Cisco Catalyst 4500E Series Power over Ethernet Capabilities and Power Supplies

Power over Ethernet on the Cisco Catalyst 4500E Series Platform

The Cisco® Catalyst® 4500E Series platform offers line cards, power supplies, and accessories to support 15.4W per port simultaneously on every port in any fully loaded Cisco Catalyst 4500E Series switch. Although all references to “Power over Ethernet” (PoE), “inline power,” and “voice” power supply and line cards are synonymous. There are four versions: Cisco prestandard PoE, 802.3af-compliant PoE, 802.3at-compliant PoEP (30W), and Universal POEP (UPOE) (60W). Every Cisco Catalyst 4500 Series chassis and PoE power supply supports the Cisco 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. PoEP is standard on the Cisco Catalyst 4500E Series platform. UPOE requires Cisco Catalyst 4500E Series chassis.

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 help ensure that 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(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 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 help ensure that power outages will not affect network availability. IEEE 802.3at-compliant PoEP extends the Power over Ethernet capability to up to 30W over 100m of Category 5e (or better) unshielded twisted-pair (UTP) cables.

UPOE

Universal POEP is an enhancement to the PoEP (802.3at) standard to allow powered devices up to 60W to connect over a single Cat 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 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, Cat5e (or better) unshielded twisted-pair (UTP) cable is recommended.

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 802.3af optional 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 internal power supplies and external power devices 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 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+E/4507R-E and 4510R+E/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 IEEE 802.3af power classifications.

Table 1. Overview of IEEE 802.3af 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 via L2 negotiation (PoEP)
4 enhanced	Up to 60W via LLDP negotiation (UPOE)
Cisco prestandard PoE	6.3W

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

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

	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)	-	-	-	-	-	-

	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)
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

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 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 4500E Series offers AC power with several internal supplies: 1000W (data only), 1400W (data only), 1300W (data and PoE), 2800W (data and PoE), 4200W (data and PoE), and 6000W (data and PoE). When 5500W or less is required, the 4200W power supply can provide 5500W while protecting the chassis from a power or power-supply subunit failure. All Cisco Catalyst 4500 AC power supplies are single phase and operate between 100VAC and 240VAC.

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 -44VDC and -72VDC.

Cisco Catalyst 4500E 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. 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
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

The 6000W ACV and 4200W ACV power supplies feature combined Mode Power Resiliency as an extension of the traditional combined mode power-supply behavior. Each power supply contains two smaller power supplies (called subunits). In Combined Mode Power Resiliency the system relies only on power from three out of four power-supply subunits. When using 200 VAC, this feature helps ensure that maximum power is available while the switch is protected against a single input power failure or subunit component failure. (See Tables 4 through 7.)

6000W AC Power Supply

Table 4. 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 5. 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

6000W AC Power Supply also supports true output power consumption monitoring capability.

4200W AC Power Supply

Table 6. 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 7. 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 1).

Figure 1. Cisco Catalyst 4500 Series Power Supplies

Features

For information on Cisco Catalyst 4500E Series power-supply specifications, see Tables 8 through 10.

Table 8. 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 to -60 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 12.2A	12V at 113.4A 3.3V at 12.2A	Two -48 VDC at 15A One -48 VDC at 12.5A
Output current (PoE)	-	-	-
Output power redundant mode (data)	1000W + 40W	1360W + 40W	1368W + 40W

Power Supply	1000 WAC (PWR C45-1000AC)	1400 WAC (PWR C45-1400AC)	1400W Triple Input DC (PWR-C45-1400DC)
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	4 ms

Table 9. 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)
Minimum Cisco IOS Software release required	12.1(12c)EW	12.1(12c)EW	12.1(13)EW	12.2	12.2(52)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)
IEEE 802.3af compliant	Yes	Yes	Yes	Yes	Yes
Input voltage	100 to 240 VAC (±10% for full range)	200 to 240 VAC (±10% for full range)	Data: -48 to -60 VDC Inline: -48 to -56 VDC	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
Output current (data)	12V at 84.7A 3.3V at 12.5A	12V at 113.3A 3.3V at 12.1A	12V at 120A 3.3V at 10A	12V at 115.3A 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)
Output power redundant mode (data)	1000W + 40W	1360W + 40W	1360W + 40W	1360W + 40W	2200W + 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)
Output power combined mode (data)	1667W	2473W	2473W	2473W	4400W
Output power combined mode (PoE)	1333W (maximum)	2333W	7280W	6700W (220V) 3360W (110V)	8700W (220V) 3360W (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
Holdup time	20 ms	20 ms	4 ms	20 ms	20 ms
Number of 802.3af class 2 powered devices supported in redundant mode	106	186	384	384 (200V) 245 (100V)	384 (200V) 245 (100V)

	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)
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)

Table 10. Specifications of Cisco Catalyst 4500E Series

Feature	Description
Power-supply indicators and interfaces	• Fan cooling: Integrated in hot-inserting or hot-extraction unit • Good: Green • Fail: Red • Support for Simple Network Management Protocol (SNMP) MIB
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 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
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, see 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, see 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.

Feature	Description
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 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, services that 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/en/US/partner/products/svcs/ps3034/serv_category_home.html.
ROHS compliance	ROHS5

Power and MTBF Information

Table 11 gives MTBF numbers for the different power supplies.

Table 11. 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-C45-1400DC-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 12 through 14.

Table 12. 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-C45-1400DC	Cisco Catalyst 4500 1400 WDC SP Central-Office Power Supply (Triple Input)

Table 13. 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=	-

Power Supply	1000 WAC	1400 WAC	1400 WDC
United Kingdom	CAB-7KACU=	CAB-7513ACU=	-
Argentina	CAB-7KACR=	CAB-7513ACR=	-
South Africa	-	CAB-7513ACSA=	-

Table 14. Cisco Catalyst 4500 Series Power-Cord Options (Data and Voice)

Power Supply	1300 ACV	2800 WACV	4200 WACV	6000 WACV	1400 WDC-P	External Power
Region and product ID	PWR C45 1300ACV	PWR C45 2800ACV	PWR C45-4200ACV	PWR C45-6000ACV	PWR C45-1400DC-P	2500W PWR-4502
Europe	CAB-7513ACE=	CAB-AC-2800W-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	-	-
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-4502AC-US
Australia	CAB-7513ACA=	Same as international	CAB-A3112-C19-AUS	CAB-A3112-C19-AUS	-	-
Italy	CAB-7513ACI=	Same as international	CAB-C2316-C19-IT	CAB-C2316-C19-IT	-	-
Argentina	CAB-7513ACR=	Same as international	Same as international	Same as international	-	-
South Africa	CAB-7513ACSA=	Same as international	Same as international	Same as international	-	-
Israel	-	-	CAB-S132-C19-ISRL	CAB-S132-C19-ISRL	-	-

* 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 15 describes the limited lifetime hardware 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 on 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 16 describes the benefits and features of Cisco technical services.

For information about Cisco Technical Services, go to http://www.cisco.com/go/ts.

Table 15. 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.
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 part within 10 business days after receipt of the RMA request and confirmation that a replacement part is 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).
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 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 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 operational costs. Table 16 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 16. Cisco Technical Services for Cisco Catalyst 4500-E Series 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 resources, communities, and tools • Next-business-day, 8x5x4, 24x7x4, and 24x7x2 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 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 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 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; please review the appropriate service descriptions for details.

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