

Cisco Catalyst 3560 Series Switches

Product Overview

The Cisco® Catalyst® 3560 Series is a line of fixed-configuration, enterprise-class switches that include IEEE 802.3af and Cisco prestandard Power over Ethernet (PoE) functionality in Fast Ethernet and Gigabit Ethernet configurations. The Cisco Catalyst 3560 is an ideal access layer switch for small enterprise LAN access or branch-office environments, combining both 10/100/1000 and PoE configurations for maximum productivity and investment protection while enabling the deployment of new applications such as IP telephony, wireless access, video surveillance, building management systems, and remote video kiosks. Customers can deploy networkwide intelligent services-such as advanced quality of service (QoS), rate limiting, access control lists (ACLs), multicast management, and high-performance IP routing-while maintaining the simplicity of traditional LAN switching. Available for the Cisco Catalyst 3560 Series at no charge, the Cisco Network Assistant is a centralized management application that simplifies the administration tasks for Cisco switches, routers, and wireless access points. Cisco Network Assistant provides configuration wizards that greatly simplify the implementation of converged networks and intelligent network services.

The Cisco Catalyst 3560 is part of a larger and more scalable family of Cisco Catalyst switches that includes the Cisco Catalyst 3560-E Series switches, the Cisco Catalyst 3750 and 3750-E Series switches with Cisco StackWise™ technology, and the Cisco Catalyst 4500 and Catalyst 6500 modular switches. United by Cisco IOS® Software, the entire family offers industry-leading availability, integrated security, optimized delivery, and manageability.

Configurations

The Cisco Catalyst 3560 Series comprises the following switches (refer to Figure 1):

Figure 1. Cisco Catalyst 3560 Switches



- Cisco Catalyst 3560-8PC: 8 Ethernet 10/100 ports with PoE and 1 dual-purpose 10/100/1000 and SFP port; compact form factor with no fan
- Cisco Catalyst 3560-12PC: 12 Ethernet 10/100 ports with PoE and 1 dual-purpose 10/100/1000 and SFP port; compact form factor with no fan
- Cisco Catalyst 3560-24TS: 24 Ethernet 10/100 ports and 2 Small Form-Factor Pluggable (SFP)-based Gigabit Ethernet ports; 1 rack unit (RU)

- Cisco Catalyst 3560-48TS: 48 Ethernet 10/100 ports and 4 SFP-based Gigabit Ethernet ports; 1RU
- Cisco Catalyst 3560-24PS: 24 Ethernet 10/100 ports with PoE and 2 SFP-based Gigabit Ethernet ports; 1 RU
- Cisco Catalyst 3560-48PS: 48 Ethernet 10/100 ports with PoE and 4 SFP-based Gigabit Ethernet ports; 1RU
- Cisco Catalyst 3560G-24TS: 24 Ethernet 10/100/1000 ports and 4 SFP-based Gigabit Ethernet ports; 1RU
- Cisco Catalyst 3560G-48TS: 48 Ethernet 10/100/1000 ports and 4 SFP-based Gigabit Ethernet ports; 1RU
- Cisco Catalyst 3560G-24PS: 24 Ethernet 10/100/1000 ports with PoE and 4 SFP-based Gigabit Ethernet ports; 1RU
- Cisco Catalyst 3560G-48PS: 48 Ethernet 10/100/1000 ports with PoE and 4 SFP-based Gigabit Ethernet ports; 1RU

The Cisco Catalyst 3560 Series can be purchased with the IP Base or IP Services licenses pre-installed. The IP Base license offers advanced QoS, rate limiting, ACLs, and basic static and Routing Information Protocol (RIP) routing functions. The IP Services license provides a richer set of enterprise-class features, including advanced hardware-based IPv6 unicast and IPv6 Multicast routing as well as policy-based routing (PBR). The IP Services license upgrades Cisco Catalyst 3560 Series switches to include IPv6 routing support. Upgrade licenses are available to upgrade a switch from the IP Base license to the IP Services license.

The SFP-based GE ports accommodate a range of SFP transceivers, including the Cisco 1000BASE-T, 1000BASE-SX, 1000BASE-LX, 1000BASE-ZX, and CWDM SFP transceivers. These ports also support the Cisco Catalyst 3560 SFP Interconnect Cable for establishing a low-cost Gigabit Ethernet point-to-point connection.

Power over Ethernet

The Cisco Catalyst 3560 Series can provide a lower total cost of ownership (TCO) for deployments that incorporate Cisco IP phones, Cisco Aironet® wireless LAN (WLAN) access points, or any IEEE 802.3af-compliant end device. PoE 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 WLAN deployments. The Cisco Catalyst 3560 8-port PoE and 24-port PoE configurations can support 8 and 24 simultaneous full-powered PoE ports at 15.4W for maximum powered-device support. The Cisco Catalyst 3560 12-port PoE can support 8 ports at 15.4W or 12 ports at 10W or any combination in between. Taking advantage of Cisco Catalyst Intelligent Power Management, the 48-port PoE configurations 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 Cisco Catalyst 3560 switch is combined with the Cisco RPS 2300 Redundant Power System for transparent protection against internal power supply failures and an uninterruptible power supply (UPS) system to safeguard against power outages.

Gigabit Ethernet

At speeds of 1000 Mbps, Gigabit Ethernet provides the bandwidth to meet new and evolving network demands, alleviate bottlenecks, and boost performance while increasing the return on

existing infrastructure investments. Today's workers are placing higher demands on networks, running multiple, concurrent applications. For example, a worker joins a team conference call through an IP videoconference, sends a 10-MB spreadsheet to meeting participants, broadcasts the latest marketing video for the team to evaluate, and queries the customer-relationship-management database for the latest real-time feedback. Meanwhile, a multigigabyte system backup starts in the background and the latest virus updates are delivered to the client. The Cisco Catalyst 3560 provides a means to intelligently scale the network beyond 100 Mbps over existing Category 5 copper cabling and simultaneously support PoE for maximum productivity and investment protection.

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, WLAN 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 help ensure their high availability, security, scalability, and control. By adding Cisco intelligent functions for LAN access, customers can now deploy networkwide intelligent services that consistently address these requirements from the desktop to the core and through the WAN.

With Cisco Catalyst Intelligent Ethernet switches, Cisco Systems® helps enable companies to realize the full benefits of adding intelligent services into their networks. Deployment of 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 is critical to further optimizing network operations.

Cisco EnergyWise Technology

Cisco EnergyWise is an innovative architecture, added to the Cisco Catalyst 3560 switches, promoting companywide sustainability by reducing energy consumption across an entire corporate infrastructure and affecting more than 50 percent of global greenhouse gas emissions created by worldwide building infrastructure, a much greater effect than the 2 percent generated by the IT industry. Cisco EnergyWise enables companies to measure the power consumption of network infrastructure and network-attached devices and manage power consumption with specific policies, reducing power consumption to realize increased cost savings, potentially affecting any powered device.

EnergyWise encompasses a highly intelligent network based approach to communicate messages that measure and control energy between network devices and endpoints. The network discovers Cisco EnergyWise manageable devices, monitors their power consumption, and takes action based on business rules to reduce power consumption. EnergyWise uses a unique domain-naming system to query and summarize information from large sets of devices, making it simpler

than traditional network management capabilities. Cisco EnergyWise's management interfaces allow facilities and network management applications to communicate with endpoints and each other using the network as a unifying fabric. The management interface uses standard SNMP or SSL to integrate Cisco and third-party management systems.

Cisco EnergyWise extends the network as a platform for power control plane for gathering, managing, and reducing power consumption of all devices, resulting in companywide optimized power delivery and reduced energy costs.

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) provides authentication, access control, and security policy administration to secure network connectivity and resources. Cisco IBNS in the Cisco 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 to which it is connected. It also can be used to limit the total number of devices plugged into a switch port, thereby protecting the switch from a MAC flooding attack as well as reducing the risks of rogue wireless access points or hubs.

With Dynamic Host Configuration Protocol (DHCP) snooping, DHCP spoofing can be thwarted by allowing only DHCP requests (but not responses) from untrusted user-facing ports. Additionally, the DHCP Interface Tracker (Option 82) helps enable granular control over IP address assignment by augmenting a host IP address request with the switch port ID. Building further on the DHCP snooping capabilities, IP address spoofing can be thwarted using Dynamic ARP Inspection and IP Source Guard.

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

Secure Shell (SSH) Protocol Version 2, 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.

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 helping ensure the stability and scalability necessary to meet the needs of future requirements. In addition to dynamic IP unicast routing, the Cisco 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 Cisco Catalyst 3560 Series switches ideal for intensive multicast environments.

Implementing routed uplinks to the core improves 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 use by implementing equal cost routing (ECR) on the uplinks to perform load balancing. Routed uplinks optimize the utility of uplinks out of the LAN Access by eliminating unnecessary broadcast data flows into the network backbone.

The Cisco Catalyst 3560 also offers dramatic bandwidth savings as a wiring-closet switch in a multicast environment. Using routed uplinks to the network core eliminates the requirement to transmit multiple streams of the same multicast from the upstream content servers to LAN access switches. 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 Cisco Catalyst 3560 switches allows users to create a scalable, multicast-rich network. The Cisco IP Services license offers IPv6 routing, including support for simultaneous IPv4 and IPv6 forwarding. IPv6 protocol support includes OSPFv3, and EIGRPv6. IPv6 management and MLD Snooping are supported on all Cisco Catalyst 3560 software images.

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 help 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 Cisco 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 Cisco 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 or UDP port. At the ingress, the Cisco Catalyst 3560 also polices to determine whether a packet is in or out of profile, marks to change the classification label, passes through or drops out of profile packets, and queues packets based on classification. Control- and data-plane ACLs are supported on all ports to help ensure proper treatment on a per-packet basis.

The Cisco 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 Cisco 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, 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. 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 making sure 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 Cisco 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 or UDP port number. Bandwidth allocation is essential when network environments require 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). Cisco Express Setup reduces the cost of deployment by helping less-skilled personnel quickly and simply set up switches.

Cisco Network Assistant is a PC-based network-management application optimized for LANs of small and medium-sized businesses with up to 250 users. Cisco Network Assistant offers centralized management of Cisco switches, routers, and WLAN access points. It supports a wide range of Cisco Catalyst intelligent switches from Cisco Catalyst 2950 through Cisco Catalyst 4506. Through a user-friendly GUI, users can configure and manage a wide array of switch functions and start the device manager of Cisco routers and Cisco wireless access points. A few mouse clicks enable the Cisco recommended security, availability, and QoS features without the need to consult a detailed design guide. The Security wizard automatically restricts unauthorized access to servers with sensitive data. Smartports and wizards save hours of time for network administrators, eliminate human errors, and help ensure that the configuration of the switch is optimized for these applications. Available at no cost, Cisco Network Assistant can be downloaded from Cisco.com.

In addition to the Cisco Network Assistant, the Cisco Catalyst 3560 Series switches provide for extensive management using SNMP network-management platforms such as CiscoWorks LAN Management Solution (LMS). LMS is a suite of powerful management tools that simplify the configuration, administration, monitoring, and troubleshooting of Cisco networks. It integrates these capabilities into a world-class solution for improving the accuracy and efficiency of your operations staff, while increasing the overall availability of your network. LMS supports over 400 different device types providing:

- Network discovery, topology views, end-station tracking, and VLAN management
- Real-time network fault analysis with easy-to-deploy device specific best-practice templates
- Hardware and software inventory management, centralized configuration tools, and syslog monitoring
- Network response time and availability monitoring and tracking
- Real-time device, link, and port traffic management, analysis, and reporting

Cisco Catalyst 3560 SFP Interconnect Cable

The Cisco Catalyst 3560 SFP Interconnect Cable (see Figure 2) provides for a low-cost point-to-point Gigabit Ethernet connection between Cisco Catalyst 3560 switches. The 50cm cable is an alternative to using SFP transceivers when interconnecting Cisco Catalyst 3560 switches through their SFP ports over a short distance.

Figure 2. Cisco Catalyst 3560 SFP Interconnect Cable

Table 1 gives the features and benefits of the Cisco Catalyst 3560 Series. Table 2 gives the hardware specifications, and Table 3 gives the power specifications. Table 4 lists the management and standards support, and Table 5 provides the safety and compliance information.

Table 1. Features and Benefits of Cisco Catalyst 3560 Series

Feature	Benefit
Ease of Use and Deployment	<ul style="list-style-type: none"> • Cisco 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 PoE 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 autoconfiguration of multiple switches through a boot server eases switch deployment. • Automatic QoS (Auto QoS) simplifies QoS configuration in voice-over-IP (VoIP) networks by issuing interface and global switch commands to detect Cisco IP phones, classify traffic, and enable egress queue configuration. • Autosensing 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. • Autonegotiating on all ports automatically selects half- or full-duplex transmission mode to optimize bandwidth. • Dynamic Trunking Protocol (DTP) helps enable 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 multiplexing (CWDM) physical interface support through a field-replaceable SFP module provides unprecedented flexibility in switch deployment. • Support for the Cisco Catalyst 3560 SFP Interconnect Cable facilitates a low-cost, point-to-point gigabit connection between Cisco Catalyst 3560 Series switches. • The default configuration stored in Flash memory helps ensure that the switch can be quickly connected to the network and can pass traffic with minimal user intervention. • Automatic medium-dependent interface crossover (Auto-MDIX) automatically adjusts transmit and receive pairs if an incorrect cable type (crossover or straight-through) is installed on a 10/100 port. • Time Domain Reflectometry (TDR) to diagnose and resolve cabling problems on copper Ethernet 10/100/1000 ports.
Cisco EnergyWise	<ul style="list-style-type: none"> • Cisco EnergyWise for greenhouse gas emissions and operational cost optimization by measuring, reporting, and reducing energy consumption across the entire corporate infrastructure, well beyond the scope of IT.

Availability and Scalability	
Superior Redundancy for Fault Backup	<ul style="list-style-type: none"> • Cisco Uplink Fast 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 Plus (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 Network Assistant 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 autorecovery (errdisable) automatically attempts to reenables a link that is disabled because of a network error. • Cisco RPS 2300 support provides superior internal power-source redundancy, resulting in improved fault tolerance and network uptime. • Equal cost routing (ECR) provides load balancing and redundancy. • Bandwidth aggregation up to 8 Gbps through Cisco 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, RIPv2 and RIPv6) are supported for small-network routing applications. • Advanced IP unicast routing protocols (OSPF, Interior Gateway Routing Protocol [IGRP], EIGRP, Border Gateway Protocol Version 4 [BGPv4] and IS-ISv4) are supported for load balancing and constructing scalable LANs. The IP Services license is required. • IPv6 routing capability (OSPFv3, EIGRPv6) is supported. IP Services license is required. • Policy-Based Routing (PBR) allows superior control by enabling flow redirection regardless of the routing protocol configured. • 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. The IP Services license is required. • Fallback bridging forwards non-IP traffic between two or more VLANs.
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. • 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 use 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. • ECR provides load balancing and redundancy. • VPN routing/forwarding (VRF)-Lite enables a service provider to support two or more VPNs, with overlapping IP addresses. • 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. • Internet Group Management Protocol v3 (IGMP) Snooping for IPv4 and IPv6 MLD v1 and v2 Snooping provide 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"> • Standard 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 or UDP port number. • Cisco control- and data-plane QoS ACLs on all ports help ensure proper marking on a per-packet basis. • Four egress queues per port enable differentiated management of up to four traffic types. • SRR scheduling helps ensure 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"> • The 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 and 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.
Security	
Networkwide 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. • Web authentication for non-802.1x clients allows non-802.1x clients to use an SSL-based browser for authentication. • Multi-Domain Authentication allows an IP phone and a PC to authenticate on the same switch port while placing them on appropriate Voice and Data VLAN. • MAC Auth Bypass (MAB) for voice allows third-party IP phones without an 802.1x supplicant to get authenticated using their MAC address. • 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- and data-plane traffic. • Port-based ACLs (PACLs) for Layer 2 interfaces allow application of security policies 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. • Private VLANs restrict traffic between hosts in a common segment by segregating traffic at Layer 2, turning a broadcast segment into a nonbroadcast multi-access-like segment. • 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. • Dynamic ARP Inspection (DAI) helps ensure user integrity by preventing malicious users from exploiting the insecure nature of the ARP protocol. • DHCP snooping allows administrators to help ensure consistent mapping of IP to MAC

	<p>addresses. This can be used to prevent attacks that attempt to poison the DHCP binding database, and to rate limit the amount of DHCP traffic that enters a switch port.</p> <ul style="list-style-type: none"> • IP source guard prevents a malicious user from spoofing or taking over another user's IP address by creating a binding table between the client's IP and MAC address, port, and VLAN. • DHCP Interface Tracker (Option 82) augments a host IP address request with the switch port ID. • 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. • 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 helps enable the fast assignment of IP addresses. • Cisco Network Assistant software security wizards ease the deployment of security features for restricting user access to a server as well as to a portion of or the entire network. • Two 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 Discovery Protocol version 2 (CDPv2) allows the Cisco Catalyst 3560 Series Switch to negotiate a more granular power setting when connecting to a Cisco powered device, such as IP phones or access points, than what is provided by IEEE classification. • The PoE MIB provides proactive visibility into power usage and allows customers to set different power level thresholds. • 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. • Generic On-Line Diagnostic (GOLD) checks the health of hardware components and verifies proper operation of the system data and control plane at run time and boot time. • 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 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. • IGMPv3 snooping provides fast client joins and leaves of multicast streams and limits bandwidth-intensive video traffic to only the requestors. • Remote SPAN (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 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.

	<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 use provide a comprehensive and convenient visual management system.
Cisco Network Assistant Software	<ul style="list-style-type: none"> • Cisco Network Assistant is a free, Windows-based application that simplifies the administration of networks of up to 250 users. It supports a wide range of Cisco Catalyst intelligent switches from Cisco Catalyst 2950 through Cisco Catalyst 4506. With Cisco Network Assistant, users can manage Cisco Catalyst switches plus launch the device managers of Cisco integrated services routers (ISRs) and Cisco Aironet WLAN access points. • The easy-to-use graphical interface provides both a topology map and front-panel view of the switch. • Cisco AVVID (Architecture for Voice, Video and Integrated Data) 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. • Upgrading the Cisco IOS Software on Cisco Catalyst switches is a simple matter of pointing and clicking, with one-click upgrades. • Cisco Network Assistant supports multilayer feature configurations such as routing protocols, ACLs, and QoS parameters. • Multidevice and multipoint configuration capabilities allow administrators to save time by configuring features across multiple switches and ports simultaneously. • The user-personalized interface allows modification of polling intervals, table views, and other settings. • Alarm notification provides automated e-mail notification of network errors and alarm thresholds.
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 helps less-skilled personnel quickly and simply set up switches, thereby reducing the cost of deployment.
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 help enable a CiscoWorks network-management station for automatic switch discovery. • The CiscoWorks LAN Management Solution supports the Cisco Catalyst 3560 Series.

Table 2. Cisco Catalyst 3560 Series Switch Hardware

Description	Specification
Performance	<ul style="list-style-type: none"> • 32 Gbps forwarding bandwidth • Forwarding rate based on 64-byte packets: <ul style="list-style-type: none"> • 38.7 Mpps (Cisco Catalyst 3560G-48TS, Catalyst 3560G-48PS, Catalyst 3560G-24TS, and Catalyst 3560G-24PS); • 13.1 Mpps (Cisco Catalyst 3560-48TS and Catalyst 3560-48PS); • 6.5 Mpps (Cisco Catalyst 3560-24TS and Catalyst 3560-24PS); • 3.2 Mpps (Cisco Catalyst 3560-12PC) • 2.7 Mpps (Cisco Catalyst 3560-8PC) • 128 MB DRAM • 32 MB Flash memory (Cisco Catalyst 3560G-24TS, Catalyst 3560G-24PS, Catalyst 3560G-48TS, Catalyst 3560G-48PS, Catalyst 3560-24TS, Catalyst 3560-48TS, and Catalyst 3560-8PC); • 16-MB Flash memory (Cisco Catalyst 3560-48PS and Catalyst 3560-24PS) • 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 9000 bytes, with a maximum Ethernet frame size of 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 PoE ports: RJ-45 connectors, two-pair Category 3, 4, or 5 UTP cabling power pins 1,2 (negative) and 3,6 (positive)

	<ul style="list-style-type: none"> • 100BASE-TX ports: RJ-45 connectors, two-pair Category 5 UTP cabling • 100BASE-TX PoE ports: RJ-45 connectors, two-pair Category 5 UTP cabling, power on pins 1,2 (negative) and 3,6 (positive) • 1000BASE-T ports: RJ-45 connectors, four-pair Category 5 UTP cabling • 1000BASE-T SFP-based ports: RJ-45 connectors, four-pair Category 5 UTP cabling • 1000BASE-SX, -LX/LH, -ZX, and CWDM SFP-based ports: LC fiber connectors (single/multimode fiber) • Cisco Catalyst 3560 SFP Interconnect Cable: two-pair shielded cabling, 50 cm • 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=)
Power Connectors	<ul style="list-style-type: none"> • Customers can provide power to a switch by using either the internal power supply or the Cisco RPS 2300. The connectors are located at the back of the switch. Note: The Cisco Catalyst 3560-8PC and Catalyst 3560-12PC do not have an RPS port. • Internal-Power-Supply Connector • The internal power supply is an autoranging 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. • Cisco RPS Connector • The connector offers connection for an optional Cisco RPS 2300 that uses AC input and supplies DC output to the switch. • The connector supports up to six external network devices and provides power to two failed devices 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 2300 (model PWR-RPS2300) 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, PoE applied, PoE error, and PoE disabled indications • System-status LEDs: System, RPS, link status, link duplex, link speed, and PoE indications
Dimensions (H x W x D)	<ul style="list-style-type: none"> • Cisco Catalyst 3560-8PC: 1.73 x 10.6 x 9.1 in. (4.4 x 27 x 23 cm) • Cisco Catalyst 3560-12PC: 1.73 x 10.6 x 9.1 in. (4.4 x 27 x 23 cm) • Cisco Catalyst 3560-24TS: 1.73 x 17.5 x 11.8 in. (4.4 x 44.5 x 30 cm) • Cisco Catalyst 3560-48TS: 1.73 x 17.5 x 11.8 in. (4.4 x 44.5 x 30 cm) • Cisco Catalyst 3560-24PS: 1.73 x 17.5 x 11.8 in. (4.4 x 44.5 x 30 cm) • Cisco Catalyst 3560-48PS: 1.73 x 17.5 x 14.9 in. (4.4 x 44.5 x 37.8 cm) • Cisco Catalyst 3560G-24TS: 1.73 x 17.5 x 14.9 in. (4.4 x 44.5 x 37.8 cm) • Cisco Catalyst 3560G-48TS: 1.73 x 17.5 x 16.1 in. (4.4 x 44.5 x 40.9 cm) • Cisco Catalyst 3560G-24PS: 1.73 x 17.5 x 14.9 in. (4.4 x 44.5 x 37.8 cm) • Cisco Catalyst 3560G-48PS: 1.73 x 17.5 x 16.1 in. (4.4 x 44.5 x 40.9 cm)
Weight	<ul style="list-style-type: none"> • Cisco Catalyst 3560-8PC: 5 lb (2.3 kg) • Cisco Catalyst 3560-12PC: 5 lb (2.3 kg) • Cisco Catalyst 3560-24TS: 8.5 lb (3.9 kg) • Cisco Catalyst 3560-48TS: 9.1 lb (4.1 kg) • Cisco Catalyst 3560-24PS: 11.3 lb (5.1 kg) • Cisco Catalyst 3560-48PS: 13.2 lb (6.0 kg) • Cisco Catalyst 3560G-24TS: 12 lb (5.4 kg) • Cisco Catalyst 3560G-24PS: 13.5 lb (6.1 kg) • Cisco Catalyst 3560G-48TS: 14.0 lb (6.4 kg) • Cisco Catalyst 3560G-48PS: 15.5 lb (7.0 kg)
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 • Cisco Catalyst 3560-8PC: 0 dBa (no fan) • Cisco Catalyst 3560-12PC: 0 dBa (no fan) • Cisco Catalyst 3560-24TS: 42 dBa • Cisco Catalyst 3560-48TS: 42 dBa

	<ul style="list-style-type: none"> • Cisco Catalyst 3560-24PS: 42 dBa • Cisco Catalyst 3560-48PS: 42 dBa • Cisco Catalyst 3560G-24TS: 42 dBa • Cisco Catalyst 3560G-48TS: 48 dBa • Cisco Catalyst 3560G-24PS: 38-44 dBa • Cisco Catalyst 3560G-48PS: 52-58 dBa
Mean Time Between Failure (MTBF)	<ul style="list-style-type: none"> • Cisco Catalyst 3560-8PC: 367,586 hours • Cisco Catalyst 3560-12PC: 406,470 hours • Cisco Catalyst 3560-24TS: 326,100 hours • Cisco Catalyst 3560-48TS: 280,900 hours • Cisco Catalyst 3560-24PS: 224,100 hours • Cisco Catalyst 3560-48PS: 173,500 hours • Cisco Catalyst 3560G-24TS: 230,700 hours • Cisco Catalyst 3560G-24PS: 186,300 hours • Cisco Catalyst 3560G-48TS: 173,400 hours • Cisco Catalyst 3560G-48PS: 147,000 hours

Table 3. Power Specifications for Cisco Catalyst 3560 Series Switch

Description	Specification		
Power Supply Rated Maximum	<ul style="list-style-type: none"> • 204W (Cisco Catalyst 3560-8PC, Catalyst 3560-12PC) • Dissipated power: 80W, 273 BTUs per hour • PoE: 124W • 45W (Cisco Catalyst 3560-24TS) • 485W (Cisco Catalyst 3560-24PS) • Dissipated power: 115W, 393 BTUs per hour • PoE: 370W • 65W (Cisco Catalyst 3560-48TS) • 530W (Cisco Catalyst 3560-48PS) • Dissipated power: 160W, 546 BTUs per hour • PoE: 370W • 100W (Cisco Catalyst 3560G-24TS) • 540W (Cisco Catalyst 3560G-24PS) • Dissipated power: 170W, 534 BTUs per hour • PoE: 370W • 160W (Cisco Catalyst 3560G-48TS) • 590W (Cisco Catalyst 3560G-48PS) • Dissipated power: 220W, 690 BTUs per hour • PoE: 370W 		
Measured 100% Throughput Power Consumption	Cisco Catalyst 3560 Series	Switch Power	Total Output BTU
	3560-8PC	19W	64 BTU/hour
	3560-12PC	22W	73 BTU/hour
	3560-24TS	27W	89 BTU/hour
	3560-48TS	45W	153 BTU/hour
	3560-24PS	43W	144 BTU/hour
	3560-48PS	86W	293 BTU/hour
	3560G-24TS	74W	249 BTU/hour
	3560G-24PS	96W	325 BTU/hour
	3560G-48TS	124W	422 BTU/hour
3560G-48PS	130W	443 BTU/hour	
Measured 5% Throughput Power Consumption	Cisco Catalyst 3560 Series	Switch Power	Total Output BTU
	3560-8PC	18W	60 BTU/hour
	3560-12PC	20W	68 BTU/hour
	3560-24TS	24W	82 BTU/hour
	3560-48TS	41W	138 BTU/hour

	3560-24PS	40W	134 BTU/hour	
	3560-48PS	72W	245 BTU/hour	
	3560G-24TS	66W	225 BTU/hour	
	3560G-24PS	86W	293 BTU/hour	
	3560G-48TS	113W	386 BTU/hour	
	3560G-48PS	123W	418 BTU/hour	
Measured 100% Throughput Power Consumption (with maximum possible PoE loads)	Cisco Catalyst 3560 Series	Switch Power	PoE Power	Total Output BTU
	3560-8PC	145W	124W	70 BTU/hour
	3560-12PC	145W	124W	72 BTU/hour
	3560-24PS	449W	370W	267 BTU/hour
	3560-48PS	483W	370W	383 BTU/hour
	3560G-24PS	496W	370W	429 BTU/hour
	3560G-48PS	534W	370W	559 BTU/hour
Measured 5% Throughput Power Consumption (with 50% PoE loads)	Cisco Catalyst 3560 Series	Switch Power	PoE Power	Total Output BTU
	3560-8PC	82W	62W	69 BTU/hour
	3560-12PC	86W	63W	76 BTU/hour
	3560-24PS	247W	188W	197 BTU/hour
	3560-48PS	275W	184W	311 BTU/hour
	3560G-24PS	287W	186W	345 BTU/hour
	3560G-48PS	328W	189	474 BTU/hour
AC Input Voltage and Current	<ul style="list-style-type: none"> • 100-240 VAC (autoranging), 2.5-1.3A, 50-60 Hz (Cisco Catalyst 3560-8PC) • 100-240 VAC (autoranging), 2.5-1.3A, 50-60 Hz (Cisco Catalyst 3560-12PC) • 100-240 VAC (autoranging), 450-190mA, 50-60 Hz (Cisco Catalyst 3560-24TS) • 100-240 VAC (autoranging), 650-270mA, 50-60 Hz (Cisco Catalyst 3560-48TS) • 100-240 VAC (autoranging), 5.5-2.8A, 50-60 Hz (Cisco Catalyst 3560-24PS and Catalyst 3560-48PS) • 100-240 VAC (autoranging), 3.0-1.5A, 50-60Hz (Cisco Catalyst 3560G-24TS and Catalyst 3560G-48TS) • 100-240 VAC (autoranging), 8.0-4.0A, 50-60Hz (Cisco Catalyst 3560G-24PS and Catalyst 3560G-48PS) 			
Power Rating	<ul style="list-style-type: none"> • Cisco Catalyst 3560-8PC: 0.2 kVA • Cisco Catalyst 3560-12PC: 0.2 kVA • Cisco Catalyst 3560-24TS: 0.075 kVA • Cisco Catalyst 3560-48TS: 0.110 kVA • Cisco Catalyst 3560-24PS: 0.485 kVA • Cisco Catalyst 3560-48PS: 0.530 kVA • Cisco Catalyst 3560G-24TS: 0.10 kVA • Cisco Catalyst 3560G-48TS: 0.16 kVA • Cisco Catalyst 3560G-24PS: 0.52 kVA • Cisco Catalyst 3560G-48PS: 0.56 kVA 			
DC Input Voltages (RPS Input)	<ul style="list-style-type: none"> • +12V at 5A (Cisco Catalyst 3560-24TS and Catalyst 3560-48TS); 7.5A (Cisco Catalyst 3560-24PS and Catalyst 3560-48PS); 10.5A (Cisco Catalyst 3560G-24TS); 17.5A (Cisco Catalyst 3560G-48TS); 14A (Cisco Catalyst 3560G-24PS and Catalyst 3560G-48PS) • -48V at 7.8A (PoE switches) 			
PoE	<ul style="list-style-type: none"> • Maximum power supplied per port: 15.4W • Total power dedicated to PoE: 370W • Total power dedicated to PoE: 124W (Cisco Catalyst 3560-8PC, Catalyst 3560-12PC) 			

Note:

Disclaimer: All power consumption numbers were measured under controlled laboratory conditions and are provided as an estimate.

The wattage rating on the power supply does not represent actual power draw. It indicates the maximum power draw possible by the power supply. This rating can be used for facility capacity

planning. For PoE switches, cooling requirements are smaller than the actual power consumption as a significant portion of PoE loads are dissipated in the endpoints.

Non-PoE Power Consumption

100 Percent Throughput Switch Power Consumption

The numbers indicate the power consumed by a typical switch under normal conditions. Normal conditions signify a temperature of 25 degrees Celsius, atmospheric pressure in the range of 860 to 1060 mbar, and relative humidity from 30 to 75 percent. Typically such power draws are only seen when encountering a 100 percent traffic load made up entirely of 64-byte packets on the switch and the uplinks.

5 Percent Throughput Switch Power Consumption

The numbers indicate the power consumed by a typical switch under normal conditions. Normal conditions signify a temperature of 25 degrees Celsius, atmospheric pressure in the range of 860 to 1060 mbar, and relative humidity from 30 to 75 percent. The numbers below indicate a 5 percent traffic load on the switch and its uplinks.

PoE Power Consumption

100 Percent Throughput Switch Power Consumption (no PoE loads)

The numbers indicate the power consumed by a typical switch under normal conditions. Normal conditions signify a temperature of 25 degrees Celsius, atmospheric pressure in the range of 860 to 1060 mbar, and relative humidity from 30 to 75 percent. Typically such power draws are only seen when encountering a 100 percent traffic load made up entirely of 64-byte packets with no PoE loads on the switch and uplinks.

Measured 5 Percent Throughput Switch Power Consumption (no PoE loads)

The numbers indicate the power consumed by a typical switch under normal conditions. Normal conditions signify a temperature of 25 degrees Celsius, atmospheric pressure in the range of 860 to 1060 mbar and relative humidity from 30 to 75 percent. The numbers below indicate a 5 percent traffic load on the switch and its uplinks

100 Percent Throughput Switch Power Consumption (with maximum PoE loads)

The numbers indicate the power consumed by a typical system (the switch and the corresponding PoE loads) under normal conditions. Normal conditions signify a temperature of 25 degrees Celsius, atmospheric pressure in the range of 860 to 1060 mbar and relative humidity from 30 to 75 percent. Typically this power draw is realized when a switch is running 100 percent traffic load of 64 byte sized packets on all its ports and uplinks and also drawing 100 percent PoE load .

5 Percent Throughput Switch Power Consumption (with 50 percent PoE loads).

The numbers indicate the power consumed by a typical system (the switch and the corresponding PoE loads) under normal conditions. Normal conditions signify a temperature of 25 degrees Celsius, atmospheric pressure in the range of 860 to 1060 mbar and relative humidity from 30 to 75 percent. The numbers below indicate a 5 percent traffic load and 50 percent PoE load on the switch and its uplinks.

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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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, and SNMPv3

Table 5. Safety and Compliance

Description	Specification
Safety Certifications	<ul style="list-style-type: none"> • UL 60950-1, First Edition • CUL to CAN/CSA 22.2 No. 60950-1, First Edition • TUV/GS to EN 60950-1, First Edition • CB to IEC 60950-1 with all country deviations • AS/NZS 60950-1, First Edition • NOM (through partners and distributors) • CE Marking
Electromagnetic Emissions Certifications	<ul style="list-style-type: none"> • FCC Part 15 Class A • EN 55022 Class A (CISPR22) • EN 55024 (CISPR24) • AS/NZS CISPR22 Class A • CE • CNS 13438 Class A

	<ul style="list-style-type: none"> • MIC • GOST • China EMC Certifications
Telco	Common Language Equipment Identifier (CLEI) code
Warranty	Limited lifetime warranty

Cisco Services for Access Switching

Cisco and our partners can help you create a robust, dependable Cisco Access Switching solution. The Cisco lifecycle approach to services defines the requisite activities at each phase of the solution lifecycle. Assessments help align your solution to business goals and gauge readiness to support new technology. Effective planning and design expedite solution adoption. Award-winning technical support increases operational efficiency, and optimization improves performance, resiliency, stability, and predictability and prepares your network and teams for change. For more information, visit <http://www.cisco.com/go/services>.

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 • Cisco SMARTnet® and SMARTnet Onsite support, available direct from Cisco • Cisco Packaged SMARTnet support program, available through resellers 	<ul style="list-style-type: none"> • Project management • Site survey, configuration, and deployment • Installation, text, and cutover • Training • Major moves, adds, and changes • Design review and product staging • Access to software updates 24 hours • 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"> • Supplements existing staff • Helps ensure that functions meet needs • Mitigates risk • Helps enable 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 Numbers	Description
WS-C3560-8PC-S	<ul style="list-style-type: none"> • 8 Ethernet 10/100 ports and 1 dual-purpose 10/100/1000 and SFP port • Compact form-factor with no fan • Enterprise-class intelligent services delivered to the network edge • IEEE 802.3af and Cisco prestandard Power over Ethernet • IP Base software feature set (IPB)
WS-C3560-12PC-S	<ul style="list-style-type: none"> • 12 Ethernet 10/100 ports and 1 dual-purpose 10/100/1000 and SFP port • Compact form-factor with no fan • Enterprise-class intelligent services delivered to the network edge • IEEE 802.3af and Cisco prestandard Power over Ethernet • IP Base software feature set (IPB)
WS-C3560-24TS-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 • IP Base software feature set (IPB)
WS-C3560-24TS-E	<ul style="list-style-type: none"> • 24 Ethernet 10/100 ports and 2 SFP-based Gigabit Ethernet ports • RU fixed-configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge

	<ul style="list-style-type: none"> • IP Services software feature set (IPS) • Provides full IPv6 dynamic routing
WS-C3560-48TS-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 • IP Base software feature set (IPB)
WS-C3560-48TS-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 • IP Services software feature set (IPS) • Provides full IPv6 dynamic routing
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 • IP Base software feature set (IPB)
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 • IP Services software feature set (IPS) • Provides full IPv6 dynamic 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 • IP Base software feature set (IPB)
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 • IP Services software feature set (IPS) • Provides full IPv6 dynamic routing
WS-C3560G-24TS-S	<ul style="list-style-type: none"> • 24 Ethernet 10/100/1000 ports and 4 SFP-based Gigabit Ethernet ports • 1RU fixed-configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge • IP Base software feature set (IPB)
WS-C3560G-24TS-E	<ul style="list-style-type: none"> • 24 Ethernet 10/100/1000 ports and 4 SFP-based Gigabit Ethernet ports • 1RU fixed-configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge • IP Services software feature set (IPS) • Provides full IPv6 dynamic routing
WS-C3560G-48TS-S	<ul style="list-style-type: none"> • 48 Ethernet 10/100/1000 ports and 4 SFP-based Gigabit Ethernet ports • 1RU fixed-configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge • IP Base software feature set (IPB)
WS-C3560G-48TS-E	<ul style="list-style-type: none"> • 48 Ethernet 10/100/1000 ports and 4 SFP-based Gigabit Ethernet ports • 1RU fixed-configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge • IP Services software feature set (IPS) • Provides full IPv6 dynamic routing
WS-C3560G-24PS-S	<ul style="list-style-type: none"> • 24 Ethernet 10/100/1000 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 • IP Base software feature set (IPB)
WS-C3560G-24PS-E	<ul style="list-style-type: none"> • 24 Ethernet 10/100/1000 ports and 4 SFP-based Gigabit Ethernet ports

	<ul style="list-style-type: none"> • 1RU fixed-configuration, multilayer switch • Enterprise-class intelligent services delivered to the network edge • IEEE 802.3af and Cisco prestandard Power over Ethernet • IP Services software feature set (IPS) • Provides full IPv6 dynamic routing
WS-C3560G-48PS-S	<ul style="list-style-type: none"> • 48 Ethernet 10/100/1000 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 • IP Base software feature set (IPB)
WS-C3560G-48PS-E	<ul style="list-style-type: none"> • 48 Ethernet 10/100/1000 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 • IP Services software feature set (IPS) • Provides full IPv6 dynamic routing
CD-3560G-EMI=	<ul style="list-style-type: none"> • IP Services License (formerly EMI) upgrade kit for IP Base versions of the Cisco Catalyst 3560G-24TS, Catalyst 3560G-24PS, Catalyst 3560G-48TS and Catalyst 3560G-48PS • Advanced IPv6 routing
CD-3560-EMI=	<ul style="list-style-type: none"> • IP Services License (formerly EMI) upgrade kit for IP Base versions of the Cisco Catalyst 3560-24PS, Catalyst 3560-48PS, Catalyst 3560-24TS, Catalyst 3560-48TS, and Catalyst 3560-8PC • Advanced IPv6 routing
PWR-RPS2300	Cisco RPS 2300 with one connector cable
RCKMNT-1RU=	Spare rack-mount kit for the Cisco Catalyst 3560
RCKMNT-REC-1RU=	1RU recessed rack-mount kit for the Cisco Catalyst 3560
RCKMNT-19-CMPCT=	Rack-mount kit for the Cisco Catalyst 3560-8PC and Catalyst 3560-12PC compact switches
CBLGRD-C3560-8PC=	Cable guard for the Cisco Catalyst 3560-8PC compact switch
CBLGRD-C3560-12PC=	Cable guard for the Cisco Catalyst 3560-12PC compact switch
GLC-LH-SM=	1000BASE-LX/LH SFP transceiver module for MMF and SMF, 1300-nm wavelength
GLC-SX-MM=	1000BASE-SX SFP transceiver module for MMF, 850-nm wavelength
GLC-ZX-SM=	1000BASE-ZX SFP transceiver module for SMF, 1550-nm wavelength
GLC-T=	1000BASE-T SFP transceiver module for Category 5 copper wire Not supported on the Cisco Catalyst 3560-8PC compact switch
GLC-BX-D=	1000BASE-BX10 SFP transceiver module for single strand SMF, 1490-nm TX / 1310-nm RX wavelength
GLC-BX-U=	1000BASE-BX10 SFP transceiver module for single strand SMF, 1310-nm TX / 1490-nm RX wavelength
GLC-GE-100FX=	<ul style="list-style-type: none"> • 100BASE-FX SFP transceiver module for Gigabit Ethernet ports, 1310 nm wavelength, 2 km over MMF • Not supported on the Cisco Catalyst 3560-8PC and Catalyst 3560-12PC compact switches
GLC-FE-100FX=	<ul style="list-style-type: none"> • 100BASE-FX SFP transceiver module for 100-Mb ports, 1310 nm wavelength, 2 km over MMF • Only supported on the Cisco Catalyst 3560-8PC and Catalyst 3560-12PC compact switches
GLC-FE-100LX=	<ul style="list-style-type: none"> • 100BASE-FX SFP transceiver module for 100-Mb ports, 1310 nm wavelength, 10 km over SMF • Only supported on the Cisco Catalyst 3560-8PC and Catalyst 3560-12PC compact switches
GLC-FE-100BX-D=	<ul style="list-style-type: none"> • 100BASE-BX10-D SFP transceiver module for 100-Mb ports, 1550 nm TX / 1310 nm RX wavelength, 10 km over single-strand SMF • Only supported on the Cisco Catalyst 3560-8PC and Catalyst 3560-12PC compact switches

GLC-FE-100BX-U=	<ul style="list-style-type: none"> • 100BASE-BX10-U SFP transceiver module for 100-Mb ports, 1310 nm TX/1550 nm RX wavelength, 10 km over single-strand SMF • Only supported on the Cisco Catalyst 3560-8PC and Catalyst 3560-12PC compact switches
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)
DWDM-SFP-3033=	DWDM SFP 1530.33 nm SFP (100 GHz ITU grid)
DWDM-SFP-3112=	DWDM SFP 1531.12 nm SFP (100 GHz ITU grid)
DWDM-SFP-3190=	DWDM SFP 1531.90 nm SFP (100 GHz ITU grid)
DWDM-SFP-3268=	DWDM SFP 1532.68 nm SFP (100 GHz ITU grid)
DWDM-SFP-3425=	DWDM SFP 1534.25 nm SFP (100 GHz ITU grid)
DWDM-SFP-3504=	DWDM SFP 1535.04 nm SFP (100 GHz ITU grid)
DWDM-SFP-3582=	DWDM SFP 1535.82 nm SFP (100 GHz ITU grid)
DWDM-SFP-3661=	DWDM SFP 1536.61 nm SFP (100 GHz ITU grid)
DWDM-SFP-3819=	DWDM SFP 1538.19 nm SFP (100 GHz ITU grid)
DWDM-SFP-3898=	DWDM SFP 1538.98 nm SFP (100 GHz ITU grid)
DWDM-SFP-3977=	DWDM SFP 1539.77 nm SFP (100 GHz ITU grid)
DWDM-SFP-4056=	DWDM SFP 1540.56 nm SFP (100 GHz ITU grid)
DWDM-SFP-4214=	DWDM SFP 1542.14 nm SFP (100 GHz ITU grid)
DWDM-SFP-4294=	DWDM SFP 1542.94 nm SFP (100 GHz ITU grid)
DWDM-SFP-4373=	DWDM SFP 1543.73 nm SFP (100 GHz ITU grid)
DWDM-SFP-4453=	DWDM SFP 1544.53 nm SFP (100 GHz ITU grid)
CWDM-SFP-1610=	Cisco CWDM SFP, 1610 nm; Gigabit Ethernet and 1G/2G FC (brown)
CAB-SFP-50CM=	Cisco Catalyst 3560 SFP Interconnect Cable (50 dcm)
CAB-SM-LCSC-1M	1m-fiber single-mode LC-to-SC connectors
CAB-SM-LCSC-5M	5m-fiber single-mode LC-to-SC connectors

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