

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

### Power over Ethernet on the Cisco Catalyst 4500 E-Series Platform

The Cisco® Catalyst® 4500 E-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 E-Series switch. Although all references to “Power over Ethernet” (PoE), “inline power,” and “voice” power supply and line cards are synonymous, there are three versions: Cisco prestandard PoE, 802.3af-compliant PoE and PoEP (30W). Every Cisco Catalyst 4500 Series chassis and PoE power supply supports the IEEE 802.3af standard, the Cisco prestandard and PoEP power implementation, helping ensure backward compatibility with existing Cisco powered devices. PoEP is standard on Cisco Catalyst 4500 E-Series platform.

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 provides –48-VDC power over standard Category 5 unshielded twisted-pair (UTP) cable up to 100 meters 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 ensure that power outages will not affect network availability. PoEP extends the power over ethernet cable to up to 30W per port.

### Deploying PoE on the Cisco Catalyst 4500 E-Series

When the Cisco Catalyst 4500 E-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 they are 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 E-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 30W per port for PoE and PoEP configurations.

The Cisco Catalyst 4510R-E (10 slot), 4507R-E (7 slot), 4506-E (6 slot), and 4503-E (3 slot) models as well as non-E-Series classic chassis 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 and 4510R-E/4510R 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 802.3af 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. The differences are illustrated by comparing the total number of PoE devices supported by the Cisco prestandard inline power line card and the 802.3 af-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)	PoEP (30W Per Port)	Cisco Prestandard (6.3W perport)
1000 WAC	–	–	–	–	–
1400 WAC	–	–	–	–	–
1400 WDC	–	–	–	–	–
1400 WDC (triple input)	–	–	–	–	–
1300 WAC	186	106	48	24	118
2800 WAC	325	186	84	43	206
AC power shelf (with 1400W-P)	384	332	150	77	384
2 AC power shelves	384	384	301	155	384
4200 WAC	384	384	223	114	384
6000 WAC	384	384	289	148	384

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

The Cisco Catalyst 4500 E-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 E-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 are required, the 4200W power supply can provide 5500W while protecting the chassis from a power or power-supply sub-unit failure. When

more than 5500W 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. All Cisco Catalyst 4500 AC power supplies are single phase.

The Cisco Catalyst 4500 E-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).

### **Cisco Catalyst 4500 E-Series External AC Power Shelf and 1400-WDC Power Supply with Integrated Power Entry Module**

The Cisco Catalyst 4500 E-Series external AC power shelf must be used in conjunction with the 1400-WDC-P 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 additional power through 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 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. 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 E-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 4503 with a single 15A circuit. Likewise, it is possible to deploy a fully populated Cisco Catalyst 4510R 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 4500 E-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 sub-units). In Combined Mode Power Resiliency the system relies only on power from three out of four power-supply sub-units. 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 sub-unit component failure.

### 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)	2560W
220V	220V	220V	220V (hot standby)	6600W

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)	2200W
220V	220V	220V	220V (hot standby)	4700W

## Cisco Catalyst 4500 E-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 Catalyst 4500 E-Series power-supply specifications, see Tables 8 through 11.

**Table 8.** Cisco Catalyst 4500 E-Series Power-Supply Specifications (Data-Only Power Supplies)

Power Supply	1000 WAC C45-1000AC)	(PWR	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 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

Power Supply	1000 WAC C45-1000AC)	(PWR	1400 WAC (PWR C45-1400AC)	1400W Triple Input DC (PWR-C45-1400DC)
<b>Output current (data)</b>	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
<b>Output current (PoE)</b>	–		–	–
<b>Output power redundant mode (data)</b>	1000W + 40W		1360W + 40W	1368W + 40W
<b>Output power redundant mode (PoE)</b>	–		–	–
<b>Output power combined mode (data)</b>	1667W		–	–
<b>Output power combined mode (PoE)</b>	–		–	–
<b>Heat dissipation</b>	943 BTU/hr		1048 BTU/hr	1048 BTU/hr
<b>Holdup time</b>	20 ms		20 ms	4 ms

**Table 9.** Cisco Catalyst 4500 E-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)	2500W (PWR-4502)
<b>Minimum Cisco IOS® Software Release required</b>	12.1(12c)EW	12.1(12c)EW	12.1(13)EW	12.2	12.2(52)SG	12.1(13)EW
<b>Minimum Cisco Catalyst Operating System Software required</b>	7.4(1)	7.4(1)	7.5(1)	–	–	7.5(1)
<b>Integrated PoE</b>	Yes (up to 800W)	Yes (up to 1400W)	Up to 7500W (minus power consumed for data) when connected directly to DC power plant or 2 external AC power shelves	Yes (up to 3855W)	Yes (up to 4800W)	2500W per power supply
<b>IEEE 802.3af compliant</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>Input current (rated)</b>	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	15A at 200 VAC
<b>Output current (data)</b>	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	–52 VDC at 50A (total output per supply)
<b>Output current (PoE)</b>	–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)	–52 VDC at 50A (total output per supply)
<b>Output power redundant mode (data)</b>	1000W + 40W	1360W + 40W	1367W + 40W	1383W + 40W	2200W + 40W	Up to 1400W (through DC supply)
<b>Output power redundant mode (PoE)</b>	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)	2500W per supply (minus the power consumed for data)
<b>Output power combined mode (data)</b>	1667W	2473W	2734W	2766W	4400W	1360W
<b>Output power combined mode (PoE)</b>	1333W (maximum)	2333W	7280W	6700W (220V) 3360W (110V)	8700W (220V) 3360W (110V)	–

	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)	2500W (PWR- 4502)
<b>Heat dissipation</b>	1568 BTU/hour	2387 BTU/hr	Data only: 1591 BTU/hr Data and voice: 2905 BTU/hr	3580 BTU/hr	2720 BTU/hr	1210 BTU/hr per power supply
<b>Holdup time</b>	20 ms	20 ms	4 ms	20 ms	20 ms	20 ms
<b>Number of 802.3af class 2 powered devices supported</b>	106	186	384	384 (200V) 245 (100V)	384 (200V) 245 (100V)	318 (per unit)
<b>Number of 802.3af classes 0 and 3 powered devices supported</b>	48	84	384	223 (200V) 111 (100V)	289 (200V) 111 (100V)	144 (per unit)

**Table 10.** Specifications of Cisco Catalyst 4500 E-Series

Feature	Description
<b>Power-supply indicators and interfaces</b>	<ul style="list-style-type: none"> <li>Fan cooling: Integrated in hot-inserting or hot-extraction unit</li> <li>Good: Green</li> <li>Fail: Red</li> <li>Support for Simple Network Management Protocol (SNMP) MIB</li> </ul>
<b>Environmental conditions</b>	<ul style="list-style-type: none"> <li>Operating temperature: 32 to 104°F (0 to 40°C)</li> <li>Storage temperature: -40 to 167°F (-40 to 75°C)</li> <li>Relative humidity: 10 to 90 percent, noncondensing</li> <li>Operating altitude: -60 to 2000m</li> </ul>
<b>Regulatory Standards Compliance</b>	
<b>Safety</b>	<ul style="list-style-type: none"> <li>UL 60950</li> <li>CAN/CSA-C22.2 No. 60950</li> <li>EN 60950</li> <li>IEC 60950</li> <li>TS 001</li> <li>AS/NZS 3260</li> </ul>
<b>Electromagnetic Compatibility (EMC)</b>	<ul style="list-style-type: none"> <li>FCC Part 15 (CFR 47) Class A</li> <li>ICES-003 Class A</li> <li>EN55022 Class A</li> <li>CISPR22 Class A</li> <li>AS/NZS 3548 Class A</li> <li>VCCI Class A</li> <li>EN 55022</li> <li>EN 55024</li> <li>EN 61000-6-1</li> <li>EN 50082-1</li> <li>EN 61000-3-2</li> <li>EN 61000-3-3</li> <li>ETS 300 386</li> </ul>
<b>Industry EMC, safety, and environmental standards</b>	<ul style="list-style-type: none"> <li>GR-63-Core Network Equipment Building Standards (NEBS) Level 3</li> <li>GR-1089-Core Level 3</li> <li>ETS 300 019 Storage Class 1.1</li> <li>ETS 300 019 Transportation Class 2.3 (pending)</li> <li>ETS 300 019 Stationary Use Class 3.1</li> <li>ETS 300 386</li> </ul>
<b>Warranty</b>	<p>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: <a href="http://www.cisco.com/en/US/docs/general/warranty/English/LH2DEN_.html">http://www.cisco.com/en/US/docs/general/warranty/English/LH2DEN_.html</a></p> <p>Note: If you purchased a Cisco Catalyst 4500 E-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: <a href="http://www.cisco.com/en/US/docs/general/warranty/English/901DEN_.html">http://www.cisco.com/en/US/docs/general/warranty/English/901DEN_.html</a></p>

Feature	Description
<b>Service and support</b>	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.
<b>Advanced service</b>	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: <a href="http://www.cisco.com/en/US/partner/products/svcs/ps11/services_segment_category_home.html">http://www.cisco.com/en/US/partner/products/svcs/ps11/services_segment_category_home.html</a>
<b>Technical support</b>	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: <a href="http://www.cisco.com/en/US/partner/products/svcs/ps3034/serv_category_home.html">http://www.cisco.com/en/US/partner/products/svcs/ps3034/serv_category_home.html</a>

## Ordering Information

To place an order, visit the Cisco Ordering Home Page or refer to Tables 9 through 11.

**Table 11.** Cisco Catalyst 4500 Power-Supply Ordering Information

Part Number	Product Name
<b>PWR-C45-1000AC</b>	Cisco Catalyst 4500 1000 WAC Power Supply (data only)
<b>PWR-C45-1400AC</b>	Cisco Catalyst 4500 1400 WAC Power Supply (data only)
<b>PWR-C45-1300ACV</b>	Cisco Catalyst 4500 1300 WAC Power Supply (PoE)
<b>PWR-C45-2800ACV</b>	Cisco Catalyst 4500 2800 WAC Power Supply (PoE)
<b>PWR-C45-1400DC-P</b>	Cisco Catalyst 4500 1400 WDC Power Supply with PEM (PoE)
<b>PWR-C45-4200ACV</b>	Cisco Catalyst 4500 4200 WAC Power Supply (PoE)
<b>PWR-C45-6000ACV</b>	Cisco Catalyst 4500 6000 WAC Power Supply (PoE)
<b>PWR-C45-1400DC</b>	Cisco Catalyst 4500 1400 WDC SP Central-Office Power Supply (triple input)
<b>External AC Power Shelf and Accessories</b>	
<b>WS-P4502-1PSU</b>	Cisco Catalyst 4500 Auxiliary Power Shelf (2 slot), including 1 (part number PWR-4502)
<b>PWR-4502</b>	Cisco Catalyst 4500 Auxiliary Power Shelf Redundant Power Supply
<b>CAB-4502-DC-2M</b>	Cisco Catalyst 4500 2 meter DC Cable set for auxiliary power shelf
<b>CAB-4502-DC-60CM</b>	Cisco Catalyst 4500 60 cm DC Cable set for auxiliary power shelf

**Table 12.** Cisco Catalyst 4500 Series Power-Cord Options (Data Only)

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

**Table 13.** 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
<b>Region and Product ID</b>	PWR C45 1300ACV	PWR C45 2800ACV	PWR C45-4200ACV	PWR C45-6000ACV	PWR C45-1400DC-P	2500W PWR-4502



<b>Europe</b>	CAB-7513ACE=	CAB-AC-2800W-EU=	CAB-CEE77-C19-EU	CAB-CEE77-C19-EU	–	CAB-4502AC-EU
<b>International</b>	N/A	CAB-AC-2800W-INT=	CAB-I309-C19-INT	CAB-I309-C19-INT	–	–
<b>United States</b>	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
<b>Australia</b>	CAB-7513ACA=	Same as international	CAB-A3112-C19-AUS	CAB-A3112-C19-AUS	–	–
<b>Italy</b>	CAB-7513ACI=	Same as international	CAB-C2316-C19-IT	CAB-C2316-C19-IT	–	–
<b>United Kingdom</b>	CAB-7513ACU=	Same as international	CAB-BS1363-C19-UK	CAB-BS1363-C19-UK	–	CAB-4502AC-UK
<b>Argentina</b>	CAB-7513ACR=	Same as international	Same as international	Same as international	–	–
<b>South Africa</b>	CAB-7513ACSA=	Same as international	Same as international	Same as international	–	–
<b>Israel</b>	–	–	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.

\*\* 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 10 meters.

## 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 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>

For additional information about Cisco products, contact:

- United States and Canada: (toll free) 800 553-NETS (6387)
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