

# Catalyst 2948G-L3 Switch— High-Performance Layer 3 Switching

The Catalyst<sup>®</sup> 2948G-L3 Switch is a fixed-configuration Layer 3 (L3) Ethernet Switch featuring wire-speed switching for Internet Protocol (IP), Internetwork Packet Exchange (IPX<sup>®</sup>) and IP multicast. This new Catalyst switch provides the high-performance that is required for mid-size campus backbones with just the right port density. It is ideal for aggregating multiprotocol traffic from multiple wiring closets or workgroup switches such as the Catalyst 2900, Catalyst 3500, Catalyst 4000, or Catalyst 5000 switches.

The Catalyst 2948G-L3 switch provides non-blocking routing and switching for IP, IPX, and IP multicast while also offering wire-speed Layer 2 switching for non-routable protocols such as NetBIOS and DECnet local-area transport (LAT). This capability allows network managers to augment their multi-protocol backbones with the Catalyst 2948G-L3 without having to build parallel networks, as is often required with IP-only switches.

### Catalyst 2948G-L3 Features at a Glance

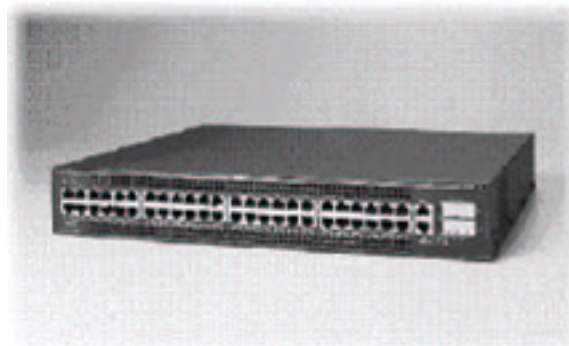
- Dedicated 48 ports of 10/100-Mbps Ethernet and two ports of 1000BaseX Gigabit Ethernet with gigabit interface converter (GBIC) support; all ports with Layer 3 switching capability

- High-performance—more than 10 Mpps Layer 3 switching and routing of IP, IPX switches, and IP multicast
- 22 Gbps non-blocking switch fabric
- High-performance CPU with Cisco IOS<sup>®</sup> system software
- Quality of service (QoS)—multiple queues with weighted round robin (WRR) scheduling
- Comprehensive management tools based on standard CiscoWorks2000 applications
- Optional redundant external power supply

### Introducing the Catalyst 2948G-L3

The Catalyst 2948G-L3 is a fixed-configuration Layer 3 Ethernet switch with 48 RJ-45 10/100 ports and two Gigabit Ethernet uplink ports with modular GBIC interfaces. The switch is ideal for backbone deployment in small to mid-sized networks that require wire-speed Layer 3 performance but do not require the high 10/100 Mbps Ethernet port counts or Gigabit Ethernet density offered in the Catalyst 6000 and Catalyst 8500 series of switches.

Figure Caption  
Catalyst 2948G-L3  
Fixed-Configuration  
Wire-Speed Layer 3  
Switch





## Catalyst 2948G-L3 Overview

The Catalyst 2948G-L3 provides an aggregate throughput of more than 10 Mpps for Layer 3 switching. These data rates apply not only to IP and IPX traffic but also to IP multicast and bridged traffic and are a result of using high-speed application-specific integrated circuit (ASIC) technology on each port to perform true Layer 3 switching. The Catalyst 2948G-L3 supports a high-performance architecture with 22 Gbps bandwidth. The switch fabric is capable of supporting all 48 10/100 ports and two Gigabit uplinks simultaneously at wire speed.

The Catalyst 2948G-L3 is housed in a 1.5 rack unit (RU) chassis and can be provisioned with an optional external redundant power supply. It supports a 22 Gbps shared-memory, fully non-blocking switch fabric, high-performance RISC processor that provides the routing intelligence and individual port-based ASICs for the Layer 3 switching. The Catalyst 2948G-L3 uses Cisco Express Forwarding (CEF), which has been developed for the Cisco 12000 series gigabit switch router (GSR), the Catalyst 8500, and the Cisco 7500. This technology provides Layer 3 switching based on a topology map of the entire network that is distributed to each port-based ASIC, allowing it to make autonomous switching decisions without the involvement of a centralized CPU.

## Catalyst 2948G-L3 Layer 3 Highlights—IP at Millions of Packets per Second

The Catalyst 2948G-L3 provides a complete IP routing solution without sacrificing any of the services that are required to build a scalable network. The Catalyst 2948G-L3 is a feature-rich switch with full Cisco IOS implementation that allows network managers to continue to administer and manage their networks as they do today while scaling their backbone bandwidths to gigabit speeds. The Catalyst 2948G-L3 supports all the routing protocols that are used today in mid-sized networks. These protocols include:

- Interior Gateway Routing Protocol (IGRP)
- Enhanced IGRP (EIGRP)
- Open Shortest Path First (OSPF)
- Routing Information Protocol (RIP) Versions 1 and 2
- Static routes
- Route redistribution

In addition to these routing protocols, the Catalyst 2948G-L3 supports all the additional protocols necessary to build scalable, reliable networks, including:

- Hot Standby Router Protocol (HSRP)
- Internet Group Management Protocol (IGMP) 1 and 2
- Dynamic Host Configuration Protocol (DHCP) Relay
- Cisco Group Management Protocol (CGMP)
- Internet Control Message Protocol (ICMP)
- Gateway Discovery Protocol (GDP)
- ICMP Router Discovery Protocol (IRDP)
- Bootstrap Protocol (BOOTP) Relay



## **IPX Switching Feature Set**

The Catalyst 2948G-L3 with its IPX wire-speed performance is also a full-fledged IPX router with the enhancements only Cisco IOS can offer. It provides basic services such as Novell NetWork RIP and Service Advertising Protocols (SAPs), value-added routing protocols such as Novell Enhanced IGRP, as well as route distribution among all of these protocols. In addition, the Catalyst 2948G-L3 supports those features that help to make a large Novell network scale. These features include:

- Get Nearest Server (GNS) response filtering and round-robin GNS support
- Novell RIP
- SAP, protocol, and NetBIOS name filtering
- Equal-cost path load sharing
- Variable RIP and SAP timers
- Novell NetBIOS type 20 propagation support for legacy applications that continue to be mission critical
- Novell-compliant IPX ping utility

This feature set as well as the wire-speed IPX switching make the Catalyst 2948G-L3 unique in terms of switching platforms.

## **IP Multicast Switching and Routing**

The Catalyst 2948G-L3 supports IP multicast at wire speeds across all its ports. As multicast applications such as Microsoft NetShow and NetMeeting become more widely deployed, end-to-end multicast support becomes increasingly important with multicast routing protocols that are integral to a consistent end-to-end multicast solution. The Catalyst 2948G-L3 supports both Protocol-Independent Multicast (PIM) sparse and dense modes, and Distance Vector Multicast Routing Protocol (DVMRP) interoperability for legacy applications. The Catalyst 2948G-L3 provides support for IGMP, Versions 1 and 2, and CGMP server capabilities for integrating IP multicast support with Catalyst wiring closet switches. These protocols are necessary not only for IP multicast clients to join groups but also for efficient leave processing, which saves bandwidth and end-station CPU cycles.

## **Fast EtherChannel and Gigabit EtherChannel Technologies**

The Catalyst 2948G-L3 supports both Fast EtherChannel<sup>®</sup> and Gigabit EtherChannel technologies, allowing network managers to group up to four of the 10/100 ports into a channel and group the two Gigabit Ethernets into an uplink channel.

## **Quality of Service**

The Catalyst 2948G-L3 incorporates a centralized non-blocking 22-Gb shared-memory switching fabric. The rich QoS capabilities of the switching fabric enable network managers to protect mission-critical applications by supporting delay-sensitive traffic while managing bandwidth in the campus backbone. The switching fabric supports per-flow queuing (PFQ), differentiated delay priorities using a WRR scheduler for delay-sensitive applications, and differentiated loss priorities for managing congestion and traffic policing and shaping. The fast packet memory embedded in the switching fabric is allocated dynamically on a per-queue (flow) basis. This dynamic allocation used in conjunction with user-defined queue thresholds and configurable queue scheduling weights ensures that time-sensitive traffic is handled properly with no packet loss. These thresholds and queuing weights can be dynamically adjusted with CiscoAssure Policy Networking, allowing an end-to-end QoS solution.



## Security

The Catalyst 2948G-L3 has the ability to prevent security breaches via the use of both IP and IPX access lists. This is useful in preventing users from accessing certain applications or services. The Catalyst 2948G-L3 supports both inbound and outbound access lists on its two Gigabit Ethernet interfaces. These access lists can be defined similar to any Cisco IOS router as standard IPX access lists as well as standard and extended IP-based access lists. Having both inbound and outbound control of packets on the Gigabit Ethernets allows network managers to prevent traffic both on egress as well as ingress on the 10/100 Ethernet ports. In addition, the Catalyst 2948G-L3 will have the capability to prevent traffic communication between 10/100 Ethernet ports. When enabled, users on the 10/100 ports can only send traffic to the Gigabit Ethernet ports and not to each other.

## Comprehensive Network Management of CiscoWorks2000

The Catalyst 2948G-L3 is managed by the powerful CiscoWorks2000 network management products option. The Essentials product suite leverages the power of intranets with browser-based access anywhere within the network. Network managers can walk up to any browser console, simply identify who they are via the access control interface, and immediately begin checking on the uptime of each device, the active software versions that are running the Catalyst 2948G-L3 and print a year 2000-compliant report. For drill-down, real-time device status information, the network operations staff can launch the award-winning CiscoView application from their fault-management station and check on the health of the power supplies, CPU, and the operational status of each port at a glance.

For more sophisticated network-wide information, network managers can launch the CiscoWorks for Switched Internetworks (CWSI) campus product bundle, which automatically discovers the physical and logical representations of the Catalyst switch networks. This object-based discovery system offers detailed information on the location and type of each switch within the network and the type of links that connect the switches together and displays integrity reports on the configurations between each switch. All this information is provided graphically within the topology interface with search and location utilities. This topology interface offers a convenient launching point for other applications within CWSI campus, including the Remote Monitoring (RMON)-based traffic-analysis application.

## Summary

The Catalyst 2948G-L3 is a cost-effective, high-performance, feature-rich Layer3 Ethernet switch ideally suited for small to mid-size backbones that require Layer 3 switching in increments of 48 10/100 connections. It supports wire-speed routing and switching of IP, IPX, and IP Multicast across all interfaces. The Catalyst 2948G-L3 features a dedicated configuration of 48 10/ 100 Ethernet ports and 2 modular Gigabit Ethernet uplink ports. This new Catalyst switch has a non-blocking, 22 Gbps architecture that enables all ports to L3 switch simultaneously at wire speed. The two gigabit uplinks support standard GBIC technology, giving network managers the flexibility to select and change gigabit interfaces in the Catalyst 2948G-L3 quickly.



## Technical Specifications

### Performance

- 22 Gbps switching fabric
- Over 10 million PPS wire-speed forwarding rate for 64-byte packets
- MIPs RISC CPU-R5000, 16 MB Flash, 64 MB DRAM
- Route Entries: 12,000 minimum; 24,000 maximum
- 12 MB memory architecture shared by all ports
- Packet forwarding rate for 64-byte packets:
  - 14,880 pps for 10-Mbps ports
  - 148,800 pps for 100BaseT ports
  - 1,488,000 pps for 1000BaseX ports

### Management

- SNMP Management Information Base (MIB) II

### Standards

- IEEE 802.3x full duplex on 10BaseT, 100BaseTX, and 1000BaseX ports
- IEEE 802.1D Spanning-Tree Protocol
- IEEE 802.1Q VLAN
- IEEE 802.3z 1000BaseX specification
- 1000BaseX (GBIC)
  - 1000BaseSX
  - 1000BaseLX/LH
  - 1000BaseZX
- IEEE 802.3u 100BaseTX specification
- IEEE 802.3 10BaseT specification

### Y2K

- Y2K compliant

### Connectors and Cabling

- 10BaseT ports: RJ-45 connectors; two-pair Category 3, 4, or 5 unshielded twisted-pair (UTP) cabling
- 100BaseTX ports: RJ-45 connectors; two-pair Category 5 UTP cabling
- 1000BaseX GBIC ports: SC fiber connectors, single mode or multimode fiber
- Console and auxiliary port: RJ-45 connectors, RS-232 serial cabling



## Indicators

- Per-port status LEDs
  - link up—illuminated
    - 10 Mbps operation—Yellow
    - 100 Mbps operation—Green
  - link down—not illuminated
- System status LED—Green

## Dimensions and Weight [H x W x D]

- 2.69 x 17.1 x 18 in. (6.6 x 43.4 x 45.7 cm)
- One-and-a-half rack unit
- 18 lb. (8.08 kg)

## Environmental Conditions and Power Requirements

- Operating temperature: 32 to 113 F (0 to 45 C)
- Storage temperature: -4 to 149 F (-20 to 65 C)
- Operating relative humidity: 10 to 85% noncondensing
- Operating altitude: Up to 10,000 ft. (3000 m)
- Power consumption: 70W maximum; 239 BTU per hour
- AC input voltage/frequency: 100 to 120/200 to 240 VAC (autoranging) 50 to 60 Hz

## Safety Certifications

- UL 1950
- CSA 22.2 No. 950
- EN 60950
- IEC 950
- AS/NZS 3260, TS001
- CE

## Electromagnetic Emissions Certifications

- FCC Part 15 Class A
- EN 55022B Class A (CISPR 22 Class A)
- VCCI Class A
- AS/NZS 3548 Class A
- BCIQ
- CE Marking

## Ordering Information

Product Number	Description
WS-C2948G-L3	Catalyst 2948G-L3 switch, fixed 48 10/100 FE, 2 1000BaseX (GBIC). Includes support for IP, IP multicast, and bridging Note: GBIC modules need to be ordered separately
FR2948GL3-IP	IP Switching License, Includes OSPF, IGRP, EIGRP
FR2948GL3-IPX	IPX switching license
WS-G5484=	1000BaseSX GBIC module
WS-G5486=	1000BaseLX/LH GBIC module
WS-G5487=	1000BaseZX GBIC module
CAB-GELX-625	Gigabit Ethernet multimode conditioning cable
PWR600-RPS-YCAB=	600W redundant AC power system with DC power cables
STKRACKMOUNT1.5RU=	Catalyst 2948G-L3 rack-mount kit (spare)
CON-SNT-WS-C2948	SMARTnet maintenance 8 x 5 x nbd
CON-SNTE-WS-C2948	SMARTnet maintenance 8 x 5 x 4
CON-SNTP-WS-C2948	SMARTnet maintenance 24 x 7 x 4
CON-OS-WS-C2948	SMARTnet maintenance Onsite 8 x 5 x nbd
CON-OSE-WS-C2948	SMARTnet maintenance Onsite 8 x 5 x 4
CON-OSP-WS-C2948	SMARTnet maintenance Onsite 24 x 7 x 4
Mini-RMON Agent License WS-C2948G-EMS-LIC	Catalyst 2948G-L3 RMON Agent License



Corporate Headquarters  
Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA  
www.cisco.com  
Tel: 408 526-4000  
800 553-NETS (6387)  
Fax: 408 526-4100

European Headquarters  
Cisco Systems International BV  
Haarlerbergpark  
Haarlerbergweg 13-19  
1101 CH Amsterdam  
The Netherlands  
www-europe.cisco.com  
Tel: 31 0 20 357 1000  
Fax: 31 0 20 357 1100

Americas Headquarters  
Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA  
www.cisco.com  
Tel: 408 526-7660  
Fax: 408 527-0883

Asia Pacific Headquarters  
Cisco Systems, Inc.  
Capital Tower  
168 Robinson Road  
#22-01 to #29-01  
Singapore 068912  
www.cisco.com  
Tel: +65 6317 7777  
Fax: +65 6317 7799

Cisco Systems has more than 200 offices in the following countries and regions. Addresses, phone numbers, and fax numbers are listed on the

**Cisco Web site at [www.cisco.com/go/offices](http://www.cisco.com/go/offices)**

Argentina • Australia • Austria • Belgium • Brazil • Bulgaria • Canada • Chile • China PRC • Colombia • Costa Rica • Croatia  
Czech Republic • Denmark • Dubai, UAE • Finland • France • Germany • Greece • Hong Kong SAR • Hungary • India • Indonesia • Ireland  
Israel • Italy • Japan • Korea • Luxembourg • Malaysia • Mexico • The Netherlands • New Zealand • Norway • Peru • Philippines • Poland  
Portugal • Puerto Rico • Romania • Russia • Saudi Arabia • Scotland • Singapore • Slovakia • Slovenia • South Africa • Spain • Sweden  
Switzerland • Taiwan • Thailand • Turkey • Ukraine • United Kingdom • United States • Venezuela • Vietnam • Zimbabwe

All contents are Copyright © 1992–2003 Cisco Systems, Inc. All rights reserved. SMARTnet is a trademark; Catalyst, Cisco, Cisco IOS, Cisco Systems, EtherChannel, and IPX are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries.

All other trademarks mentioned in this document or Web site are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company.  
(0303R) 203070ETMG\_05/03