

Why Is Power Backup Important?

One of the compelling advantages of implementing Power over Ethernet (PoE) for voice over IP (VoIP) is the ability to converge multiple networks. A single network simplifies power backup, maintenance, and monitoring, while extending the high availability of traditional voice networks to the data network. This at-a-glance provides a high-level view of PoE high availability on Cisco® Catalyst® 4500 E-Series Switches.

Figure 1. 4200W AC Dual Input



Types of Uninterruptible Power Supplies: AC and AC-Powered DC Uninterruptible Power Supplies

Figure 2 shows a typical AC uninterruptible power supply (UPS) connected to an AC wall outlet. The AC current is converted to DC and stored in batteries. When the batteries are used to power the LAN switch, the DC current is converted back to AC so that it can power an AC power supply in the switch. Because the switch's internal electronics operate on DC power (like most communications equipment), the switch's AC power supply converts the current back to DC. Thus, in a traditional UPS switch deployment, the utility line power is converted three times: each conversion wastes electricity and creates excess heat (about 10 percent each time).

Figure 2. AC UPS Connection

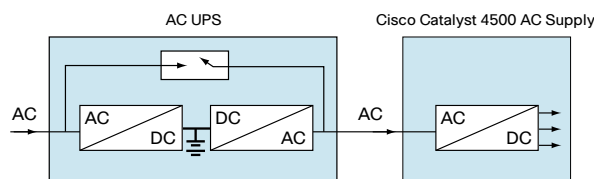
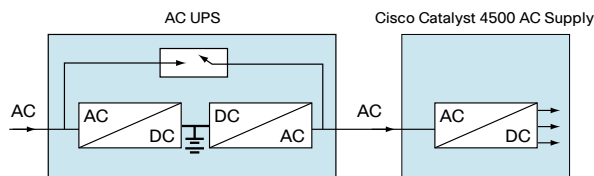


Figure 3 illustrates an AC-powered DC UPS solution. The UPS converts AC to DC. The DC power is stored in the batteries and passed to the 1400 Watt (W) DC-P power supply in the switch (1400W DC refers to the power supply's data capabilities; the rated input is 8600W DC). The entire process requires only one AC to DC conversion. A DC UPS requires less power and produces less heat than a comparable AC UPS solution. AC-powered DC UPSs also use smaller, more powerful batteries, providing significantly more run time.

Figure 3. AC-Powered DC UPS Connection



Sizing Your UPS

UPS power is measured in kilovolt amps (KVAs). To assess a UPS KVA rating, review the device's power input label, which will note the device's maximum current draw. Multiply the input volts by the amps for the total VA. Divide the VA by 1000 to obtain the KVA. Before selecting a UPS, determine the run time your applications need; this is usually measured in minutes or hours. Most power line outages last for less than 10 minutes, but some can last for an hour or more. If downtime is unacceptable, consider backing up your building's power with an onsite diesel generator.

Equations

$$VA = W \times 1.25$$

$$KVA = (\text{volts} \times \text{amps}) / 1000$$

NOTE: Converting W to VA requires a power factor multiple. This multiple compensates for power efficiency loss within the power supply.

Power Management

Cisco Catalyst 4500 E-Series Switches support combined and redundant power supply output modes. Redundant mode is recommended for VoIP applications: it protects against power line and power supply

failure. The switches also provide administrators with the flexibility to enable PoE on a per-port basis. Configuring a port as "static" enables the system to reserve power even if a device is not attached. Static configuration is used for high-priority ports: the system will power up all static ports before it begins powering "auto" ports. The switches also support powered devices that are compliant with Cisco Discovery Protocol. Cisco Discovery Protocol v2 allows powered devices to communicate exact power requirements in addition to 802.3af class requirements (15.4W). Some Cisco Class 3 IP phones use far less than 15.4W; planning for precise power requirements (rather than the worst case) can save huge sums of money for large VoIP deployments.

Thermal Properties of the Cisco Catalyst 4500 E-Series

LAN switches use power for data and inline PoE. 100 percent of the power used for data processing stays in the closet, while 11 to 15 percent of the PoE power stays in the closet. Power supplies and UPSs also produce heat from efficiency losses. In total, this energy loss can exceed 30 percent of the power input.

Total System Availability

High availability is a critical requirement for today's mission-critical networks. Minimizing Ethernet switch downtime maximizes productivity for hosts and other network devices connected to it. PoE high availability is provided by UPSs in the event of commercial power outages. Mechanical or electrical problems in the Catalyst 4500 E-Series power supply are addressed by redundant power supplies. Such redundant configuration provides uninterrupted VoIP services. Cisco integrates Stateful Switchover (SSO), Non-Stop Forwarding (NSF) and In-Service Software Upgrade (ISSU) technology into Cisco Catalyst 4500 E-Series Switches. When configured with dual supervisor engines, ISSU, NSF, and SSO provide protection from software and hardware issues. Together, these features provide 360 degrees of PoE high availability in case of electrical, mechanical hardware, and software outages.