

CISCO CATALYST 4500 SERIES SWITCHES

The Cisco Catalyst 4500 Series switches integrate resiliency for advanced control of converged networks.

Figure 1. Cisco Catalyst 4500 Series



OVERVIEW

The Cisco® Catalyst® 4500 Series offers nonblocking Layer 2–4 switching with integrated resiliency, further enhancing control of converged networks. Converged voice, video, and data networks with high availability help enable business resiliency for enterprises, small and medium-sized businesses (SMBs), and Metro Ethernet customers deploying Internet-based business applications.

The Cisco Catalyst 4500 Series includes four Catalyst chassis: the Catalyst 4510R (10 slots), the Catalyst 4507R (seven slots), Catalyst 4506 (six slots), and Catalyst 4503 (three slots). Integrated resiliency enhancements offered in the Catalyst 4500 Series include 1+1 supervisor-engine redundancy (Catalyst 4507R and 4510R), redundant fans, software-based fault tolerance, and 1+1 power-supply redundancy. Integrated resiliency in both hardware and software minimizes network downtime, helping to ensure workforce productivity, profitability, and customer success.

The Cisco Catalyst 4500 Series extends control to the network edge with intelligent network services, including sophisticated quality of service (QoS), predictable performance, advanced security, comprehensive management, and integrated resiliency. Offering compatibility with all Catalyst 4500 Series line cards and supervisor engines, the Catalyst 4500 Series reduces the cost of ownership by minimizing recurring operational expenses, improving return on investment (ROI).

CISCO CATALYST 4500 SERIES CHASSIS

The Cisco Catalyst 4500 Series offers four chassis options and four supervisor-engine options. It provides a common architecture that can scale up to 384 ports. The Cisco Catalyst 4507R and 4510R offer high availability in supporting 1+1 redundant supervisor engines with subsecond failover time. Using the same line cards and supervisor engines as the widely deployed Catalyst 4000 Series Switch, the Catalyst 4500 Series enhances the Cisco commitment to affordable enterprise and branch scalability. It provides a cost-effective, flexible network solution that scales to meet today's high-performance needs with investment protection (Table 1).

Table 1. Cisco Catalyst 4500 Series Chassis Features

Feature	Cisco Catalyst 4503 Chassis	Cisco Catalyst 4506 Chassis	Cisco Catalyst 4507R Chassis	Cisco Catalyst 4510R Chassis
Total number of slots	3	6	7	10
Supervisor-engine slots	1*	1*	2**	2**
Supervisor-engine redundancy	No	No	Yes (Supervisor Engine II-Plus, IV, V, V-10GE)	Yes (Supervisor Engine V and V-10GE)
Supervisor engines supported	Supervisor Engine II-Plus, II-Plus-TS, IV, V, V-10GE	Supervisor Engine II-Plus, IV, V, V-10GE	Supervisor Engine II-Plus, IV, V, V-10GE	Supervisor Engine V and V-10GE
Line-card slots	2	5	5**	8**
Number of power-supply bays	2	2	2	2
AC input power	Yes	Yes	Yes	Yes
DC input power	Yes	Yes	Yes	Yes
Integrated Power over Ethernet	Yes	Yes	Yes	Yes
Minimum number of power supplies	1	1	1	1
Number of fan-tray bays	1	1	1	1
Location of 19-in. rack mount***	Front	Front	Front	Front
Location of 23-in. rack mount	Front (option)	Front (option)	Front (option)	Front (option)

* Slot 1 is reserved for supervisor engine only; slots 2 and higher are reserved for line cards.

** Slots 1 and 2 are reserved for supervisor engines only in Cisco Catalyst 4507R and 4510R; slots 3 and higher are reserved for line cards.

*** Chassis can be mounted in racks and cabinets that meet ANSI/EIA-310-D and ETS 300 119-3

Note: Supervisor-engine slots do not support switching line-card modules. Line-card slots do not support supervisor engines.

CONFIGURATION ALTERNATIVES

The Cisco Catalyst 4500 Series offers a powerful and flexible network solution that can be built with five supervisor-engine alternatives. Each provides a high-performance, centralized, shared-memory switch fabric, protecting your line-card investment by supporting the addition of optional higher-layer engines (Table 2).

Table 2. Cisco Catalyst 4500 Series Supervisor Engine Support and Performance

Feature	Catalyst 4500 Series Supervisor Engine II-Plus-TS	Catalyst 4500 Series Supervisor Engine II-Plus	Catalyst 4000/4500 Supervisor Engine IV	Catalyst 4000/4500 Supervisor Engine V	Catalyst 4500 Series Supervisor Engine V-10GE
Cisco Catalyst 4503 chassis	Supported, 64 Gbps, 48 mpps	Supported, 28 Gbps, 21 mpps	Supported, 28 Gbps, 21 mpps	Supported, 28 Gbps, 21 mpps	Supported, 64 Gbps, 48 mpps
Cisco Catalyst 4506 chassis	Not supported	Supported, 64 Gbps, 48 mpps	Supported 64 Gbps, 48 mpps	Supported 64 Gbps, 48 mpps	Supported. 100 Gbps, 75 mpps
Cisco Catalyst 4507R chassis	Not supported	Supported, 64 Gbps, 48 mpps	Supported 64 Gbps, 48 mpps	Supported 68 Gbps, 51 mpps	Supported, 100 Gbps, 75 mpps
Cisco Catalyst 4510R chassis	Not supported	Not supported	Not supported	Supported, 96 Gbps, 72 mpps	Supported, 136 Gbps, 102 mpps

The Cisco Catalyst 4500 Series has flexible interface types and port densities that allow network configurations to be mixed and matched to meet the specific needs of campus networks (Table 3).

Table 3. Cisco Catalyst 4500 Series Port Densities

Cisco Catalyst 4500 Series Switching Modules	Number of Interfaces Supported per Line Card	Cisco Catalyst 4503	Cisco Catalyst 4506	Cisco Catalyst 4507R	Cisco Catalyst 4510R
Switched 10/100 Fast Ethernet (RJ-45)	24, 32, or 48	96	240	240	384*
Switched 10/100 Fast Ethernet (RJ-45) with IEEE 802.3af Power over Ethernet (PoE)	24, 48	96	240	240	384*
Switched 10/100 Fast Ethernet (RJ-21) with or without IEEE 802.3af PoE	48	96	240	240	384*
Switched 100 FX Fast Ethernet (MT-RJ)	4**, 24, or 48	96	240	240	384*
Switched 100 LX-10 (MT-RJ) or 100 BX-D (LC) Fast Ethernet	48	96	240	240	384*
Switched 1000 Gigabit Ethernet (fiber)	2, 6, 18, or 48	104***	240	240	384*
Switched 10/100/1000BASE-T Gigabit Ethernet	24 or 48	108***	240	240	384*
Switched 10/100/1000BASE-T Gigabit Ethernet with IEEE 802.3af PoE	24 or 48	108***	240	240	384*
Switched 10,000 (10 Gigabit Ethernet)	2 (Supervisor V-10GE)	2	2	2	2

* When using the Cisco Catalyst 4000/4500 Supervisor Engine V, 336 ports are supported. The Catalyst 4510R can support up to 384 ports with Catalyst 4500 Series Supervisor Engine V-10GE. When Catalyst 4000/4500 Supervisor Engine V is used in the Catalyst 4510R chassis, slot 10 (Flex-slot) supports a subset of line cards: 2-port Gigabit Interface Converter (GBIC) and Access Gateway Module This is because of the switching capacity of the Catalyst 4000/4500 Supervisor Engine V; not a limitation of Catalyst 4510R chassis. The Catalyst 4500 Series Supervisor Engine V-10GE allows slot 10 to accommodate any and all line cards.

** Four 100BASE-FX, multimode fiber (MMF) interfaces are supported through the uplink module using the Cisco Catalyst 32-port, 10/100, RJ-45 line card.

*** Cisco Catalyst 4500 Series Supervisor II-Plus-TS required for 104 1000BASE-X ports or 108 10/100/1000 ports.

CONFIGURATION FLEXIBILITY AND MODULAR SUPERIORITY

Cisco Catalyst 4500 Series modules can be mixed and matched to suit numerous LAN Access, data center, SMB, or branch-office deployments. Any Gigabit Ethernet port can be 1000BASE-SX, 1000BASE-LX/LH, 1000BASE-ZX, or coarse wavelength-division multiplexing (CWDM) by using flexible, hot-swappable, gigabit-interface-converter (GBIC) modules. The Cisco Catalyst 4500 Series supports the following switching modules, listed by part number:

- WS-F4531—Cisco Catalyst 4500 NetFlow Services Daughter Card
- WS-X4148-FE-LX-MT—Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-port 100BASE-LX10 single-mode fiber (SMF) (MT-RJ)
- WS-X4148-FE-BD-LC—Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-port 100BASE-BX-D SMF (LC)
- WS-X4124-FX-MT—Cisco Catalyst 4000 Fast Ethernet Switching Module, 24-port 100BASE-FX (MT-RJ)
- WS-X4148-FX-MT—Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-port 100BASE-FX multimode fiber (MMF) (MT-RJ)
- WS-X4124-RJ45—Cisco Catalyst 4500 10/100 Module, 24-port (RJ-45)
- WS-X4148-RJ—Cisco Catalyst 4500 10/100 Module, 48-port (RJ-45)
- WS-X4148-RJ21—Cisco Catalyst 4500 10/100 Module, 48-port telco (4 x RJ-21)
- WS-X4248-RJ21V—Cisco Catalyst 4500 PoE 802.3af 10/100, 48-port (RJ-21)
- WS-X4148-RJ45V—Cisco Catalyst 4500 Cisco prestandard PoE 10/100, 48-port (RJ-45)
- WS-X4224-RJ45V—Cisco Catalyst 4500 PoE 803.3af 10/100, 24-port (RJ-45)
- WS-X4248-RJ45V—Cisco Catalyst 4500 PoE 802.3af 10/100, 48-port (RJ-45)
- WS-X4232-GB-RJ—Cisco Catalyst 4500 32-port 10/100 (RJ-45), 2-Gigabit Ethernet (GBIC) Module
- WS-X4232-RJ-XX—Cisco Catalyst 4500 32-port 10/100 (RJ-45), plus modular uplink slot
- WS-U4504-FX-MT—Cisco Catalyst 4500 Fast Ethernet Uplink Daughter Card for WS-X4232-RJ-XX, 4-port 100BASE-FX (MT-RJ)
- WS-X4302-GB—Cisco Catalyst 4500 Gigabit Ethernet Module, 2-port (GBIC)
- WS-X4306-GB—Cisco Catalyst 4500 Gigabit Ethernet Module, 6-port (GBIC)
- WS-X4506-GB-T—Cisco Catalyst 4500 Gigabit Ethernet Module, 6-port 10/100/1000 802.3af PoE or 1000BASE-X (SFP)
- WS-X4418-GB—Cisco Catalyst 4500 Gigabit Ethernet Module, server switching 18-port (GBIC)
- WS-X4448-GB-LX—Cisco Catalyst 4500 48-Port 1000BASE-LX (SFP optics included)
- WS-X4448-GB-SFP—Catalyst 4500 Gigabit Ethernet Module, 48-Port 1000BASE-X (optional SFP optics)
- WS-X4424-GB-RJ45—Cisco Catalyst 4500 24-Port 10/100/1000 Module (RJ-45)
- WS-X4448-GB-RJ45—Cisco Catalyst 4500 48-Port 10/100/1000 Module (RJ-45)
- WS-X4548-GB-RJ45—Cisco Catalyst 4500 Enhanced 48-Port 10/100/1000 Module (RJ-45)
- WS-X4524-GB-RJ45V—Cisco Catalyst 4500 PoE 802.3af 10/100/1000, 24-port (RJ-45)
- WS-X4548-GB-RJ45V—Cisco Catalyst 4500 PoE 802.3af 10/100/1000, 48-port (RJ-45)
- WS-G5483—Cisco 1000BASE-T GBIC
- WS-G5484—Cisco 1000BASE-SX Short-Wavelength GBIC (multimode only)
- WS-G5486—Cisco 1000BASE-LX/LH Long-Haul GBIC (single-mode or multimode)
- WS-G5487—Cisco 1000BASE-ZX Extended-Reach GBIC (single-mode)
- GLC-T—1000BASE-T SFP
- GLC-SC-MM—GE SFP, LC connector SX transceiver
- GLC-LH-SM—GE SFP, LC connector LX/LH transceiver
- GLC-ZX-SM—1000BASE-ZX SFP
- Cisco CWDM GBIC solution
- Cisco CWDM SFP solution
- X2 Optic Support

Table 4 lists the minimum software requirements for the Cisco Catalyst supervisor engines, and Table 5 compares the Cisco Catalyst chassis.

Table 4. Cisco Catalyst Supervisor Engine Software Minimum Requirements

Specification	Minimum Software Requirement
Cisco Catalyst 4503 with Supervisor II-Plus-TS	Cisco IOS® Software Release 12.2(20)EWA or later
Cisco Catalyst 4503, 4506, and 4507R with Supervisor Engine II-Plus	Cisco IOS Software Release 12.1(19)EW or later
Cisco Catalyst 4503, 4506, and 4507R with Supervisor Engine IV	Cisco IOS Software Release 12.1(12c)EW or later
Cisco Catalyst 4503, 4506, 4507R, and 4510R with Supervisor Engine V	Cisco IOS Software Release 12.2(18)EW
Cisco Catalyst 4503, 4506, 4507R, and 4510R with Supervisor Engine V-10GE	Cisco IOS Software Release 12.2(25)EW

Table 5. Comparison Between Cisco Catalyst Chassis

Feature	Cisco Catalyst 4006	Cisco Catalyst 4503	Cisco Catalyst 4506	Cisco Catalyst 4507R	Cisco Catalyst 4510R
Power over Ethernet (PoE)	Yes—with external power shelf	Yes—integrated	Yes—integrated	Yes—integrated	Yes—integrated
PoE per line-card slot maximum	400W	830W	830W	830W	830W
Power-supply redundancy	2 + 1	1 + 1	1 + 1	1 + 1	1 + 1
Supervisor-engine redundancy	No	No	No	Yes	Yes
Supported line cards	All Catalyst 4000 Series line cards	All Catalyst 4000 Series line cards	All Catalyst 4000 Series line cards	All Catalyst 4000 Series line cards	All Catalyst 4000 Series line cards
Supervisor engines supported	Supervisor engines II-Plus, IV, and V	Supervisor engines II-Plus, Supervisor Engine II-Plus-TS, IV, V, and V-10GE	Supervisor engines II-Plus, IV, V, and V-10GE	Supervisor engines II-Plus, IV, V, and V-10GE	Supervisor engines V and V-10GE
Internal power supplies supported	400W AC	1000W AC 1400W AC 1300W ACV 2800W ACV 1400W DC w/PEM 1400W DC Triple Input 4200W AC	1000W AC 1400W AC 1300W ACV 2800W ACV 1400W DC w/PEM 1400W DC Triple Input 4200W AC	1000W AC 1400W AC 1300W ACV 2800W ACV 1400W DC w/PEM 1400W DC Triple Input 4200W AC	1400W AC* 2800W ACV* 1400W DC w/PEM 1400W DC Triple Input 4200W AC

* The 1400W AC, 2800W AC, 1400W DC, and 4200W AC power supplies are required to support a fully loaded Cisco Catalyst 4510R. The 1000W AC and 1300W AC power supplies can be deployed in the Catalyst 4510R; however, power management is required.

Standard Network Protocols

- Ethernet
 - IEEE 802.3, 10BASE-T
- Fast Ethernet
 - IEEE 802.3u, 100BASE-TX
 - IEEE 802.3, 100BASE-FX
- Gigabit Ethernet
 - IEEE 802.3z
 - IEEE 802.3x
 - IEEE 802.3ab
- 1000BASE-X (GBIC)
 - 1000BASE-SX
 - 1000BASE-LX/LH
 - 1000BASE-ZX
- VLAN trunking and tagging
 - IEEE 802.1Q
 - IEEE 802.3ad
- Spanning Tree Protocol
 - IEEE 802.1D
 - IEEE 802.1w
 - IEEE 802.1s
- Security
 - IEEE 802.1x
- Power over Ethernet (PoE)
 - IEEE 802.3af

NETWORK MANAGEMENT

CiscoWorks Resource Manager Essentials, a component of CiscoWorks LAN Management Solution (LMS), provides the following benefits to the Cisco Catalyst 4500 Series:

- Builds and maintains an up-to-date hardware and software inventory
- Maintains an active archive and simplifies deployment of configuration changes to multiple devices
- Simplifies and accelerates software-image analysis and automates deployment
- Records and displays comprehensive reports of software, hardware, and configuration changes
- Highlights critical devices and their ability to respond
- Isolates network error conditions and suggests probable causes
- Network-topology discovery and display services
- VLAN provisioning and logical display representation
- Traffic monitoring and performance assessment
- End-station tracking with search utilities
- CiscoView graphical device management
- Network-topology integrity checking

- Cisco Discovery Protocol
- Cisco Virtual Trunking Protocol (VTP)
- Simple Network Management Protocol (SNMP) Version 1 (RFCs 1155-1157)
- SNMP Version 2c
- Cisco Workgroup MIB
- Ethernet MIB (RFC 1643)
- Ethernet Repeater MIB (RFC 1516)
- SNMP MIB II (RFC 1213)
- Remote Monitoring (RMON) (RFC 1757)
- RMON II (RFC 2021)
- Interface table (RFC 1573)
- Bridge MIB (RFC 1493)
- Switched Port Analyzer (SPAN)
- Enhanced Switched Port Analyzer (ESpan)
- Port snooping and connection steering
- Standard Cisco IOS Software security capabilities: passwords and TACACS+
- Telnet, Trivial File Transfer Protocol (TFTP), and BOOTP for management access

PHYSICAL SPECIFICATIONS

Table 6 lists physical specifications of the chassis and Table 7 lists power-supply specifications for the Cisco Catalyst 4500 Series.

Table 6. Physical Specifications of Cisco Catalyst 4500 Series Chassis

Specification	Cisco Catalyst 4503	Cisco Catalyst 4506	Cisco Catalyst 4507R	Cisco Catalyst 4510R
Dimensions (H x W x D)	12.25 x 17.31 x 12.50 in. (31.12 x 43.97 x 31.70 cm)	17.38 x 17.31 x 12.50 in. (44.13 x 43.97 x 31.70 cm)	19.19 x 17.31 x 12.50 in. (48.74 x 43.97 x 31.70 cm)	24.35 x 17.31 x 12.50 in. (61.84 x 43.97 x 31.70 cm)
Rack units (RU)	7 RU	10 RU	11 RU	14 RU
Chassis weight (with fan tray)	31.25 lb (14.18 kg)	40.50 lb (18.37 kg)	44.25 lb (20.07 kg)	51.50 lb (23.36 kg)
Mounting	19- and 23-in. rack compatible (19-in. rack and cable guide hardware included)	19- and 23-in. rack-compatible (19-in. rack and cable guide hardware included)	19- and 23-in. rack-compatible (19-in. rack and cable guide hardware included)	19- and 23-in. rack-compatible (19-in. rack and cable guide hardware included)

POWER SUPPLY INDICATORS AND INTERFACES

- Fan cooling: Integrated in hot-insertion/hot-extraction unit
- Good: Green
- Fail: Red (faulty)
- SNMP MIB supported

Table 7. Cisco Catalyst 4500 Series Data Only Power Supply Specifications

Power Supply	1000W AC	1400W AC	1400W DC Triple Input
Integrated PoE	No (data only)	No (data Only)	No (data only)
IEEE 802.3af-compliant PoE	No	No	No
Input current (rated)	12A @ 100 VAC, 5A @ 240 VAC	16A @ 100 VAC, 7A @ 240 VAC	2x -48 VDC @ 15A 1x -48 VDC @ 12.5A
Output current (data)	12V @ 83.4A 3.3V @ 12.2A	12V @ 113.4A 3.3V @ 12.2A	12V @ 114.0A 3.3V @ 12.5A
Output current (PoE)	–	–	–
Output power redundant mode (data)	1000W + 40W	1360W + 40W	1368W + 40W
Output power redundant mode (PoE)	–	–	–
Output power combined mode (data)	1667W	–	–
Output power combined mode (PoE)	–	–	–
Heat dissipation*	943 Btus per hour	1048 Btus per hour	1048 Btus per hour
Holdup time	20 ms	20 ms	4ms
Number of 802.3af Class 2 power devices supported with 1 power supply (1+1)	–	–	–
Number of 802.3af Class 0 and 3 power devices supported with 1 power supply (1+1)	–	–	–
Cisco phones with Integrated PoE	None	–	–
Hot swappable	Yes	Yes	Yes

* Note that calculations for heat dissipation is based on one power supply operating at maximum output power.

Table 8. Cisco Catalyst 4500 Series PoE Power Supply Specifications

Power Supply	1300W AC	2800W AC	1400W DC-P	4200W AC	2500W AC
Integrated PoE	Yes (Up to 800W)	Yes (Up to 1400W)	Up to 8500W (minus the power consumed for data when connected directly to a DC power plant or 2 external AC power shelves)	Yes (Up to 3700W)	2500W per power supply
IEEE 802.3af-compliant PoE	Yes	Yes	Yes	Yes	Yes

Power Supply	1300W AC	2800W AC	1400W DC-P	4200W AC	2500W AC
Input current (rated)	16A @ 100 VAC, 7A @ 240 VAC	16A @ 200 VAC	Data: 31A @ -60VDC Inline: 180A @ -48VDC	2x 12A @ 100 VAC or 2x 12A @ 200 VAC	15A @ 200VAC
Output current (data)	12V @ 84.7A 3.3V @ 12.5A	12V @ 113.3A 3.3V @ 12.1A	12V @ 120A 3.3V @ 10A	12V @ 115.3A 3.3V @ 12.5A	-
Output current (PoE)	-50V @ 16.7A	-50V @ 28A	-50V @ 140A	-50V @ 77.1A (200V) -50V @ 38A (100V)	-50V @ 50A
Output power redundant mode (data)	1000W + 40W	1360W + 40W	1367W + 40W	1360W + 40W	-
Output power redundant mode (PoE)	800W	1400W	7500W	3700W (200V) 1850W (100V)	2500W (per unit)
Output power combined mode (data)	1667W	2473W	2267W	2766W	-
Output power combined mode (PoE)	1333W	2333W	7280W	7600W (200 V)** 3782W (100 V)	-
Heat dissipation*	1568 BTU/hr	2387 BTU/hr	1591 BTU/hr (data) 2905 BTU/hr (data and PoE)	3580 BTU/hr	1210 BTU/hr
Holdup time	20 ms	20 ms	4 ms	20 ms	20 ms
Number of 802.3af Class 2 power devices supported with 1 power supply (1+1)	101 PDs	178 PDs	384 PDs	384 PDs (200V) 175 PDs (100V)	318 PDs (per unit)
Number of 802.3af Class 0 and 3 power devices supported with 1 power supply (1+1)	46 PDs	80 PDs	384 PDs	186 PDs (200V) 79 PDs (100V)	144 PDs (per unit)
Cisco phones with Integrated PoE***	113 PDs	198 PDs	384 PDs	384 PDs (200 V) 195 PDs (100 V)	353 PDs (per unit)
Hot swappable	Yes	Yes	Yes	Yes	Yes

* Note that calculations for heat dissipation is based on one power supply operating at maximum output power.

** Measured when two AC power shelves are strapped together and contain 3x2500W AC power supplies.

*** Measured when using Cisco prestandard PoE line cards (WS-X4148-RJ45V).

Additional notes for Table 7 and 8:

1. Output power is per power supply, unless otherwise stated.
2. Heat dissipation numbers represent the power-conversion losses of the power supply in operation.
3. The number of power devices supported will depend on customer configuration.

FAN TRAYS

Each Cisco Catalyst 4500 Series chassis uses a single fan tray for cooling. All fan trays are composed of independent fans. If one fan fails, the system will continue to operate without a significant degradation in cooling. The system will detect and notify the user (through LED, command-line interface [CLI], and SNMP) that a fan has failed and the tray needs to be replaced.

FABRIC-REDUNDANCY MODULES (CISCO CATALYST 4507R AND 4510R ONLY)

The Cisco Catalyst 4500 Series redundancy scheme uses removable fabric-redundancy modules on the passive backplane to switch traffic to the active supervisor engine. There is one fabric-redundancy module per line card. Fabric-redundancy modules and redundant clocks ship standard with every Cisco Catalyst 4507R and 4510R chassis. Spare fabric-redundancy modules and clock modules are available for serviceability.

ENVIRONMENTAL CONDITIONS

The Cisco Catalyst 4500 Series requires the following conditions:

- Operating temperature: 32 to 104°F (0 to 40°C)
- Storage temperature: -40 to 167°F (-40 to 75°C)
- Relative humidity: 10 to 90 percent, noncondensing
- Operating altitude: -60 to 2000 meters (m)

REGULATORY STANDARDS COMPLIANCE

Table 9 lists the regulatory standards compliance of the Cisco Catalyst 4500 Series.

Table 9. Regulatory Standards Compliance

Specification	Standard
Regulatory Compliance	<ul style="list-style-type: none">• CE marking
Safety	<ul style="list-style-type: none">• UL 60950• CAN/CSA-C22.2 No. 60950• EN 60950• IEC 60950• TS 001• AS/NZS 3260
EMC	<ul style="list-style-type: none">• FCC Part 15 (CFR 47) Class A• ICES-003 Class A• EN55022 Class A• CISPR22 Class A• AS/NZS 3548 Class A• VCCI Class A• EN 55022• EN 55024• EN 61000-6-1• EN 50082-1• EN 61000-3-2• EN 61000-3-3• ETS 300 386

Specification	Standard
Industry EMC, Safety, and Environmental Standards	<ul style="list-style-type: none"> • GR-63-Core Network Equipment Building Standards (NEBS) Level 3 • GR-1089-Core Level 3 • ETS 300 019 Storage Class 1.1 • ETS 300 019 Transportation Class 2.3 (pending) • ETS 300 019 Stationary Use Class 3.1 • ETS 300 386
Telecom (E1)	<ul style="list-style-type: none"> • CTR 12/13 • CTR 4 • ACA TS016
Telecom (T1)	<ul style="list-style-type: none"> • FCC Part 68 • Canada CS-03 • JATE Green Book

ORDERING INFORMATION

Table 10 lists the ordering information for equipment that is commonly used with the Cisco Catalyst 4500 Series.

Table 10. Ordering Information

Product Number	Description
WS-C4503	Cisco Catalyst 4503 Switch (3-slot chassis), fan, no power supply
WS-C4506	Cisco Catalyst 4506 Switch (6-slot chassis), fan, no power supply
WS-C4507R	Cisco Catalyst 4507R Switch (7-slot chassis), fan, no power supply, redundant supervisor capable
WS-C4510R	Cisco Catalyst 4510R Switch (10-slot chassis), fan, no power supply; redundant supervisor capable
PWR-C45-1000AC	Cisco Catalyst 4500 Series 1000W AC power supply (data only)
PWR-C45-1400AC	Cisco Catalyst 4500 Series 1400W AC power supply (data only)
PWR-C45-1300ACV	Cisco Catalyst 4500 Series 1300W AC power supply (with integrated PoE)
PWR-C45-2800ACV	Cisco Catalyst 4500 Series 2800W AC power supply (with integrated PoE)
PWR-C45-1400DC-P	Cisco Catalyst 4500 Series 1400W DC power supply with integrated power entry module (PEM)
PWR-C45-1400DC	Cisco Catalyst 4500 Series triple input 1400W DC power supply (data only)
PWR-C45-4200ACV	Cisco Catalyst 4500 Series 4200 W AC power supply (with integrated PoE)
WS-P4502-1PSU	Catalyst 4500 Series auxiliary power shelf (2-slot), including 1 PWR-4502
PWR-4502	Catalyst 4500 Series auxiliary power-shelf redundant power supply
WS-X4013+	Cisco Catalyst 4500 Series Supervisor Engine II-Plus
WS-X4013+TS	Cisco Catalyst 4500 Series Supervisor Engine II-Plus-TS, twelve 10/100/1000 PoE (RJ-45) and eight 1000-X SFP ports included on supervisor-engine faceplate
WS-X4515	Cisco Catalyst 4000/4500 Supervisor Engine IV
WS-X4515/2	Cisco Catalyst 4507R Redundant Supervisor Engine IV

Product Number	Description
WS-X4516	Cisco Catalyst 4000/4500 Supervisor Engine V
WS-X4516/2	Cisco Catalyst 4507R Redundant Supervisor Engine V
WS-X4516-10GE	Cisco Catalyst 4500 Series Supervisor Engine V-10GE
WS-X4516-10GE/2	Cisco Catalyst 4507R/4510R Redundant Supervisor Engine V-10GE
S4KL3-12218EW*	Cisco IOS Software: basic Layer 3 software image (Routing Information Protocol [RIP], static routes, Internetwork Packet Exchange [IPX] protocol, AppleTalk)
S4KL3K91-12218EW	Cisco IOS Software: basic Layer 3 software image (RIP, static routes, IPX, AppleTalk, Triple Data Encryption Standard [3DES])
S4KL3E-12218EW	Cisco IOS Software: enhanced Layer 3 software image (Open Shortest Path First [OSPF], Enhanced Interior Gateway Routing Protocol [EIGRP], and Intermediate System-to-Intermediate System [IS-IS] Protocol)
S4KL3EK91-12218EW	Cisco IOS Software: enhanced Layer 3 software image (OSPF, EIGRP, IS-IS, and 3DES)
MEM-C4K-FLD64M	Compact Flash memory, 64-MB option
MEM-C4K-FLD128M	Compact Flash memory, 128-MB option

* Enhanced Layer 3 software (S4KL3E-12218EW and S4KL3EK91-12218EW) is available for the Cisco Catalyst 4000/4500 supervisor engines IV and V only

LICENSING

Use of Border Gateway Protocol Version 4 (BGP4) on the Cisco Catalyst 4000/4500 supervisor engines IV and V requires an InterDomain Routing license (Table 10). Only one InterDomain Routing license is required per chassis.

Table 11. Licensing on the Cisco Catalyst 4500 Series

Product Number	Description
FR-IRC4(=)	Cisco Catalyst supervisor engines IV, V, and V-10GE InterDomain Routing feature license

WARRANTY

The warranty for the Cisco Catalyst 4500 Series is 90 days; it includes hardware replacement with a 10-day turnaround from return to manufacturer authorization (RMA).

CISCO TECHNICAL SUPPORT SERVICES

Cisco Systems® offers Cisco Technical Support Services to help ensure that your Cisco products operate efficiently, remain highly available, and benefit from current system software to assist you in effectively managing your network service while controlling operational costs.

Cisco Technical Support Services provide significant benefits that go beyond what is offered under the Cisco warranty policy. Services available under a Cisco SMARTnet® service contract that are not covered under a warranty include the following:

- Latest software updates
- Rapid replacement of hardware in next-day, 4-hour, or 2-hour dispatch options
- Ongoing technical support through Cisco Technical Assistance Center (TAC)
- Registered access to Cisco.com

Tables 12 and 13 list the components and competitive differentiators of Cisco Technical Support Services.

Table 12. Technical Support Services—Components

Service Feature Overview	Benefits
Software Support	Offers maintenance and minor and major updates for licensed feature set. Downloading new maintenance releases, patches, or updates of Cisco IOS Software helps to enhance and extend the useful life of Cisco devices. Through major software updates it is possible to extend the life of equipment and maximize application technology investments by: <ul style="list-style-type: none"> • Increasing the performance of current functions • Adding new capability that, in many cases, requires no additional hardware investment • Enhancing network and application availability, reliability, and stability
TAC Support	With more than 1000 highly trained customer support engineers, 390 CCIE® certifications, and access to 13,000 research and development engineers, Cisco TAC complements your in-house staff with a high level of knowledge in voice, video, and data communications networking technology. Its sophisticated call-routing system quickly routes calls to the correct technology personnel. The Cisco TAC is available 24 hours a day, 365 days a year.
Cisco.com	This award-winning Website provides 24-hour access to an extensive collection of online product and technology information, interactive network-management and troubleshooting tools, and knowledge-transfer resources that can help customers reduce costs by increasing staff self-sufficiency and productivity.
Advance Hardware Replacement	Advance replacement and onsite field-engineer options supply fast access to replacement hardware and field resources for installing hardware, minimizing the risk of potential network downtime.

Table 13. Technical Support Services—Competitive Differentiators

Feature	Benefits
Worldwide Virtual Lab	This extensive lab of Cisco equipment and Cisco IOS Software releases provides an invaluable engineering resource and knowledge base for training, product information, and recreation and testing of selected network issues to help decrease time to resolution.
TAC Training <ul style="list-style-type: none"> • Boot camps • Tech calls • Tech forums 	Cisco is committed to providing customers the latest in technology support. These TAC training programs assist customers in case avoidance as well as provide knowledge transfer of Cisco networking expertise.
Cisco Live	A powerful suite of Internet-enabled tools with firewall-friendly features; these secure, encrypted Java applets can turn a simple phone call into an interactive collaboration session, allowing a customer and Cisco TAC support engineer to work together more effectively.
Global Logistics	Delivers award-winning, worldwide hardware-replacement support with 650 depots, covering 120 countries, at a US\$2.3 billion investment in inventory, using 10,000 onsite field engineers.
Cisco IOS Software	Employs 100 discrete technologies with more than 2000 features. 400 new features are added each year. Cisco IOS Software is installed in more than 10 million devices and is running on more than 10,000 networks worldwide. It operates on the world’s largest IPv6 and VoIP networks and in all major service provider networks worldwide.

FOR MORE INFORMATION

To learn more about how you can take advantage of Cisco Technical Support Services, talk to your Cisco representative or visit Cisco Technical Support Services at: http://www.cisco.com/en/US/products/svcs/ps3034/ps2827/serv_group_home.html.

For additional information about the Cisco Catalyst 4500 Series, visit: <http://www.cisco.com/go/catalyst4500>.

For additional information about Cisco products, contact:

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