DATA SHEET

CISCO CATALYST 4500 SERIES POWER-OVER-ETHERNET CAPABILITIES AND POWER SUPPLIES

POWER OVER ETHERNET ON THE CISCO CATALYST 4500 SERIES PLATFORM

The Cisco® Catalyst® 4500 Series platform offers line cards, power supplies, and accessories (including an AC power shelf) to support 15.4W per port simultaneously on every port in any fully loaded Cisco Catalyst 4500 Series Switch. Although all references to "Power over Ethernet" (PoE), "inline power," and "voice" power supply and line cards are synonymous, there are only two versions: Cisco prestandard PoE and 802.3af-compliant PoE. Every Cisco Catalyst 4500 Series chassis and PoE power supply supports the IEEE 802.3af standard and the Cisco prestandard power implementation, ensuring backward compatibility with existing Cisco powered devices.

All Cisco Catalyst 4500 Series PoE line cards can distinguish an IEEE or Cisco prestandard powered device from an unpowered network interface card (NIC) to ensure power is applied only when an appropriate device is connected. With a Cisco PoE network, administrators can depend on a robust network that is safe to deploy and simple to maintain.

PoE

PoE provides –48 VDC power over standard Category 5 unshielded twisted-pair (UTP) cable up to 100 meters when an IEEE 802.3af-compliant or Cisco prestandard powered device is attached to the PoE line-card port. 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 ensure that power outages will not affect network availability.

DEPLOYING PoE ON THE CISCO CATALYST 4500 SERIES

When the Cisco Catalyst 4500 Series is properly configured, implementing PoE is easy when used with a Cisco powered device that supports Cisco Discovery Protocol. All Cisco Catalyst 4500 Series PoE line cards automatically detect an attached powered device the moment it is installed. Moreover, the Cisco Catalyst 4500 Series returns unused port power to the system power budget for use by other devices because it supports the IEEE802.3af optional power classifications.

The Cisco Catalyst 4500 Series offers internal power supplies and external power devices for multiple deployment scenarios. These scenarios include small and large deployments in AC or DC environments for data-only configurations, and scalability up to 15.4W per port for PoE configurations.

The Cisco Catalyst 4510R (10 slots), Catalyst 4507R (7 slots), Catalyst 4506 (6 slots), and Catalyst 4503 (3 slots) share a common power supply form factor. Each Cisco Catalyst 4500 Series chassis is designed for 1 + 1 power protection while meeting the needs of PoE demands. In addition to power resiliency, the Cisco Catalyst 4500 Series includes 1 + 1 supervisor-engine redundancy (Cisco Catalyst 4507R and Catalyst 4510R 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 IEEE 802.3af power classifications.

Table 1. Overview of IEEE 802.3af Power Classifications (measured at the switch port)

IEEE 802.3af Class	Power Available at the Switch Port
0	15.4W—Default class
1	4W
2	7W
3	15.4W
4	Future expansion
Cisco prestandard PoE	6.3W

Comparison Between Cisco Prestandard PoE and 802.3af-Compliant PoE

From a power perspective, there are several significant differences between the Cisco prestandard and 802.3af-compliant line cards. This is illustrated by comparing the total number of PoE devices supported by the Cisco prestandard inline power line card and the 802.3af-compliant line cards (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

	802.3af Class 1 (4W/port)	802.3af Class 2 (7W/port)	802.3af Class 0 & 3 (15.4W/port)	Cisco Pre-Standard (6.3W/port)
1000 WAC	–	–	–	–
1400 WAC	–	–	–	–
1400 WDC	–	–	–	–
1400 WDC (triple input)	–	–	–	–
1300 WAC	144	102	46	112
2800 WAC	192	179	80	197
AC power shelf	240	240	231	240
2 AC power shelves	336	336	336	336

CISCO CATALYST 4500 SERIES POWER-SUPPLY OPTIONS: AC AND DC

The Cisco Catalyst 4500 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 data-only deployments, which typically require just a few hundred watts. For deployments that dictate support for PoE power, Cisco offers several options.

The Cisco Catalyst 4500 Series offers AC power with several internal supplies: 1000W (data only), 1400 WAC (data only), 1300W (data and PoE), and 2800W (data and PoE). When more than 2800W of redundant data and PoE are required for a Cisco Catalyst 4500 Series chassis in an AC-powered environment, Cisco offers an external AC power shelf that houses two 2500 WAC power supplies. When two power shelves are combined, they can produce 7500W—the remaining 2500W supply can be used for N + 1 protection.

The Cisco Catalyst 4500 Series has two DC power options—one is optimized for data-only deployments in service provider central offices (part number PWR-C45-1400DC), the other is used for high-power PoE deployments (part number PWR-C45-1400DC-P).

CISCO CATALYST 4500 SERIES EXTERNAL AC POWER SHELF AND 1400W DC POWER SUPPLY WITH INTEGRATED POWER ENTRY MODULE

The Cisco Catalyst 4500 Series external AC power shelf must be used in conjunction with the 1400 WDC power supply. In addition to providing power for the chassis, fans, and non-PoE line cards, the 1400 WDC power supply contains a power entry module (PEM). The PEM is used to pass-through additional power to the chassis backplane—power demanded by the PoE line cards. The chassis power trace used for PoE is independent from the one used by the supervisor engine(s), fan tray, and backplane components. The 1400 WDC power supply can accept up to 7500 WDC for data and PoE applications. Up to 1400W can be dedicated for data (supervisor[s], fan tray, etc.), while the remaining power is passed through via the PEM and is used for PoE.

When only one external AC power shelf is used (with two 2500 WAC power supplies), it provides the 1400 WDC power supply with 5000W of DC power in total. When two AC power shelves are strapped together, the Cisco Catalyst 4500 Series can provide up to 7500W of DC power (3 + 1 redundant).

CISCO CATALYST 4500 SERIES SERVICE PROVIDER DC POWER SUPPLY

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. Low current inputs mean technicians can connect the supply to smaller fuses and breakers. The service provider power supply makes it possible to deploy a Cisco Catalyst 4503 with a single 15A circuit. Likewise, it is possible to deploy a fully populated Cisco Catalyst 4510R with two 20A and one 15A 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	1 x 12.5A	412W
2	2 or 3	1 x 15A	495W
3	1, 2, or 3	1 x 12.5A and 1 x 15A	908W
4	2 or 3	2 x 15A	990W
5	1, 2, or 3	1 x 12.5A and 2 x 15A	1400W

CISCO CATALYST 4500 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 1).

Figure 1.   Cisco Catalyst 4500 Series Power Supplies

1000 WAC

1300 WAC

1400 WAC

2800 WACV

1400 WDC with PEM

External AC Power Shelf 2500W

1400 WDC Triple Input

External AC Power Shelf

FEATURES

Table 4 gives Cisco Catalyst 4500 Series data-only power-supply specifications.

Table 4.   Cisco Catalyst 4500 Series Power-Supply Specifications (data-only power supplies)

Power Supply	1000W AC (part number PWR-C45-1000AC)	1400W AC (part number PWR-C45-1400AC)	1400W SP DC (part number PWR-C45-1400DC)
Minimum Cisco IOS® Software 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 current (rated)	12A @ 100 VAC 5A @ 240 VAC	16A @ 100 VAC 7A @ 240 VAC	2 x –48 VDC @ 15A 1 x –48 VDC @ 12.5A
Output current (data)	12V @ 83.4A 3.3V @ 12.2A	12V @ 113.4A 3.3V @ 12.2A	12V @ 1360W 3.3V @ 40W
Output current (PoE)	–	–	–
Output power redundant mode (data)	1000W + 40W	1360W + 40W	1400W + 40W
Output power redundant mode (PoE)	–	–	–
Output power combined mode (data)	1667W	2473W	2473 W
Output power combined mode (PoE)	–	–	–
Heat dissipation	943 BTU/hr	1048 BTU/hr	1048 BTU/hr
Holdup time	20 ms	20 ms	20 ms

Table 5 gives power-supply specifications for the Cisco Catalyst 4500 Series.

Table 5. Cisco Catalyst 4500 Series Power-Supply Specifications (data and voice)

	1300W ACV (part number PWR-C45-1300ACV)	2800W ACV (part number PWR-C45-2800ACV)	1400W DC-P (part number PWR-C45-1400DC-P)	2500W (part number PWR-4502)
Minimum Cisco IOS® Software required	12.1(12c)EW	12.1(12c)EW	12.1(13)EW	12.1(13)EW
Minimum Cisco Catalyst Operating System Software required	7.4(1)	7.4(1)	7.5(1)	7.5(1)
Integrated PoE	Yes (up to 800W)	Yes (up to 1400W)	Up to 7500W (minus the power consumed for data) when connected directly to a DC power plant or 2 external AC power shelves	2500W per power supply
IEEE 802.3af-compliant	Yes	Yes	Yes	Yes
Input current (rated)	16A @ 100 VAC 7A @ 240 VAC	16A @ 200 VAC 31A @ –60VDC (data only)	180A @ –48 VDC (PoE) 15A @ 200 VAC	
Output current (data)	12V @ 84.7A 3.3V @ 12.5A	12V @ 113.3A 3.3V @ 12.1A	12V @ 120A 3.3V @ 10A	–52 VDC @ 50A (total output per supply)
Output current (PoE)	–50V @ 16.7A	–50V @ 28A	–48/–60 VDC @ 140A	–52 VDC @ 50A (total output per supply)
Output power redundant mode (data)	1000W + 40W	1360W + 40W	1360W + 40W	Up to 1400W (through DC supply)
Output power redundant mode (PoE)	800W maximum per power supply	1400W maximum per power supply	Up to 7500W (minus the power consumed for data)	2500W per supply (minus the power consumed for data)
Output power combined mode (data)	1667W	2473W	–	–
Output power combined mode (PoE)	1333W (maximum)	2333W	–	–

	1300W ACV (part number PWR-C45-1300ACV)	2800W ACV (part number PWR-C45-2800ACV)	1400W DC-P (part number PWR-C45-1400DC-P)	2500W (part number PWR-4502)
Heat dissipation	1568 BTU/hr	2387 BTU/hr	Data only: 1591 BTU/hr Data and voice: 2905 BTU/hr	1210 BTU/hr per power supply
Holdup time	20 ms	20 ms	4 ms	20 ms
Number of 802.3af Class 2 powered devices supported	102	179	384	–
Number of 802.3af Class 0 and 3 powered devices supported	46	80	384	–

Table 6 gives specifications of the Cisco Catalyst 4500 Series.

Table 6. Specifications of Cisco Catalyst 4500 Series

Power-Supply Indicators and Interfaces	• Fan cooling: integrated in hot-inserting or hot-extraction unit • Good: green • Fail: red • Simple Network Management Protocol (SNMP) MIB supported
Environmental Conditions	• Operating temperature: 32 to 104ºF (0 to 40ºC) • Storage temperature: –40 to 167ºF (–40 to 75ºC) • Relative humidity: 10 to 90 percent, noncondensing • Operating altitude: –60 to 2000m
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
Industry EMC, Safety, and Environmental Standards	• 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
Warranty	The warranty for the Cisco Catalyst 4500 Series is 90 days; it includes hardware replacement with a 10-day turnaround from return materials authorization (RMA).
Service and Support	Cisco Systems® 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/warp/public/cc/serv/mkt/sup/ent/tis/.
Technical Support	Cisco SMARTnet® 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 SMARTnet Onsite support adds the services of a field engineer, and this can be critical when customer staffing is insufficient or unavailable for parts-replacement activities. For more information about Cisco SMARTnet support, visit: http://www.cisco.com/warp/public/cc/serv/mkt/sup/ent/snet/.

For More Information	For additional information about Cisco products, contact:
	• United States and Canada: (toll free) 800 553-NETS (6387)
	• Europe: 32 2 778 4242
	• Australia: 612 9935 4107

ORDERING INFORMATION

To place an order, visit the Cisco Ordering Home Page or refer to Tables 7 through 9.

Table 7. Cisco Catalyst 4500 Power-Supply Ordering Information

Product Name	Part Number
Cisco Catalyst 4500 1000 WAC Power Supply (data only)	PWR-C45-1000AC
Cisco Catalyst 4500 1400 WAC Power Supply (data only)	PWR-C45-1400AC
Cisco Catalyst 4500 1300 WAC Power Supply (PoE)	PWR-C45-1300ACV
Cisco Catalyst 4500 2800 WAC Power Supply (PoE)	PWR-C45-2800ACV
Cisco Catalyst 4500 1400 WDC Power Supply with PEM (PoE)	PWR-C45-1400DC-P
Cisco Catalyst 4500 1400 WDC SP Central-Office Power Supply (triple input)	PWR-C45-1400DC
External AC Power Shelf and Accessories	
Cisco Catalyst 4500 Auxiliary Power Shelf (2 slot), including 1 (part number PWR-4502)	WS-P4502-1PSU
Cisco Catalyst 4500 Auxiliary Power Shelf Redundant Power Supply	PWR-4502
Cisco Catalyst 4500 2 meter DC Cable set for auxiliary power shelf	CAB-4502-DC-2M
Cisco Catalyst 4500 60 cm DC Cable set for auxiliary power shelf	CAB-4502-DC-60CM

Table 8. Cisco Catalyst 4500 Series Power-Cord Options (data only)

Power Supply	1000 WAC	1400 WAC	1400 WDC
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=	–

Power Supply	1000 WAC	1400 WAC	1400 WDC
Argentina	CAB-7KACR=	CAB-7513ACR=	–
South Africa	–	CAB-7513ACSA=	–

Table 9. Cisco Catalyst 4500 Series Power-Cord Options (data and voice)

	1300 ACV	2800 WACV	1400 WDC-P	External Power 2500W
Product ID	PWR-C45-1300ACV	PWR-C45-2800ACV	PWR-C45-1400DC-P	PWR-4502
Europe	CAB-7513ACE=	CAB-AC-2800W-EU=	–	CAB-4502AC-EU
International	N/A	CAB-AC-2800W-INT=	–	–
United States	CAB-7513AC=	CAB-AC-2800W-TWLK= CAB-AC-2800W-6-20=	–	CAB-4502AC-US
Australia	CAB-7513ACA=	Same as international	–	–
Italy	CAB-7513ACI=	Same as international	–	–
United Kingdom	CAB-7513ACU=	Same as international	–	CAB-4502AC-UK
Argentina	CAB-7513ACR=	Same as international	–	–
South Africa	CAB-7513ACSA=	Same as international	–	–

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

** When connecting the 1400 WDC power supply to the Cisco external AC power shelf, a Cisco cord is required. When connecting directly to a DC power source, consult local codes; the cord must not be longer than 10m.

SERVICE AND SUPPORT

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you to protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Cisco Services, refer to Cisco Technical Support Services or Cisco Advanced Services.

FOR MORE INFORMATION

For more information about the Cisco Catalyst 4500 Series, visit: http://www.cisco.com/en/US/products/hw/switches/ps4324/index.html

CISCO SYSTEMS

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
    800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Cisco Systems has more than 200 offices in the following countries and regions. Addresses, phone numbers, and fax numbers are listed on
the Cisco Web site at www.cisco.com/go/offices.

Argentina • Australia • Austria • Belgium • Brazil • Bulgaria • Canada • Chile • China PRC • Colombia • Costa Rica • Croatia • Cyprus Czech Republic • Denmark • Dubai, UAE • Finland • France • Germany • Greece • Hong Kong SAR • Hungary • India • Indonesia • Ireland Israel • Italy • Japan • Korea • Luxembourg • Malaysia • Mexico • The Netherlands • New Zealand • Norway • Peru • Philippines • Poland Portugal • Puerto Rico • Romania • Russia • Saudi Arabia • Scotland • Singapore • Slovakia • Slovenia • South Africa • Spain • Sweden Switzerland • Taiwan • Thailand • Turkey • Ukraine • United Kingdom • United States • Venezuela • Vietnam • Zimbabwe