Power over Ethernet on the Cisco Catalyst 4500E Series Platform

The Cisco® Catalyst® 4500E Series platform offers a variety of choices in power supplies to enable the desired Power over Ethernet (PoE) scale and chassis configuration. Note that the terms "Power over Ethernet" and "inline power" are synonymous and can be used interchangeably. PoE has four versions: Cisco Catalyst 4500 Prestandard PoE (Prestandard PoE), 802.3af-compliant PoE (15W), 802.3at-compliant PoE Plus (PoE+) (30W), and Universal PoE (UPOE) (60W). Every Cisco Catalyst 4500 Series chassis and PoE power supply supports the Cisco Catalyst 4500 Prestandard PoE, the IEEE 802.3af standard PoE, and IEEE 802.3at-compliant PoEP power implementation, helping ensure backward compatibility with existing Cisco powered devices.

All Cisco Catalyst 4500 Series PoE Line Cards can distinguish an IEEE or Cisco Catalyst 4500 Prestandard powered device from an unpowered network interface card (NIC) to help ensure that power is applied only when an appropriate device is connected.

Cisco Catalyst 4500 Prestandard PoE

Cisco Catalyst 4500 Power Supplies have complete support for the Prestandard PoE. The first generation of Cisco Catalyst 4500 Prestandard PoE was designed to power devices such as Cisco IP phones and access points. This prestandard solution had relatively low power requirements (approximately 6 to 7 watts).

IEEE Standard PoE(P)

PoE is the capability to provide up to 15.4W of power over 100m of standard Category 3 (or better) unshielded twisted pair (UTP) cables when an IEEE 802.3 af-compliant device is attached to the PoE line-card port. IEEE 802.3at-compliant PoE+ extends the Power over Ethernet capability to up to 30W over 100m of Category 5e (or better) UTP cables.

UPOE

Universal Power Over Ethernet (UPOE) is an enhancement to the PoEP (802.3at) standard to allow powered devices up to 60W to connect over a single Category 5e cable. Standard PoEP uses only 2 twisted pairs (out of 4) in the Ethernet cable. UPOE uses all 4 twisted pairs to deliver 60W to the port. The additional power that UPOE offers over standard PoE extends the advantages of PoE to next-generation powered workspace devices such as virtual desktop displays, workgroup switches, and physical access controllers. All Cisco Catalyst 4500E Series UPOE Line Cards support standard PoE as well as Cisco Prestandard PoE. When deploying UPOE devices, Category 5e (or better) UTP cable is recommended.

Instead of requiring wall power, attached devices such as IP phones, wireless base stations, video cameras, and other IEEE-compliant appliances can use power provided from the Cisco Catalyst 4500 Series PoE Line Cards. This capability gives network administrators centralized control over power and eliminates the need to install outlets in ceilings and other out-of-the-way places where a powered device can be installed. When a switch is connected to an uninterruptible-power-supply (UPS) system, network administrators can help ensure that power outages will not affect network availability.

Deploying PoE on the Cisco Catalyst 4500E Series

PoE deployment is extremely easy on the Cisco Catalyst 4500E Series platform. All Cisco Catalyst 4500 Series PoE Line Cards automatically detect and power all attached powered devices. Moreover, the Cisco Catalyst 4500 Series returns unused port power to the system power budget for use by other devices because it supports the IEEE 802.3optional power classifications. Finer granularity for the budgeted power is achieved on Cisco power devices that support Cisco Discovery Protocol.

The Cisco Catalyst 4500E Series offers several internal power supplies for multiple deployment scenarios, including small and large deployments in AC or DC environments for data-only configurations, and scalability up to 60W per port for PoE, PoEP, and UPOE configurations.

All the Cisco Catalyst E-Series Chassis models share a common power-supply form factor. Each Cisco Catalyst 4500 Series chassis is designed for 1 + 1 power redundancy while meeting the needs of PoE demand. In addition to power resiliency, the Cisco Catalyst 4500 Series includes 1 + 1 supervisor-engine redundancy (Cisco Catalyst 4507R+E, and 4510R+E models only) and software-based fault tolerance. Integrated resiliency in both hardware and software minimizes network downtime, helping ensure workforce productivity, profitability, and customer success.

Table 1 gives an overview of various classes of PoE devices.

Table 1.   Overview of PoE Power Classifications (Measured at the Switch Port)

IEEE 802.3 Class	Power Available at the Switch Port
0	15.4W: Default class
1	4W
2	7W
3	15.4W
4	Up to 30W through Layer 2 negotiation (PoEP)
4 Enhanced	Up to 60W through Link Layer Discovery Protocol (LLDP) negotiation (UPOE)
Cisco Prestandard PoE	6.3W

Comparison between Cisco Prestandard PoE, 802.3af-Compliant PoE, and 802.3at-Compliant PoE

PoE device densities achieved with the Cisco Catalyst 4500 Power Supply vary depending on the classification of PoE device being powered. The difference in PoE scalability with a chosen power supply in 1 + 1 redundancy mode is highlighted in Table 2.

Table 2. Number of Powered Devices Supported When Using Power Supplies in a 1 + 1 Mode Using IEEE 802.3af-Compliant Line Cards

	Standard 802.3af Class 1 (4W per Port)	Standard 802.3af Class 2 (7W per Port)	Standard 802.3af Classes 0 and 3 (15.4W per Port)	Standard 802.3at Class 4 (PoEP) (30W per Port)	UPOE (60W per port)	Cisco Prestandard (6.3W per Port)
1000 WAC	-	-	-	-	-	-
1400 WAC	-	-	-	-	-	-
1400 WDC	-	-	-	-	-	-
1400 WDC (triple input)	-	-	-	-	-	-
1300 WAC	186	106	48	24	12	118
2800 WAC	325	186	84	43	21	206
4200 WAC	384	384	223	114	57	384
6000 WAC	384	384	289	148	74	384
9000 WAC	384	384	384	232	116	384

Cisco Catalyst 4500E Series Power-Supply Options: AC and DC

The Cisco Catalyst 4500E Series offers a variety of power supplies and accessories to meet the diverse needs of enterprise and service provider customers. All available Cisco Catalyst 4500 Series Power Supplies can be used for both PoE and data-only deployments.

The Cisco Catalyst 4500E Series offers several AC power supplies: 1000W (data only), 1400W (data only), 1300W (data and PoE), 2800W (data and PoE), 4200W (data and PoE), 6000W (data and PoE), and 9000W (data and PoE). All Cisco Catalyst 4500 AC power supplies are single-phase and operate between 100 and 240 VAC except the 2800WAV pwr supply which is 200-240VAC input only.

The Cisco Catalyst 4500E Series has two DC power options: one is optimized for data-only deployments in service provider central offices (part number PWR-C45-1400DC), and the other is used for high-power PoE deployments (PWR-C45-1400DC-P). All DC power supplies are designed to operate between -44 and -72 VDC.

Cisco Catalyst 4500E Series Service Provider DC Power Supply

This section is applicable only to the power supply for data-only deployments in service provider central offices (PWR-C45-1400DC). The triple-input 1400-WDC power supply is optimized for service provider central-office deployments. By providing multiple inputs, the service provider DC power supply allows central-office technicians to customize the output power to meet their application needs. Many central-office deployments require only a fraction of the 1400W available in the service provider power supply. With low-current inputs, technicians can connect the supply to smaller fuses and breakers. The service provider power supply makes it possible to deploy a Cisco Catalyst 3-slot chassis with a single 15A circuit. Likewise, it is possible to deploy a fully populated Cisco Catalyst 10-slot chassis with one 15A and two 20A circuits rather than a single 60A connection, which often requires rack rewiring (Table 3).

Table 3. Triple-Input 1400-WDC Power-Supply Input Modes

Input Mode	Input No.	Input Configuration	Maximum Total Output Power
1	1	One 12.5A	412W
2	2 or 3	One 15A	495W
3	1, 2, or 3	One 12.5A and one 15A	908W

Input Mode	Input No.	Input Configuration	Maximum Total Output Power
4	2 or 3	Two 15A	990W
5	1, 2, or 3	One 12.5A and two 15A	1400W

Cisco Catalyst 4500E Series Dual-Input AC PoE Power Supplies

There are three modes of operation supported by Cisco Catalyst 4500 Power Supplies. In all the modes the two power supplies need to be of equal wattage and type (AC/DC).

Redundant 1 + 1 Mode

In this mode the Cisco 4500 Chassis supports two power supplies, each fully capable of supporting the entire load of the switch. If one of the power supplies fails, the other power-supply unit in the chassis takes over the entire load without any downtime or discontinuity of operation while providing high availability and system resiliency. The failover is completely transparent.

Redundant N + 1 Mode

The Cisco Catalyst 4500 Chassis also supports N + 1 redundancy with N independent input circuits and safeguards against failure of one (+1) of the circuits as opposed to power supply unit failure.

Combined Mode

In this mode the power available for the entire chassis is equal to the sum of the output power of both of the power supplies times the share ratio.

P = Power output of one power-supply unit

Total combined mode power = $P + P^*$(share ratio)

The 9000W ACV, 6000W ACV, and 4200W ACV power supplies can also be used in the N + 1 mode of operation in addition to the 1 + 1 and the combined mode of operation. The 9000W ACV power supply offers 5 + 1, whereas the 6000W ACV and 4200W ACV power supplies offer 3 + 1 redundancy (refer to Tables 4 through 9).

9000W AC Power Supply

Table 4.   Triple-Input 9000 WAC Power-Supply Input Mode (Single Power Supply)

PS1-1	PS1-2	PS1-3	Total Output Power
110V	Off	Off	1100W
110V	110V	Off	2200W
110V	110V	110V	3300W
220V	Off	Off	3000W
220V	220V	Off	6000W
220V	220V	220V	9000W

Table 5.   Triple-Input 9000 WAC Total Output Power in Combined Mode Power Resiliency

PS1-1	PS1-2	PS1-3	PS2-1	PS2-2	PS2-3	Total Output Power
110V	110V	110V	110V	110V	110V (hot standby)	4509W
220V	220V	220V	220V	220V	220V (hot standby)	13429W

Note: The 9000W AC power supply also supports a true output power consumption monitoring capability.

6000W AC Power Supply

Table 6.   Dual-Input 6000 WAC Power-Supply Input Mode (Single Power Supply)

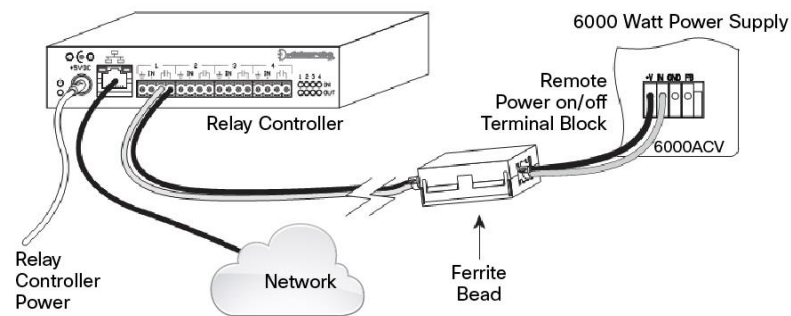| PS1-1	PS1-2	Total Output Power
110V	Off	1050W
110V	110V	2100W
220V	Off	3000W
220V	220V	6000W

Table 7.   Dual-Input 6000 WAC Total Output Power in Combined Mode Power Resiliency

PS1-1	PS1-2	PS2-1	PS2-2	Total Output Power
110V	110V	110V	110V (hot standby)	2730W
220V	220V	220V	220V (hot standby)	7850W

Note: The 6000W AC power supply also supports a true output power consumption monitoring capability.

Both 9000W ACV and 6000W ACV power supplies have input and output power-monitoring capabilities. Both power supplies can provide not only the input AC power consumed by the switch but also the instantaneous power being used by the system. This setup enables provisioning of the optimal number of power circuits in the wiring closet and accurately size the back-up power (uninterruptible power supply [UPS]) for reduced infrastructure costs. In addition, both of these power supplies are equipped with remote power-cycling functions through a relay to shut down or power-cycle the switch for maintenance when there is no access to the console or switch command-line interface (CLI). This feature helps reduce overall maintenance cost of the switch (Figure 1). A three-position terminal block, located on the lower right quadrant of the power-supply faceplate, provides the interface to the external relay controller box.

Figure 1.   Cisco Catalyst 6000W and 9000W Remote Power Cycling

4200W AC Power Supply

Table 8.   Dual-Input 4200 WAC Power-Supply Input Mode (Single Power Supply)

PS1-1	PS1-2	Total Output Power
110V	Off	1050W
110V	110V	2100W
220V	Off	2100W
220V	220V	4200W

Table 9. Dual-Input 4200 WAC Total Output Power in Combined Mode Power Resiliency

PS1-1	PS1-2	PS2-1	PS2-2	Total Output Power
110V	110V	110V	110V (hot standby)	2730W
220V	220V	220V	220V (hot standby)	5500W

Cisco Catalyst 4500E Series Power Supplies

In any deployment scenario, whether AC or DC, the Cisco Catalyst 4500 Series has the power supplies and external power devices to meet customers' power needs for data, voice, and video applications (Figure 2).

Figure 2. Cisco Catalyst 4500 Series Power Supplies

1000 WAC   1300 WAC   1400 WAC

2800 WACV   1400 WDC with PEM   1400 WDC Triple Input

4200 WAC Dual Input   6000 WAC Dual Input   9000 WAC Triple Input

Features

Tables 10 through 12 give information about Cisco Catalyst 4500E Series power-supply specifications.

Table 10. Cisco Catalyst 4500E Series Power-Supply Specifications (Data-Only Power Supplies)

Power Supply	1000 WAC (PWR C45-1000AC)	1400 WAC (PWR C45-1400AC)	1400W Triple Input DC (PWR-C45-1400DC)
Minimum Cisco IOS® Software release required	12.1(12c)EW	12.2(18)EW	12.2(25)EW
Minimum Cisco Catalyst Operating System Software required	7.4(1)	-	-
Integrated PoE	No (data only)	No (data only)	No (data only)
IEEE 802.3af compliant	No	No	No
Input voltage	100 to 240 VAC (±10% for full range)	100 to 240 VAC (±10% for full range)	-48.5 to -72 VDC
Input current (rated)	12A at 100 VAC 5A at 240 VAC	16A at 100 VAC 7A at 240 VAC	Two -48 VDC at 15A One -48 VDC at 12.5A
Output current (data)	12V at 83.4A 3.3V at 12.5A	12V at 113.4A 3.3V at 12.5A	Two -48 VDC at 15A One -48 VDC at 12.5A
Output current (PoE)	-	-	-

Power Supply	1000 WAC (PWR C45-1000AC)	1400 WAC (PWR C45-1400AC)	1400W Triple Input DC (PWR-C45-1400DC)
Output power redundant mode (data)	1000W + 40W	1360W + 40W	1368W + 40W
Output power redundant mode (PoE)	-	-	-
Output power combined mode (data)	1667W	2473W	2473W
Output power combined mode (PoE)	-	-	-
Heat dissipation	943 BTU/hr	1048 BTU/hr	1048 BTU/hr
Holdup time	20 ms	20 ms	8ms

Table 11.　Cisco Catalyst 4500E Series Power-Supply Specifications (Data and Voice)

	1300 WACV (PWR C45-1300ACV)	2800 WACV (PWR C45 2800ACV)	1400 WDC-P (PWR C45-1400DC-P)	4200 WACV (PWR C45-4200ACV)	6000 WACV (PWR C45-6000ACV)	9000 WACV (PWR C45-9000ACV)
Minimum Cisco IOS Software release required	12.1(12c)EW	12.1(12c)EW	12.1(13)EW	12.2	12.2(52)SG	15.1(2)SG
Minimum Cisco Catalyst Operating System Software required	7.4(1)	7.4(1)	7.5(1)	-	-	-
Integrated PoE	Yes (up to 800W)	Yes (up to 1400W)	Up to 7500W (minus power consumed for data) when connected directly to DC power plant	Yes (up to 3855W)	Yes (up to 4800W)	Yes (up to 7500W)
Input voltage	100 to 240 VAC (±10% for full range)	200 to 240 VAC (±10% for full range)	Data: -48.5 to -72 VDC Inline: -48 to -56 VDC	100 to 240 VAC (±10% for full range)	100 to 240 VAC (±10% for full range)	100 to 240 VAC (±10% for full range)
Input current (rated)	16A at 100 VAC 7A at 240 VAC	16A at 200 VAC	Data: 31A at -60 VDC Inline: 180A at -48VDC	Two 12A at 100 VAC or Two 12A at 200 VAC	Two 12A at 100 VAC or Two 16A at 200 VAC	Three 12A at 100 VAC or Three 16A at 200 VAC
Output current (data)	12V at 84.7A 3.3V at 12.5A	12V at 113.3A 3.3V at 12.5A	12V at 120A 3.3V at 12.5A	12V at 115.3A 3.3V at 12.5A	12V at 186.9A 3.3V at 12.5A	12V at 186.9A 3.3V at 12.5A
Output current (PoE)	-50V at 16.7A	-50V at 28A	-48 or -60 VDC at 140A	-50V at 77.1A (200V) -50V at 38A (100V)	50V at 100.0A (200V) -50V at 38.5A (120V)	-50V at 100.0A (200V) -50V at 38.5A (120V)
Output power redundant mode (data)	1000W + 40W	1360W + 40W	1360W + 40W	1360W + 40W	2200W + 40W	1960W + 40W
Output power redundant mode (PoE)	800W maximum per power supply	1400W maximum per power supply	Up to 7500W (minus the power consumed for data)	3700W (220V) 1850W (110V)	4800W (220V) 1850W (110V)	7500W (220V) 2500W (110V)
Output power combined mode (data)	1667W	2473W	2473W	2473W	4400W	3762W
Output power combined mode (PoE)	1333W (maximum)	2333W	7280W	6700W (220V) 3360W (110V)	8700W (220V) 3360W (110V)	14400W (220V) 4150W (110V)
Heat dissipation	1568 BTU/hour	2387 BTU/hr	Data only: 1591 BTU/hr Data and voice: 2905 BTU/hr	3580 BTU/hr	2720 BTU/hr	3010 BTU/hr
Holdup time	20 ms	20 ms	4 ms	20 ms	20 ms	20 ms

	1300 WACV (PWR C45-1300ACV)	2800 WACV (PWR C45 2800ACV)	1400 WDC-P (PWR C45-1400DC-P)	4200 WACV (PWR C45-4200ACV)	6000 WACV (PWR C45-6000ACV)	9000 WACV (PWR C45-9000ACV)
Number of 802.3af class 2 powered devices supported in redundant mode	106	186	384	384 (200V) 245 (100V)	384 (200V) 245 (100V)	384 (200V) 384 (100V)
Number of 802.3af classes 0 and 3 powered devices supported in the redundant mode	48	84	384	223 (200V) 111 (100V)	289 (200V) 111 (100V)	384 (200V) 158 (100V)
Number of 802.3af class 4 powered devices supported in the redundant mode	24	43	237	223 (200V) 59 (100V)	148 (200V) 59 (100V)	232 (200V) 76 (100V)
Number of UPOE devices supported in the redundant mode	12	22	-	58	74	116

Table 12.   Specifications of Cisco Catalyst 4500E Series

Feature	Description
Power-supply indicators and interfaces	• Fan OK LED(per input): Green• Input OK LED(per input): Green • Output Fail LED (per unit): Red • Support for Simple Network Management Protocol (SNMP) MIB
Environmental conditions	• Operating temperature: 32 to 104ºF (0 to 40ºC) • Storage temperature: SNMP 40 to 167ºF (SNMP 40 to 75ºC) • Relative humidity: 10 to 90 percent, noncondensing • Operating altitude: SNMP 60 to 3000m
Regulatory Standards Compliance	
Safety	• UL 60950 • CAN/CSA-C22.2 No. 60950 • EN 60950 • IEC 60950 • TS 001 • AS/NZS 3260
Electromagnetic compatibility (EMC)	• 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

Feature	Description
Industry EMC, safety, and environmental standards	• GR-63-Core Network Equipment Building Standards (NEBS) Level 3 • GR-1089-Core Level 3 • EN 50121-4 • 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
Warranty	Cisco Catalyst 4500 Power Supplies are covered for five (5) years by the Cisco Limited Lifetime Hardware Warranty. For more information, refer to this document on Cisco.com: http://www.cisco.com/en/US/docs/general/warranty/English/LH2DEN__.html. **Note:** If you purchased a Cisco Catalyst 4500E Series PoE Line Card or power supply before May 1, 2009, it is covered by the Cisco 90-Day Limited Hardware Warranty. For more information, refer to this document on Cisco.com: http://www.cisco.com/en/US/docs/general/warranty/English/901DEN__.html.
Service and support	Cisco offers lifecycle service and support for the Cisco Catalyst 4500 Series, directly and for resale through Cisco distributors. From implementation to operation and optimization, Cisco offers advanced service and technical support.
Advanced service	Cisco Total Implementation Solutions (TIS) offers a full range of implementation solutions, including project management, project engineering, configuration, and staging and rollout coordination. Cisco TIS helps ensure correct installation and deployment. For more information about Cisco TIS, visit: http://www.cisco.com/en/US/partner/products/svcs/ps11/services_segment_category_home.html.
Technical support	Cisco Smart Net Total Care™ online and telephone support augments the customer's operations-staff resources. Support includes the ability to refresh system software at will as well as a range of Advance Replacement hardware options. Cisco Smart Net Total Care Onsite support adds the services of a field engineer, services that can be critical when customer staffing is insufficient or unavailable for parts-replacement activities. For more information about Cisco Smart Net Total Care support, visit: http://www.cisco.com/en/US/partner/products/svcs/ps3034/serv_category_home.html.
ROHS compliance	ROHS5

Power and MTBF Information

Table 13 gives mean-time-between-failures (MTBF) numbers for the different power supplies.

Table 13. MTBF Numbers

Part Number	Rated MTBF (Hours)
PWR-C45-1300ACV	164,220
PWR-C45-2800ACV	155,822
PWR-C45-4200ACV	331,945
PWR-C45-6000ACV	341,356
PWR-C45-9000ACV	186,000
PWR-C45-1400DC-P	316,454
PWR-C45-1000AC	250,000
PWR-C45-1400AC	570,530
PWR-C45-1400DC	316,454

Ordering Information

To place an order, visit the Cisco Ordering homepage or refer to Tables 14 through 16.

Table 14.   Cisco Catalyst 4500 Power-Supply Ordering Information

Part Number	Product Name
PWR-C45-1000AC	Cisco Catalyst 4500 1000 WAC Power Supply (Data Only)
PWR-C45-1400AC	Cisco Catalyst 4500 1400 WAC Power Supply (Data Only)
PWR-C45-1300ACV	Cisco Catalyst 4500 1300 WAC Power Supply (PoE)
PWR-C45-2800ACV	Cisco Catalyst 4500 2800 WAC Power Supply (PoE)
PWR-C45-1400DC-P	Cisco Catalyst 4500 1400 WDC Power Supply with PEM (PoE)
PWR-C45-4200ACV	Cisco Catalyst 4500 4200 WAC Power Supply (PoE)
PWR-C45-6000ACV	Cisco Catalyst 4500 6000 WAC Power Supply (PoE)
PWR-C45-9000ACV	Cisco Catalyst 4500 9000 WAC Power Supply (PoE)
PWR-C45-1400DC	Cisco Catalyst 4500 1400 WDC SP Central-Office Power Supply (Triple Input)

Table 15.   Cisco Catalyst 4500 Series Power-Cord Options (Data Only)

Power Supply	1000 WAC	1400 WAC	1400 WDC
Region/Product ID	PWR-C45-1000AC	PWR-C45-1400AC	-
Europe	CAB-7KACE=	CAB-7513ACE=	-
International	-	-	-
United States	CAB-7KAC=	CAB-7513AC=	-
Australia	CAB-7KACA=	CAB-7513ACA=	-
Italy	CAB-7KACI=	CAB-7513ACI=	-
United Kingdom	CAB-7KACU=	CAB-7513ACU=	-
Argentina	CAB-7KACR=	CAB-7513ACR=	-
South Africa	-	CAB-7513ACSA=	-

Table 16.   Cisco Catalyst 4500 Series Power-Cord Options (Data and Voice)

Power Supply	1300 ACV	2800 WACV	4200 WACV	6000 WACV	9000 WACV	1400 WDC-P	External Power Cable to 1400 WDC-P
Region and product ID	PWR C45 1300ACV	PWR C45 2800ACV	PWR C45-4200ACV	PWR C45-6000ACV	PWR C45-9000ACV	PWR C45-1400DC-P	2500W PWR-4502
Europe	CAB-7513ACE=	CAB-AC-2800W-EU=	CAB-CEE77-C19-EU	CAB-CEE77-C19-EU	CAB-CEE77-C19-EU	-	CAB-4502AC-EU
International	N/A	CAB-AC-2800W-INT=	CAB-I309-C19-INT	CAB-I309-C19-INT	CAB-I309-C19-INT	-	-
United States	CAB-7513AC=	CAB-AC-2800W-TWLK= CAB-AC-2800W-6-20=	CAB-US515P-C19-US CAB-L620P-C19-US CAB-US620P-C19-US	CAB-US515P-C19-US CAB-L620P-C19-US CAB-US620P-C19-US	CAB-US515P-C19-US CAB-L620P-C19-US CAB-US620P-C19-US	-	CAB-4502AC-US
Australia	CAB-7513ACA=	Same as international	CAB-A3112-C19-AUS	CAB-A3112-C19-AUS	CAB-A3112-C19-AUS	-	-
Italy	CAB-7513ACI=	Same as international	CAB-C2316-C19-IT	CAB-C2316-C19-IT	CAB-C2316-C19-IT	-	-

Power Supply	1300 ACV	2800 WACV	4200 WACV	6000 WACV	9000 WACV	1400 WDC-P	External Power Cable to 1400 WDC-P
China	CAB-9K16A-CH	CAB-AC16A-CH	CAB-AC16A-CH, CAB-9K16A-CH	CAB-9K16A-CH	CAB-9K16A-CH		
United Kingdom	CAB-BS1363-C19-UK=		CAB-BS1363-C19-UK=	CAB-BS1363-C19-UK=	CAB-BS1363-C19-UK=		
Argentina	CAB-7513ACR=	Same as international	Same as international	Same as international	Same as international	-	-
South Africa	CAB-7513ACSA=	Same as international	Same as international	Same as international	Same as international	-	-
Israel	-	-	CAB-S132-C19-ISRL	CAB-S132-C19-ISRL	CAB-S132-C19-ISRL	-	-
India	CAB-SABS-C19-IND	CAB-SABS-C19-IND	CAB-SABS-C19-IND	CAB-SABS-C19-IND	CAB-SABS-C19-IND		
UPS 220V			CAB-C19-CBN	CAB-C19-CBN	CAB-C19-CBN		

* The 1300-WACV and 1400-WAC power supplies can use the power cords for the 2800-WAC power supply.

Cisco Limited Lifetime Hardware Warranty

The Cisco Limited Lifetime Hardware Warranty (LLW) includes 10-day advance hardware replacement for as long as the original end user owns the product. Table 17 describes the lifetime warranty.

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.
For additional information about warranty terms, visit http://www.cisco.com/go/warranty.

Adding a Cisco technical services contract to your device coverage provides benefits not available with warranty, including access to the Cisco Technical Assistance Center (TAC), a variety of hardware replacement options to meet critical business needs, updates for licensed Cisco IOS Software, and registered access to the extensive Cisco.com knowledge base and support tools. Table 18 describes the benefits and features of Cisco Technical Services.
For information about Cisco Technical Services, go to http://www.cisco.com/go/ts.

Table 17.   Limited Lifetime Hardware Warranty

	Cisco Limited Lifetime Hardware Warranty[1]
Warranty duration	As long as the original end user continues to own or use the product except for the fan and power supply, which are limited to 5 years.
End-of-life 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 part within 10 business days after receipt of the Return Material Authorization (RMA) request and confirmation that a replacement part is the appropriate response. Actual delivery times may vary depending on customer location.
Effective date	Hardware warranty commences from the date of shipment to the customer (and in case of resale by a Cisco reseller, not more than 90 days after original shipment by Cisco).
Cisco TAC support	None.
Cisco.com access	Warranty allows guest access only to Cisco.com.

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

Cisco and Partner Services

Enable the innovative, secure, intelligent edge in the Borderless Networks 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 4500-E Series 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 operating costs. Table 18 shows the Cisco Technical Services available for Cisco Catalyst 4500-E Series Switches.

For additional information about Cisco services, visit http://www.cisco.com/go/services.

Table 18. Cisco Technical Services for Cisco Catalyst 4500-E Series Switches

Technical Services
Cisco Smart Net Total Care Service
• Twenty-four-hour global access to the Cisco Technical Assistance Center (TAC)
• Unrestricted access to the extensive Cisco.com resources, communities, and tools
• Next-business-day, 8 x 5 x 4, 24 x 7 x 4, and 24 x 7 x 2 advance hardware replacement[2] and onsite parts replacement and installation available
• Ongoing operating system software updates within the licensed feature set[1]
• Proactive diagnostics and real-time alerts on Smart Call Home-enabled devices
Cisco Smart Foundation Service
• Next-business-day (NBD) advance hardware replacement as available
• Business-hours access to small and medium-sized business (SMB) TAC (access levels vary by region)
• Access to Cisco.com SMB knowledge base
• Online technical resources through the Smart Foundation Portal
• Operating system software bug fixes and patches
Cisco Focused Technical Support Services
Three 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 Smart Net Total Care 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, 8 x 5 x NBD 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 shipping is provided. Restrictions apply; please review the appropriate service descriptions for details.

Cisco Capital

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Cisco Capital can help you acquire the technology you need to achieve your objectives and stay competitive. We can help you reduce CapEx. Accelerate your growth. Optimize your investment dollars and ROI. Cisco Capital financing gives you flexibility in acquiring hardware, software, services, and complementary third-party equipment. And there's just one predictable payment. Cisco Capital is available in more than 100 countries. Learn more.

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