Cisco Catalyst 3750-X and 3560-X Series Switches

Ready to Replace an Old Switch?

If you're looking for a new switch, consider the next-generation Catalyst 9300 Series. It enables converged wired-wireless access to support BYOD and mobility. It also offers a variety of performance, security, and operational enhancements versus previous generations of switches.

- See Model Comparison for the Cisco Catalyst 9300 Series Switches
- Free tool! Check to see if you have obsolete or end-of-support equipment through free Cisco Active Advisor.
- Trade-in your old switch and save!

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The Cisco® Catalyst® 3750-X and 3560-X Series Switches are an enterprise-class lines of stackable and standalone switches, respectively. These switches provide high availability, scalability, security, energy efficiency, and ease of operation with innovative features such as Cisco StackPower (available only on the Catalyst 3750-X), IEEE 802.3at Power over Ethernet Plus (PoE+) configurations, optional network modules, redundant power supplies, and Media Access Control Security (MACsec) features. The Cisco Catalyst 3750-X Series with StackWise® Plus technology provides scalability, ease of management and investment protection for the evolving business needs. The Cisco Catalyst 3750-X and 3560-X enhance productivity by enabling applications such as IP telephony, wireless, and video for borderless network experience.

Cisco Catalyst 3750-X and 3560-X Series primary features:

- 24 and 48 10/100/1000 PoE+, non-PoE models, and 12 and 24 GE SFP port models
- 24 and 48 10/100/1000 UPOE-capable models with Energy Efficient Ethernet (EEE) support
- Four optional uplink network modules with GE or 10GE ports
- Industry first PoE+ with 30W power on all ports in 1 rack unit (RU) form factor
- Dual redundant, modular power supplies and fans
- Media Access Control Security (MACsec) hardware-based encryption
- Flexible NetFlow and switch-to-switch hardware encryption with the Service Module uplink
- Open Shortest Path First (OSPF) for routed access in IP Base image
- IPv4 and IPv6 routing, Multicast routing, advanced quality of service (QoS), and security features in hardware
- Enhanced limited lifetime warranty (LLW) with next business day (NBD) advance hardware replacement and 90 day access to Cisco Technical Assistance Center (TAC) support
- Enhanced Cisco EnergyWise for operational cost optimization by measuring actual power consumption of the PoE devices, reporting, and reducing energy consumption across the network
- USB Type-A and Type-B ports for storage and console respectively and an out-of-band Ethernet management port

In addition to the above features, the Cisco Catalyst 3750-X switches also offer:

- Cisco StackPower™ technology: An innovative feature and industry first for sharing power among stack members
- Cisco StackWise Plus technology for ease of use and resiliency with 64 Gbps of throughput
- Investment protection with backward compatibility with all other models of Cisco Catalyst 3750 Series Switches

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Switch Models and Configurations

All switch models can be configured with four optional network modules. The UPOE, PoE+, and non-PoE switch models are available with either the LAN Base or IP Base feature set. IP Services feature set is available as an upgrade option at the time of ordering or through a license at a later time. The GE SFP switch models are available with either IP Base or IP Services feature set.

Stackable Switches

Figure 1 shows the Cisco Catalyst 3750-X Series Switches (front and back).

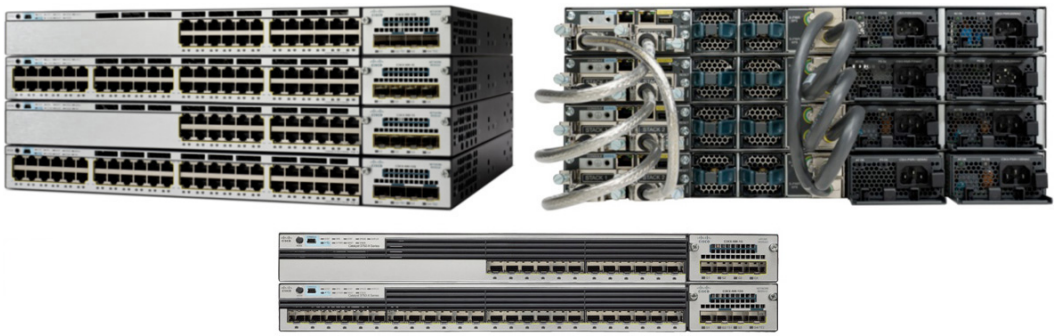


Figure 1.
Cisco Catalyst 3750-X Series Switches (Front and Back)

Table 1 shows the Cisco Catalyst 3750-X Series configurations.

Table 1. Cisco Catalyst 3750-X Series Configurations

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power	Stackpower
LAN Base	WS-C3750X-24T-L	24	350W	-	Yes- starting 15.0(2)SE software release (cables purchased separately)
	WS-C3750X-48T-L	48			
	WS-C3750X-24P-L	24 PoE+	715W	435W	
	WS-C3750X-48P-L	48 PoE+			
	WS-C3750X-48PF-L	48 PoE+	1100W	800W	
	WS-C3750X-24U-L	24 UPOE	1100W	800W	
	WS-C3750X-48U-L	48 UPOE	1100W	800W	
IP Base	WS-C3750X-24T-S	24	350W	-	
	WS-C3750X-48T-S	48			
	WS-C3750X-24P-S	24 PoE+	715W	435W	
	WS-C3750X-48P-S	48 PoE+			
	WS-C3750X-48PF-S	48 PoE+	1100W	800W	
	WS-C3750X-24U-S	24 UPOE	1100W	800W	
	WS-C3750X-48U-S	48 UPOE	1100W	800W	
	WS-C3750X-12S-S	12 GE SFP	350W	-	
	WS-C3750X-24S-S	24 GE SFP	350W	-	

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Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power	Stackpower
IP Services	WS-C3750X-24T-E	24	350W	-	
	WS-C3750X-48T-E	48			
	WS-C3750X-24P-E	24 PoE+	715W	435W	
	WS-C3750X-48P-E	48 PoE+			
	WS-C3750X-48PF-E	48 PoE+	1100W	800W	
	WS-C3750X-24U-E	24 UPOE	1100W	800W	
	WS-C3750X-48U-E	48 UPOE	1100W	800W	
	WS-C3750X-12S-E	12 GE SFP	350W	-	
	WS-C3750X-24S-E	24 GE SFP	350W	-	

Standalone Switches

Figure 2 shows Cisco Catalyst 3560-X Series Switches.



Figure 2.
Cisco Catalyst 3560-X Series Switches

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Table 2 shows the Cisco Catalyst 3560-X Series configurations.

Table 2. Cisco Catalyst 3560-X Series Configurations

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power
LAN Base	WS-C3560X-24T-L	24	350W	-
	WS-C3560X-48T-L	48		
	WS-C3560X-24P-L	24 PoE+	715W	435W
	WS-C3560X-48P-L	48 PoE+		
	WS-C3560X-48PF-L	48 PoE+	1100W	800W
	WS-C3560X-24U-L	24 UPOE	1100W	800W
	WS-C3560X-48U-L	48 UPOE	1100W	800W
IP Base	WS-C3560X-24T-S	24	350W	-
	WS-C3560X-48T-S	48		
	WS-C3560X-24P-S	24 PoE+	715W	435W
	WS-C3560X-48P-S	48 PoE+		
	WS-C3560X-48PF-S	48 PoE+	1100W	800W
	WS-C3560X-24U-S	24 UPOE	1100W	800W
	WS-C3560X-48U-S	48 UPOE	1100W	800W
IP Services	WS-C3560X-24T-E	24	350W	-
	WS-C3560X-48T-E	48		
	WS-C3560X-24P-E	24 PoE+	715W	435W
	WS-C3560X-48P-E	48 PoE+		
	WS-C3560X-48PF-E	48 PoE+	1100W	800W
	WS-C3560X-24U-E	24 UPOE	1100W	800W
	WS-C3560X-48U-E	48 UPOE	1100W	800W

Cisco Catalyst 3750-X and 3560-X Series Software

In addition to IP Base and IP Services feature sets, the Cisco Catalyst 3750-X and 3560-X Series come with a new LAN Base feature set. The three feature sets available with all Cisco Catalyst 3750-X and 3560-X Series Switches are:

- LAN Base: enterprise access Layer 2 switching features
- IP Base: baseline enterprise access Layer 3 switching features
- IP Services: advanced Layer 3 switching (IPv4 and IPv6) features

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The LAN Base feature set includes comprehensive Layer 2 features, with up-to 255 VLANs. The IP Base feature set provides baseline enterprise services in addition to all LAN Base features, with 1K VLANs. IP Base also includes the support for routed access, StackPower (available only on the Catalyst 3750-X), MACsec, and the new Cisco Service Module. The IP Services feature set provides full enterprise services that includes advanced Layer 3 features such as Enhanced Interior Gateway Routing Protocol (EIGRP), Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), Protocol Independent Multicast (PIM), and IPv6 routing such as OSPFv3 and EIGRPv6. All software feature sets support advanced security, QoS, and management features.

The Cisco Catalyst 3750-X Series Switches with LAN Base feature set can only stack with other Cisco Catalyst 3750-X Series LAN Base switches. A mixed stack of LAN Base switch with IP Base or IP Services features set is not supported.

Customers can transparently upgrade the software feature set in the Cisco Catalyst 3750-X and 3560-X Series Switches through Cisco IOS® Software activation. Software activation authorizes and enables the Cisco IOS Software feature sets. A special file contained in the switch, called a license file, is examined by Cisco IOS Software when the switch is powered on. Based on the license's type, Cisco IOS Software activates the appropriate feature set. License types can be changed, or upgraded, to activate a different feature set. For detailed information about Software Activation, visit https://www.cisco.com/go/sa.

Cisco StackWise Plus Technology

Cisco StackWise Plus technology is built on the highly successful industry leading StackWise technology, which is a premium stacking architecture optimized for GbE. StackWise technology was designed to respond to additions, deletions, and redeployment while maintaining constant performance. The stack behaves as a single switching unit that is managed by a primary switch elected from one of the member switches. The primary switch automatically creates and updates all the switching and optional routing tables. A working stack can accept new members or delete old ones without service interruption. StackWise creates a highly resilient single unified system of up to nine switches, providing simplified management using a single IP address, single telnet session, single command-line interface (CLI), auto-version checking, autoconfiguration, and more. StackWise Plus supports all the features of StackWise and provides backward compatibility with the existing Cisco Catalyst 3750 Series Switches while enhancing the throughput of the system up to 64 Gbps. StackWise Plus also enables local switching in Cisco Catalyst 3750-X Series Switches. Local switching packets coming into a port in the Cisco Catalyst 3750-X Series or 3750-E Series Switch destined for another port in the same switch do not have to traverse through the stack ring, thus increasing the forwarding capacity of the switch. The Cisco Catalyst 3750-X Series stacks up to nine switches as a single logical unit for a total of 432 Ethernet 10/100/1000 ports with 18 10GbE ports. Individual 10/100/1000 units can be joined in any combination to evolve with network needs.

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Cisco StackPower Technology

The Cisco Catalyst 3750-X Series introduces Cisco StackPower technology, innovative power interconnect system that allows the power supplies in a stack to be shared as a common resource among all the switches. Cisco StackPower unifies the individual power supplies installed in the switches and creates a pool of power, directing that power where it is needed. This feature is available in all Cisco Catalyst 3750-X Series Switches feature sets*. Up to four switches can be configured in a StackPower stack with the special connector at the back of the switch using the StackPower cable**, which is different than the StackWise cables. (See Figure 3.)



Figure 3.
StackPower Connector

StackPower can be deployed in either power sharing mode or redundancy mode. In power sharing mode, the power of all the power supplies in the stack is aggregated and distributed among the switches in the stack. In redundant mode, when the total power budget of the stack is calculated, the wattage of the largest power supply is not included. That power is held in reserve and used to maintain power to switches and attached devices when one power supply fails, enabling the network to operate without interruption. Following the failure of one power supply, the StackPower mode becomes power sharing.

StackPower allows customers to simply add one extra power supply in any switch of the stack and provide either power redundancy for any of the stack members or simply add more power to the shared pool. StackPower eliminates the need for an external redundant power system or installation of dual power supplies in all the stack members.

* Available in LAN Base in the 15.0(2)SE software release

** For LAN Base, cables need to be purchased separately

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Network Module

Figure 4 shows various Network Modules with Four GbE, Two 10GbE SFP+ Interfaces, Two 10GB-T and Service Module with Two 10GbE SFP+ Interfaces.

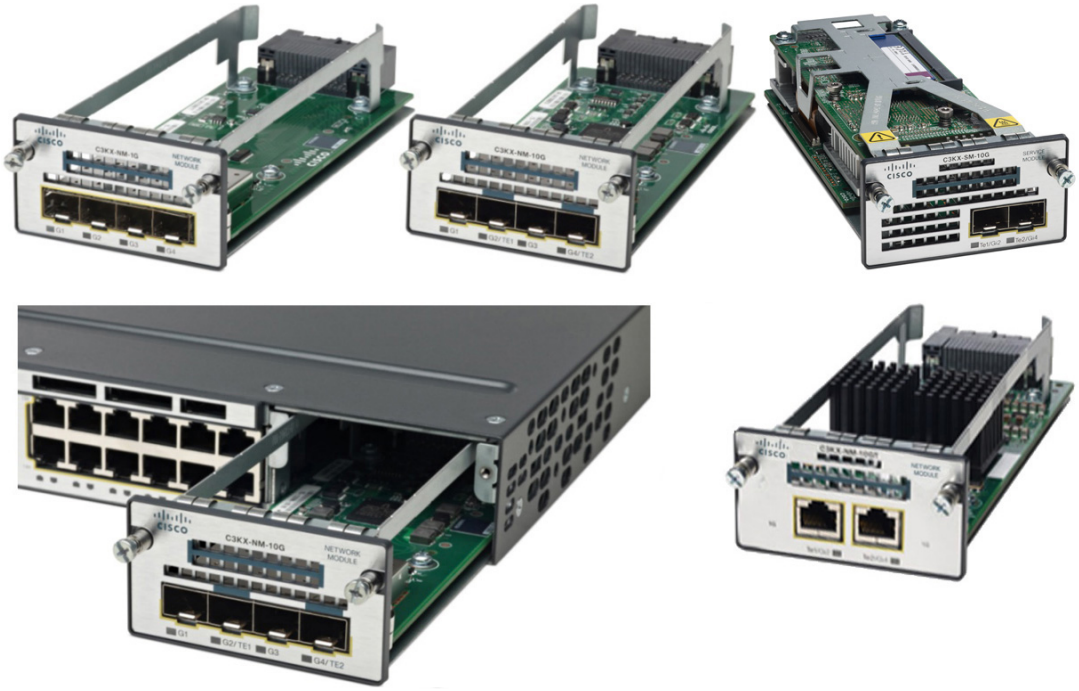


Figure 4.
Network Modules with Four GbE, Two 10GbE SFP+ Interfaces, Two 10GB-T and Service Module with Two 10GbE SFP+ Interfaces

The Cisco Catalyst 3750-X Series and 3560-X Series Switches support four optional network modules for uplink ports. The default switch configuration doesn't include the uplink module; at the time of switch purchase the customer has the flexibility to choose from the network modules described in Table 3.

Table 3. Network Module Numbers and Descriptions

Product Number	Product Description
C3KX-NM-1G	Four GbE port network module
C3KX-NM-10G	Two 10GbE SFP+ ports network module with four physical ports with two SFP+ and two regular SFP ports
C3KX-NM-10GT	Two 10GB-T ports network module
C3KX-SM-10G	Service Module with two 10GbE SFP+ ports network module for Netflow and MACsec encryption

The SFP+ interface supports both 10GbE and GbE port, allowing customers to use their investment in GbE SFP and upgrade to 10GbE when business demands change, without having to do a comprehensive upgrade of the access switch. The four uplink modules are hot swappable. The four network modules can be used in any of the combinations shown in Table 4.

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Table 4. 10GbE Network Module Configuration

	Interface Options	
Network Module	**10GbE SFP+ Ports**	**GbE SFP Ports**
1GbE	0	4
10GbE Network Module	2	0
	0	4
	1	2
10GB-T	2 (RJ-45)	0
Service Module	2	0
	1	1
	0	2

Service Module

The new Cisco Service Module offers enhanced security and Flexible Netflow (FNF) features on the uplink ports of the Catalyst 3750-X and 3560-X. The service module is supported with IP Base or IP Services feature set. It can be used with SFP or SFP+ at 1G or 10G speeds. The new Cisco Service Module has custom dedicated hardware for FNF monitoring, separate from the dedicated hardware for MACSec. Therefore there is no impact on packet forwarding performance & latency. It offers flexibility with the user being able to define flows. The new Cisco Service Module enables the following services:

- Line rate (40G) Flexible NetFlow for Network Monitoring and Security Anomaly Detection
  - Supported version 9
  - 32,000 simultaneous flows
  - 128 of simultaneous active monitors
- Line rate (40G) MACsec encryption (please refer to MACsec section below)

FNF is a networking monitoring technology. A NetFlow table can be used to collect flow statistics. The flow information can be used by customers for a variety of use cases like understanding:

1. Applications running on the network, and identify undesired applications, P2P etc
2. Granular Local and aggregated Campus view (Top N applications, drill down etc).
3. Top talkers (ports, users, applications) for application usage, productivity and asset utilization etc.
4. Security Anomaly Detection by examining flows that do not traverse trust boundaries for inside the perimeter attacks
5. Impacts of network and application changes
6. Compliance conformation
7. Traffic patterns for capacity planning

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Enabling FNF at the access switch ensures you get all flows. The access switch is the most logical place in the network for collecting statistics and monitoring all flows. With Netflow, you can obtain MAC-address and access port information associated with the flow, to get directly to the source of the flow. Most collectors are able to leverage the location based on MAC-address and interface port number provided by the access switch to the collector. Thus by enabling FNF at the access switch you are able to get the location information of the flow. The access switch has a variety of identity mechanism for user authentication and adding user awareness is the natural progression that can be developed. Access switches are an order of magnitude greater than distribution and core which makes them scale well for FNF and ensure there are no performance impacts of oversubscription at aggregation and core.

10GB-T Module

The new Cisco 10G Base-T module is hot-swapable and can operate at either 10GE or GE speed (with manual configuration).

Table 5 shows the cable types and supported lengths of the new Cisco 10G Base-T module.

Table 5. 10GB-T Cable Types and Supported Lengths

Cable Type	Supported Length
Category 7a	**100 meters**
Category 7	**100 meters**
Category 6	**55 meters**
Category 6a*	**100 meters**

* Category 6a requires 3db Insertion Loss margin at 250MHz.

MACsec

The Cisco Catalyst 3750-X and 3560-X Series Switches offer exceptional security with integrated hardware support for MACsec defined in IEEE 802.1AE. MACsec provides MAC layer encryption over wired networks using out-of-band methods for encryption keying. The MACsec Key Agreement (MKA) protocol provides the required session keys and manages the keys required for encryption when configured. MKA and MACsec are implemented following successful authentication using 802.1x Extensible Authentication Protocol (EAP) framework. In Cisco Catalyst 3750-X and 3560-X Series Switches both the user/down-link ports (links between the switch and endpoint devices such as a PC or IP phone) and, using the service module, the network/up-link ports can be secured using MACsec. With the service module you can encrypt switch to switch links such as access to distribution, or encrypt dark fiber links within a building or between buildings.

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Dual Redundant Modular Power Supplies

The Cisco Catalyst 3750-X Series and 3560-X Series Switches support dual redundant power supplies. The switch ships with one power supply by default, and the second power supply can be purchased at the time of ordering the switch or at a later time. If only one power supply is installed, it should always be in the power supply bay 1. (See Figure 5).



Figure 5.
Dual Redundant Power Supplies

Table 6 shows the different power supplies available in these switches and available PoE power.

Table 6. Power Supply Models

Models	Default Power Supply	Available PoE Power
24 Port Data Switch	C3KX-PWR-350WAC	-
48 Port Data Switch		
24 Port PoE Switch	C3KX-PWR-715WAC	435W
48 Port PoE Switch		
48 Port Full PoE Switch	C3KX-PWR-1100WAC	800W
24 Port UPOE Switch	C3KX-PWR-1100WAC	800W
48 Port UPOE Switch		

In addition to the above power supplies a 440W DC power supply is available as a spare (should be ordered separately) on all switch models. The DC power supply also delivers PoE capabilities for maximum flexibility, (please refer to table 7 for available PoE for different configurations) and customers can mix and match the AC and DC power supplies in the two available power supply slots. Any of these power supplies can be installed in any of the switches.

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Table 7. Available PoE with DC power supply

Model	# of 440W DC PS	Total Available PoE Budget
24-Port PoE Switch	1	220W
	2	660W
48-Port PoE Switch	1	185W
	2	625W

Power over Ethernet Plus (PoE+)/Universal Power Over Ethernet (UPOE)

In addition to PoE 802.3af, the Cisco Catalyst 3750-X and 3560-X Series Switches support PoE+ (IEEE 802.3at standard), which provides up to 30W of power per port and UPOE, which provides 60W of power per port (only on UPOE-capable models). The Cisco Catalyst 3750-X and 3560-X Series Switches can provide a lower total cost of ownership 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 and circuits that would otherwise be necessary in IP phone and WLAN deployments. Table 8 shows the power supply combinations required for different PoE needs. Cisco UPOE switches extend the IEEE 802.3 PoE+ standard to double the power per port to 60 watts. UPOE-enabled ports can be used to deliver power for all current PoE/PoE+ solutions in addition to UPOE devices, including VDI clients, IP turrets for financial trading, personal Cisco TelePresence® systems, and more. The maximum UPOE budget available on the Cisco Catalyst 3750-X/3560-X switch is 1800W per switch. This requires the 1100W AC power supply in both the power supply slots. 1800W in POE budget makes sure that the 24-port models support full UPOE on all ports (24 x 60W/port = 1440W) and the 48-port models support up to 30 UPOE connections (30 x 60W/port = 1800W) per switch.

Table 8. Power Supply Requirements for PoE/PoE+ and UPOE models

POE/POE+	24 Port PoE Switch	48 Port PoE Switch
PoE (15.4W per port)	One C3KX-PWR-715WAC	One C3KX-PWR-1100WAC or Two C3KX-PWR-715WAC
PoE+ (30W per port)	One C3KX-PWR-1100WAC or Two C3KX-PWR-715WAC	Two C3KX-PWR-1100WAC or One C3KX-PWR-1100WAC and one C3KX-PWR-715WAC
UPOE (60W per port)	One C3KX-PWR-715WAC and one C3KX-PWR-1100WAC or Two C3KX-PWR-1100WAC	One C3KX-PWR-715WAC and one C3KX-PWR-1100WAC or Two C3KX-PWR-1100WAC

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EXpandable Power System (XPS) 2200

The XPS 2200 is the next-generation redundant power system (RPS). It not only provides the functionalities offered by the RPS but also provides enhanced services with the support for Cisco StackPower technology. When used with the Cisco Catalyst 3560-X, it provides RPS functionality, but when used with the Cisco Catalyst 3750-X, it provides StackPower functionality to all the stack members, including power supply redundancy.

The XPS supports dual redundant power supplies and fans. Up to nine switches can be connected to the XPS 2200, and it can provide power backup to two of the failed switches concurrently (when appropriately sized power supplies are used). The power supplies used by the XPS 2200 are the same as the ones supported in the Cisco Catalyst 3750-X and 3560-X Series Switches. The XPS 2200 is fully configurable for setting switch priorities in case of multiple failures.

Please refer to the XPS 2200 Performance Specifications section at the end of this document.



Figure 6.
The XPS 2200

Features

Borderless Networks, a Cisco architecture, deliver the new workspace experience, connecting anyone, anywhere, using any device, to any resource securely, reliably, and transparently. Cisco's Borderless Networks architecture addresses primary IT and business challenges to help create a truly borderless experience by bringing interactions closer to the employee and customer.

Borderless experience is only possible with intelligent network elements designed and architected to meet the needs of a global workspace. Cisco Network Access is a primary component of this architecture, enabling various borderless network services such as mobility, security, MediaNet, EnergyWise, and ease of operations for increased productivity and operational efficiency. When network access is intelligent, it knows the identity of the user, as well as where the user is on the network. It knows what is connecting to the network, to automatically provision the network for QoS and delivery. It becomes services-aware to optimize user experience. Only with intelligent access network, your enterprise can go borderless securely and transparently. Your business can save energy, simplify operations with better business efficiency, and have an optimized total cost of ownership.

Cisco Network Access for Borderless solution focuses on the following primary areas:

- Sustainability
- Ease of operations
- Borderless security
- Borderless experience

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Sustainability

Cisco Catalyst switching solutions enable greener practices through measurable power efficiency, integrated services, and continuous innovations such as Cisco EnergyWise, an enterprisewide solution that monitors and conserves energy with customized policies. Together, Cisco EnergyWise technology and Cisco Catalyst switches reduce greenhouse gas (GhG) emissions and increase energy cost savings and sustainable business behavior. Sustainability features in the Cisco Catalyst 3750-X and 3560-X Series Switches include the following features sets:

- Cisco EnergyWise technology
- Efficient switch operation
- Intelligent power management
- Energy Efficient Ethernet

Cisco EnergyWise Technology

Cisco EnergyWise is an innovative architecture, added to fixed configuration 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 TCP to integrate Cisco and third-party management systems.

Efficient Switch Operation

Cisco Catalyst 3750-X and 3560-X Series Switches, designed and engineered by Cisco, provide optimum power saving, low power operations for industry best-in-class power management, and power consumption capabilities. The Cisco Catalyst 3750-X and 3560-X ports are capable of reduced power modes so that ports not in use can move into a lower power utilization state.

StackPower lets customers to simply add one extra power supply in any switch of the stack and provide either power redundancy for any of the stack members or simply add more power to the shared pool.

Intelligent Power over Ethernet Management

The Cisco Catalyst 3750-X and 3560-X Series PoE models support Cisco IP phones and Cisco Aironet WLAN access points providing up to 30W of power per port, as well as any IEEE 802.3af-compliant end device.

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- **Cisco Discovery Protocol Version 2** allows the Cisco Catalyst 3750-X and 3560-X Series Switches 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.
- **Per port power consumption** command allows customers to specify maximum power setting on an individual port.
- **Per port PoE power sensing** measures actual power being drawn, enabling more intelligent control of powered devices.
- **The PoE MIB** provides proactive visibility into power usage and allows customers to set different power-level thresholds.

Energy Efficient Ethernet (EEE)

EEE (IEEE 802.3az) provides a mechanism and a standard for reducing the energy usage of an Ethernet port without affecting the vital function of forwarding traffic. During peak work hours, most wired client devices use their network connections with infrequent bursts. The normal EEE operation is well suited to this behavior. During off-peak times the client devices may use sleep or hibernate modes. At this time the network interface can be completely inactive and able to be woken on demand by remote request.

Prior to the EEE standard, it was a common practice for client devices such as personal computers and servers to save power during sleep states by renegotiating the Ethernet link to a lower speed. With EEE capability, PCs and other “sleep oriented” devices can achieve power savings similar to the speed downshift while allowing a much faster transition back to the active state. Faster link wake time improves the user’s experience by allowing a faster transition for the client device from the sleep to active and connected state.

Cisco Catalyst 3750-X/3560-X series switches support EEE on the UPOE models.

Ease of Operations

The Cisco Catalyst 3750-X and 3560-X help reduce the operating costs through:

- Cisco Catalyst Smart Operations
- Easy to use deployment and control features
- Advanced, intelligent network management tools

Cisco Catalyst Smart Operations

Cisco Catalyst Smart Operations is a comprehensive set of capabilities that simplify LAN deployment, configuration, and troubleshooting. In addition to adaptive, always on technologies such as StackWise and StackPower, Cisco Catalyst Smart Operations enable zero touch installation and replacement of switches, fast upgrade, as well as ease of troubleshooting with reduced operational cost. **Cisco Catalyst Smart Operations** is a set of features that includes Smart Install, auto Smartports, Smart Configuration. and Smart Troubleshooting to enhance operational excellence:

- **Cisco Smart Install** is a transparent plug and play technology to configure the Cisco IOS Software image and switch configuration without user intervention. Smart Install utilizes dynamic IP address allocation and the assistance of other switches to facilitate installation providing transparent network plug and play.
- **Cisco Auto Smartports** provide automatic configuration as devices connect to the switch port, allowing auto detection and plug and play of the device onto the network.

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- **Cisco Smart Configuration** provides a single point of management for a group of switches and in addition adds the ability to archive and backup configuration files to a file server or switch allowing seamless zero touch switch replacement.
- **Cisco Smart Troubleshooting** is an extensive array of debug diagnostic commands and system health checks within the switch, including Generic Online Diagnostics (GOLD) and Onboard Failure Logging (OBFL).

Easy to Use Deployment and Control Features

- **Embedded Event Manager (EEM)** is a powerful and flexible feature that provides real-time network event detection and onboard automation. Using EEM, customers can adapt the behavior of their network devices to align with their business needs. This feature requires IP Base feature set.
- **IP service-level agreements (SLAs)** enable customers to assure new business-critical IP applications, as well as IP services that utilize data, voice, and video, in an IP network. This feature requires IP Services feature set.
- **Dynamic Host Configuration Protocol (DHCP)** autoconfiguration of multiple switches through a boot server eases switch deployment.
- **Automatic QoS (AutoQoS)** simplifies QoS configuration in voice over IP (VoIP) networks by issuing interface and global switch commands to detect Cisco IP phones, classify traffic, and help enable egress queue configuration.
- **Stacking primary configuration management** and Cisco StackWise technology helps ensure that all switches are automatically upgraded when the primary switch receives a new software version. Automatic software version checking and updating help ensure that all stack members have the same software version.
- **Autonegotiation** on all ports automatically selects half- or full-duplex transmission mode to optimize bandwidth.
- **Dynamic Trunking Protocol (DTP)** facilitates 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.
- **Automatic media-dependent interface crossover (MDIX)** automatically adjusts transmit and receive pairs if an incorrect cable type (crossover or straight-through) is installed.
- **Unidirectional Link Detection Protocol (UDLD)** and Aggressive UDLD allow unidirectional links caused by incorrect fiber-optic wiring or port faults to be detected and disabled on fiber-optic interfaces.
- **Switching Database Manager (SDM)** templates for access, routing, and VLAN deployment allow the administrator to easily maximize memory allocation to the desired features based on deployment-specific requirements.
- **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.
- **Smart Multicast, with Cisco StackWise Plus technology**, allows the Cisco Catalyst 3750-X Series to offer greater efficiency and support for more multicast data streams such as video by putting each data packet onto the backplane only once.

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- **Internet Group Management Protocol (IGMP)** Snooping for IPv4 and IPv6 MLD v1 and v2 Snooping provide fast client joins and leaves of multicast streams and limit bandwidth-intensive video traffic to only the requestors.
- **Multicast VLAN Registration (MVR)** continuously sends multicast streams in a multicast VLAN while isolating the streams from subscriber VLANs for bandwidth and security reasons.
- **Per-port broadcast, multicast, and unicast storm control** prevents faulty end stations from degrading overall systems performance.
- **Voice VLAN** simplifies telephony installations by keeping voice traffic on a separate VLAN for easier administration and troubleshooting.
- **Cisco VLAN Trunking Protocol (VTP)** supports dynamic VLANs and dynamic trunk configuration across all switches.
- **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.
- **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.

Advanced, Intelligent Network Management Tools

The Cisco Catalyst 3750-X and 3560-X Series Switches offer both a superior CLI for detailed configuration, a PC-based tool for quick configuration based on preset templates. In addition, CiscoWorks LAN Management Solution (LMS) supports the Cisco Catalyst 3750-X and 3560-X Series Switches for networkwide management.

CiscoWorks LAN Management Solution

CiscoWorks LAN Management Solution (LMS) is a comprehensive network lifecycle management solution. It provides an extensive library of easy-to-use features to automate the initial and day-to-day management of your Cisco network infrastructure. CiscoWorks LMS uniquely uses Cisco hardware and software platform knowledge and operational experience into a powerful set of work-flow driven configuration, monitoring, troubleshooting, reporting, and administrative tools. Including:

- Support for new Cisco hardware platforms the day they ship
- Support for new technologies and services from initial deployment to day-to-day administration and management, such as EnergyWise, Identity, Cisco Auto Smartports, Cisco Smart Install, and much more
- Configuration management tools built from Cisco experience and Cisco Validated Design recommendations
- Monitoring and troubleshooting capabilities that incorporates Cisco hardware best practices and diagnostics features
- Automation in managing hardware inventories, security vulnerabilities (PSIRTS) and platform end-of-life and support cycles

For detailed information about CiscoWorks LMS, go to https://www.cisco.com/en/US/products/sw/cscowork/ps2425/index.html.

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Borderless Security

The Cisco Catalyst 3750-X and 3560-X Series Switches provide superior Layer 2 threat defense capabilities for mitigating man-in-the-middle attacks (such as MAC, IP, and ARP spoofing). TrustSec, a primary element of Borderless Security Architecture, helps enterprise customers secure their networks, data and resources with policy-based access control, identity and role-aware networking, pervasive integrity, and confidentiality. The borderless security is enabled by the following feature sets in the Cisco Catalyst 3750-X and 3560-X Series Switches:

- Threat defense
- Cisco TrustSec
- Other advanced security features

Threat Defense

Cisco Integrated Security Features is an industry-leading solution available on Cisco Catalyst Switches that proactively protects your critical network infrastructure. Delivering powerful, easy-to-use tools to effectively prevent the most common and potentially damaging Layer 2 security threats, Cisco Integrated Security Features provides robust security throughout the network. Cisco Integrated Security Features include Port Security, DHCP Snooping, Dynamic ARP Inspection, and IP Source guard.

- **Port Security** secures the access to an access or trunk port based on MAC address. It limits the number of learned MAC addresses to deny MAC address-flooding.
- **DHCP Snooping** prevents malicious users from spoofing a DHCP server and sending out bogus addresses. This feature is used by other primary security features to prevent a number of other attacks such as ARP poisoning.
- **Dynamic ARP Inspection (DAI)** helps ensure user integrity by preventing malicious users from exploiting the insecure nature of the ARP protocol.
- **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.

Cisco TrustSec

TrustSec secures access to the network, enforces security policies, and delivers standard based security solutions such as 802.1X enabling secure collaboration and policy compliance. TrustSec capabilities reflect Cisco thought leadership, innovations, and commitment to customer success. These new capabilities include:

- **IEEE 802.1AE MACsec** with prestandard 802.1X-REV Key management: industry's first fixed switches with prestandard 802.1X-Rev key management. Available on Cisco Catalyst 3750-X and 3560-X Series Switches, MACsec provides Layer 2, line rate Ethernet data confidentiality and integrity on host facing ports, protecting against man-in-the-middle attacks (snooping, tampering, and replay).
- **FIPS 140-2** validated for devices used in government and sensitive environments for extremely high levels of data security.
- **Flexible authentication** that supports multiple authentication mechanisms including 802.1X, MAC Authentication Bypass and web authentication using a single, consistent configuration.
- **Open mode** that creates a user friendly environment for 802.1X operations.
- **Integration of device profiling technology and guest access** handling with Cisco switching to significantly improve security while reducing deployment and operational challenges.

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- **RADIUS Change of Authorization and downloadable Calls** for Comprehensive policy management capabilities.
- **802.1X Supplicant with Network Edge Access Transport (NEAT)** enables extended secure access where compact switches in the conference rooms have the same level of security as switches inside the locked wiring closet.

Other Advanced Security Features

Other Advanced Security features include but are not limited to:

- **Private VLANs** restrict traffic between hosts in a common segment by segregating traffic at Layer 2, turning a broadcast segment into a nonbroadcast multiaccesslike segment.
- **Private VLAN Edge** provides security and isolation between switch ports, which helps ensure that users cannot snoop on other users' traffic.
- **Unicast Reverse Path Forwarding (RPF)** feature helps mitigate problems caused by the introduction of malformed or forged (spoofed) IP source addresses into a network by discarding IP packets that lack a verifiable IP source address.
- **Multidomain Authentication** allows an IP phone and a PC to authenticate on the same switch port while placing them on appropriate voice and data VLAN.
- **Cisco security VLAN ACLs** on all VLANs prevent unauthorized data flows from being bridged within VLANs.
- **Cisco standard and extended IP security router ACLs** define security policies on routed interfaces for control-plane and data-plane traffic. IPv6 ACLs can be applied to filter IPv6 traffic.
- **Port-based ACLs** for Layer 2 interfaces allow security policies to be applied on individual switch ports.
- **Secure Shell (SSH) Protocol, Kerberos, and Simple Network Management Protocol Version 3 (SNMPv3)** provide network security by encrypting administrator traffic during Telnet and SNMP sessions. SSH Protocol, Kerberos, and the cryptographic version of SNMPv3 require a special cryptographic software image because of U.S. export restrictions.
- Bidirectional data support on the **Switched Port Analyzer (SPAN)** port allows Cisco Intrusion Detection System (IDS) to take action when an intruder is detected.
- **TACACS+ and RADIUS authentication** facilitates centralized control of the switch and restricts unauthorized users from altering the configuration.
- **MAC Address Notification** allows administrators to be notified of users added to or removed from the network.
- **Multilevel security on console access** prevents unauthorized users from altering the switch configuration.
- **Bridge protocol data unit (BPDU) Guard** shuts down Spanning Tree 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 client capability to provide flexibility in assigning ports to VLANs. Dynamic VLAN facilitates the fast assignment of IP addresses.

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Borderless Experience

Borderless network enables enterprise mobility and business-grade video services. Industry's first unified network (wired and wireless) location services enable tracking of mobile assets and the users of those assets for both wired and wireless devices. The true borderless experience is enabled by the following feature sets in the Cisco Catalyst 3750-X and 3560-X Series Switches:

- High availability
- High-performance IP routing
- Superior QoS
- Location awareness and mobility

High Availability

The Cisco Catalyst 3750-X Series increases availability for stackable switches. Each switch can operate both as primary controller and as forwarding processor. Each switch in the stack can serve as a primary, creating a 1:N availability scheme for network control. In the unlikely event of a single unit failure, all other units continue to forward traffic and maintain operation.

Other high-availability features include but are not limited to:

- Cross-Stack EtherChannel provides the ability to configure Cisco EtherChannel technology across different members of the stack for high resiliency.
- Flexlink provides link redundancy with convergence time less than 100 ms.
- IEEE 802.1s/w Rapid Spanning Tree Protocol (RSTP) and Multiple Spanning Tree Protocol (MSTP) provide rapid spanning-tree convergence independent of spanning-tree timers and also offers the benefit of Layer 2 load balancing and distributed processing. Stacked units behave as a single spanning-tree node.
- 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.

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- Cisco Hot Standby Router Protocol (HSRP) is supported to create redundant, failsafe routing topologies.
- Switch-port autorecovery (Errdisable) automatically attempts to reactivate a link that is disabled because of a network error.

High-Performance IP Routing

Cisco Express Forwarding hardware routing architecture delivers extremely high-performance IP routing in the Cisco Catalyst 3750-X and 3560-X Series Switches.

- Static routing (16 routes) with LAN Base feature set.
- IP unicast routing protocols (Static, Routing Information Protocol Version 1 [RIPv1], and RIPv2, RIPng, EIGRP stub) are supported for small-network routing applications with IP Base feature set.
- Advanced IP unicast routing protocols (OSPF, EIGRP, BGPv4, and IS-ISv4) are supported for load balancing and constructing scalable LANs. IPv6 routing (OSPFv3, EIGRPv6) is supported in hardware for maximum performance. OSPF for routed access is included in the IP Base image. The IP Services feature set is required for full OSPF, EIGRP, BGPv4, and IS-ISv4.
- Equal-cost routing facilitates Layer 3 load balancing and redundancy across the stack.
- Policy-based routing (PBR) allows superior control by facilitating flow redirection regardless of the routing protocol configured. The IP Services feature set is required.
- Hot Standby Routing Protocol (HSRP) provides dynamic load balancing and failover for routed links, up to 32 HSRP links supported per unit or stack.
- Protocol Independent Multicast (PIM) for IP multicast routing is supported, including PIM sparse mode (PIM-SM), PIM dense mode (PIM-DM), PIM sparse-dense mode and Source Specific Multicast (SSM). The IP Services feature set is required.
- Virtual routing and forwarding (VRF)-Lite enables a service provider to support two or more VPNs, with overlapping IP addresses. IP Services feature set is required.

Superior Quality of Service

The Cisco Catalyst 3750-X and 3560-X Series offers GbE speed with intelligent services that keep everything flowing smoothly, even at 10 times the normal network speed. Industry-leading mechanisms for marking, classification, and scheduling deliver superior performance for data, voice, and video traffic, all at wire speed.

Following are some of the QoS features supported in the Cisco Catalyst 3750-X and 3560-X Series Switches:

- Cross-stack QoS allows QoS to be configured across the entire stack (available only on the Catalyst 3750-X).
- 802.1p class of service (CoS) and differentiated services code point (DSCP) field classification are provided, using marking and reclassification on a per-packet basis by source and destination IP address, MAC address, or Layer 4 TCP/UDP port number.
- Cisco control-plane and data-plane QoS ACLs on all ports help ensure proper marking on a per-packet basis.
- Eight egress queues per port help enable differentiated management of different traffic types across the stack. Four queues are user configurable and four are reserved for system use.
- Shaped Round Robin (SRR) scheduling helps ensure differential prioritization of packet flows by intelligently servicing the ingress queues and egress queues.

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- Weighted Tail Drop (WTD) provides congestion avoidance at the ingress and egress queues before a disruption occurs.
- Strict priority queuing helps ensure that the highest-priority packets are serviced ahead of all other traffic.
- The Cisco committed information rate (CIR) function provides 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.
- Up to 64 aggregate or individual policers are available per Fast Ethernet or GbE port.

Location Awareness and Mobility

In order to provide delivery of a best-in-class network experience to end users, it’s critical for network access to be location aware. A wide variety of devices can appear on the network, both wired (switches, routers, IP phones, PCs, access points, controllers, video digital media players, and so on) and wireless (mobile devices, wireless tags, rogues, and so on). In many industries, locating assets is primarily a manual process and is time consuming and error prone. The inability to locate assets in real time and to help ensure their availability when and where they are needed limits reaction time and efficiency.

Location services answer business-critical questions about both mobile assets and the users of those assets regardless of whether those assets are connecting using wired or wireless, and hence directly improve their organization's profitability. Network Location Services also improve security and accelerate client troubleshooting by locating an asset, user, or device on the network.

- Network visibility and control provide centralized visibility into wired and wireless devices on the network and their location.
- Location-assisted client troubleshooting enables tracking of wired or wireless clients for quick problem resolution.
- Asset tracking and improved security provide centralized inventory of wired and wireless devices and asset management for improved business processes.
- Cisco Mobility Service Engine (MSE) Open API provides an open API (based on Simple Object Access Protocol [SOAP] and XML protocol) for any business application that needs the location data.
- Location based policy allows greater control and visibility. With EnergyWise, power policies can be set up (to reduce the power or shut down the power from a port) based on the location.
- Cisco Emergency Responder (CER) enhances emergency calling from Cisco Unified CallManager. It helps assure that Cisco Unified CallManager sends emergency calls to the appropriate Public Safety Answering Point (PSAP) for the caller's location.

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Specifications

Switch Performance

Table 9 shows Cisco Catalyst 3750-X and 3560-X Series Switches performance specifications.

Table 9. Cisco Catalyst 3750-X and 3560-X Performance Specifications

Performance Numbers for All Switch Models	
Switching Fabric	160 Gbps
DRAM	256 MB (512 MB for 3750X-12S and 3750X-24S)
Flash	64 MB (128 MB for 3750X-12S and 3750X-24S)
Total VLANs	1005
VLAN IDs	4K
Total Switched Virtual Interfaces (SVIs)	1K
Jumbo Frame	9216 Byte
Total Routed Ports per 3750-X Stack	468
Forwarding Rate of the Switch Models (with Two 10GbE Uplinks)	
	Forwarding Rate
3750X-24T	65.5 mpps
3750X-24P	
3750X-24U	
3750X-48T	101.2 mpps
3750X-48P	
3750X-48PF	
3750X-48U	
3750X-12S	35.7 mpps
3750X-24S	65.5 mpps
3560X-24T	65.5 mpps
3560X-24P	
3560X-24U	
3560X-48T	101.2 mpps
3560X-48P	

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Performance Numbers for All Switch Models	
3560X-48U	
3560X-48PF	

Scalability Numbers

MAC, routing, security, and QoS scalability numbers depend on the type template used in the switch. Routing template is not supported in the LAN Base feature set. Table 10 shows Cisco Catalyst 3750-X and 3560-X Series Switch scalability numbers.

Table 10. Cisco Catalyst 3750-X and 3560-X Series Switch Scalability Numbers

	Access	Default	Routing	VLAN
Unicast MAC addresses	4K	6K	3K	12K
IGMP groups and multicast routes	1K	1K	1K	1K
Unicast routes	6K	8K	11K	0
Directly connected hosts	4K	6K	3K	0
Indirect routes	2K	2K	8K	0
Policy-based routing ACEs	0.5K	0	0.5K	0
QoS classification ACEs	0.5K	0.5K	0.5K	0.5K
Security ACEs	2K	1K	1K	1K
VLANs	1K	1K	1K	1K

Dimensions, Weight, Acoustic, MTBF, and Environmental Range Specifications for Cisco Catalyst 3750-X and 3560-X Series Switches

Table 11 shows dimensions, weight, acoustic, MTBF, and environmental range.

Table 11. Dimensions, Weight, Acoustic, MTBF, and Environmental Range

Dimensions (H x W x D)	Inches	Centimeters
3750X-24T	1.75 x 17.5 x 18.0	4.45 x 44.5 x 46.0
3750X-24P		
3750X-48T		
3750X-48P		
3750X-48PF **3750X-24U** **3750X-48U**	1.75 x 17.5 x 19.5	4.45 x 44.5 x 49.5

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3750X-12S	1.75 x 17.5 x 18.0	4.45 x 44.5 x 46.0
3750X-24S	1.75 x 17.5 x 18.0	4.45 x 44.5 x 46.0
3560X-24T	1.75 x 17.5 x 18.0	4.45 x 44.5 x 46.0
3560X-24P		
3560X-48T		
3560X-48P		
3560X-48PF **3560X-24U** **3560X-48U**	1.75 x 17.5 x 19.5	4.45 x 44.5 x 49.5
Weight	**Pounds**	**Kilograms**
3750X-24T	15.6	7.1
3750X-24P	15.8	7.2
3750X-24U	16.0	7.3
3750X-48T	16.3	7.4
3750X-48P	16.5	7.5
3750X-48PF	16.7	7.6
3750X-48U	16.7	7.6
3750X-12S	15.0	6.8
3750X-24S	15.4	7.0
3560X-24T	15.4	7.0
3560X-24P	15.7	7.1
3560X-24U	15.9	7.2
3560X-48T	16.1	7.3
3560X-48P	16.4	7.4
3560X-48PF	16.6	7.5
3560X-48U	16.7	7.6

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Mean Time Between Failure (MTBF) Hours	
3750X-24T	189,704
3750X-24P	167,198
3750X-24U	238,070
3750X-48T	171,846
3750X-48P	139,913
3750X-48PF	139,913
3750X-48U	184,120
3750X-12S	194,224
3750X-24S	163,707
3560X-24T	208,218
3560X-24P	181,370
3560X-24U	247,580
3560X-48T	186,778
3560X-48P	149,594
3560X-48PF	149,594
3560X-48U	189,710
C3KX-PWR-350WAC	580,710
C3KX-PWR-715WAC	664,055
C3KX-PWR-1100WAC	392,174
C3KX-PWR-440WDC	469,350
C3KX-NM-1G	5,083,574
C3KX-NM-10G	2,468,553
C3KX-NM-10GT	1,411,719
C3KX-SM-10G	396,940

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Environmental Ranges	
With AC Power Supply **Operating Environment and Altitude**	Normal Operating Temperature and Altitudes: -5ºC to +45ºC, up to 5,000 feet (1500 m) -5ºC to +40ºC, up to 10,000 feet (3000 m) Short-Term* Exceptional Conditions: -5ºC to +50ºC, up to 5,000 feet (1500 m) -5ºC to +45ºC, up to 10,000 feet (3000 m) -5ºC to +45ºC, at sea level with single fan failure * Not more than following in one year period: 96 consecutive hours, or 360 hours total, or 15 occurrences
With DC Power Supply **Operating Environment and Altitude (NEBS)**	Normal Operating Temperature and Altitudes: -5ºC to +45ºC, up to 6,000 feet (1800 m) -5ºC to +40ºC, up to 10,000 feet (3000 m) -5ºC to +35ºC, up to 13,000 feet (4000 m) Short-Term* Exceptional Conditions: -5ºC to +55ºC, up to 6,000 feet (1800 m) -5ºC to +50ºC, up to 10,000 feet (3000 m) -5ºC to +45ºC, up to 10,000 feet (4000 m) -5ºC to +45ºC, at sea level with single fan failure * Not more than following in one year period: 96 consecutive hours, or 360 hours total, or 15 occurrences
Acoustic Noise **Measured per ISO 7779 & Declared per ISO 9296** **Bystander positions operating to an ambient temperature of 25° C**	With AC Power Supply (with 16PoE+ ports loaded): LpA: 43 dbA Typical, 46 dbA Maximum LwA: 5.2 Bel Typical, 5.5 Bel Maximum For GE SFP port models: LpA: 31 dbA Typical, 34 dbA Maximum LwA: 4.2 Bel Typical, 4.5 Bel Maximum **Typical:** Noise emission for a typical configuration **Maximum:** Statistical maximum to account for variation in production
Relative Humidity	5% to 95%, noncondensing
Storage Environment	Temperature: -40 C' to 70 C' Altitude: 15,000 ft
Vibration	Operating: 0.41Grms from 3 to 500Hz with spectral break points of 0.0005 G2/Hz at 10Hz and 200Hz 5dB/octave roll off at each end.
	Nonoperating: 1.12Grms from 3 to 500Hz with spectral break points of 0.0065 G2/Hz at 10Hz and 100Hz 5dB/octave roll off at each end.
Shock	Operating: 30G, 2ms Half sine
	Nonoperating: 55G, 10ms Trapezoid

Note: GLC-GE-100FX and GLC-T SFPs are not supported for NEBS short-term operation.

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Connectors and LED Indicators for Cisco Catalyst 3750-X and 3560X Series

Table 12 shows connectors and LED indicators.

Table 12. Connectors and LED Indicators

Connectors and Cabling	• 1000BASE-T ports: RJ-45 connectors, 2-pair Cat-5E UTP cabling • 1000BASE-T SFP-based ports: RJ-45 connectors, 2-pair Cat-5E UTP cabling • 100BASE-FX, 1000BASE-SX, -LX/LH, -ZX, -BX10, DWDM and CWDM SFP Transceivers: LC fiber connectors (single-mode or multimode fiber) • 10GBASE-SR, LR, LRM, CX1 (v02 or higher) SFP+ Transceivers: LC fiber connectors (single-mode or multimode fiber) • Cisco StackWise stacking ports: copper-based Cisco StackWise cabling • Cisco StackPower: Cisco Proprietary Power Stacking cables • Ethernet Management port: RJ-45 connectors, 2-pair Cat-5 UTP cabling • Management console port: RJ-45-to-DB9 cable for PC connections
Power Connectors	• Customers can provide power to a switch by using either the internal power supply or the Cisco XPS 2200. The connectors are located at the back of the switch • Internal power supply connector: The internal power supply is an autoranging unit. The internal power supply supports input voltages between 100 and 240VAC. Use the supplied AC power cord to connect the AC power connector to an AC power outlet

Management and Standards Support for Cisco Catalyst 3750-X and 3560-X Series Switches

Table 13 shows management and standards support for the Cisco Catalyst 3750-X and 3560-X Series.

Table 13. Management and Standards Support for the Cisco Catalyst 3750-X and 3560-X Series

Description	Specification	
Management	BRIDGE-MIB	CISCO-VTP-MIB
	CISCO-CDP-MIB	ENTITY-MIB
	CISCO-CLUSTER-MIB	ETHERLIKE-MIB
	CISCO-CONFIG-MAN-MIB	IF-MIB
	CISCO-ENTITY-FRU-CONTROL-MIB	IGMP-MIB
	CISCO-ENVMON-MIB	IPMROUTE-MIB
	CISCO-FLASH-MIB	OLD-CISCO-CHASSIS-MIB
	CISCO-FTP-CLIENT-MIB	OLD-CISCO-FLASH-MIB
	CISCO-HSRP-MIB	OLD-CISCO-INTERFACES-MIB
	CISCO-HSRP-EXT-MIB	OLD-CISCO-IP-MIB
	CISCO-IGMP-FILTER-MIB	OLD-CISCO-SYS-MIB
	CISCO-IMAGE-MIB	OLD-CISCO-TCP-MIB
	CISCO-IP-STAT-MIB	OLD-CISCO-TS-MIB
	CISCO-L2L3-INTERFACE-CONFIG-MIB	OSPF-MIB (RFC 1253)
	CISCO-POE-EXTENSIONS-MIB	PIM-MIB
	CISCO-MAC-NOTIFICATION-MIB	RFC1213-MIB
	CISCO-MEMORY-POOL-MIB	RFC1253-MIB
	CISCO-PAGP-MIB	RMON-MIB
	CISCO-PING-MIB	RMON2-MIB
	CISCO-PROCESS-MIB	SNMP-FRAMEWORK-MIB
	CISCO-RTTMON-MIB	SNMP-MPD-MIB
	CISCO-STP-EXTENSIONS-MIB	SNMP-NOTIFICATION-MIB

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Description	Specification	
	CISCO-SYSLOG-MIB CISCO-TCP-MIB CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB CISCO-VLAN-MEMBERSHIP-MIB	SNMP-TARGET-MIB SNMPv2-MIB TCP-MIB UDP-MIB
Standards	IEEE 802.1s IEEE 802.1w IEEE 802.1x IEEE 802.1x-Rev IEEE 802.3ad IEEE 802.1ae IEEE 802.3af IEEE 802.3at 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	RMON I and II standards SNMPv1, SNMPv2c, and SNMPv3

Power Supply Specifications

Table 14 lists the power specifications for the Cisco Catalyst 3750-X and 3560-X Series based on the kind of power supply used.

Table 14. Power Specifications for Cisco Catalyst 3750-X and 3560-X Series

Description	Specification			
	C3KX-PWR-1100WAC	**C3KX-PWR-715WAC**	**C3KX-PWR-350WAC**	**C3KX-PWR-440WDC**
Power Supply Rated Maximum	1100W	715W	350W	440W
Total Output BTU (Note: 1000 BTU/hr = 293W)	3793 BTU/hr, 1100W	2465 BTU/hr, 715W	1207 BTU/hr, 350W	1517 BTU/hr, 440W
Input-Voltage Range and Frequency	115-240VAC, 50-60 Hz	100-240VAC, 50-60 Hz	100-240VAC, 50-60 Hz	-36VDC to -72VDC
Input Current	12-6A	10-5A	4-2A	<8A@-72VDC <16A@-36VDC
Output Ratings	-56V@19.64A	-56V@12.8A	-56V@6.25A	-56V@7.86A

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Description	Specification			
Output Holdup Time	10 ms minimum @ 102.5VAC	16.7 ms minimum @ 100VAC	16.7 ms minimum @ 100VAC	> 2ms@-48VDC
Power-Supply Input Receptacles	IEC 320-C16 (IEC60320-C16)	IEC 320-C16 (IEC60320-C16)	IEC 320-C16 (IEC60320-C16)	Terminal Strip
Power Cord Rating	13A	13A	10A	20A @ 100VDC
Physical Specifications	(H x W x D): 1.58 X 3.25 X 13.25 in Weight: 3.5 lb (1.6 kg)	(H x W x D): 1.58 X 3.25 X 11.75 in Weight: 2.78 lb (1.26 kg)	(H x W x D): 1.58 X 3.25 X 11.75 in Weight: 2.76 lb (1.25 kg)	(H x W x D): 1.58 X 3.25 X 11.75 in Weight: 2.65 lb (1.2 kg)
Operating Temperature	23 to 113°F (-5 to 45°C)			
Storage Temperature	-40 to 158°F (-40 to 70°C)			
Relative Humidity Operating, and Nonoperating Noncondensing	5 to 90% noncondensing			
Altitude	10,000 ft. (3000 meters), up to 45°C			
MTBF	Calculated MTBF must be greater than 300,000 using Telcordia SR-332, Method 1, Case 3. Demonstrated MTBF is 500,000 hr (with 90% confidence level).			
EMI and EMC Compliance	FCC Part 15 (CFR 47) Class A ICES-003 Class A EN 55022 Class A CISPR 22 Class A AS/NZS 3548 Class A BSMI Class A (AC input models only) VCCI Class A EN 55024, EN300386, EN 50082-1, EN 61000-3-2, EN 61000-3-3 EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN 61000-6-1			
Safety Compliance	UL 60950-1, CAN/CSA-C22.2 No. 60950-1, EN 60950-1, IEC 60950-1, CCC			
LED Indicators	“AC OK”: Input power to the power supply is OK. “PS OK”: Output power from the power supply is OK.			

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Power Consumptions of Standalone Cisco Catalyst 3750-X and 3560-X Series Switches

Table 15 shows power consumptions of standalone Cisco Catalyst 3750-X and 3560-X Series Switches based on Alliance for Telecommunications Industry Solutions (ATIS) testing using IMIX distribution stream traffic, with input voltage of 115V AC @ 60 Hz and no PoE loading.

Table 15. Power Consumptions of Standalone Cisco Catalyst 3750-X and 3560-X Series

Models	Uplink Module	Power Consumption, W			
		0% Traffic	10% Traffic	100% Traffic	Weighted Average
3750X-24T & 3560X-24T	C3KX-NM-1G	93.6	92.8	93.5	93.0
3750X-24P & 3560X-24P		99.4	98.7	99.3	98.9
3750X-48T & 3560X-48T		121.3	119.7	120.4	120.0
3750X-48P & 3560X-48P		134.9	133.3	133.9	133.6
3750X-48PF & 3560X-48PF		137.4	135.8	137.2	136.2
3750X-12S		86.1	86.1	87.1	86.4
3750X-24S		107.5	107.5	108.9	107.9
3560X-24U		97.82	97.27	98.01	97.43
3560X-48U		122.55	121.33	122.06	121.59
3750X-24U		95.59	95.17	96.10	95.33
3750X-48U		126.39	125.29	125.87	125.51
3750X-24T & 3560X-24T	C3KX-NM-10G	95.8	95.4	98.7	95.8
3750X-24P & 3560X-24P		101.7	101.5	104.6	101.8
3750X-48T & 3560X-48T		124.2	122.7	126.0	123.3
3750X-48P & 3560X-48P		137.2	136.0	139.3	136.5
3750X-48PF & 3560X-48PF		140.9	139.6	142.9	140.1
3750X-12S		87.6	87.9	91.9	88.6
3750X-24S		109.7	110.1	114.1	110.7

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Models	Uplink Module	Power Consumption, W			
		0% Traffic	10% Traffic	100% Traffic	Weighted Average
3560X-24U		99.23	99.10	102.63	99.48
3560X-48U		123.54	122.73	125.99	123.17
3750X-24U		99.34	99.16	102.69	99.54
3750X-48U		127.17	126.33	129.48	126.77
3750X-24T & 3560X-24T	C3KX-NM-10GT	111.7	110.6	114.1	111.1
3750X-24P & 3560X-24P		119	116.9	122.4	117.7
3750X-48T & 3560X-48T		142.8	141.9	145.4	142.4
3750X-48P & 3560X-48P		151.6	150.7	154.2	151.2
3750X-48PF & 3560X-48PF		156.3	155.1	158.5	155.6
3750X-12S		109.3	109.1	111.2	109.3
3750X-24S		139.4	139	142.7	139.5
3560X-24U		116.16	115.92	119.27	116.29
3560X-48U		139.25	138.42	141.83	138.88
3750X-24U		114.92	114.64	118.09	115.03
3750X-48U		141.22	140.37	143.78	140.84
3750X-24T & 3560X-24T	C3KX-SM-10G	125.80	125.63	130.45	126.14
3750X-24P & 3560X-24P		132.15	132.31	137.00	132.75
3750X-48T & 3560X-48T		157.46	156.72	161.61	157.32
3750X-48P & 3560X-48P		166.26	165.57	170.36	166.15
3750X-48PF & 3560X-48PF		169.75	169.35	173.69	169.85
3750X-12S		127.4	127.3	130.3	127.6
3750X-24S		151.7	151.7	156.8	152.2

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Models	Uplink Module	Power Consumption, W			
		0% Traffic	10% Traffic	100% Traffic	Weighted Average
3560X-24U		131.14	131.05	135.41	131.50
3560X-48U		155.00	154.24	158.86	154.82
3750X-24U		132.43	132.45	137.21	132.92
3750X-48U		156.94	156.33	160.92	156.88

Safety and Compliance

Table 16 lists the safety and compliance information for the Cisco Catalyst 3750-X and 3560-X Series.

Table 16. Safety and Compliance Information for Cisco Catalyst 3750-X and 3560-X Series

Description	Specification
Safety Certifications	UL60950-1 C-UL to CAN/CSA 22.2 No.60950-1 TUV/GS to EN 60950-1 CB to IEC 60950-1 with all country deviations AS/NZS 60950-1 CE Marking NOM (through partners and distributors) GOST (Russia Safety Mark)
Electromagnetic Emissions Certifications	FCC Part 15 Class A EN 55022B Class A (CISPR22 Class A) VCCI Class A AS/NZS 3548 Class A or AS/NZS CISPR22 Class A KCC CE Marking GOST (Russian mark - Post FCS through partners) CCC for PS FRU Redundant
Environmental	Reduction of Hazardous Substances (ROHS) 5
Noise Specifications	Office Product Spec: 48dBA at 30°C (refer to ISO 7779)
Telco	CLEI code

NEBS

The Cisco Catalyst 3750-X and 3560-X Series Switches are NEBS Level 3 compliant according to NEBS Criteria Levels SR-3580.

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Warranty

The Cisco Catalyst 3750-X and 3560-X Series Switches come with an enhanced limited lifetime hardware warranty (E-LLW) that includes next business day delivery of replacement hardware where available and 90 days of 8x5 Cisco Technical Assistance Center (TAC) support.

Your formal warranty statement, including the warranty applicable to Cisco software, appears in the Cisco information packet that accompanies your Cisco product. We encourage you to review carefully the warranty statement shipped with your specific product before use.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

For further information on warranty terms, visit https://www.cisco.com/go/warranty. Table 17 provides information about the enhanced limited lifetime hardware warranty.

Table 17. Enhanced Limited Lifetime Hardware Warranty

	Cisco Enhanced Limited Lifetime Hardware Warranty
Device Covered	Applies to Cisco Catalyst 3750-X and 3560-X Series Switches.
Warranty Duration	Lifetime. As long as the original customer owns the product.
EoL Policy	In the event of discontinuance of product manufacture, Cisco warranty support is limited to 5 years from the announcement of discontinuance.
Hardware Replacement	Cisco or its service center will use commercially reasonable efforts to ship a replacement for next business day delivery, where available. Otherwise, a replacement will be shipped within ten (10) working days after receipt of the RMA request. Actual delivery times might vary depending on customer location.
Effective Date	Hardware warranty commences from the date of shipment to customer (and in case of resale by a Cisco reseller, not more than 90 days after original shipment by Cisco).
TAC Support	Cisco will provide during business hours, 8 hours per day, 5 days per week basic configuration, diagnosis, and troubleshooting of device-level problems for up to a 90-day period from the date of shipment of the originally purchased Cisco Catalyst 3750-X or 3560-X product. This support does not include solution or network-level support beyond the specific device under consideration.
Cisco.com Access	Warranty allows guest access only to Cisco.com

Software Policy for Cisco Catalyst 3750-X and 3560-X Series Switches

Customers with Cisco Catalyst LAN Base and IP Base software feature sets will be provided with maintenance updates and bug fixes designed to maintain the compliance of the software with published specifications, release notes, and industry standards compliance as long as the original end user continues to own or use the product or up to one year from the end-of-sale date for this product, whichever occurs earlier. Customers with licenses for our premium software images require a service support contract such as Cisco SMARTnet® Service to download updates.

This policy supersedes any previous warranty or software statement and is subject to change without notice.

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Cisco and Partner Services

Enable the innovative, secure, intelligent edge in the Borderless Network Architecture using personalized services from Cisco and our partners. Through a discovery process that begins with understanding your business objectives, we help you integrate the next-generation Cisco Catalyst fixed switches into your architecture and incorporate network services onto that platform. Sharing knowledge and leading practices, we support your success every step of the way as you deploy, absorb, manage, and scale new technology. Choose from a flexible suite of support services designed to meet your business needs and help you maintain high-quality network performance while controlling operational costs. (See Table 18.)

Table 18. Technical Services Available for Cisco Catalyst 3750-X and 3560-X Switches

Technical Services
Cisco SMARTnet Service • Around-the-clock, global access to the Cisco Technical Assistance Center (TAC) • Unrestricted access to the extensive Cisco.com knowledge base and tools • Next-business-day, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement and onsite parts replacement and installation available • Ongoing operating system software updates within the licensed feature set • Proactive diagnostics and real-time alerts on Smart Call Home enabled devices
Cisco Smart Foundation Service • Next business day advance hardware replacement as available • Business hours access to SMB TAC (access levels vary by region) • Access to Cisco.com SMB knowledge base • Online technical resources through Smart Foundation Portal • Operating system software bug fixes and patches
Cisco SP Base Service • Around-the-clock, global access to the Cisco TAC • Registered access to Cisco.com • Next business day, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement. Return to factory option available[2] • Ongoing operating system software updates[1]
Cisco Focused Technical Support Services • 3 levels of premium, high-touch services are available: • Cisco High-Touch Operations Management Service • Cisco High-Touch Technical Support Service • Cisco High-Touch Engineering Service • Valid Cisco SMARTnet or SP Base contracts on all network equipment are required

Notes:

[1]. Cisco operating system updates include the following: maintenance releases, minor updates, and major updates within the licensed feature set.

[2]. Advance hardware replacement is available in various service-level combinations. For example, 8x5xNBD indicates that shipment will be initiated during the standard 8-hour business day, 5 days a week (the generally accepted business days within the relevant region), with next business day (NBD) delivery. Where NBD is not available, same day ship is provided. Restrictions apply; for details, review the appropriate service descriptions.

Ordering Information

Table 19 lists ordering information for the Cisco Catalyst 3750-X and 3560-X Series. To place an order, visit the Cisco Ordering homepage at https://www.cisco.com/en/US/ordering/or13/or8/order_customer_help_how_to_order_listing.html.

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Table 19. Cisco Catalyst 3750-X and 3560-X Series Ordering Information

Product Number	Product Description
Cisco Catalyst 3750-X Series	
WS-C3750X-24T-L	Stackable 24 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, LAN Base feature set (Stackpower cables need to be purchased separately)
WS-C3750X-48T-L	Stackable 48 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, LAN Base feature set (Stackpower cables need to be purchased separately)
WS-C3750X-24P-L	Stackable 24 10/100/1000 Ethernet PoE+ ports, with 715W AC power supply 1 RU, LAN Base feature set (Stackpower cables need to be purchased separately)
WS-C3750X-24U-L	Stackable 24 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, LAN Base feature set (Stackpower cables need to be purchased separately)
WS-C3750X-48P-L	Stackable 48 10/100/1000 Ethernet PoE+ ports, with 715W AC power supply 1 RU, LAN Base feature set (Stackpower cables need to be purchased separately)
WS-C3750X-48PF-L	Stackable 48 10/100/1000 Ethernet PoE+ ports, with 1100W AC power supply 1 RU, LAN Base feature set (Stackpower cables need to be purchased separately)
WS-C3750X-48U-L	Stackable 48 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, LAN Base feature set (Stackpower cables need to be purchased separately)
WS-C3750X-24T-S	Stackable 24 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, IP Base feature set
WS-C3750X-48T-S	Stackable 48 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, IP Base feature set
WS-C3750X-24P-S	Stackable 24 10/100/1000 Ethernet PoE+ ports, with 715W AC Power Supply 1 RU, IP Base feature set
WS-C3750X-24U-S	Stackable 24 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, IP Base feature set
WS-C3750X-48P-S	Stackable 48 10/100/1000 Ethernet PoE+ ports, with 715W AC Power Supply 1 RU, IP Base feature set
WS-C3750X-48PF-S	Stackable 48 10/100/1000 Ethernet PoE+ ports, with 1100W AC power supply 1 RU, IP Base feature set
WS-C3750X-48U-S	Stackable 48 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, IP Base feature set
WS-C3750X-12S-S	Stackable 12 GE SFP Ethernet ports, with 350W AC power supply 1 RU, IP Base feature set
WS-C3750X-24S-S	Stackable 24 GE SFP Ethernet ports, with 350W AC power supply 1 RU, IP Base feature set
WS-C3750X-24T-E	Stackable 24 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, IP Services feature set
WS-C3750X-48T-E	Stackable 48 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, IP Services feature set
WS-C3750X-24P-E	Stackable 24 10/100/1000 Ethernet PoE+ ports, with 715W AC Power Supply 1 RU, IP Services feature set
WS-C3750X-24U-E	Stackable 24 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, IP Services feature set

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Product Number	Product Description
WS-C3750X-48P-E	Stackable 48 10/100/1000 Ethernet PoE+ ports, with 715W AC Power Supply 1 RU, IP Services feature set
WS-C3750X-48PF-E	Stackable 48 10/100/1000 Ethernet PoE+ ports, with 1100W AC power supply 1 RU, IP Services feature set
WS-C3750X-48U-E	Stackable 48 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, IP Services feature set
WS-C3750X-12S-E	Stackable 12 GE SFP Ethernet ports, with 350W AC power supply 1 RU, IP Services feature set
WS-C3750X-24S-E	Stackable 24 GE SFP Ethernet ports, with 350W AC power supply 1 RU, IP Services feature set
Cisco Catalyst 3560-X Series	
WS-C3560X-24T-L	Standalone 24 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, LAN Base feature set
WS-C3560X-48T-L	Standalone 48 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, LAN Base feature set
WS-C3560X-24P-L	Standalone 24 10/100/1000 Ethernet PoE+ ports, with 715W AC power supply 1 RU, LAN Base feature set
WS-C3560X-24U-L	Standalone 24 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, LAN Base feature set
WS-C3560X-48P-L	Standalone 48 10/100/1000 Ethernet PoE+ ports, with 715W AC power supply 1 RU, LAN Base feature set
WS-C3560X-48P-L	Standalone 48 10/100/1000 Ethernet PoE+ ports, with 715W AC power supply 1 RU, LAN Base feature set
WS-C3560X-48PF-L	Standalone 48 10/100/1000 Ethernet PoE+ ports, with 1100W AC power supply 1 RU, LAN Base feature set
WS-C3560X-48U-L	Standalone 48 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, LAN Base feature set
WS-C3560X-24T-S	Standalone 24 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, IP Base feature set
WS-C3560X-48T-S	Standalone 48 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, IP Base feature set
WS-C3560X-24P-S	Standalone 24 10/100/1000 Ethernet PoE+ ports, with 715W AC power supply 1 RU, IP Base feature set
WS-C3560X-24U-S	Standalone 24 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, IP Base feature set
WS-C3560X-48P-S	Standalone 48 10/100/1000 Ethernet PoE+ ports, with 715W AC power supply 1 RU, IP Base feature set
WS-C3560X-48PF-S	Standalone 48 10/100/1000 Ethernet PoE+ ports, with 1100W AC power supply 1 RU, IP Base feature set
WS-C3560X-48U-S	Standalone 48 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, IP Base feature set

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Product Number	Product Description
WS-C3560X-24T-E	Standalone 24 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, IP Services feature set
WS-C3560X-48T-E	Standalone 48 10/100/1000 Ethernet ports, with 350W AC power supply 1 RU, IP Services feature set
WS-C3560X-24P-E	Standalone 24 10/100/1000 Ethernet PoE+ ports, with 715W AC power supply 1 RU, IP Services feature set
WS-C3560X-24U-E	Standalone 24 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, IP Services feature set
WS-C3560X-48P-E	Standalone 48 10/100/1000 Ethernet PoE+ ports, with 715W AC power supply 1 RU, IP Services feature set
WS-C3560X-48PF-E	Standalone 48 10/100/1000 Ethernet PoE+ ports, with 1100W AC power supply 1 RU, IP Services feature set
WS-C3560X-48U-E	Standalone 48 10/100/1000 Ethernet UPOE ports, with 1100W AC power supply 1 RU, IP Services feature set
Network Modules for the Cisco Catalyst 3750-X and 3560-X Series	
C3KX-NM-1G=	1G network module spare
C3KX-NM-10G=	10G network module spare
C3KX-NM-10GT=	10G-T network module spare
C3KX-NM-BLANK=	Network module blank spare
C3KX-SM-10G=	10G Service Module Spare
Power Supplies and Fan for the Cisco Catalyst 3750-X and 3560-X Series	
C3KX-PWR-350WAC=	350W AC power supply
C3KX-PWR-715WAC=	715W AC power supply
C3KX-PWR-1100WAC=	1100W AC power supply
C3KX-PWR-440WDC=	440W DC power supply
C3KX-PS-BLANK=	Power supply blank spare
C3KX-FAN-23CFM=	Fan module spare
eXpandable Power System (XPS) for the Cisco Catalyst 3750-X and 3560-X Series	
XPS-2200	eXpandable Power System 2200
CAB-XPS-58CM=	XPS cable 58 cm spare
CAB-XPS-150CM=	XPS cable 150 cm spare
XPS-2200-FAN=	XPS 2200 fan module spare

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Product Number	Product Description
StackWise and StackPower Cables for the Cisco Catalyst 3750-X Series	
CAB-STACK-50CM=	Cisco StackWise 50 cm stacking cable
CAB-STACK-1M=	Cisco StackWise 1 m stacking cable
CAB-STACK-3M=	Cisco StackWise 3 m stacking cable
CAB-STACK-50CM-NH=	Cisco StackWise 50 cm nonhalogen lead-free stacking cable
CAB-STACK-1M-NH=	Cisco StackWise 1 m nonhalogen lead-free stacking cable
CAB-STACK-3M-NH=	Cisco StackWise 3 m nonhalogen lead-free stacking cable
CAB-SPWR-30CM=	Cisco Catalyst 3750-X StackPower cable 30 cm spare
CAB-SPWR-150CM=	Cisco Catalyst 3750-X StackPower cable 150 cm spare
Spare Power Cords for the Cisco Catalyst 3750-X and 3560-X Series	
CAB-3KX-AC=	AC Power Cord for Cisco Catalyst 3K-X (North America)
CAB-3KX-AC-AP=	AC Power Cord for Cisco Catalyst 3K-X (Australia)
CAB-3KX-AC-AR=	AC Power Cord for Cisco Catalyst 3K-X (Argentina)
CAB-3KX-AC-SW=	AC Power Cord for Cisco Catalyst 3K-X (Switzerland)
CAB-3KX-AC-UK=	AC Power Cord for Cisco Catalyst 3K-X (United Kingdom)
CAB-3KX-AC-JP=	AC Power Cord for Cisco Catalyst 3K-X (Japan)
CAB-3KX-250VAC-JP=	Japan 250V AC Power Cord for Cisco Catalyst 3K-X (Japan)
CAB-3KX-AC-EU=	AC Power Cord for Cisco Catalyst 3K-X (Europe)
CAB-3KX-AC-IT=	AC Power Cord for Cisco Catalyst 3K-X (Italy)
CAB-3KX-AC-IN=	AC Power Cord for Cisco Catalyst 3K-X (India)
CAB-3KX-AC-CN=	AC Power Cord for Cisco Catalyst 3K-X (China)
CAB-3KX-AC-DN=	AC Power Cord for Cisco Catalyst 3K-X (Denmark)
CAB-3KX-AC-IS=	AC Power Cord for Cisco Catalyst 3K-X (Israel)
CAB-C15-CBN	Cabinet Jumper Power Cord, 250 VAC 13A, C14-C15 Connectors

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Product Number	Product Description
Spare Accessory and Rack Mount Kits for the Cisco Catalyst 3750-X and 3560-X Series	
C3KX-ACC-KIT=	Accessory kit for Cisco Catalyst 3750-X and 3560-X Series
C3KX-RACK-KIT=	Rack mount kit for Cisco Catalyst 3750-X and 3560-X Series
C3KX-4PT-KIT=	Extension rails and brackets for four-point mounting for Cisco Catalyst 3750-X and 3560-X Series
FIPS Accessory Kit for the Cisco Catalyst 3750-X and 3560-X Series	
C3KX-FIPS-KIT	FIPS Opacity Shield for Catalyst 3750-X and 3560-X Series

[1] Not supported for NEBS

[2] DOM = digital optical monitoring

[3] These SFPs will not operate in the SFP+ module slots for the C3KX-NM-10G and C3KX-SM-10G Network Modules

Optics compatibility information

The Cisco Catalyst 3750-X and 3560-X Series support a wide range of optics. Since the list of supported optics is updated on a regular basis, please consult the tables available here for the latest SFP compatibility information: https://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html

Cisco Catalyst 3750-X and 3560-X Series Product Activation Process

The Cisco Catalyst 3750-X and 3560-X Series product activation process has two steps, described in Table 20.

The first step shows the product activation key, and the second step shows the various upgrade licenses.

Table 20. Cisco Catalyst 3750-X and 3560-X Series Product Activation Process

Step One: Product Activation Keys	Step Two: Upgrade License	
Product Number and Description	**Product Number**	**Product Description**
C3750X-LIC= (Product activation keys for 3750-X Series)	**3750-X LAN Base to IP Base Upgrade License**	
	C3750X-24-L-S	C3750X-24 LAN Base to IP Base Paper License
	C3750X-48-L-S	C3750X-48 LAN Base to IP Base Paper License
	L-C3750X-24-L-S	C3750X-24 LAN Base to IP Base E-License
	L-C3750X-48-L-S	C3750X-48 LAN Base to IP Base E-License
	3750-X IP Base to IP Services Upgrade	
	C3750X-24-IOS-S-E	C3750X-24 IP Base to IP Services factory IOS Upgrade
	C3750X-48-IOS-S-E	C3750X-48 IP Base to IP Services factory IOS Upgrade

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Step One: Product Activation Keys	Step Two: Upgrade License	
	C3750X-24-S-E	C3750X-24 IP Base to IP Services Paper License
	C3750X-48-S-E	C3750X-48 IP Base to IP Services Paper License
	C3750X-12S-S-E	C3750X-12S IP Base to IP Services Paper License
	C3750X-24S-S-E	C3750X-24S IP Base to IP Services Paper License
	L-C3750X-24-S-E	C3750X-24 IP Base to IP Services E-License
	L-C3750X-48-S-E	C3750X-48 IP Base to IP Services E-License
	L-C3750X-12S-S-E	C3750X-12S IP Base to IP Services E-License
	L-C3750X-24S-S-E	C3750X-24S IP Base to IP Services E-License
	3750-X LAN Base to IP Services Upgrade	
	C3750X-24-L-E	C3750X-24 LAN Base to IP Services Paper License
	C3750X-48-L-E	C3750X-48 LAN Base to IP Services Paper License
	L-C3750X-24-L-E	C3750X-24 LAN Base to IP Services E-License
	L-C3750X-48-L-E	C3750X-48 LAN Base to IP Services E-License
C3560X-LIC= (Product activation keys for 3560-X Series)	**3560-X LAN Base to IP Base Upgrade License**	
	C3560X-24-L-S	C3560X-24 LAN Base to IP Base Paper License
	C3560X-48-L-S	C3560X-48 LAN Base to IP Base Paper License
	L-C3560X-24-L-S	C3560X-24 LAN Base to IP Base E-License
	L-C3560X-48-L-S	C3560X-48 LAN Base to IP Base E-License
	3560-X IP Base to IP Services Upgrade	
	C3560X-24-IOS-S-E	C3560X-24 IP Base to IP Services factory IOS Upgrade
	C3560X-48-IOS-S-E	C3560X-48 IP Base to IP Services factory IOS Upgrade
	C3560X-24-S-E	C3560X-24 IP Base to IP Services Paper License
	C3560X-48-S-E	C3560X-48 IP Base to IP Services Paper License
	L-C3560X-24-S-E	C3560X-24 IP Base to IP Services E-License
	L-C3560X-48-S-E	C3560X-48 IP Base to IP Services E-License
	3560-X LAN Base to IP Services Upgrade	
	C3560X-24-L-E	C3560X-24 LAN Base to IP Services Paper License

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Step One: Product Activation Keys	Step Two: Upgrade License	
	C3560X-48-L-E	C3560X-48 LAN Base to IP Services Paper License
	L-C3560X-24-L-E	C3560X-24 LAN Base to IP Services E-License
	L-C3560X-48-L-E	C3560X-48 LAN Base to IP Services E-License

XPS 2200 Performance Specifications

Table 21 lists the performance specifications for the power supplies.

Please note that the same power supplies used in the 3750-X and 3560-X are all usable in the XPS-2200 (please refer to Table 12).

Table 21. XPS 2200 Performance Specifications

Performance Numbers for XPS 2200	
Total Power Sharing Capability (Stack Power Mode, 9 Switches and 20 total 1100W power supplies)	22kW
Maximum Power Back-up Capability (RPS Mode, 2x1100W power supplies in XPS 2200)	2200W
Nominal Voltage	56V
Nominal Maximum Current per Port (input or output)	40A
Flash	8MB

Heat Dissipation

Table 22 provides heat dissipation information for the Cisco XPS 2200.

Table 22. Heat Dissipation

Cisco XPS 2200 Power Supply Configuration	Heat Dissipation	
	No Load (BTU/hr)	Full Load (BTU/hr)
1 x 350WAC	120	480
2 x 350WAC	160	665
1 x 715WAC	155	610
2 x 715WAC	205	920
1 x 1100WAC	155	825
2 x 1100WAC	205	1350
1 x 440WDC	115	645
2 x 440WDC	155	990

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Physical and Environmental Specifications

Table 23 lists the physical and environmental specifications for XPS-2200.

Table 23. Physical and Environmental Specifications

Description	Specification
Physical specifications	H x W x D: 1.73 x 17.5 x 20.5 in. (4.4 x 44.5 x 52.1 cm) Weight: 19.8 lb (9.0 kg)
Total input BTU (1000 BTU/Hr = 290W)	8525 BTU/Hr
Operating temperature	-5 to 45°C up to 5000ft elevation, -5 to 40°C up to 10000ft elevation
Storage temperature	-40 to 70°C
Relative humidity operating, non-condensing	5 to 95% non-condensing
Relative humidity non-operating, non-condensing	5 to 95% non-condensing
Operating altitude	10,000 ft. (3000m)
Storage altitude	15,000 ft. (4750 m)
Mean Time Between Failure (MTBF)	222,000 hours
Electromagnetic compatibility certifications	FCC Class A for North America: 47 CFR Part 15 VCCI Class A for Japan: V-3/2007.04 CCC EMC for China on Spare Power Supplies: EN61000-3-2 (GB17625.1-1998) BSMI Class A for Taiwan: CNS13438 KCC (formerly MIC) GB17625.1-1998 Class A for Korea: KN24/KN22 AS/NZS Class A for Australia: CISPR22:2004 or EN55022 Brazil, ANATEL In-Country approval CE Class A for European Union: EN55022, EN300386, EN55024 (CISPR24)
Safety certifications	UL 60950-1 CAN/CSA 22.2 No.60950-1 EN 60950-1CB to IEC 60950-1 GB 4943

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Acoustic Specifications

Table 24 lists the acoustic specifications of the Cisco XPS 2200.

The following numbers represent the range of values for Idle, 50% and 100%:

Table 24. Cisco XPS 2200 Acoustic Specifications

Cisco XPS 2200 Power Supply Configuration	Sound Pressure		Sound Power	
	LpA (Typical)	LpAD (Maximum)	LwA (Typical)	LwAD (Maximum)
2 x 1100WAC	43 dB	63 dB	5.3 B	7.3 B
2 x 715WAC	42 dB	61 dB	5.3 B	6.6 B

Dimensions and Weight Options

Table 25 describes various XPS2200 dimensions and weight options (All have a 1 RU height).

Table 25. Cisco XPS 2200 Dimensions and Weight Options

XPS2200 dimensions and weight options	Dimensions (H x W x D)		Weight	
	Inches	Centimeters	Pounds	Kilograms
XPS2200 including 3 fan FRUs	1.73 x 17.5 x 17.46	4.4 x 44.5 x 44.4	12.8	5.8
With two C3K-PWR-1100WAC power supplies	1.73 x 17.5 x 20.5	4.4 x 44.5 x 52.1	19.0	8.6
With two C3K-PWR-715WAC power supplies	1.73 x 17.5 x 19.0	4.4 x 44.5 x 48.3	18.5	8.4
With two C3K-PWR-350WAC power supplies	1.73 x 17.5 x 19.0	4.4 x 44.5 x 48.3	18.5	8.4
With two C3K-PWR-440WDC power supplies	1.73 x 17.5 x 19.0	4.4 x 44.5 x 48.3	18.4	8.3

Connectors and Cabling

Table 26 describes the connectors and cabling for the XPS2200.

Table 26. Cisco XPS 2200 Connectors and Cabling

Connectors and Cabling	• Cisco StackPower: Cisco Proprietary Power Stacking cables • Service port: RJ-45-to-DB9 cable for PC connections
Power Connectors	• Customers can provide power to a XPS-2200 by using either the internal power supply or via one or more 3750-X/3560-X Switches. The connectors are located at the back of the switch. (9 StackPower/XPS ports and up to two AC Power Inlet Connections). • Internal power supply connector: The internal power supply is an autoranging unit. The internal power supply supports input voltages between 100 and 240VAC. Use the supplied AC power cord to connect the AC power connector to an AC power outlet.

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Fans

The Cisco XPS 2200 has 3 field-replaceable fan modules (XPS-2200-FAN).

Table 27 describes the fan module for the XPS2200.

Table 27. Cisco XPS 2200 Fan Module Dimensions and Weight

	Dimensions (H x W x D)		Weight	
	Inches	Centimeters	Pounds	Kilograms
XPS2200 Fan Module	1.59 x 1.59 x 4.24	4.04 x 4.04 x 10.77	.13	.06

- System fan modules offer up to 24 cubic feet per minute (CFM) under full load at ambient temperature of 45° C and altitude of 3000 meters.

Indicators

Table 28 describes the indicator options for the XPS2200.

Table 28. Cisco XPS 2200 Indicators

RPS Mode- 9 port associated LEDs	• Solid Green when in RPS mode and able to backup this Port • Blinking Green when actively backing up Port • Solid Amber indicates backup not available for this Port • Blinking Amber for any port faults
SP Mode- 9 port associated LEDs	• Solid Green when in SP mode and there are no issues • Blinking Green not defined • Solid Amber indicates that SP port off-line (No Power Output) • Blinking Amber for any port faults
Combined function (SP and RPS) LEDs	• Blinking Amber on both RPS and SP LEDs indicates cable fault (short, etc.) • Both RPS and SP ports alternate Green/Amber when selected via push button • 18 Port LEDs for new features with more comprehensive single look status assessment
System LEDs - Front of System	• System ◦ Solid Green - Normal operation with no faults ◦ Blinking Green during boot ◦ Solid Amber - Temperature faults, cable faults, port faults, power supply faults, fan faults ◦ Blinking Amber during software updates • Fan ◦ Use one Fan LED, amber when any one fan fails, green when all OK ◦ Each FRU Fan (3) will have an associated Status LED (green=working, amber=failed), but no silkscreen on front panel • Temp ◦ Green – No Problems. Amber – Over Temperature • FEP (PS1 & PS2) ◦ Solid Green - Stack Power Mode OK ◦ Blinking Green - RPS Mode OK ◦ Solid Amber - Stack Power Mode Faulty

Power Supply Specifications

The XPS 2200 uses the same power supplies as the Cisco Catalyst 3750-X and 3560-X Series Switches. Refer to Table 12 for the power specifications for each type of power supply that is usable in the XPS 2200 as well as the Cisco Catalyst 3750-X and 3560-X Series Switches.

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Cisco XPS2200 Ordering information

Table 29 shows Cisco XPS2200 ordering information.

Table 29. Ordering Information

Product Number	Product Description
XPS-2200	eXpandable Power System 2200
CAB-XPS-58CM=	XPS cable 58 cm spare Cable to connect XPS-2200 StackPower/XPS ports to 3750-X or 3560-X Switch SKUs
CAB-XPS-150CM=	XPS cable 150 cm spare Cable to connect XPS-2200 StackPower/XPS ports to 3750-X or 3560-X Switch SKUs
XPS-2200-FAN=	XPS 2200 fan module spare
C3KX-RACK-KIT=	Rack mount kit for Cisco Catalyst 3750-X and 3560-X Series
C3KX-ACC-KIT=	Accessory kit for Catalyst 3750-X and 3560-X Series
C3KX-4PT-KIT=	Extension rails and brackets for four-point mounting for Cisco Catalyst 3750-X and 3560-X Series

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