

Cisco Catalyst 2950 Series

Fast Ethernet Desktop Switches

Overview

The Cisco Catalyst® 2950 Series of fixed configuration, wire-speed Fast Ethernet desktop switches delivers premium performance and functionality for local-area networks (LANs). These standalone, 10/100 autosensing switches provide enhanced quality of service (QoS) and multicast management features—managed with the easy-to-use, Web-based Cisco Cluster Management Suite (CMS) and integrated Cisco IOS® Software. The Catalyst 2950 Gigabit-over-copper version with 10/100/1000BaseT uplinks offers medium-sized businesses and enterprise branch offices with an ideal solution to migrate from Fast Ethernet to a higher-performance Gigabit Ethernet backbone using existing Category 5 copper cabling.

The Catalyst 2950 Series consists of the Catalyst 2950T-24, 2950-24, 2950-12, and 2950C-24 switches. The Catalyst 2950-24 Switch provides 24 10/100 ports; the 2950-12 has 12 10/100 ports; the 2950T-24 has 24 10/100 ports with 2 fixed 10/100/1000BaseT uplink ports; and the 2950C-24 has 24 10/100 ports with 2 fixed 100BaseFX uplink ports. Each switch has a one rack-unit (RU) form factor, making them very flexible to deploy, either on a desktop or mounted in a wiring closet (Figure 1).

Figure 1 Catalyst 2950 Series 10/100/1000 Switches



Wire-Speed Performance in Connecting End-Stations to the LAN

With a switching fabric of 8.8 Gigabits per second (Gbps) and a maximum forwarding bandwidth of 4.4 Gbps, the Catalyst 2950 switches deliver wire-speed performance on all ports in connecting end-stations and users to the company LAN.

Catalyst 2950 switches support performance boosting features such as Fast EtherChannel® and Gigabit EtherChannel technology, offering up to 4-Gbps of high-performance bandwidth between Catalyst switches, routers, and servers.

Migrate to Gigabit Speeds in the LAN
Midmarket customers who have existing copper (Category 5, UTP) wiring infrastructure in their buildings now have a truly compelling solution to migrate to Gigabit speeds in their LANs. The Catalyst 2950T-24 delivers two fixed 10/100/1000BaseT (Gigabit-Ethernet-over-copper) uplink ports in addition to 24 10/100 ports for desktop connectivity. For a fractional increment in price per port, midsized businesses can now upgrade their LANs to higher-performance Gigabit Ethernet.

In conjunction with the new Catalyst 3550-12T multilayer Gigabit Ethernet switch, the Catalyst 2950T-24 switch provides an integrated Gigabit-Ethernet-over-copper solution for midmarket customers who have outgrown their Fast Ethernet backbones.

Sophisticated Quality of Service

The Catalyst 2950 Series delivers sophisticated LAN-edge QoS, unmatched in its category of products in the industry. All Catalyst 2950 switches support two modes of reclassification. One mode—based on the IEEE 802.1p standard—honors the class-of-service (CoS) value at the ingress point and assigns the packet to the appropriate queue. In the second mode, packets can be reclassified based on a default CoS value assigned to the ingress port by the network administrator. In the case of frames that arrive without a CoS value (such as untagged frames), Catalyst 2950 switches support classification based on a default CoS value per port assigned by the network administrator.

Once the frames have been classified or reclassified using one of the above modes, they are assigned to the appropriate queue at the egress. Catalyst 2950 switches support four egress queues, which allow the network administrator to be more discriminating and granular in assigning priorities for the various applications on the LAN traffic. Strict Priority Scheduling configuration ensures time-sensitive applications such as voice, always follow an expedited path through the switch fabric. Weighted Round Robin (WRR) scheduling, another significant enhancement, ensures that lower-priority traffic receives attention without comprising the priority settings administered by a network manager.

These features allow network administrators to prioritize mission-critical, time-sensitive traffic, such as ERP (Oracle, SAP, and so on), voice (IP telephony traffic), and CAD/CAM over less time-sensitive applications such as FTP or e-mail (SMTP).

Multicast Management via IGMP Snooping
The Internet Group Management Protocol (IGMP) Snooping feature allows the switch to “listen in” on the IGMP conversation between hosts and routers. When a switch hears an IGMP join request from a host for a given multicast group, the switch adds the host’s port number to the Group Destination Address (GDA) list for that group. And, when the switch hears an IGMP leave request, it removes the host’s port from the Content Addressable Memory (CAM) table entry.

By supporting IGMP Snooping in hardware and configuration of IGMP Snooping via the Cisco Cluster Management Suite, Catalyst 2950 switches deliver outstanding performance and ease of use in administering and managing multicast applications on the LAN.

Cisco Cluster Management Suite

The Cisco Cluster Management Suite (CMS) is Web-based software that is embedded in Catalyst 2950, 3550-12T, 3500 XL, 2900 XL, and 1900 switches. Through Cisco Switch Clustering technology, users access CMS with any standard Web browser to manage up to 16 interconnected Catalyst 2950, 3550-12T, 3500 XL, 2900 XL, and 1900 switches at once—regardless of their geographic proximity—using a single-IP address. CMS provides an integrated management interface for all Cisco IOS functionality, firmware management, and offers administrators a powerful graphical user interface (GUI) tool to easily monitor and manage their LANs.

CMS supports a broad range of standards-based connectivity options and configurations to deliver levels of performance that are scalable to meet customer requirements. Switch Cluster connectivity options for Catalyst 2950 switches include Ethernet, Fast Ethernet, Fast EtherChannel, Gigabit Ethernet (1000BaseT), and Gigabit EtherChannel connectivity. Because the technology is not limited by proprietary stacking modules or stacking cables, CMS expands the traditional cluster domain beyond a single wiring closet and lets users mix and match interconnections to meet specific management, performance, and cost requirements.



Catalyst 2950 switches can be configured either as command or member switches in a Cisco switch cluster. The command switch serves as the single-IP address management point and disburses all management instructions dictated by the network administrator. Command switches can cluster up to 15 additional interconnected member switches regardless of interconnection media. CMS also allows the network administrator to designate a standby or redundant command switch, which takes the commander duties should the primary command switch fail.

Enhanced Security, Management, and Integrated Cisco IOS Features
Cisco Catalyst 2950 Series switches have several exceptional features to increase network performance, manageability, and security. Network managers can implement higher levels of data security and boost LAN performance by deploying up to 64 virtual LANs (VLANs) per switch. This ensures that data packets are forwarded only to stations within a specific VLAN, creating a virtual firewall between groups of ports on the network and reducing broadcast transmission. VLAN trunks can be created from any port using the standards-based 802.1Q VLAN trunking architecture. Per VLAN Spanning Tree (PVST+) allows users to implement redundant uplinks while also distributing traffic loads across multiple links. This is not possible with standard Spanning Tree Protocol (STP) implementations. Cisco Uplink Fast technology ensures immediate transfer to the secondary uplink, much better than the traditional 30 to 60 second convergence time. This is yet another enhancement of the STP implementation.

With Catalyst 2950 switches, network managers can implement high levels of port and console security. Media Access control (MAC) address-based port level security prevents unauthorized stations from accessing the switch. Static and dynamic address limits can be created, giving administrators powerful control over network access. Multilevel access security on the switch console prevents unauthorized users from accessing or altering switch configuration. Terminal access controller access control

system (TACACS+) authentication enables centralized coordination of access control across a large group of networking devices.

Features And Key Benefits

Exceptional Performance

- Wire-speed, nonblocking performance on all ports, including Gigabit ports
- 8.8-Gbps switching fabric and 6.6 million packets-per-second maximum forwarding rate ensures maximum throughput—even for the most performance-sensitive applications
- 12- or 24- 10BaseT/100BaseTX autosensing ports, each delivering up to 200 Mbps of bandwidth to individual users, servers or workgroups to support bandwidth-intensive applications
- Catalyst 2950T-24 has two built-in, Gigabit Ethernet (1000BaseT) ports that deliver up to 4 Gbps aggregated bandwidth to the Gigabit Ethernet backbone, Gigabit Ethernet servers or between switches—leveraging existing Category 5 cabling infrastructure—up to a distance of 100 meters
- Catalyst 2950C-24 switch has two multimode (100BaseFX) fiber uplinks deliver up to 200 Mbps of bandwidth over an extended distance of up to 2 kilometers
- 8 MB shared memory architecture ensures the highest possible throughput with a design that eliminates head-of-line blocking, minimizes packet loss, and delivers better overall performance in environments with extensive multicast and broadcast traffic
- 16 MB of DRAM and 8 MB of Flash on-board enable the addition of future feature upgrades, maximizing customer investments
- Bandwidth aggregation through Fast EtherChannel and Gigabit EtherChannel technology enhances fault tolerance and offers up to 4 Gbps of aggregated bandwidth between switches, to routers and to individual servers
- 802.1Q standards-based VLAN trunking on each port; 64 VLANs per switch with 64 instances of Spanning Tree (PVST+)



- Superior multicast management via support for IGMP snooping in hardware

QoS

- Support for reclassifying frames based either on 802.1p CoS value or default CoS value per port assigned by network manager
- Four queues per egress port supported in hardware
- WRR queuing algorithm ensures low priority queues are not starved
- Strict Priority Scheduling configuration ensures time-sensitive applications such as voice always follow an expedited path through the switch fabric

Ease-of-Use and Ease-of-Deployment

- Cisco CMS allows the network administrator to manage up to 16 interconnected Catalyst 2950, 3550-12T, 3500 XL, 2900 XL, and 1900 switches through a single IP address, using any standard Web browser regardless of the location of the switches—that is, the switches do not have to be physically located in the same wiring closet
- Full backward compatibility ensures that any Catalyst 3500 XL, Catalyst 2900 XL, or Catalyst 1900 switch can be managed with a Catalyst 2950 using the Cisco CMS
- Cluster software upgrade feature allows the user to automatically upgrade the system software on a group of Catalyst 3550-12T, Catalyst 2950, Catalyst 3500 XL, and Catalyst 2900 XL switches
- Autosensing on each port detects the speed of the attached device and automatically configures the port for 10-, 100- or 1000-Mbps operation, easing switch deployment in mixed 10-, 100-, and 1000BaseT environments
- Autonegotiating on all ports automatically selects half- or full-duplex transmission mode to optimize bandwidth
- Default configuration stored in Flash memory ensures the switch is quickly connected to the network and can pass traffic with minimal user intervention

Integrated Cisco IOS Switching Solution

- Bandwidth aggregation through Fast EtherChannel and Gigabit EtherChannel technology enhances fault tolerance and offers up to 4 Gbps of bandwidth between switches, to routers and individual servers
- Per-port broadcast storm control prevents faulty end stations from degrading overall systems performance with broadcast storms
- Command line interface (CLI) support provides a user interface and command set, which is common across all Catalyst switches and Cisco routers
- Cisco Discovery Protocol (CDP) enables a CiscoWorks network management station to automatically discover the switch in a network topology

Superior Manageability

- Cisco CMS allows the network administrator to manage up to 16 interconnected Catalyst 2950, 3550-12T, 3500 XL, 2900 XL, and 1900 switches through a single IP address and any standard Web browser, regardless of the location of the switches—that is, the switches do not have to be physically located in the same wiring closet
- Switch clustering software upgrade allows network administrators to upgrade the system software of up to 16 interconnected switches through the easy-to-use Cisco CMS interface or a single CLI command
- Simple Network Management Protocol (SNMP), and Telnet interface support delivers comprehensive in-band management, and a CLI-based management console provides detailed out-of-band management
- Manageable through CiscoWorks Windows network management software on a per-port and per-switch basis providing a common management interface for Cisco routers, switches, and hubs
- Embedded Remote Monitoring (RMON) software agent supports four RMON groups (History, Statistics, Alarms and Events) for enhanced traffic management, monitoring, and analysis

- Switch Port Analyzing (SPAN) port monitors traffic of a single port from a single network analyzer or RMON probe
- Autoconfiguration eases deployment of switches in the network by automatically configuring multiple switches across a network via a boot server
- Domain Name Services (DNS) provide IP address resolution with user-defined device names
- Trivial File Transfer Protocol (TFTP) reduces the cost of administering software upgrades by downloading from a centralized location
- Network Time Protocol (NTP) provides an accurate and consistent timestamp to all switches within the intranet
- Spanning Tree Root Guard (STRG) prevents edge devices that are not in the network administrator's control from becoming STP root nodes
- Multi-function LEDs per port for Port Status, half-duplex/full-duplex, 10BaseT/100BaseTX/1000BaseT indication as well as switch-level status LEDs for system, RPS, and bandwidth utilization provide a comprehensive and convenient visual management system

Security and Redundancy

- IEEE 802.1x support (planned future software support)
 - Cisco Uplink Fast technology ensures quick fail-over (typically fewer than 3 seconds) recovery enhancing overall network stability and reliability
 - Private VLAN Edge provides security and isolation between ports on a switch, ensuring that voice traffic travels directly from its entry point to the aggregation device through a virtual path and cannot be directed to a different port
 - MAC-based port level security prevents unauthorized stations from accessing the switch
 - User-selectable address learning mode simplifies configuration and enhances security
 - IEEE 802.1D STP support for redundant backbone connections and loop-free networks simplifies network configuration and improves fault tolerance
- Support for the Cisco Redundant Power System 300 (RPS 300), which provides a backup internal power supply for up to six units, provides improved fault tolerance and network uptime
 - Multilevel security on console access prevents unauthorized users from altering the switch configuration
 - Support for TACACS+ authentication enables centralized control of the switch and restricts unauthorized users from altering the configuration

Technical Specifications

Performance

- 8.8-Gbps switching fabric
- Forwarding Rates based on 64-byte packets
 - Catalyst 2950-12: 1.8 Mpps wire-speed forwarding rate
 - Catalyst 2950-24: 3.6 Mpps wire-speed forwarding rate
 - Catalyst 2950T-24: 6.6 Mpps wire-speed forwarding rate
 - Catalyst 2950C-24: 3.9 Mpps wire-speed forwarding rate

- 4.4-Gbps maximum forwarding bandwidth
- 8 MB packet buffer memory architecture shared by all ports
- 16 MB DRAM and 8 MB Flash memory
- 8,000 MAC addresses

Management

- SNMP Management Information Base (MIB) II, SNMP MIB extensions, Bridging MIB (RFC 1493)

Standards

- IEEE 802.1x support (planned future software support)
- IEEE 802.3x full duplex on 10BaseT, 100BaseTX, and 1000BaseT ports
- IEEE 802.1D Spanning-Tree Protocol
- IEEE 802.1p CoS
- IEEE 802.1Q VLAN
- IEEE 802.3ab 1000BaseT specification
- 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
- 1000BaseT ports: RJ-45 connectors; two-pair Category 5 UTP cabling
- 100BaseFX ports: MT-RJ connectors, 10/125 or 62.5/125 micron multi-mode fiber-optic cabling
- Management console port: 8-pin RJ-45 connector, RJ-45-to-RJ-45 rollover cable with RJ-45-to-DB9 adapter for PC connections. For terminal connections, use RJ-45-to-DB25 female DTE adapter (can be ordered separately from Cisco. Part Number: ACS-DSBUSYN=)

MT-RJ Patch Cables (Type of Cable, Cisco Part Number)

- 1-meter, MT-RJ-to-SC multimode cable, CAB-MTRJ-SC-MM-1M
- 3-meter, MT-RJ-to-SC multimode cable, CAB-MTRJ-SC-MM-3M
- 5-meter, MT-RJ-to-SC multimode cable, CAB-MTRJ-SC-MM-5M
- 1-meter, MT-RJ-to-ST multimode cable, CAB-MTRJ-ST-MM-1M
- 3-meter, MT-RJ-to-ST multimode cable, CAB-MTRJ-ST-MM-3M
- 5-meter, MT-RJ-to-ST multimode cable, CAB-MTRJ-ST-MM-5M

Power Connectors

You can provide power to a switch either by using the internal power supply or the Cisco RPS 300. The connectors are located at the back of the switch.

Internal Power Supply Connector

- The internal power supply is an autoranging unit
- Supports input voltages between 100 and 240 VAC
- Use the supplied AC power cord to connect the AC power connector to an AC power outlet

Cisco RPS Connector

- Connection for an optional Cisco RPS 300 that uses AC input and supplies DC output to the switch
- 300-watt redundant power system that can support six external network devices and provides power to one failed device at a time
- Automatically senses when the internal power supply of a connected device fails and provides power to the failed device, preventing loss of network traffic
- When internal power supply has been brought up or replaced, the RPS 300 automatically stops powering the device
- Attach only the Cisco RPS 300 (model PWR300-AC-RPS-N1) to the RPS receptacle

Indicators

- Per-port status LEDs: link integrity, disabled, activity, speed, and full-duplex indications
- System status LEDs: system, RPS, and bandwidth utilization indications

Dimensions and Weight (H x W x D)

- Dimensions: 1.72 x 17.5 x 9.52 in. (4.36 x 44.45 x 24.18 cm)
- One rack-unit (RU) high (1.72 in./4.36 cm)
- Weight: 6.5 lbs (3.0 kg)

Environmental Conditions and Power Requirements

Environmental Ranges

- Operating temperature: 23 to 113 F (-5° C to 45 C)
- Storage temperature: -13 to 158 F (-25 to 70 C)
- Operating relative humidity: 10 to 95% (non-condensing)
- Operating altitude: Up to 10,000 ft (3,000 m)
- Storage Altitude: Up to 15,000 ft (4,500 m)

Power Requirements

- Power consumption: 30W (maximum), 102 BTUs per hour
- AC input voltage/frequency: 100 to 127 or 200 to 240 VAC (auto-ranging), 50 to 60 Hz
- DC Input Voltages: +12V @ 4.5A

Fiber-port Specifications (Catalyst 2950C-24)

- Optical Transmitter Wavelength: 1300 nm (nanometers)
- Optical receiver sensibility: -14dBm (decibel milliwatt)
- Optical transmitter power: -19dBm to -14 dBm
- Transmit: -19 dBm to -14dBm

Mean Time Between Failure (MTBF) Predictions

Part Number	MTBF Predictions (Hours)
WS-C2950T-24	297,144
WS-C2950-24	268,292
WS-C2950C-24	268,292
WS-C2950-12	318,440

Regulatory Agency Approvals

Safety Certifications

- UL/CSA G0950 Third Edition
- CSA 22.2 No. 950
- EN 60950
- IEC 950
- AS/NZS 3260, TS001
- CE Marking

Electromagnetic Emissions Certifications

- FCC Part 15 Class A
- EN 55022 Class A (CISPR 22 Class A)
- VCCI Class A
- AS/NZS 3548 Class A
- CE Marking
- CLEI Code
- BSMI Class A

Warranty

- Lifetime limited warranty

Service and Support

The services and support programs described in the table below are available as part of the Cisco Desktop Switching Service and Support solution.

Service and Support	Features	Benefits
Rapid Deployment Tools and Service		
Total Implementation Solutions	<ul style="list-style-type: none"> • Project management • Site survey, configuration deployment • Installation, text, and cutover • Training • Major Moves, Adds, Changes • Design review and product staging 	<ul style="list-style-type: none"> • Supplements existing staff • Ensures functionality meets needs • Mitigates risk
Core Service and Support <ul style="list-style-type: none"> • TAC • SMARTnet™ support • SMARTnet Onsite (OS) support 	<ul style="list-style-type: none"> • 24x7 access to software updates • Web access to technical repositories • Telephone support through the Technical Assistance Center • Advance replacement of hardware parts 	<ul style="list-style-type: none"> • Enables proactive or expedited issue resolution • Lowers cost of ownership by utilizing Cisco expertise and knowledge • Minimize network downtime
Advanced Service and Support		
Solution Packages		
Cisco Business Essential Solution (BES)	<ul style="list-style-type: none"> • Comprehensive solution that includes Network Supported Accounts (NSA) Program, ETAC Relationship Manager, SMARTnet and SMARTnet Onsite support, Cisco Interactive Mentor (complete library; five user licenses) 	<ul style="list-style-type: none"> • Maximizes network stability and performance • Ensures Seamless Change management • Augments internal networking staff • Deploys solutions and technologies faster with less risk
Cisco Business Critical Solution (BCS)	<ul style="list-style-type: none"> • Comprehensive high availability solution that includes: Complete Business Essential Solution, Service Delivery Manager, NSA-High-Availability Services (NSA-HAS) Program and Network Availability SAL, 24x7 access to ETAC and CIM enterprise-wide license 	<ul style="list-style-type: none"> • Fully optimize network to achieve business goals and ahead of competitors • Increase control over network operations • Proactively drive high network availability

Ordering Information

Model Numbers

- WS-C2950-12: 12 10/100 ports
- WS-C2950-24: 24 10/100 ports
- WS-C2950T-24: 24 10/100 ports + 2 10/100/1000BaseT ports
- WS-C2950C-24: 24 10/100 ports + 2 100BaseFX ports

For More Information

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