Catalyst **3524-PWR XL Stackable 10/100** Ethernet Switch

The Catalyst® 3524-PWR XL switch is a member of the Cisco Systems Catalyst 3500 Series XL, a scalable line of stackable 10/100 and Gigabit Ethernet switches that delivers premium performance, manageability, and flexibility with unparalleled investment protection. Advanced quality of service (QoS) fully integrated with Cisco IP phones and high-availability network features make the Catalyst 3524-PWR XL the premier switching solution for customers as they prepare their local-area networks (LAN) for integrated voice, video, and data applications.

The Catalyst 3524-PWR XL switch has 24 10/100 switched ports with integrated inline power and two Gigabit Interface Converter (GBIC)-based Gigabit Ethernet ports (See Figure 1). Integrated inline power provides DC current to devices that can accept power over traditional unshielded twisted pair (UTP) cabling (for example, the Cisco 7900 family of Cisco IP phones). The dual GBIC-based Gigabit Ethernet implementation provides customers with tremendous deployment flexibility—allowing customers to implement one type of stacking and uplink configuration today, while preserving the option to migrate that configuration in the future.

Any customer who expects to deploy converged network applications in the future must consider deploying LAN equipment such as switches today that can support those increased requirements. Such switches should be able to treat time-sensitive traffic such as voice and critical data traffic with the appropriate priority and ensure that the network can recover immediately from any network convergence or power failure. The Catalyst 3524-PWR XL is easy to deploy in traditional data LANs and has the advanced QoS and high-availability features to prepare networks to run applications that merge voice, video and data traffic.

Figure 1   The Catalyst 3524-PWR XL switch provides 24 10/100 ports with integrated inline power and two built-in GBIC-based Gigabit Ethernet ports with up to 7.0 million packets per second performance

Quality of Service

All Catalyst 3500 Series XL switches support LAN edge QoS based on the Institute of Electrical and Electronic Engineers (IEEE) 802.1p class of service (CoS), as well as port-based prioritization. The Catalyst 3524-PWR XL supports port-based reclassification, which allows the switch to change the CoS settings of tagged packets on a per-port basis. For untagged packets, the switch uses the default ingress port priority to classify the packets. Priority scheduling is applied between the queues, which ensures that the high priority queue is always serviced before scheduling the lower priority traffic. These features enable users to prioritize mission critical traffic, such as Voice over IP (VoIP) and Enterprise Resource Planning (ERP) applications over regular traffic, such as File Transfer Protocol (FTP) or low-priority Web surfing traffic.

Catalyst 3500 XL and 2900 XL switches can automatically configure Virtual LAN (VLAN) and trusted-extension settings for IP telephones, which overcomes the management complexity of overlaying a voice topology onto a data network and maintaining the quality of voice traffic. With the auxiliary VLAN feature, network administrators can segment phones into separate logical networks even though the data and voice infrastructure is physically the same. The auxiliary VLAN feature places the phones into their own VLANs without any end-user intervention. The user simply plugs the phone into the switch, and the switch will provide the phone with the necessary VLAN information. Trusted extension settings allow the switch to ensure that voice traffic from an IP phone gets high-priority treatment by controlling how traffic from a daisy-chained device is classified.

Resiliency Features

Catalyst 3500 Series XL switches have a number of hardware- and software-based high-availability features that prevent network and power outages from disrupting network availability, including inline power and advanced spanning-tree convergence.

Catalyst 3524-PWR XL can provide 48-volt DC power over standard Category 5 UTP cable up to 100 meters. Instead of requiring wall power at every desktop, terminal devices such as IP telephones can utilize power provided from the Catalyst 3524-PWR XL switch. With the Phone Discovery feature, the Catalyst switch automatically detects the presence of an IP phone and supplies inline power. By deploying Catalyst 3524-PWR XL switches with uninterruptible power supply (UPS) systems in secured wiring closets, network administrators can ensure that power outages will not affect a building's network telephony connections.

The Cisco Redundant Power System 300 (RPS 300) provides internal power supply redundancy for up to six networking devices and features an immediate fail-over capability. The Cisco RPS 300 can be combined with the Catalyst 3524-PWR Series XL desktop switch and a UPS to establish the Cisco Centralized Power Provisioning System.

Dual gigabit uplinks on the Catalyst 3524-PWR XL switch provide physical uplink redundancy in case the primary link goes down. Enhanced spanning-tree convergence features such as Port Fast, Uplink Fast and Per VLAN Spanning Tree (PVST) ensure rapid convergence of spanning tree in the case of link failure. PVST allows users to implement redundant uplinks while also distributing traffic loads across multiple links—not possible with standard shielded twisted pair (STP) implementations. Cisco Uplink Fast and Cisco Cross Stack Uplink Fast technologies ensure quick failover recovery, enhancing network and stack stability and reliability.

Software Management Features

Cisco Catalyst 3500 Series XL switches include several exceptional features to increase performance and manageability for converged networks. To boost performance, Fast EtherChannel® and Gigabit EtherChannel technology offer from 400 Mbps to 4 Gbps high-performance bandwidth among Catalyst switches, routers, and servers. The Cisco Group Management Protocol (CGMP) enhances the performance of multimedia applications and reduces network traffic by allowing a switch to selectively and dynamically forward IP multicast traffic to targeted end stations.
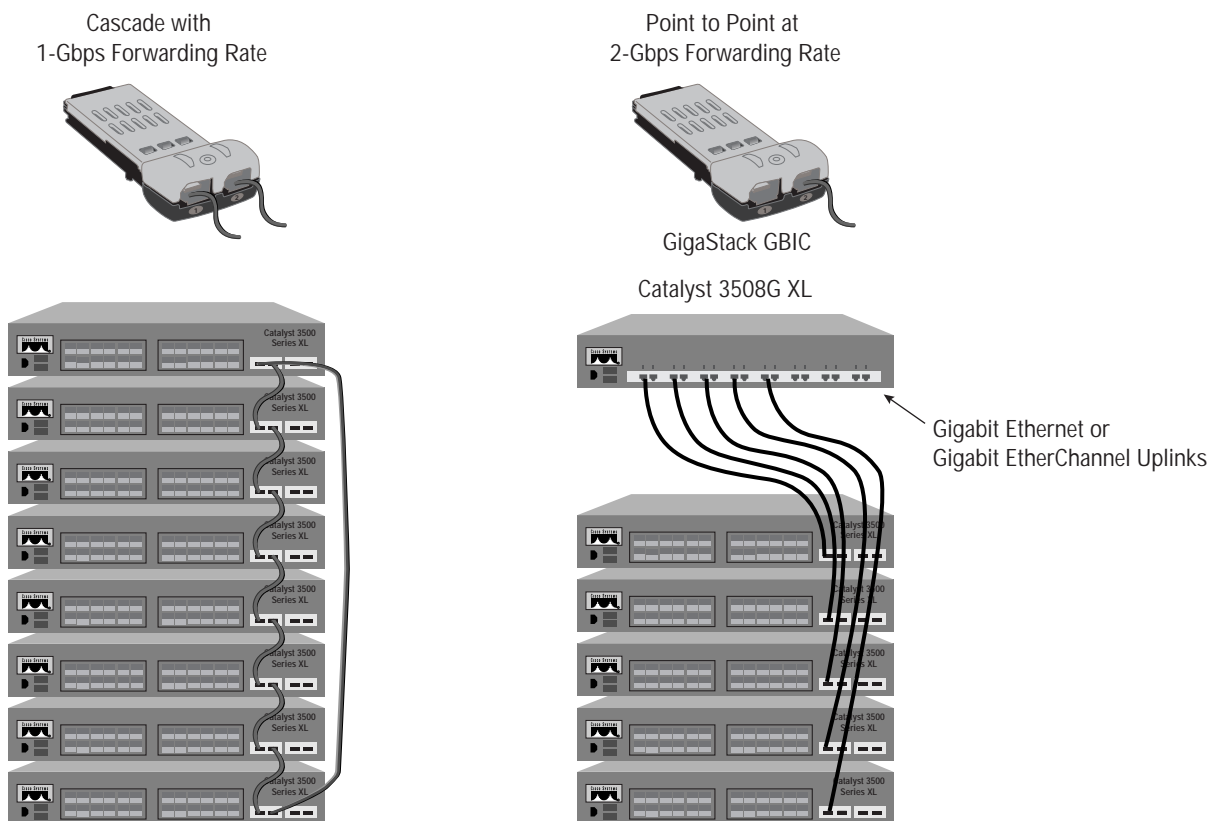
Flexible Stacking with the GigaStack GBIC

The Catalyst 3500 Series XL and Gigabit Ethernet-enabled Catalyst 2900 Series XL switches can be stacked using the low-cost Cisco GigaStack GBIC. The two-port GigaStack GBIC offers a range of highly flexible stacking and performance options. Customers can deploy a 1 Gbps independent stack backplane in a cascade configuration, or scale up to 5 Gbps of bandwidth in a star configuration using the Catalyst 3508G XL Gigabit Ethernet aggregation switch (See Figure 2). Network managers may use one or both of the available GBIC ports to create high-speed uplinks to the network core, using standard Gigabit Ethernet or Gigabit EtherChannel technology. High levels of stack resiliency can also be implemented by deploying dual redundant Gigabit Ethernet Uplinks, a redundant GigaStack loopback cable, Uplink Fast for high-speed uplink failover, and per VLAN Spanning Tree (PVST+) for uplink load balancing. This Gigabit Ethernet flexibility makes the Catalyst 3500 Series XL an ideal LAN edge complement to the Cisco Catalyst 6500 family of Gigabit Ethernet-optimized core LAN switches.

Cisco Switch Clustering

Breakthrough Cisco switch clustering technology enables up to 16 interconnected Catalyst 3500 XL, Catalyst 2900 XL, and Catalyst 1900 switches—regardless of geographic proximity—to form a single IP management domain. Switch-cluster connectivity options for the Catalyst 3500 Series XL include Ethernet, Fast Ethernet, Fast EtherChannel, low-cost Cisco GigaStack GBIC, Gigabit Ethernet, and Gigabit EtherChannel connectivity. Because the technology is not limited by proprietary stacking modules or stacking cables, Cisco switch clustering expands the traditional stacking domain beyond a single wiring closet. Catalyst 3500 XL switches can be configured either as command or member switches in a Cisco switch stack or 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.

Figure 2   Customers can start with a low-cost GigaStack, GBIC-based, 1 Gbps, independent stack backplane. At any point, users have the option to increase their stack performance to 5 Gbps using the same GigaStack GBICs In combination with the high-performance Catalyst 3508G XL Gigabit Ethernet aggregation switch.

Cascade with
1-Gbps Forwarding Rate

Point to Point at
2-Gbps Forwarding Rate

GigaStack GBIC

Catalyst 3508G XL

Gigabit Ethernet or
Gigabit EtherChannel Uplinks

Key Features/Benefits

Exceptional Performance

- Twelve, 24, or 48 10Base-T/100Base-TX autosensing ports, each delivering up to 200 Mbps of bandwidth to individual users, servers, or workgroups to support bandwidth-intensive applications
- Two built-in, GBIC-based Gigabit Ethernet ports, delivering up to 4 Gbps aggregated bandwidth to Gigabit Ethernet backbones, Gigabit Ethernet servers, or between switches
- 10.8 Gbps switching fabric and up to a 8.0-million-packets-per-second forwarding rate, ensuring high performance forwarding to each 10Base-T/100Base-TX and Gigabit Ethernet port
- 4 MB shared-memory architecture, ensuring 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
- Full-duplex operation on all ports, delivering up to 200 Mbps on 10/100 ports or 2 Gbps on 1000Base-X ports
- Dual-priority forwarding queues on each 10/100 and Gigabit Ethernet ports, enabling network traffic prioritization and seamless data, voice, and video integration through IEEE 802.1p protocol
- Trusted extension settings allows the switch to set trusted port settings for the PC port on Cisco IP phones, ensuring voice traffic receives highest priority
- Port-based reclassification allows users to reclassify IEEE 802.1p class-of-service (CoS) values on a per-port basis (via command-line interface [CLIs]) enabling a finer granularity of control to implement LAN edge QoS
- Bandwidth aggregation through Fast EtherChannel and Gigabit EtherChannel technologies, enhancing fault tolerance and offering from 400 Mbps to 4 Gbps of aggregated bandwidth between switches, and to routers and individual servers
- GigaStack GBIC delivers a low-cost, independent stack bus with a 1 Gbps forwarding bandwidth in a daisy-chain configuration, with up to nine Catalyst 3500 XL or gigabit-enabled Catalyst 2900 Series XL switches or a 2 Gbps forwarding rate in a point-to-point configuration

- GBIC-based Gigabit Ethernet ports give customers a choice of 1000Base-T, 1000Base-SX, 1000Base-LX/LH, 1000Base-ZX or Cisco GigaStack stacking GBICs to fit their connection needs
- Per-port broadcast, multicast and unicast storm control prevents faulty end stations from degrading overall system performance

Flexible and Scalable Switch Clustering Architecture

- Cisco Switch Clustering technology allows a user to manage up to sixteen interconnected Catalyst 3500 XL, 2900 XL, and Catalyst 1900 switches through a single IP address regardless of location
- Command Switch Redundancy allows customers to designate a backup command switch, which takes over cluster management functions in the event of a failure of the primary command switch

Ease of Use and Ease of Deployment

- Auxiliary VLAN via 802.1Q supports automatic segmentation of phone and data endpoints into separate logical networks
- Cluster software administration feature allows the network manager to quickly and easily upgrade the system software on a group of Catalyst 3500 XL, 2900 XL, and Catalyst 1900 switches
- IEEE 802.3z-compliant 1000Base-T, 1000Base-SX, 1000Base-LX/LH, and 1000Base-ZX physical interface support through a field-replaceable GBIC module provides customers unprecedented flexibility in switch deployment
- Autosensing on each port detects attached device speed and automatically configures the port for 10 or 100 Mbps operation, easing the deployment of the switch in mixed 10Base-T and 100Base-TX environments
- Autonegotiating on all ports automatically selects half- or full-duplex transmission mode to optimize bandwidth
- Autoconfiguration eases switch deployment in the network by automatically configuring multiple switches across a network via a boot server
- Default configuration stored in Flash memory ensures that a switch can be quickly connected to the network and can pass traffic with minimal user intervention, preserving configuration in case of a power outage

- Voice VLAN creates a new subnet for use by IP phones in cases where there are not enough free IP addresses in the existing subnets

Integrated Cisco IOS Switching Solution
- Cisco Group Management Protocol (CGMP) enables a switch to selectively and dynamically forward routed IP multicast traffic to targeted multimedia end stations, reducing overall network traffic
- CGMP Fast Leave allows end stations to quickly exit from a multicast session, reducing superfluous network traffic
- Virtual LAN trunks can be created from any port using either standards-based 802.1Q tagging or the Cisco Inter Switch Link (ISL) VLAN architecture
- IEEE 802.1p Layer 2 protocol for prioritization of mission-critical and time-sensitive traffic from data, voice, and telephony applications
- Cisco Virtual Trunking Protocol (VTP) supports dynamic VLANs and trunk configuration across all switches
- Cisco IOS® Command-Line Interface (CLI) support provides common user interface and command set across all Catalyst series switches and Cisco routers
- Cisco Discovery Protocol (CDP) enables a CiscoWorks network management station to automatically discover a switch in a network topology

Superior Manageability
- Built-in Web-based management interface provides easy-to-use management through a standard browser such as Netscape Navigator or Microsoft Explorer
- Simple Network Management Protocol (SNMP) and Telnet interface support deliver comprehensive in-band management, and a CLI-based management console provides detailed out-of-band management
- Manageable through CiscoWorks2000 network management software on a per-port and per-switch basis, providing a common management interface for Cisco routers, switches, and hubs
- 8 MB DRAM and 4 MB Flash memory onboard, enabling the addition of a continuous stream of feature upgrades and maximizing customer investments
- Configurable network port, supporting unlimited Media Access Control (MAC) addresses for backbone connectivity

- Embedded Remote Monitoring (RMON) software agent supports four RMON groups (History, Statistics, Alarms, and Events) for enhanced traffic management, monitoring, and analysis
- Support for all nine RMON groups through use of a Switch Port Analyzer (SPAN) port that permits traffic monitoring of a single port, a group of ports, or the entire switch from a single network analyzer or RMON probe
- Domain Name System (DNS) client support provides IP address resolution with user-defined device name
- 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
- Multifunction LEDs per port for port status, half-duplex/full-duplex, and 10Base-T/100Base-TX indication, as well as switch-level status LEDs for system, redundant power supply (RPS), bandwidth utilization and inline power provide a comprehensive and convenient visual management system
- Spanning Tree Root Guard (STRG) prevents devices not in the network administrator's or service provider's control from becoming STP root nodes by configuring STRG on device ports it does control
- VTP pruning limits broadcasts on VTP trunks. When VTP pruning is enabled, broadcast traffic is flooded only on trunk links required to reach the destination devices.

Security and Redundancy
- Inline power 48-volt DC power is provided over Category 5 UTP cable up to 100 meters (pin assignment: 1, 2, 3, 6)
- Cisco Uplink Fast technology ensures quick fail-over recovery, enhancing overall network stability and reliability
- Cross-Stack Uplink Fast (CSUF) technology provides increased redundancy and network resiliency through fast-spanning-tree convergence (less than two seconds) across a stack of switches using Gigastack GBICs

- 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
- Support for TACACS+ authentication enables centralized control of the switch and restricts unauthorized users from altering the configuration
- MAC-based port-level security prevents unauthorized stations from accessing the switch
- User-selectable address learning mode simplifies configuration and enhances security
- Multilevel security on console access prevents unauthorized users from altering switch configurations
- IEEE 802.1D Spanning-Tree Protocol support for redundant backbone connections and loop-free networks simplifies network configuration and improves fault tolerance
- Support for a redundant loopback cable connecting the top and bottom switches in a GigaStack stack
- Support for optional Cisco Redundant Power System 300 (RPS 300) provides internal power supply redundancy and resiliency
- Support for optional Cisco 300 watt redundant AC power system provides a backup power source for up to four units for improved fault tolerance and network uptime

Technical Specifications

Performance
- 10.8 Gbps switching fabric
- 6.5 million pps wire-speed forwarding rate for 64-byte packets
- 5.4 Gbps maximum forwarding bandwidth
- 4 MB memory architecture shared by all ports
- 8 MB DRAM and 4 MB Flash memory
- 8192 MAC addresses

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

Standards
- IEEE 802.3x full duplex on 10Base-T, 100Base-TX, and 1000Base-X ports
- IEEE 802.1D Spanning-Tree Protocol
- IEEE 802.1p CoS prioritization
- IEEE 802.1Q VLAN
- IEEE 802.3ab 1000Base-T specification
- IEEE 802.3z 1000Base-X specification
- 1000Base-X (GBIC)
  - 1000Base-T
  - 1000Base-SX
  - 1000Base-LX/LH
  - 1000Base-ZX
- IEEE 802.3u 100Base-TX specification
- IEEE 802.3 10Base-T specification

Connectors and Cabling
- 10Base-T ports: RJ-45 connectors; two-pair Category 3, 4, or 5 UTP cabling
- 100Base-TX ports: RJ-45 connectors; two-pair Category 5 UTP cabling
- 1000Base-T GBIC ports: RJ-45 connectors; two-pair Category 5 UTP cabling
- 1000Base-SX,-LX/LH and -ZX GBIC ports: SC fiber connectors, single-mode or multimode fiber
- GigaStack GBIC ports: copper-based Cisco GigaStack cabling
- Management console port: RJ-45 connector, RS-232 serial cabling

Indicators
- Per-port status LEDs—link integrity, disabled, activity, speed, full-duplex indications and inline power enabled
- System status LEDs—system, RPS, and bandwidth utilization indications
- Fan-fault on over-temperature indicators

Dimensions and Weight (H x W x D)
- 1.75 x 17.5 x 11.8 in. (4.4 x 44.5 x 30 cm)
- One rack-unit (RU) high
- 12 lb (5.45 kg)

Environmental Conditions and Power Requirements

- Operating temperature: 32 to 113 F (0 to 45 C)
- Storage temperature: -13 to 158 F (-25 to 70 C)
- Operating relative humidity: 10 to 85% noncondensing
- Operating altitude: Up to 10,000 ft (3000 m)
- Power consumption: 325W maximum; 1100 BTU per hour (Actual power consumption depends on number of IP phones connected. 325W represents 24 IP phones connected)
- AC input voltage/frequency: 100 to 127/200 to 240 VAC (autoranging) 50 to 60 Hz
- MTBF 150,000 hours

Safety Certifications

- UL 1950, Third Edition
- CAN/CSA 22.2 No. 950-95, Third Edition
- NOM-019-SCFI
- AS/NZS 3260 and TS001-1997
- IEC 60950 with all country deviations
- EN 60950 with Amendmenta A1-A4 and A11
- CE Marking

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

Warranty

- Lifetime limited warranty

Ordering Information

Model Number

- WS-C3524-PWR-XL-EN (24-port 10/100 with integrated inline power + two-port 1000Base-X, Enterprise Edition)

For More Information on Cisco Products, contact:
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