

Cisco Catalyst 3560 Series Switches

Product Overview

The Cisco® Catalyst® 3560 Series switches is a line of fixed configuration, enterprise-class, IEEE 802.3af and Cisco prestandard Power over Ethernet (PoE) switches in Fast Ethernet configurations that provide availability, security, and quality of service (QoS) to enhance network operations. The Catalyst 3560 is an ideal access layer switch for small enterprise wiring closets or branch office environments that are using their LAN infrastructure for the deployment of new products and applications such as IP telephones, wireless access points, video surveillance, building management systems, and remote video kiosks. Customers can deploy network-wide intelligent services, such as advanced QoS, rate limiting, access control lists, multicast management, and high-performance IP routing—while maintaining the simplicity of traditional LAN switching. Embedded in the Catalyst 3560 is the Cisco Cluster Management Suite (CMS) Software, which allows users to simultaneously configure and troubleshoot multiple Cisco Catalyst desktop switches using a standard Web browser. Cisco CMS Software provides configuration wizards that greatly simplify the implementation of converged networks and intelligent network services.

The Catalyst 3560 Series can provide a lower total cost of ownership (TCO) for deployments that incorporate Cisco IP phones and Cisco Aironet® wireless LAN access points, as well as any IEEE 802.3af-compliant end device. Power over Ethernet removes the need for wall power to each PoE-enabled device and eliminates the cost for additional electrical cabling that would otherwise be necessary in IP phone and wireless LAN deployments. The Catalyst 3560 24-port version can support 24 simultaneous full-powered PoE ports at 15.4 watts for maximum powered device support. Taking advantage of Cisco Catalyst Intelligent Power Management, the 48-port version can deliver the necessary power to support 24 ports at 15.4W, 48 ports at 7.7W, or any combination in-between. Maximum power availability for a converged voice and data network is attainable when a Catalyst 3560 Switch is combined with the Cisco Redundant Power System 675 (RPS 675) for seamless protection against internal power supply failures and an uninterruptible power supply (UPS) system to safeguard against power outages.

The Catalyst 3560 is part of a larger family of Cisco Catalyst switches that include the Cisco Catalyst 6500 and Catalyst 4500 modular switches. The entire family offers industry-leading performance, functionality, scalability, and flexibility. Maximum investment protection, PoE port density, and flexibility can be provided in a modular platform. For example, a high port density 10/100/1000 Power over Ethernet configuration is available in the Cisco Catalyst 6500 and Catalyst 4500 Series switches.



Configurations

- *Cisco Catalyst 3560-24PS*—24 Ethernet 10/100 ports with Power over Ethernet (PoE) and 2 Small Form-Factor Pluggable (SFP)-based Gigabit Ethernet ports; 1 rack unit (1RU)
- *Cisco Catalyst 3560-48PS*—48 Ethernet 10/100 ports with PoE and 4 SFP-based Gigabit Ethernet ports; 1RU

The Cisco Catalyst 3560 Series is available in the standard multilayer software image (SMI) or the enhanced multilayer software image (EMI). The SMI feature set includes advanced QoS, rate limiting, access control lists (ACLs), and basic static and Routing Information Protocol (RIP) routing functionality. The EMI provides a richer set of enterprise-class features, including advanced hardware-based IP unicast and multicast routing, Policy Based Routing (PBR), and the Web Cache Communication Protocol (WCCP). After initial deployment, the Catalyst 3560 EMI Upgrade Kit gives users the flexibility to upgrade to the EMI.

Figure 1
Cisco Catalyst 3560 Series Switches



Intelligence in the Network

Networks of today are evolving to address four new developments at the network edge:

- Increase in desktop computing power
- Introduction of bandwidth-intensive applications
- Expansion of highly sensitive data on the network
- Presence of multiple device types, such as IP phones, wireless LAN access points, and IP video cameras

These new demands are contending for resources with many existing mission-critical applications. As a result, IT professionals must view the edge of the network as critical to effectively manage the delivery of information and applications.

As companies increasingly rely on networks as the strategic business infrastructure, it is more important than ever to ensure their high availability, security, scalability, and control. By adding Cisco intelligent functionality to the wiring closet, customers can now deploy network-wide intelligent services that consistently address these requirements from the desktop to the core and through the WAN.

With Cisco Catalyst Intelligent Ethernet switches, Cisco enables companies to realize the full benefits of adding intelligent services into their networks. Deploying capabilities that make the network infrastructure highly available to accommodate time-critical needs, scalable to accommodate growth, secure enough to protect confidential information, and capable of differentiating and controlling traffic flows are key to further optimizing network operations.



Enhanced Security

With the wide range of security features that the Cisco Catalyst 3560 Series offers, businesses can protect important information, keep unauthorized people off the network, guard privacy, and maintain uninterrupted operation.

Cisco Identity Based Networking Services (IBNS) in the Catalyst 3560 Series prevents unauthorized access and helps ensure that users get only their designated privileges. It provides the ability to dynamically administer granular levels of network access. Using the 802.1x standard and the Cisco Access Control Server (ACS), users can be assigned a VLAN or an ACL upon authentication, regardless of where they connect to the network. This setup allows IT departments to enable strong security policies without compromising user mobility—and with minimal administrative overhead.

To guard against denial-of-service and other attacks, ACLs can be used to restrict access to sensitive portions of the network by denying packets based on source and destination MAC addresses, IP addresses, or TCP/UDP ports. ACL lookups are done in hardware, so forwarding performance is not compromised when implementing ACL-based security.

Port security can be used to limit access on an Ethernet port based on the MAC address of the device that is connected to it. It also can be used to limit the total number of devices plugged into a switch port, thereby reducing the risks of rogue wireless access points or hubs.

Secure Shell Version 2 (SSHv2), Kerberos, and Simple Network Management Protocol Version 3 (SNMPv3) encrypt administrative and network management information, protecting the network from tampering or eavesdropping. TACACS+ or RADIUS authentication enables centralized access control of switches and restricts unauthorized users from altering the configurations. Alternatively, a local username and password database can be configured on the switch itself. Fifteen levels of authorization on the switch console and two levels on the Web-based management interface provide the ability to give different levels of configuration capabilities to different administrators.

The MAC Address Notification feature can be used to monitor the network and track users by sending an alert to a management station so that network administrators know when and where users entered the network. The Dynamic Host Configuration Protocol (DHCP) Interface Tracker (Option 82) feature tracks where a user is physically connected on a network by providing both switch and port ID to a DHCP server. Additionally, the DHCP Snooping Option 82 feature enables granular control over IP address assignment by a DHCP server by augmenting a host IP address request so that the DHCP server can make a more sophisticated address assignment.

The Private VLAN Edge feature isolates ports on a switch, helping to ensure that traffic travels directly from the entry point to the aggregation device through a virtual path and cannot be directed to another port.

Availability and Scalability

The Cisco Catalyst 3560 Series is equipped with a robust set of features that allow for network scalability and higher availability through IP routing as well as a complete suite of Spanning-Tree Protocol enhancements aimed to maximize availability in a Layer 2 network.

The Cisco Catalyst 3560 switches deliver high performance, hardware-based IP routing. The Cisco Express Forwarding-based routing architecture allows for increased scalability and performance. This architecture allows for very high-speed lookups while also ensuring the stability and scalability necessary to meet the needs of future



requirements. In addition to dynamic IP unicast routing, the Catalyst 3560 Series is perfectly equipped for networks requiring multicast support. Protocol Independent Multicast (PIM) and Internet Group Management Protocol (IGMP) snooping in hardware make the Catalyst 3560 Series switches ideal for intensive multicast environments.

Implementing routed uplinks to the core will improve network availability by enabling faster failover protection and simplifying the Spanning-Tree Protocol algorithm by terminating all Spanning-Tree Protocol instances at the aggregator switch. If one of the uplinks fails, quicker failover to the redundant uplink can be achieved with a scalable routing protocol such as Open Shortest Path First (OSPF) or Enhanced Interior Gateway Routing Protocol (EIGRP) rather than relying on standard Spanning-Tree Protocol convergence. Redirection of a packet after a link failure using a routing protocol results in faster failover than a solution that uses Layer 2 spanning-tree enhancements. Additionally, routed uplinks allow better bandwidth utilization by implementing equal cost routing (ECR) on the uplinks to perform load balancing. Routed uplinks optimize the utility of uplinks out of the wiring closet by eliminating unnecessary broadcast data flows into the network backbone.

The Catalyst 3560 also offers dramatic bandwidth savings as a wiring closet switch in a multicast environment. Using routed uplinks to the network core will eliminate the requirement to transmit multiple streams of the same multicast from the upstream content servers to the wiring closet. For example, if three users are assigned to three separate VLANs and they all want to view multicast ABC, then three streams of multicast ABC must be transmitted from the upstream router to the wiring closet switch—assuming the wiring closet switch is not capable of routed uplinks. Deploying IP routing to the core with Catalyst 3560 switches allows users to create a scalable, multicast-rich network.

Enhancements to the standard Spanning-Tree Protocol, such as Per-VLAN Spanning Tree Plus (PVST+), Uplink Fast, and PortFast, maximize network uptime. PVST+ allows for Layer 2 load sharing on redundant links to efficiently use the extra capacity inherent in a redundant design. Uplink Fast, PortFast, and BackboneFast all greatly reduce the standard 30- to 60-second Spanning-Tree Protocol convergence time. Loop guard and bridge-protocol-data-unit (BPDU) guard provide Spanning-Tree Protocol loop avoidance.

Advanced QoS

The Cisco Catalyst 3560 offers superior multilayer, granular QoS features to ensure that network traffic is classified and prioritized, and that congestion is avoided in the best possible manner. Configuration of QoS is greatly simplified through automatic QoS (Auto QoS), a feature that detects Cisco IP phones and automatically configures the switch for the appropriate classification and egress queuing. This optimizes traffic prioritization and network availability without the challenge of a complex configuration.

The Catalyst 3560 can classify, reclassify, police, mark, queue, and schedule incoming packets, and can queue and schedule packets at egress. Packet classification allows the network elements to discriminate between various traffic flows and enforce policies based on Layer 2 and Layer 3 QoS fields.

To implement QoS, the Catalyst 3560 Series Switch first identifies traffic flows or packet groups, and classifies or reclassifies these groups using the Differentiated Services Code Point (DSCP) field or the 802.1p Class of Service (CoS) field. Classification and reclassification can be based on criteria as specific as the source or destination IP address, source or destination MAC address, or the Layer 4 TCP/UDP port. At the ingress, the Cisco Catalyst 3560 will also police to determine whether a packet is in or out of profile, mark to change the classification label, pass through or drop out of profile packets, and queue packets based on classification. Control plane and data plane ACLs are supported on all ports to ensure proper treatment on a per-packet basis.



The Catalyst 3560 supports four egress queues per port, allowing the network administrator to be more discriminating and specific in assigning priorities for the various applications on the LAN. At egress, the switch performs scheduling and congestion control. Scheduling is an algorithm or process that determines the order in which the queues are processed. The Catalyst 3560 Series Switch supports shaped round robin (SRR) and strict priority queuing. The SRR algorithm helps ensure differential prioritization.

These QoS features allow network administrators to prioritize mission-critical and bandwidth-intensive traffic, such as enterprise resource planning (ERP) (Oracle, Service Advertising Protocol [SAP], etc.), voice (IP telephony traffic), and computer-aided design (CAD) or computer-aided manufacturing (CAM) over less time-sensitive applications such as FTP or e-mail (Simple Mail Transfer Protocol [SMTP]). For example, it would be highly undesirable to have a large file download destined to one port on a wiring closet switch and have quality implications such as increased latency in voice traffic, destined to another port on this switch. This condition is avoided by ensuring that voice traffic is properly classified and prioritized throughout the network. Other applications, such as Web browsing, can be treated as low priority and handled on a best-effort basis.

The Catalyst 3560 Series can perform rate limiting through its support of the Cisco Committed Information Rate (CIR) function. Through CIR, bandwidth can be guaranteed in increments as low as 8 kbps. Bandwidth can be allocated based on several criteria, including MAC source address, MAC destination address, IP source address, IP destination address, and TCP/UDP port number. Bandwidth allocation is essential in network environments requiring service-level agreements or when it is necessary for the network manager to control the bandwidth given to certain users.

Management

The new Cisco Express Setup feature simplifies the initial configuration of a switch. Users now have the option to set up the switch through a Web browser, eliminating the need for more complex terminal emulation programs and knowledge of the command-line interface (CLI). Express Setup reduces the cost of deployment by enabling less-skilled personnel to quickly and simply set up switches.

Embedded in the Cisco Catalyst 3560 Series switches is the Cisco CMS Software, which allows users to simultaneously configure and troubleshoot up to 16 Cisco Catalyst desktop switches—regardless of their physical location—using a standard Web browser. Cisco CMS Software provides an integrated management interface for delivering intelligent services, such as multilayer switching, QoS, multicast, and security ACLs. Thus, Cisco CMS allows administrators to take advantage of benefits formerly reserved for only the most advanced networks without having to learn the CLI or the details of the technology. The new guide mode in Cisco CMS Software leads the user step by step through the configuration of high-end features and provides enhanced online help for context-sensitive assistance. In addition, Cisco AVVID (Architecture for Voice, Video and Integrated Data) wizards provide automated configuration of the switch to optimally support video streaming or videoconferencing, voice over IP (VoIP), and mission-critical applications. These wizards can save hours of time for network administrators, eliminate human errors, and help ensure the configuration of the switch is optimized for these applications.

In addition to Cisco CMS Software, the Catalyst 3560 Series switches provide for extensive management using SNMP network management platforms such as CiscoWorks for Switched Internetworks. Managed with CiscoWorks, Cisco Catalyst switches can be configured and managed to deliver end-to-end device, VLAN, traffic, and policy



management. Additionally, the CiscoWorks Resource Manager Essentials, a Web-based management tool, enables automated inventory collection, software deployment, easy tracking of network changes, views into device availability, and quick isolation of error conditions.

Table 1 Features and Benefits of Cisco Catalyst 3560 Series

Feature	Benefit
Ease of use and deployment	<ul style="list-style-type: none">• Express Setup simplifies initial configuration with a Web browser, eliminating the need for more complex terminal emulation programs and CLI knowledge.• IEEE 802.3af and Cisco prestandard Power over Ethernet support comes with automatic discovery to detect a Cisco prestandard or IEEE 802.3af endpoint and provide the necessary power without any user configuration.• DHCP auto-configuration of multiple switches through a boot server eases switch deployment.• Automatic QoS (AutoQoS) simplifies QoS configuration in VoIP networks by issuing interface and global switch commands to detect Cisco IP phones, classify traffic, and enable egress queue configuration.• Auto-sensing on each 10/100 port detects the speed of the attached device and automatically configures the port for 10- or 100-Mbps operation, easing switch deployment in mixed 10- and 100-Mbps environments.• Auto-negotiating on all ports automatically selects half- or full-duplex transmission mode to optimize bandwidth.• Dynamic Trunking Protocol (DTP) enables dynamic trunk configuration across all switch ports.• Port Aggregation Protocol (PAgP) automates the creation of Cisco Fast EtherChannel[®] groups or Gigabit EtherChannel groups to link to another switch, router, or server.• Link Aggregation Control Protocol (LACP) allows the creation of Ethernet channeling with devices that conform to IEEE 802.3ad. This feature is similar to Cisco EtherChannel technology and PAgP.• DHCP Server enables a convenient deployment option for the assignment of IP addresses in networks that do not have a dedicated DHCP server.• DHCP Relay allows a DHCP relay agent to broadcast DHCP requests to the network DHCP server.• IEEE 802.3z-compliant 1000BASE-SX, 1000BASE-LX/LH, 1000BASE-ZX, 1000BASE-T, and coarse wavelength-division (CWDM) physical interface support through a field-replaceable SFP module provides unprecedented flexibility in switch deployment.• The default configuration stored in Flash memory ensures that the switch can be quickly connected to the network and can pass traffic with minimal user intervention.• Auto-media-dependent interface cross-over (MDIX) automatically adjusts transmit and receive pairs if an incorrect cable type (cross-over or straight-through) is installed on a 10/100 port.



Table 1 Features and Benefits of Cisco Catalyst 3560 Series (Continued)

Feature	Benefit
Availability and Scalability	
Superior redundancy for fault backup	<ul style="list-style-type: none"> • Cisco UplinkFast and BackboneFast technologies help ensure quick failover recovery, enhancing overall network stability and reliability. • IEEE 802.1w Rapid Spanning-Tree Protocol (RSTP) provides rapid spanning-tree convergence independent of spanning-tree timers and the benefit of distributed processing. • Per VLAN Rapid Spanning Tree (PVRST+) allows rapid spanning-tree reconvergence on a per-VLAN spanning-tree basis, without requiring the implementation of spanning-tree instances. • Cisco Hot Standby Router Protocol (HSRP) is supported to create redundant, fail-safe routing topologies. • Command-switch redundancy enabled in Cisco CMS Software allows designation of a backup command switch that takes over cluster management functions if the primary command switch fails. • Unidirectional Link Detection Protocol (UDLD) and Aggressive UDLD allow unidirectional links to be detected and disabled to avoid problems such as spanning-tree loops. • Switch port auto-recovery (errdisable) automatically attempts to reenab a link that is disabled because of a network error. • Cisco RPS 675 support provides superior internal power-source redundancy for up to six Cisco networking devices, resulting in improved fault tolerance and network uptime. • Equal cost routing provides load balancing and redundancy. • Bandwidth aggregation up to 4 Gbps through Gigabit EtherChannel technology and up to 800 Mbps through Cisco Fast EtherChannel technology enhances fault tolerance and offers higher-speed aggregated bandwidth between switches and to routers and individual servers.
High-performance IP routing	<ul style="list-style-type: none"> • Cisco Express Forwarding hardware routing architecture delivers extremely high-performance IP routing. • Basic IP unicast routing protocols (static, RIPv1, and RIPv2) are supported for small-network routing applications. • Advanced IP unicast routing protocols (OSPF, Interior Gateway Routing Protocol [IGRP], EIGRP, and Border Gateway Protocol Version 4 [BGPv4]) are supported for load balancing and constructing scalable LANs. EMI is required. • Policy-Based Routing allows superior control by enabling flow redirection regardless of the routing protocol configured. EMI is required. • Inter-VLAN IP routing provides for full Layer 3 routing between two or more VLANs. • Protocol Independent Multicast (PIM) for IP Multicast routing is supported, including PIM sparse mode (PIM-SM), PIM dense mode (PIM-DM), and PIM sparse-dense mode. EMI is required. • Distance Vector Multicast Routing Protocol (DVMRP) tunneling interconnects two multicast-enabled networks across nonmulticast networks. EMI is required. • Fallback bridging forwards non-IP traffic between two or more VLANs. EMI is required.



Table 1 Features and Benefits of Cisco Catalyst 3560 Series (Continued)

Feature	Benefit
Integrated Cisco IOS® Software features for bandwidth optimization	<ul style="list-style-type: none"> • Per-port broadcast, multicast, and unicast storm control prevents faulty end stations from degrading overall systems performance. • Web Cache Communication Protocol (WCCP) allows interaction with a Web cache for the purpose of redirecting content requests and performing basic load balancing across multiple caches. EMI is required. • IEEE 802.1d Spanning-Tree Protocol support for redundant backbone connections and loop-free networks simplifies network configuration and improves fault tolerance. • PVST+ allows for Layer 2 load sharing on redundant links to efficiently utilize the extra capacity inherent in a redundant design. • IEEE 802.1s Multiple Spanning-Tree Protocol (MSTP) allows a spanning-tree instance per VLAN, enabling Layer 2 load sharing on redundant links. • Equal cost routing for load balancing and redundancy. • Local Proxy Address Resolution Protocol (ARP) works in conjunction with Private VLAN Edge to minimize broadcasts and maximize available bandwidth. • VLAN1 minimization allows VLAN1 to be disabled on any individual VLAN trunk link. • VLAN Trunking Protocol (VTP) pruning limits bandwidth consumption on VTP trunks by flooding broadcast traffic only on trunk links required to reach the destination devices. • IGMPv3 snooping provides fast client joins and leaves of multicast streams and limits bandwidth-intensive video traffic to only the requestors. • IGMP filtering provides multicast authentication by filtering out nonsubscribers and limits the number of concurrent multicast streams available per port. • Multicast VLAN registration (MVR) continuously sends multicast streams in a multicast VLAN while isolating the streams from subscriber VLANs for bandwidth and security reasons.
QoS and Control	
Advanced QoS	<ul style="list-style-type: none"> • 802.1p CoS and DSCP field classification are provided, using marking and reclassification on a per-packet basis by source and destination IP address, source and destination MAC address, or Layer 4 TCP/UDP port number. • Cisco control plane and data plane QoS ACLs on all ports ensure proper marking on a per-packet basis. • Four egress queues per port enable differentiated management of up to four traffic types across the stack. • Shaped Round Robin (SRR) scheduling ensures differential prioritization of packet flows by intelligently servicing the ingress and egress queues. • Weighted tail drop (WTD) provides congestion avoidance at the ingress and egress queues before a disruption occurs. • Strict priority queuing guarantees that the highest-priority packets are serviced ahead of all other traffic. • There is no performance penalty for highly granular QoS functions.
Granular rate limiting	<ul style="list-style-type: none"> • Cisco Committed Information Rate (CIR) function guarantees bandwidth in increments as low as 8 kbps. • Rate limiting is provided based on source and destination IP address, source and destination MAC address, Layer 4 TCP/UDP information, or any combination of these fields, using QoS ACLs (IP ACLs or MAC ACLs), class maps, and policy maps. • Asynchronous data flows upstream and downstream from the end station or on the uplink are easily managed using ingress policing and egress shaping. • Up to 64 aggregate or individual policers are available per Fast Ethernet or Gigabit Ethernet port.



Table 1 Features and Benefits of Cisco Catalyst 3560 Series (Continued)

Feature	Benefit
Security	
Network-wide security features	<ul style="list-style-type: none">• IEEE 802.1x allows dynamic, port-based security, providing user authentication.• IEEE 802.1x with VLAN assignment allows a dynamic VLAN assignment for a specific user regardless of where the user is connected.• IEEE 802.1x with voice VLAN permits an IP phone to access the voice VLAN irrespective of the authorized or unauthorized state of the port.• IEEE 802.1x and port security are provided to authenticate the port and manage network access for all MAC addresses, including those of the client.• IEEE 802.1x with an ACL assignment allows for specific identity-based security policies regardless of where the user is connected.• IEEE 802.1x with Guest VLAN allows guests without 802.1x clients to have limited network access on the guest VLAN.• Cisco security VLAN ACLs (VACLs) on all VLANs prevent unauthorized data flows from being bridged within VLANs.• Cisco standard and extended IP security router ACLs (RACLs) define security policies on routed interfaces for control-plane and data-plane traffic.• Port-based ACLs (PACLs) for Layer 2 interfaces allow security policies to be applied on individual switch ports.• Unicast MAC filtering prevents the forwarding of any type of packet with a matching MAC address.• Unknown unicast and multicast port blocking allows tight control by filtering packets that the switch has not already learned how to forward.• SSHv2, Kerberos, and SNMPv3 provide network security by encrypting administrator traffic during Telnet and SNMP sessions. SSHv2, Kerberos, and the cryptographic version of SNMPv3 require a special cryptographic software image because of U.S. export restrictions.• Private VLAN Edge provides security and isolation between switch ports, helping ensure that users cannot snoop on other users' traffic.• Bidirectional data support on the Switched Port Analyzer (SPAN) port allows the Cisco Secure Intrusion Detection System (IDS) to take action when an intruder is detected.• TACACS+ and RADIUS authentication enable centralized control of the switch and restrict unauthorized users from altering the configuration.• MAC address notification allows administrators to be notified of users added to or removed from the network.• DHCP Interface Tracker (Option 82) tracks where a user is physically connected on a network by providing both switch and port ID to a DHCP server.• DHCP Snooping Option 82 enables granular control over a DHCP server IP address assignment by augmenting a host IP address request so that the DHCP server can make a more sophisticated address assignment.• Port security secures the access to an access or trunk port based on MAC address.• After a specific timeframe, the aging feature removes the MAC address from the switch to allow another device to connect to the same port.• Trusted Boundary provides the ability to trust the QoS priority settings if an IP phone is present and to disable the trust setting if the IP phone is removed, thereby preventing a malicious user from overriding prioritization policies in the network.• Multilevel security on console access prevents unauthorized users from altering the switch configuration.• The user-selectable address-learning mode simplifies configuration and enhances security.• BPDU Guard shuts down Spanning-Tree Protocol PortFast-enabled interfaces when BPDUs are received to avoid accidental topology loops..



Table 1 Features and Benefits of Cisco Catalyst 3560 Series (Continued)

Feature	Benefit
Network-wide security features (contd.)	<ul style="list-style-type: none"> • Spanning-Tree Root Guard (STRG) prevents edge devices not in the network administrator's control from becoming Spanning-Tree Protocol root nodes • IGMP filtering provides multicast authentication by filtering out nonsubscribers and limits the number of concurrent multicast streams available per port. • Dynamic VLAN assignment is supported through implementation of VLAN Membership Policy Server (VMPS) client functions to provide flexibility in assigning ports to VLANs. Dynamic VLAN enables the fast assignment of IP addresses. • Cisco CMS Software security wizards ease the deployment of security features for restricting user access to a server as well as to a portion or all of the network. • One thousand access control entries (ACEs) are supported.
Manageability	
Superior manageability	<ul style="list-style-type: none"> • Cisco IOS CLI support provides a common user interface and command set with all Cisco routers and Cisco Catalyst desktop switches. • Cisco Intelligent Power Management implements the IEEE 802.3af optional power classification features in addition to Cisco enhancements to enable the granular control of power delivery to each Power over Ethernet port. • Service Assurance Agent (SAA) support facilitates service-level management throughout the LAN. • Switching Database Manager templates for access, routing, and VLAN deployment scenarios allow the administrator to easily maximize memory allocation to the desired features based on deployment-specific requirements. • VLAN trunks can be created from any port, using either standards-based 802.1Q tagging or the Cisco Inter-Switch Link (ISL) VLAN architecture. • Up to 1024 VLANs per switch or stack and up to 128 spanning-tree instances per switch are supported. • Four thousand VLAN IDs are supported. • Voice VLAN simplifies telephony installations by keeping voice traffic on a separate VLAN for easier administration and troubleshooting. • Cisco VTP supports dynamic VLANs and dynamic trunk configuration across all switches. • Cisco Group Management Protocol server functions enable a switch to serve as the Cisco Group Management Protocol router for client switches. EMI is required. • IGMPv3 snooping provides fast client joins and leaves of multicast streams and limits bandwidth-intensive video traffic to only the requestors. • Remote Switch Port Analyzer (RSPAN) allows administrators to remotely monitor ports in a Layer 2 switch network from any other switch in the same network. • For enhanced traffic management, monitoring, and analysis, the Embedded Remote Monitoring (RMON) software agent supports four RMON groups (history, statistics, alarms, and events). • Layer 2 traceroute eases troubleshooting by identifying the physical path that a packet takes from source to destination. • All nine RMON groups are supported through a SPAN port, which permits traffic monitoring of a single port, a group of ports, or the entire stack from a single network analyzer or RMON probe. • Domain Name System (DNS) provides 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 Timing Protocol (NTP) provides an accurate and consistent timestamp to all intranet switches.



Table 1 Features and Benefits of Cisco Catalyst 3560 Series (Continued)

Feature	Benefit
Superior manageability (contd.)	<ul style="list-style-type: none"> • Multifunction LEDs per port for port status; half-duplex and full-duplex mode; and 10BASE-T, 100BASE-TX, and 1000BASE-T indication as well as switch-level status LEDs for system, redundant-power supply, and bandwidth utilization provide a comprehensive and convenient visual management system.
Cisco CMS Software	<ul style="list-style-type: none"> • Cisco CMS Software provides an easy-to-use, Web-based management interface through a standard Web browser. • The easy-to-use graphical interface provides both a topology map and front-panel view of the cluster and stacks. • Cisco AVVID wizards need just a few user inputs to automatically configure the switch to optimally handle different types of traffic: voice, video, multicast, and high-priority data. • A security wizard is provided to restrict unauthorized access to applications, servers, and networks. • Cisco CMS Software allows management of up to 16 interconnected Cisco Catalyst 3750, Catalyst 3560, Catalyst 3550, Catalyst 3500 XL, Catalyst 2970, Catalyst 2950, Catalyst 2950 Long-Reach Ethernet (LRE), Catalyst 2940, Catalyst 2900 XL, Catalyst 2900 LRE XL, and Catalyst 1900 switches through a single IP address, without the limitation of being physically located in the same wiring closet. • The Cisco CMS Software Upgrade feature allows one-click software upgrade across an entire cluster of Cisco Catalyst 3750, Catalyst 3560, Catalyst 3550, Catalyst 3500 XL, Catalyst 2970, Catalyst 2950, Catalyst 2950 LRE, Catalyst 2940, Catalyst 2900 XL, Catalyst 2900 LRE XL, and Catalyst 1900 Series switches. Configuration cloning enables rapid deployment of networks. • Cisco CMS Software has been extended to include multilayer feature configurations such as routing protocols, ACLs, and QoS parameters. • Cisco CMS Software guide mode assists in the configuration of powerful advanced features by providing step-by-step instructions. • Cisco CMS Software provides enhanced online help for context-sensitive assistance. • Multidevice and multiport configuration capabilities allow administrators to save time by configuring features across multiple switches and ports simultaneously. • Web-based management for a Cisco Aironet Wireless Access Point is launched by clicking the relevant icon in the topology map. • The user-personalized interface allows modification of polling intervals, table views, and other settings within Cisco CMS Software and retains these settings. • Alarm Notification provides automated e-mail notification of network errors and alarm thresholds. • Client Side Install enables fast Cisco CMS launch time by allowing users to install the Cisco CMS Software files on a personal computer. • The Cisco CMS plug-in configures the management station with the correct run-time software to remove the burden of manually finding and installing this software.
Cisco Express Setup	<ul style="list-style-type: none"> • Cisco Express Setup simplifies initial configuration of a switch through a Web browser, eliminating the need for more complex terminal emulation programs and CLI knowledge. • The Web interface enables less-skilled personnel to quickly and simply set up switches, thereby reducing the cost of deployment.



Table 1 Features and Benefits of Cisco Catalyst 3560 Series (Continued)

Feature	Benefit
CiscoWorks support	<ul style="list-style-type: none"> • CiscoWorks network-management software provides management capabilities on a per-port and per-switch basis, providing a common management interface for Cisco routers, switches, and hubs. • SNMP v1, v2c, and v3 and Telnet interface support delivers comprehensive in-band management, and a CLI-based management console provides detailed out-of-band management. • Cisco Discovery Protocol Versions 1 and 2 enable a CiscoWorks network management station for automatic switch discovery. • Supported by the CiscoWorks 2000 LAN Management solution.

Table 2 Cisco Catalyst 3560 Series Switch Hardware

Description	Specification
Performance	<ul style="list-style-type: none"> • 17.6 Gbps switching fabric (Catalyst 3560-48PS), 8.8 Gbps switching fabric (Catalyst 3560-24PS) • 8.8 Gbps maximum forwarding bandwidth at Layer 2 and Layer 3 (Catalyst 3560-48PS), 4.4 Gbps maximum forwarding bandwidth at Layer 2 and Layer 3 (Catalyst 3560-24PS) • Forwarding rate based on 64-byte packets: 13.1 Mpps (Catalyst 3560-48PS), 6.6 Mpps (Catalyst 3560-24PS) • 128-MB DRAM and 16-MB Flash memory • Configurable up to 12,000 MAC addresses • Configurable up to 11,000 unicast routes • Configurable up to 1000 IGMP groups and multicast routes • Configurable maximum transmission unit (MTU) of up to 9018 bytes (Jumbo frames) for bridging on Gigabit Ethernet ports, and up to 1546 bytes for bridging of Multiprotocol Label Switching (MPLS) tagged frames on 10/100 ports
Connectors and Cabling	<ul style="list-style-type: none"> • 10BASE-T ports: RJ-45 connectors, two-pair Category 3, 4, or 5 unshielded twisted-pair (UTP) cabling • 10BASE-T Power over Ethernet ports: RJ-45 connectors, two-pair Category 3, 4, or 5 UTP cabling power pins 1,2 (negative) and 3,6 (positive) • 100BASE-TX ports: RJ-45 connectors, two-pair Category 5 UTP cabling • 100BASE-TX Power over Ethernet ports: RJ-45 connectors, two-pair Category 5 UTP cabling, power on pins 1,2 (negative) and 3,6 (positive) • 1000BASE-T SFP-based ports: RJ-45 connectors, two-pair Category 5 UTP cabling • 1000BASE-SX, -LX/LH, -ZX, and CWDM SFP-based ports: LC fiber connectors (single-mode or multimode fiber) • Management console port: RJ-45-to-DB-9 cable for PC connections; for terminal connections, use RJ-45-to-DB-25 female data-terminal-equipment (DTE) adaptor (can be ordered separately from Cisco, part number ACS-DSBUASYN=)



Table 2 Cisco Catalyst 3560 Series Switch Hardware (Continued)

Description	Specification
Power Connectors	<p>Customers can provide power to a switch by using either the internal power supply or the Cisco RPS 675. The connectors are located at the back of the switch.</p> <p>Internal Power Supply Connector</p> <ul style="list-style-type: none"> • The internal power supply is an auto-ranging unit. • The internal power supply 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. <p>Cisco RPS Connector</p> <ul style="list-style-type: none"> • The connector offers connection for an optional Cisco RPS 675 that uses AC input and supplies DC output to the switch. • The connector offers a 675W RPS that supports up to six external network devices and provides power to one failed device at a time. • The connector automatically senses when the internal power supply of a connected device fails and provides power to the failed device, preventing loss of network traffic. • Only the Cisco RPS 675 (model PWR675-AC-RPS-N1=) should be attached to the redundant-power-supply receptacle.
Indicators	<ul style="list-style-type: none"> • Per-port status LEDs: link integrity, disabled, activity, speed, full-duplex indications, Power over Ethernet applied, Power over Ethernet error, and Power over Ethernet disabled indications • System-status LEDs: system, RPS, link status, link duplex, link speed, and Power over Ethernet indications
Dimensions (H x W x D)	<ul style="list-style-type: none"> • 1.73 x 17.5 x 11.81 in. (4.4 x 44.5 x 30.0 cm) (Catalyst 3560-24PS) • 1.73 x 17.5 x 14.85 in. (4.4 x 44.5 x 37.7 cm) (Catalyst 3560-48PS)
Weight	<ul style="list-style-type: none"> • 11.3 lb (5.1 kg) (Catalyst 3560-24PS) • 13.2 lb (6.0 kg) (Catalyst 3560-48PS)
Environmental Ranges	<ul style="list-style-type: none"> • 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 (3049m) • Storage altitude: Up to 15,000 ft (4573m)
Acoustic Noise	<ul style="list-style-type: none"> • ISO 7779: bystander position operating to an ambient temperature of 25 C • Catalyst 3560-24PS: 42 dBA • Catalyst 3560-48PS: 42 dBA
Mean Time Between Failure (MTBF)	<ul style="list-style-type: none"> • 224,100 hours (Catalyst 3560-24PS) • 173,500 hours (Catalyst 3560-48PS)



Table 3 Power Specifications for Cisco Catalyst 3560 Series Switch

Description	Specification
Maximum Power Consumption	<ul style="list-style-type: none">485W (Catalyst 3560-24PS)Dissipated Power: 115W, 393 BTUs per hourPower over Ethernet: 370W 530W (Catalyst 3560-48PS) <ul style="list-style-type: none">Dissipated Power: 160W, 546 BTUs per hourPower over Ethernet: 370W
AC Input Voltage and Current	<ul style="list-style-type: none">100–240 VAC (auto-ranging)5.5A/2.8A
Power Rating	<ul style="list-style-type: none">0.485KVA (Catalyst 3560-24PS)0.530KVA (Catalyst 3560-48PS)
DC Input Voltages (RPS input)	<ul style="list-style-type: none">+12V at 7.5A- 48V at 7.8A
Power over Ethernet (PoE)	<ul style="list-style-type: none">Maximum power supplied per port: 15.4WTotal power dedicated to Power over Ethernet: 370W (Cisco Catalyst 3560-24PS and Catalyst 3560-48PS)



Table 4 Management and Standards Support for Cisco Catalyst 3560 Series Switch

Description	Specification
Management	<ul style="list-style-type: none"> • BRIDGE-MIB • CISCO-CDP-MIB • CISCO-CLUSTER-MIB • CISCO-CONFIG-MAN-MIB • CISCO-ENTITY-FRU-CONTROL-MIB • CISCO-ENVMON-MIB • CISCO-FLASH-MIB • CISCO-FTP-CLIENT-MIB • CISCO-HSRP-MIB • CISCO-HSRP-EXT-MIB • CISCO-IGMP-FILTER-MIB • CISCO-IMAGE-MIB • CISCO-IP-STAT-MIB • CISCO-L2L3-INTERFACE-CONFIG-MIB • CISCO-MAC-NOTIFICATION-MIB • CISCO-MEMORY-POOL-MIB • CISCO-PAGP-MIB • CISCO-PING-MIB • CISCO-PROCESS-MIB • CISCO-RTTMON-MIB • CISCO-STP-EXTENSIONS-MIB • CISCO-SYSLOG-MIB • CISCO-TCP-MIB • CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB • CISCO-VLAN-MEMBERSHIP-MIB • CISCO-VTP-MIB • ENTITY-MIB • ETHERLIKE-MIB • IF-MIB • IGMP-MIB • IPMROUTE-MIB • OLD-CISCO-CHASSIS-MIB • OLD-CISCO-FLASH-MIB • OLD-CISCO-INTERFACES-MIB • OLD-CISCO-IP-MIB • OLD-CISCO-SYS-MIB • OLD-CISCO-TCP-MIB • OLD-CISCO-TS-MIB • OSPF-MIB (RFC 1253) • PIM-MIB • RFC1213-MIB • RFC1253-MIB • RMON-MIB • RMON2-MIB • SNMP-FRAMEWORK-MIB • SNMP-MPD-MIB • SNMP-NOTIFICATION-MIB • SNMP-TARGET-MIB • SNMPv2-MIB • TCP-MIB • UDP-MIB
Standards	<ul style="list-style-type: none"> • IEEE 802.1s • IEEE 802.1w • IEEE 802.1x • IEEE 802.3ad • IEEE 802.3af • IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports • IEEE 802.1D Spanning-Tree Protocol • IEEE 802.1p CoS Prioritization • IEEE 802.1Q VLAN • IEEE 802.3 10BASE-T specification • IEEE 802.3u 100BASE-TX specification • IEEE 802.3ab 1000BASE-T specification • IEEE 802.3z 1000BASE-X specification • 1000BASE-X (SFP) • 1000BASE-SX • 1000BASE-LX/LH • 1000BASE-ZX • 1000BASE-CWDM SFP 1470 nm • 1000BASE-CWDM SFP 1490 nm • 1000BASE-CWDM SFP 1510 nm • 1000BASE-CWDM SFP 1530 nm • 1000BASE-CWDM SFP 1550 nm • 1000BASE-CWDM SFP 1570 nm • 1000BASE-CWDM SFP 1590 nm • 1000BASE-CWDM SFP 1610 nm • RMON I and II standards • SNMPv1, SNMPv2c, SNMPv3



Table 5 Safety and Compliance

Description	Specification
Safety Certifications	<ul style="list-style-type: none"> • UL to UL 60950, Third Edition • C-UL to CAN/CSA C22.2 No. 60950-00, Third Edition • TUV/GS to EN 60950:2000 • CB to IEC 60950 with all country deviations • NOM to NOM-019-SCFI • CE Marking
Electromagnetic Emissions Certifications	<ul style="list-style-type: none"> • FCC Part 15 Class A • EN 55022: 1998 (CISPR22) • EN 55024: 1998 (CISPR24) • VCCI Class A • AS/NZS 3548 Class A • CE • CNS 13438 Class A • MIC
Telco	<ul style="list-style-type: none"> • CLEI code
Warranty	<ul style="list-style-type: none"> • Limited lifetime warranty

Service and Support

Cisco Systems[®] is committed to minimizing TCO. Cisco offers a portfolio of technical support services to help ensure that Cisco products operate efficiently, remain highly available, and benefit from the most up-to-date system software. The services and support programs described in Table 6 are available as part of the Cisco Desktop Switching Service and Support solution, and are available directly from Cisco and through resellers.

Table 6 Cisco Services and Support Programs

Service and Support	Features	Benefits
Advanced Services		
<ul style="list-style-type: none"> • Cisco Total Implementation Solutions (TIS), available direct from Cisco • Cisco Packaged TIS, available through resellers 	<ul style="list-style-type: none"> • Project management • Site survey, configuration, and deployment • Installation, test, and cutover • Training • Major moves, adds, and changes • Design review and product staging 	<ul style="list-style-type: none"> • Supplements existing staff • Ensures functions meet needs • Mitigates risk



Table 6 Cisco Services and Support Programs (Continued)

Service and Support	Features	Benefits
<ul style="list-style-type: none"> • Cisco SMARTnet® and SMARTnet Onsite support, available direct from Cisco • Cisco Packaged SMARTnet support program, available through resellers 	<ul style="list-style-type: none"> • Access to software updates 24 x 7 • Web access to technical repositories • Telephone support through the Cisco Technical Assistance Center (TAC) • Advance Replacement of hardware parts 	<ul style="list-style-type: none"> • Enables proactive or expedited issue resolution • Lowers TCO by taking advantage of Cisco expertise and knowledge • Minimizes network downtime

Ordering Information

Table 7 gives ordering information for the Cisco Catalyst 3560 Series Switches.

Table 7 Ordering Information for Cisco Catalyst 3560 Series Switches

Part Number	Description
WS-C3560-24PS-S	<ul style="list-style-type: none"> • 24 Ethernet 10/100 ports and 2 SFP-based Gigabit Ethernet ports • 1RU fixed configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge • IEEE 802.3af and Cisco prestandard Power over Ethernet • Standard Multilayer Software Image (SMI) installed • Basic RIP and static routing, upgradable to full dynamic IP routing
WS-C3560-24PS-E	<ul style="list-style-type: none"> • 24 Ethernet 10/100 ports and 2 SFP-based Gigabit Ethernet ports • 1RU fixed configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge • IEEE 802.3af and Cisco prestandard Power over Ethernet • Enhanced Multilayer Software Image (EMI) installed • Advanced IP routing
WS-C3560-48PS-S	<ul style="list-style-type: none"> • 48 Ethernet 10/100 ports and 4 SFP-based Gigabit Ethernet ports • 1RU fixed configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge • IEEE 802.3af and Cisco prestandard Power over Ethernet • SMI installed • Basic RIP and static routing, upgradable to full dynamic IP routing
WS-C3560-48PS-E	<ul style="list-style-type: none"> • 48 Ethernet 10/100 ports and 4 SFP-based Gigabit Ethernet ports • 1RU fixed configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge • IEEE 802.3af and Cisco prestandard Power over Ethernet • EMI installed • Advanced IP routing
CD-3560-EMI=	<ul style="list-style-type: none"> • Enhanced Multilayer Software Image (EMI) upgrade kit for SMI versions of the Cisco Catalyst 3560 • Advanced IP routing
PWR675-AC-RPS-N1=	Cisco RPS 675 with one connector cable



Table 7 Ordering Information for Cisco Catalyst 3560 Series Switches (Continued)

Part Number	Description
CAB-RPS-1614=	1.2-meter cable for Cisco RPS 675 to external device connection
RCKMNT-1RU=	Spare rack mount kit for the Cisco Catalyst 3560
RCKMNT-REC-1RU=	1RU recessed rack mount kit for the Cisco Catalyst 3560
GLC-LH-SM=	Gigabit Ethernet SFP, LC connector, LH transceiver
GLC-SX-MM=	Gigabit Ethernet SFP, LC connector, SX transceiver
GLC-ZX-SM=	Gigabit Ethernet SFP, LC connector, ZX transceiver
GLC-T=	Gigabit Ethernet SFP, RJ-45 connector, 10/100/1000BASE-T transceiver
CWDM-SFP-1470=	Cisco CWDM SFP 1470 nm; Gigabit Ethernet and 1G/2G FC (gray)
CWDM-SFP-1490=	Cisco CWDM SFP 1490 nm; Gigabit Ethernet and 1G/2G FC (violet)
CWDM-SFP-1510=	Cisco CWDM SFP 1510 nm; Gigabit Ethernet and 1G/2G FC (blue)
CWDM-SFP-1530=	Cisco CWDM SFP 1530 nm; Gigabit Ethernet and 1G/2G FC (green)
CWDM-SFP-1550=	Cisco CWDM SFP 1550 nm; Gigabit Ethernet and 1G/2G FC (yellow)
CWDM-SFP-1570=	Cisco CWDM SFP 1570 nm; Gigabit Ethernet and 1G/2G FC (orange)
CWDM-SFP-1590=	Cisco CWDM SFP 1590 nm; Gigabit Ethernet and 1G/2G FC (red)
CWDM-SFP-1610=	Cisco CWDM SFP 1610 nm; Gigabit Ethernet and 1G/2G FC (brown)
CAB-SM-LCSC-1M	1-meter fiber single-mode LC-to-SC connectors
CAB-SM-LCSC-5M	5-meter fiber single-mode LC-to-SC connectors

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