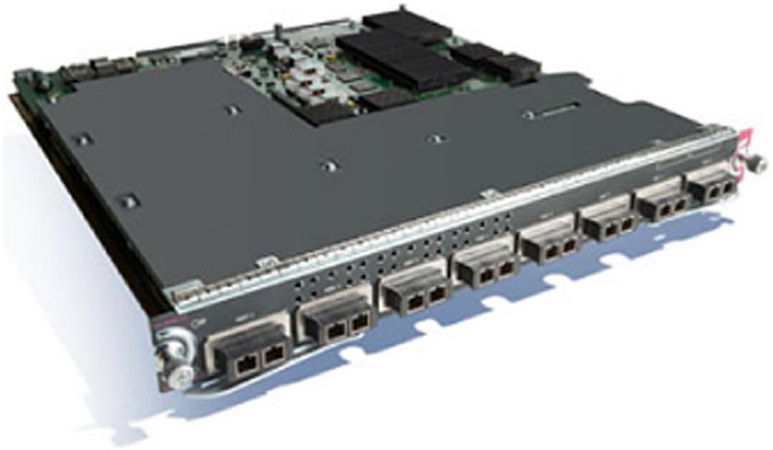
Product Overview

The Cisco® Catalyst® 6500 Series Switches offer a variety of 10 Gigabit Ethernet modules to serve different needs in the campus and data center for enterprise, commercial, and service provider customers. The Cisco Catalyst 6900 Series 8-port 10 Gigabit Ethernet Fiber Module is the first 10 Gigabit Ethernet Module for the Cisco Catalyst 6500 Series Switch that supports Cisco TrustSec and Layer 2 encryption in hardware to enable IEEE 802.1ae (MACSec) encryption for Role-Based Access Control (RBACL) functionality. The module has two 40 Gbps connections (for a total of 80 Gbps) to the 2Tbps switch fabric of the Supervisor Engine 2T and therefore is able to deliver 10 Gigabit performance on all 8 ports for larger than 128 bytes size packets with no oversubscription. The new Cisco Catalyst 6900 Series 8-port 10 Gigabit Ethernet Fiber module supports Virtual Switch Link (VSL) on all 8 ports. The Cisco Catalyst 6900 Series 8-port 10 Gigabit Ethernet Fiber Module supports pluggable X2 optics, providing operational distances of up to 80 km over single-mode fiber and 300m over multimode fiber allowing for deployment in various types of networking environments. The Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module is only compatible with the new Cisco Catalyst 6500 Supervisor Engine 2T (VS-S2T-10G or VS-S2T-10G-XL), enabling the system to deliver three times the performance and four times the scalability for Cisco Catalyst 6500 Series Switches in comparison to the previous generation.

The new Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber module is designed for deployment in the distribution and core of the campus and data center for traffic aggregation in a network requiring security, manageability, virtualization, application performance, and video. With its large 256 MB packet buffers per port, no oversubscription, and distributed forwarding with high scalability, the new Cisco Catalyst 6900 Series 8-port 10 Gigabit Ethernet Fiber module is able to deliver secure and predictable performance for bandwidth-intensive applications such as market data feeds in the financial vertical or video broadcast in campus networks.

The 8-Port 10 Gigabit Ethernet Fiber Module (Figure 1) provides up to 88 10 Gigabit Ethernet Fiber ports in a single Cisco Catalyst 6513-E chassis and 176 10 Gigabit Ethernet ports in a Cisco Catalyst 6500 Virtual Switching System (VSS) 4T.

Figure 1. Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module



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For more information, see the white paper discussing 10 Gigabit Ethernet switching for enterprises at http://www.cisco.com/en/US/products/hw/switches/ps708/products_white_paper0900aecd802a648b.shtml.

Main Features and Benefits

Table 1 summarizes the primary features and benefits of the Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module.

Table 1. Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module Primary Features

Feature	Cisco Catalyst 6900 Series 8-Port 10GbE Fiber Module
Ports	8
Optics	X2
Switch fabric connection	80 Gbps full duplex
Oversubscription	1:1
Forwarding engine	• WS-X6908-10G-2T: comes equipped with DFC4 for distributed forwarding, supporting 256K forwarding entries, increased ACL entries to 64K, increased Netflow entries to 512K, and increased IPv4 forwarding speed to 60 Mpps • WS-X6908-10G-2TXL: equipped with DFC4XL for distributed forwarding, supporting 1 million+ forwarding entries, increased ACL entries to 256K, increased Netflow entries to 1 million+ and increased IPv4 forwarding speed to 60 Mpps • Increased performance of up to 60Mpps for L2, IPv4 and MPLS forwarding and up to 30Mpps for IPv6 forwarding • Increased multicast routes to 256K • Support for 16K Bridge Domains, allowing the standard 4K VLANs to be reused across these bridge domains, effectively increasing the number of VLANs available in the system • Increased MAC Address Table to 128K • IPV4 IGMPv3 snooping in hardware • IPv6 MLDv2 snooping in hardware • PIM registers in hardware • IPV4 & IPv6 in IPv6 tunneling • IPv6 in IPv4 tunneling (ISATAP, 6to4, GRE) • QoS support for uniform, short pipe and pipe mode tunnel • Terminate the tunnel in the same loopback
Security	• TrustSec and IEEE 802.1ae Layer 2 Encryption in HW to enable MACSec
Queues	• Receive: 8q4t • Transmit: 1p7q4t
Queuing mechanisms	• Class of Service (CoS) based queue mapping • Differentiated Service Code Point (DSCP) based queue mapping
Scheduler	• Deficit Weighted Round Robin (DWRR) • Weighted Random Early Detection (WRED) • Smoothed Round Robin (SRR) at egress
Port buffers	• 256MB per port
Hardware-based multicast replication	• Ingress and egress • Approximately 20 Gbps per replication engine • 4 replication engines per module delivering total throughput of 80 Gbps
Jumbo frame support for bridged and routed packets	Up to 9216 bytes
Maximum port density per chassis	64 ports (6509-E chassis) 88 ports (6513-E chassis)
Maximum port density per VSS	128 ports (6509-E chassis) 176 ports (6513-E chassis)
Can be used to form virtual switch link	Yes (all ports)
Supervisor engines supported	Supervisor Engine 2T and 2TXL

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Feature	Cisco Catalyst 6900 Series 8-Port 10GbE Fiber Module
Chassis supported	• Any Cisco Catalyst 6500 E-Series chassis, including 6503-E, 6504-E, 6506-E, 6509-E, 6509-V-E, 6513-E (NEBS compliant: operating temperature up to 55°C) • Not supported in non-E Series chassis.
Slot requirements	• Can occupy any slot in any Cisco Catalyst 6503-E, 6504-E, 6506-E, 6509-E, or 6509-V-E chassis • Can occupy slots 1-6 and 9-13 in a Cisco Catalyst 6513-E chassis
Onboard memory	2 GB default (no higher upgrade)

Table 2 summarizes pluggable optics supported on the Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module.

Table 2. Pluggable Optics for Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module

Part Number	Transceiver Type	Wavelength	IEEE Standard	Maximum Distance and Cable Type[1]
X2-10GB-LRM	10GBASE-LRM	1310 nm serial	IEEE 802.3aq	220m over multimode fiber
X2-10GB-LR	!0GBASE-LR	1310 nm serial	IEEE 802.3ae	10 km over single-mode fiber
X2-10GB-SR	10GBASE-SR	850 nm serial	IEEE 802.3ae	• 26m over 62.5-micron FDDI-grade multimode fiber • 33m over 62.5-micron 200 MHz x km multimode fiber • 66m over 50-micron 400 MHz x km multimode fiber • 82m over 50-micron 500 MHz x km multimode fiber • 300m over 50-micron 2000 MHz x km multimode fiber
X2-10GB-ER	10GBASE-ER	1550 nm serial	IEEE 802.3ae	40 km over single-mode fiber
X2-10GB-ZR	10GBASE-ZR	1550 nm serial		80 km over single-mode fiber
X2-10GB-LX4	10GBASE-LX4	WWDM 1310 nm	IEEE 802.3ae	• 300m over 62.5-micron FDDI grade multimode fiber • 240m over 50-micron 400 MHz x km multimode fiber • 300m over 50-micron 500 MHz x km multimode fiber
X2-10GB-CX4	10GBASE-CX4	Copper	IEEE 802.3ak	15m over 8 pair 100-Ohm InfiniBand cable
X2-10G-DWDM	DWDM	32 different wavelengths; C band	100 GHz ITU grid	32 wavelengths over single strand of single-mode fiber; 80 km
CVR-X2-SFP10G	SFP+ converter for X2 ports			
SFP-10G-LRM	10GBASE-LRM	1310 nm	IEEE 802.3	220m over multimode fiber
SFP-10G-LR	10GBASE-LR	1310 nm	IEEE 802.3	10 k over single-mode fier
SFP-10G-ER	10GBASE-ER	1550 nm	IEEE 802.3	40 k over single-mode fiber
SFP-H10GB-CU1M1 (With CVR-X2-SFP10G converter for X2 ports)	Cisco 10GBASE-CU SFP+ cable	Copper	SFP+ MSA SFF-8431	1-m 10G SFP+ Twinax cable assembly, passive
SFP-H10GB-CU3M1 (With CVR-X2-SFP10G converter for X2 ports)	Cisco 10GBASE-CU SFP+ cable	Copper	SFP+ MSA SFF-8431	3-m 10G SFP+ Twinax cable assembly, passive
SFP-H10GB-CU5M1 (With CVR-X2-SFP10G converter for X2 ports)	Cisco 10GBASE-CU SFP+ cable	Copper	SFP+ MSA SFF-8431	5-m 10G SFP+ Twinax cable assembly, passive
SFP-10G-SR (With CVR-X2-SFP10G converter for X2 ports)	10GBASE-SR SFP+ transceiver module	850nm	IEEE 802.3ae	• 26m over 62.5-micron FDDI-grade multimode fiber • 33m over 62.5-micron 200 MHz x km multimode fiber • 66m over 50-micron 400 MHz x km multimode fiber • 82m over 50-micron 500 MHz x km multimode fiber • 300m over 50-micron 2000 MHz x km multimode fiber

[1] To calculate the exact distances that your module will support before installation, see optical specifications in the X2 data sheets. The exact distance supported varies according to the number of splices and connectors in a single-mode fiber strand.
Cisco 10GBASE X2 modules data sheet

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For more information about most up to date EOS/EOL information on Cisco Catalyst 6500 Series Switches compatible transceivers, visit http://www.cisco.com/en/US/products/hw/modules/ps5455/prod_eol_notices_list.html.

Product Specifications

Table 3 lists product specifications of the Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module.

Table 3. Product Specifications

Product	Specifications
Standard protocols	IEEE 802.1d, IEEE 802.1p, IEEE 802.1q, IEEE 802.1s, IEEE 802.1w, IEEE 802.3x, IEEE 802.3ad, IEEE 802.3ae, IEEE 802.3aq, and IEEE 802.3an
Physical specifications	• Occupies one slot in the Cisco Catalyst 6500 E-Series chassis • Dimensions (H x W x D): 1.73 x 14.4 x 16 in. (4.4 x 36.6 x 40.6 cm) • Weight: 12.6 pounds excluding X2 components; ¼ pound for each X2
Environmental conditions	Operating temperature: • Agency-certified for operation: 32 to 104°F (0 to 40°C) • Design and tested for operation 32 to 130°F (0 to 55°C) • Storage temperature: -40 to 167°F (-40 to 75°C) • Relative humidity: 10 to 90 percent, noncondensing Operating altitude: • Agency-certified for operation: -500 to 6500 ft (-150 to 2000m) • Designed and tested for operation -500 to 10000 ft (-150 to 3000m)
Regulatory compliance	Cisco Catalyst 6500 Series 10 Gigabit Ethernet Fiber modules, when installed in a system, comply with the following EMC and safety standards: EMC Standards: • FCC Part 15 (CFR 47) Class A • ICES-003 Class A • VCCI Class A • EN55022 Class A • EN55024 • CISPR24 • CISPR 22 Class A • AS/NZS CISPR 22 Class A • ETS 300 386 • KN 22 Class A • EN61000-3-2 • EN61000-3-3 • CNS13438 Class A Safety Standards: • UL 60950-1 • CAN/CSA C22.2 No. 60950 • EN 60950-1 • IEC 60950-1 • AS/NZS 60950-1
NEBS criteria levels	SR-3580 Issue 3, June 2007 (GR-63-CORE, issue 3, and GR-1089-CORE, issue 4)[2]
ETSI	• ETS 300 019-2-1, Class 1.2 Storage • ETS 300 019-2-2, 2.3 Transportation • ETS 300 019-2-3, Class 3.2 Stationary Use

[2] In NEBs environments you will require to install Airdams in slots immediately above and below in the adjacent slots to each installed 6900 Series 8 Port 10 Gigabit Ethernet Fiber Module if no active Module is installed in those slots. The part number for the Airdam is WS-X6K-SLOT-CVR.

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Product	Specifications
Network management	• ETHERLIKE-MIB (RFC 1643) • IP-MIB and IP-FORWARD-MIB for IPv6 • IF-MIB (RFC 1573) • Bridge MIB (RFC 1493) • CISCO-STACK-MIB • CISCO-VTP-MIB • CISCO-CDP-MIB • RMON MIB (RFC 1757) • CISCO-PAGP-MIB • CISCO-STP-EXTENSIONS-MIB • CISCO-VLAN-BRIDGE-MIB • CISCO-VLAN-MEMBERSHIP-MIB • ENTITY-MIB (RFC 2037) • HC-RMON • RFC1213-MIB (MIB-II) • SMON-MIB
Power requirements	• WS-X6908-10G-2T: 588 Watts Maximum • WS-X6908-10G-2TXL: 603 Watts Maximum • At the time of the writing of this datasheet, the final power numbers are not known. Please consult the 12.2(50)SY Release Notes for these numbers if they are not provided here. • Go to http://www.cisco.com/go/powercalculator for easy power consumption calculation.
Indicators	• Status: green (operational), red (faulty), and orange (module booting) • Link: green (port enabled and connected), orange (port disabled), and off (port enabled and not connected) • Blue Beacon: Used to ID a specific module in a fully populated system, within a multi-system environment

Ordering Information

Table 4 gives ordering information.

Table 4. Part Numbers for Ordering

Part Numbers	Description
10 Gigabit Ethernet Fiber Modules	
WS-X6908-10G-2T	Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module with DFC4 (Requires X2)
WS-X6908-10G-2TXL	Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module with DFC4XL (Requires X2)
WS-X6908-10G-2T=	Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module with DFC4 (Requires X2) Spare
WS-X6908-10G-2TXL=	Cisco Catalyst 6900 Series 8-Port 10 Gigabit Ethernet Fiber Module with DFC4XL (Requires X2) Spare
WS-F6K-DFC4-EXL=	Cisco Catalyst 6500 Dist Fwd Card- DFC4XL Spare, for WS-X6908-10G-2T
X2 Optics	
X2-10GB-LRM	10GBASE-LRM X2 (multimode fiber)
XR-10GB-LR	10GBASE-LR X2 (single-mode fiber)
X2-10GB-SR	10GBASE-SR X2 (multimode fiber)
X2-10GB-ER	10GBASE-ER X2 (single-mode fiber)
X2-10GB-ZR	10GBASE-ZR X2 (single-mode fiber)
X2-10GB-LX4	10GBASE-LX4 X2 (multimode fiber)
X2-10GB-CX4	10GBASE-CX4 X2 (copper InfiniBand cable)
X2-10G-DWDM	32 wavelengths over single strand of single-mode fiber; 80 km
SFP Optics	
CVR-X2-SFP10G	SFP+ converter for X2 ports
SFP-10G-LRM	10GBASE-LRM SFP+ Transceiver Module
SFP-10G-LR	10GBASE-LR SFP+ Transceiver Module
SFP-10G-ER	10GBASE-ER SFP+ Transceiver Module
SFP-10G-SR	10GBASE-SR SFP+ transceiver module

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Part Numbers	Description
SFP-H10GB-CU1M1	1-m 10G SFP+ Twinax cable assembly, passive
SFP-H10GB-CU3M1	3-m 10G SFP+ Twinax cable assembly, passive
SFP-H10GB-CU5M1	5-m 10G SFP+ Twinax cable assembly, passive

Note:

- 8-port 10 Gigabit Ethernet Fiber Module:
  - WS-X6908-10G-2T ships with WS-X6908-10GE and WS-F6K-DFC4-E.
  - WS-X6908-10G-2TXL ships with WS-X6908-10GE and WS-F6K-DFC4-EXL.
  - The front panel of these modules is labeled:

    WS-X6908-10GE-2T or

    WS-X6908-10GE-2TXL if it is XL version
  - Cisco IOS® Software commands will display WS-X6908-10GE with either WS-F6K-DFC4-E or WS-F6K-DFC4-EXL for XL version.

Cisco and Partner Services for Expanding the Borderless Network

Drive borderless network innovation, optimize operational efficiencies, establish business flexibility, and gain competitive advantage using intelligent, personalized services from Cisco and our partners. Through a discovery process that begins with understanding your business objectives, we help you integrate end-to-end solutions into your architecture and incorporate network services onto that platform. Sharing knowledge and leading practices, we support your success every step of the way as you deploy, absorb, manage, and scale new technology. Choose from a flexible suite of support services designed to meet your business needs and help you maintain high-quality network performance while controlling operational costs. For more information, visit http://www.cisco.com/go/services.

Warranty Coverage and Technical Service Options

The Cisco Catalyst 6500 System comes with a Cisco 90-day hardware warranty. Adding a contract for a technical service offering such as Cisco SMARTnet® Service to your device coverage provides access to the Cisco Technical Assistance Center (TAC) and can provide a variety of hardware replacement options to meet critical business needs, updates for licensed OS software, and registered access to the extensive Cisco.com knowledge base and support tools.

For more information about Cisco warranties, go to http://www.cisco.com/go/warranty.

For information about Cisco Technical Services, go to http://www.cisco.com/go/ts.

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Table 5 shows the Cisco technical services available for the Cisco Catalyst 6500 System.

Table 5. Cisco Technical Services for Cisco Catalyst 6500 System

Technical Services
Cisco SMARTnet Service • Around-the-clock, global access to the Cisco Technical Assistance Center (TAC) • Unrestricted access to the extensive Cisco.com resources, communities, and tools • Next-business-day, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement[3] and onsite parts replacement and installation available • Ongoing operating system software updates within the licensed feature set[4] • Proactive diagnostics and real-time alerts on Smart Call Home enabled devices
Cisco Focused Technical Support Services 3 levels of premium, high-touch services are available: • Cisco High-Touch Operations Management Service • Cisco High-Touch Technical Support Service • Cisco High-Touch Engineering Service Valid Cisco SMARTnet or SP Base contracts on all network equipment are required.

For More Information

For more information about Cisco Catalyst 6500 Series Switches, visit http://www.cisco.com/en/US/products/hw/switches/ps708/index.html or contact your local account representative.

[3] Cisco operating system updates include the following: maintenance releases, minor updates, and major updates within the licensed feature set.
[4] Advance hardware replacement is available in various service-level combinations. For example, 8x5xNBD indicates that shipment will be initiated during the standard 8-hour business day, 5 days a week (the generally accepted business days within the relevant region), with next business day (NBD) delivery. Where NBD is not available, same day ship is provided. Restrictions apply; please review the appropriate service descriptions for details.

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