

## Two-Port Enhanced Gigabit Ethernet Module for the Catalyst 8540 Platform

THE CATALYST<sup>®</sup> 8540 TWO-PORT ENHANCED GIGABIT ETHERNET MODULE IS IDEAL FOR SUPPORTING LAYER 3, GIGABIT BACKBONE APPLICATIONS THAT REQUIRE NONBLOCKING, WIRE-SPEED PERFORMANCE. THE TWO-PORT ENHANCED GIGABIT ETHERNET MODULE IS SUPPORTED BY THE CATALYST 8540 PLATFORM, A HIGH-END MULTISERVICE SWITCH THAT PROVIDES LARGE ENTERPRISES AND SERVICE PROVIDERS WITH BOTH LAYER 3 AND ATM SWITCHING IN ONE INTEGRATED PLATFORM.



### Feature Support

The following features and capabilities are supported in the Two-Port Enhanced Gigabit Ethernet Module.

Feature	Description
Wirespeed Routing	Wirespeed routing on both OC-12 Packet-over-SONET uplink and Gigabit Ethernet port
Built-in ACL	Access Control List support on both Packet-over-SONET uplink and Gigabit Ethernet ports
Large Routing Table	Up to 256K routing table entries
QoS Capabilities	Module developed with enhanced on-board processor to provide QoS capabilities
Cisco IOS	Feature rich software for advanced networking applications

### Layer 3 Switching

The Two-Port Enhanced Gigabit Ethernet Module supports Layer 3 routing and switching on each port. This Layer 3 or inter-VLAN traffic goes through the main switching fabric.

### Industry Standards Support

The Two-Port Enhanced Gigabit Ethernet Module supports industry-standard IEEE 802.3z, ensuring vendor interoperability and long-term investment protection. Auto-negotiation is also supported for flow control.

### Gigabit EtherChannel Support

Cisco Gigabit EtherChannel<sup>®</sup> technology is based on proven EtherChannel technology pioneered by Cisco with thousands of Fast EtherChannel ports deployed in production networks. Gigabit EtherChannel technology enables critical backbone trunks to be scaled to multiple gigabits of throughput as backbone traffic continues to grow. By combining four Gigabit Ethernet links into one logical link, up to 8 Gbps of throughput is possible between devices. Customers can take advantage of the new multimodule channeling feature that combines ports from the same module or from different modules into a Gigabit EtherChannel link. Furthermore, Gigabit EtherChannel technology provides an unmatched level of resiliency. If one physical port on a Gigabit EtherChannel link goes down, all traffic on that port is automatically redirected and load balanced to the remaining ports. This redirection happens without operator intervention, assuring maximum backbone throughput and availability.

### **Modular Gigabit Interfaces Provide Choice and Upgrade Flexibility**

The Two-Port Enhanced Gigabit Ethernet Module for the Catalyst 8540 supports Gigabit interface converter (GBIC) modular technology to ensure customers have the maximum flexibility in configuring physical network interfaces in their Gigabit Ethernet network. GBICs enable the customer to intermix any combination of 802.3z-compliant 1000BaseX interfaces on a port-by-port basis. GBICs provide easy selection or change of interfaces. Cisco is offering a 1000BaseLX/LH interface that is fully compliant with the IEEE 802.3z 1000BaseLX standard, but has the ability to go up to 10 km over single-mode fiber, and 5 km further than garden-variety 1000BaseLX interfaces. The 1000BaseZX standard has the ability to transmit traffic up to 100 km over dispersion-shifted fiber.

### **Gigabit Ethernet Module OIR Support for Maximum Uptime**

The Catalyst 8540 supports advanced technology that enables online insertion and removal (OIR) of the Two-Port Enhanced Gigabit Ethernet Module without powering down the switch. When the module is removed or inserted while the switch is powered on and operating, the system:

- Determines whether there is sufficient power for the module
- Scans the backplane for configuration changes
- Initializes all newly inserted switching modules
- Places any previously configured interfaces on the switching module back to the state they were in when they were removed

The ability to perform OIR on the Gigabit Ethernet modules in the Catalyst 8540 switches enables maximum system uptime in addition to the configuration flexibility many customers want and need.

### **Access Control Lists**

The following built-in ACL features are supported in the two-port enhanced Gigabit Ethernet interface modules:

- All Cisco IOS® ACLs for control-plane traffic
- Standard/extended IP access lists (1-99; 1301-1999/100-199; 2000-2699) in hardware; both inbound and outbound
- Named access lists
- Standard IPX access lists (800-899) without source node; both inbound and outbound

### **Multiprotocol Routing**

The Catalyst 8540 provides support for IP and IPX forwarding and routing. IP routing support includes Routing Information Protocol (RIP) Versions 1 and 2, Open Shortest Path First (OSPF), Interior Gateway Routing Protocol (IGRP) and Enhanced IGRP (EIGRP), and Border Gateway Protocol Version 4 (BGPv4). IPX routing support includes RIP and EIGRP.

### **Cisco Express Forwarding**

The Two-Port Enhanced Gigabit Ethernet Module features Cisco Express Forwarding (CEF), a new paradigm for route distribution and forwarding by distributing routing information from the central processor to the individual interface modules. Used within the Internet, this technology provides for scalability in large campus core networks. CEF provides Layer 3 forwarding based on a “shadow” of the routing table, resulting in very-high-speed routing table lookups and forwarding. This feature provides for wire-speed IP and IPX forwarding for all ports.

### **Layer 2 VLAN and Switching**

Ports may be configured as access ports (no virtual LAN [VLAN] tagging) or trunk ports (tagging using 802.1 Q or Inter-Switch Link [ISL] encapsulation). Access ports are used for direct server connectivity. Trunk ports are used for high-density wiring-closet aggregation with the Catalyst 8540 providing inter-VLAN routing as well as server network interface cards (NICs) that support dot1Q or ISL encapsulation. In addition, IEEE 802.1d Spanning-Tree Protocol is supported.

### **Integrated Routing and Bridging Support**

Integrated routing and bridging (IRB) provides a means to route a given protocol between routed and bridged interfaces. IRB also enables routing a protocol between bridge groups.

### **Internet Group Management Protocol and Cisco Group Management Protocol**

The Catalyst 8540 supports both Internet Group Management Protocol (IGMP) and Cisco Group Management Protocol (CGMP) server to enable the deployment of scalable multicast networks. IGMP uses the IP transport that enables hosts to join a multicast group dynamically. IGMP queries joins and leaves (IGMPv2) are supported. CGMP provides a way for Layer 2 switches to provide Layer 2 multicast control.

### Hot Standby Router Protocol

Hot Standby Router Protocol (HSRP) is designed to provide high network availability by routing IP traffic from hosts on Ethernet networks without relying on the availability of any single router. This feature is particularly useful for hosts that do not support a router discovery protocol, such as Internet Control Message Protocol (ICMP) Router Discovery Protocol (IRDP), and do not have the functionality to switch to a new router when their selected router reloads or loses power. Without this functionality, a router that loses its default gateway because of a router failure is unable to communicate with the network.

### Cisco Discovery Protocol

Cisco Discovery Protocol (CDP) runs on all Cisco devices so that these devices can learn about neighboring devices and exchange information. CDP uses a well-known multicast MAC address. During system initialization,

the application-specific integrated circuit (ASIC) will be configured to forward these packets to the Cisco IOS software CPU, which will process them.

### Advanced Manageability for Maximum Availability

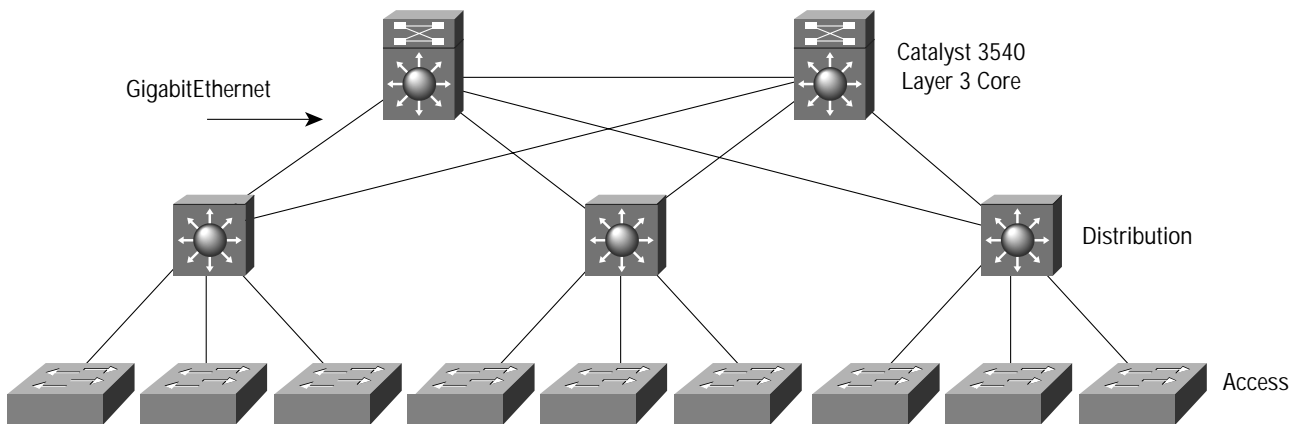
The Catalyst 8540 offers advanced network management features to make it easy to configure and monitor Gigabit Ethernet modules within the Catalyst system from the CiscoWorks enterprise management console.

### Applications

The Two-Port Enhanced Gigabit Ethernet Module is designed specifically to meet the demanding needs of large-enterprise and service-provider networks.

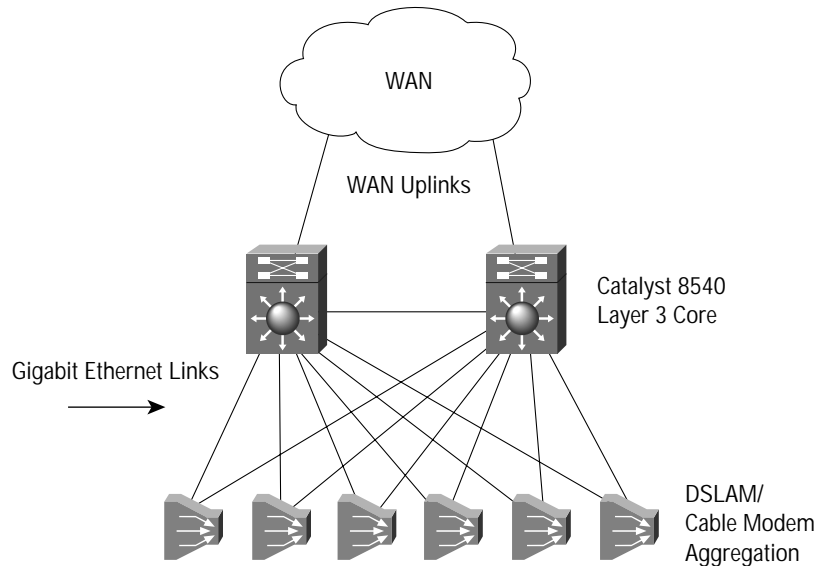
Up to eight of the Two-Port Enhanced Gigabit Ethernet Modules may be placed in a Catalyst 8540 chassis, providing 16 ports of nonblocking, wire-speed Gigabit Ethernet capacity in the core of an Enterprise network.

Figure 1 Enterprise Core Network



Service providers can use the nonblocking, wire-speed two-port Gigabit Ethernet interface module to aggregate Gigabit Ethernet traffic before it is sent out over a WAN uplink.

Figure 2 Service Provider Point-of-Presence



**Specifications**

**Standard Network Protocols**

- Ethernet: IEEE 802.3z, IEEE 802.3x, 1000BaseX

**Physical Specification**

- Occupies one slot in the Catalyst 8540 platform
- Dimensions (H x W x D): 1.2 x 14.4 x 16.0 in. (3.0 x 36.6 x 40.6 cm)

**Safety Compliance**

The Catalyst 8540 Two-Port Enhanced Gigabit Ethernet Module, when installed in a system, complies with the following compliance and safety standards:

- UL 1950
- CSA C22.2 No.950
- EN 60825-1
- EN60950
- IEC 950
- IEC 60825-1

- TS 001
- CE marking
- AS/NZS 3260
- 21CFR1040
- Network Equipment Building Systems (NEBS) Level 3

**EMC Compliance**

The Catalyst 8540 Two-Port Enhanced Gigabit Ethernet Module, when installed in a system, complies with the following EMI standards:

- FCC Part 15 (CFR 47) Class A
- VCCI Class B
- EN55022 Class B
- CISPR 22 Class B
- CE marking
- AS/NZS 3548 Class B

#### LED Indicators

- OP-DET: optical signal detected (on), no signal (off)
- Full Duplex: full-duplex mode (always on)
- RX-SYNC: link synchronized (on)
- Link: link active (on), link idle (off)
- Tx (transmit) activity: active (on), idle (off)
- Rx (receive) activity: active (on), idle (off)

#### Interfaces

- GBIC only

#### Maximum Station-to-Station Cabling Distance

Using one of the following GBIC types:

- 1000BaseSX: 50-um multimode fiber: up to 550 m
- 1000BaseLX: 62.5-um multimode fiber: up to 550 m
- 1000BaseLX: 50-um multimode fiber: up to 550 m
- 1000BaseLX: 9/10-um single-mode fiber: up to 5 km
- 1000BaseLH: 62.5-um multimode fiber: up to 550 m
- 1000BaseLH: 50-um multimode fiber: up to 550 m
- 1000BaseLH: 9/10-um single-mode fiber: up to 10 km
- 1000BaseZX: 9/10-um single-mode fiber: up to 70 km
- 1000BaseZX: disposition-shifted fiber: up to 100 km

#### Network Management

- CiscoWorks
- Simple Network Management Protocol (SNMP)
- ETHERLIKE-MIB (RFC 1643)
- MIB II (RFC 1213)
- IF-MIB (RFC 1573)
- Bridge MIB (RFC 1493)
- CISCO-CDP-MIB
- ENTITY-MIB (RFC 2037)

## Ordering Information

#### Required Software

Platform		
Catalyst 8540 MSR	12.0(10)W5(18)	S854R2-12.0.10W or higher
Catalyst 8540 CSR	12.0(10)W5(18)	S854R3-12.0.10W or higher

#### Product Availability and Part Numbers

Part Number	Product Description	Availability
C85EGE-2X-256K	C8540 2-port Enhanced GE with 256K Routing Table	Q2CY00
C85EGE-2X-64K	C8540 2-port Enhanced GE with 64K Routing Table	Q2CY00
C85EGE-2X-16K	C8540 2-port Enhanced GE with 16K Routing Table	Q2CY00

Note: The Two-Port Enhanced Gigabit Ethernet Module requires GBICs (Gigabit Interface Converters). GBICs are sold separately from the Two-Port Enhanced Gigabit Ethernet Module.

#### GBIC Part Numbers

Part Number	Product Description	Availability
WS-G5484	1000BaseSX "short-wavelength" GBIC (MMF only)	Now
WS-G5486	1000BaseLX/LH "long-wavelength/long-haul" GBIC (single mode or multimode)	Now
WS-G5487	1000BaseZX "extended-reach" GBIC (single mode)	Now

Note: The maximum number of 1000BaseZX GBICs in one Catalyst 8540 switch is limited to eight because of EMC compliance regulations.



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