



IT White Paper

**IP TELEPHONY AND RELIABILITY:  
PROTECTING MISSION-CRITICAL  
PHONE SYSTEMS FROM POWER  
THREATS**



## Executive Summary

IT managers who are used to implementing power protection for IT network or data center applications face new challenges in protecting their enterprise IP telephony systems. Users demand the same high level of reliability for IP telephony and its converged voice/data/video applications as they demand from the conventional phone systems that IP telephony replaces.

The benefits of IP telephony will be greatly reduced — to the point where the entire implementation could be jeopardized — if proper power and cooling support is not provided for IP telephony equipment. In the data center this equipment may already be protected by online UPSs, be precision cooled, have physical security, and be monitored and managed by an internal IT staff who can provide immediate attention in the event of a problem.

However, IP telephony equipment in remote wiring closets is typically less secure, less protected, and far more apt to be at risk from higher repair times. Accordingly, IT managers must consider the complete protection system required to provide a high-availability system. The six requirements for achieving high-availability in wiring closets and other remote locations are:

1. Power quality
2. System redundancy
3. Precision cooling
4. Remote monitoring and management
5. Physical security of system equipment
6. Mission-critical service

If your organization is looking into IP telephony systems, make sure you have adequate power protection and cooling in network closets to achieve the same availability you are accustomed to in your traditional phone system — a level of availability which is almost always higher than for other IT applications.

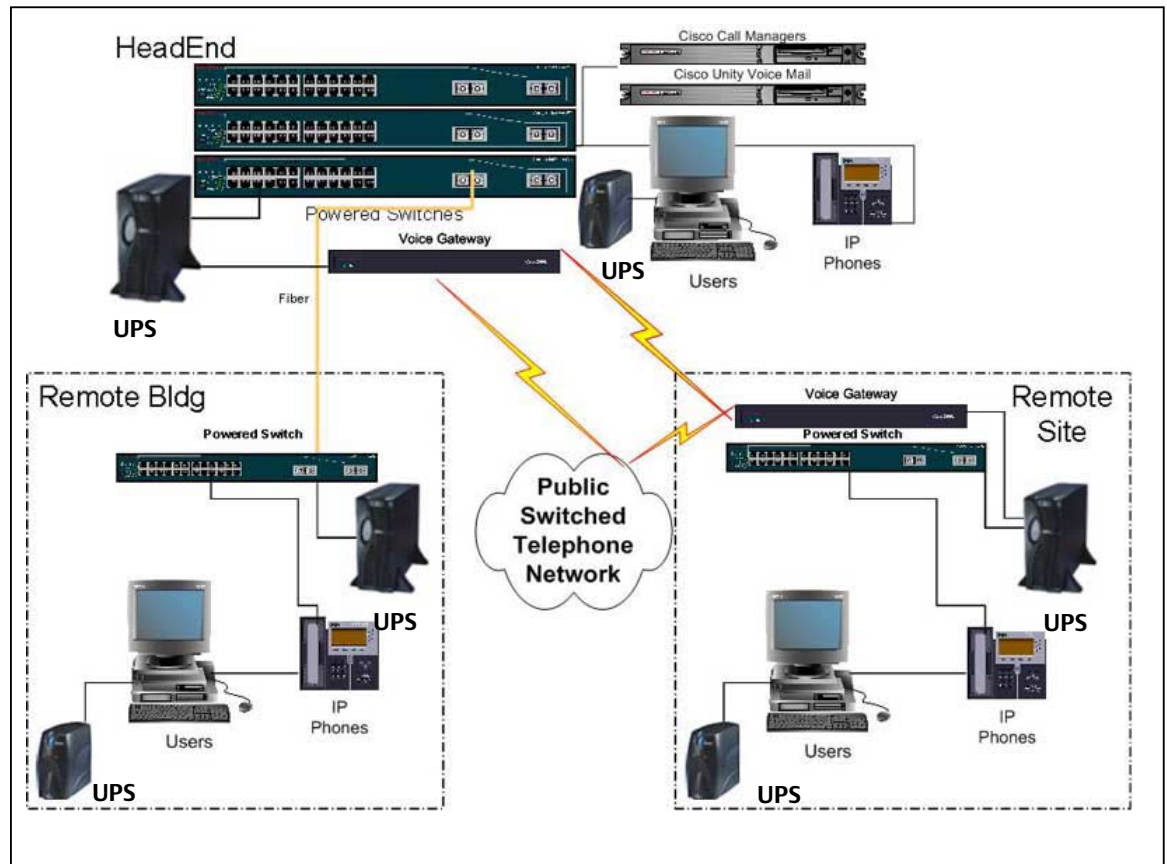
For power availability and protection, integrated systems are now available that are tailored to the needs of IP telephony equipment outside the data center, ensuring protection while simplifying deployment. For heat removal, a choice of ceiling-mounted precision cooling systems or sealed enclosures with integrated cooling is available.

## Defending Your Network

IP telephony offers organizations compelling benefits: Lower costs through the elimination of redundant infrastructure, the streamlining of maintenance, and greater staffing flexibility. It also reduces application-hosting costs, integration between

data and voice applications such as e-mail and voice mail, and greater ease of connectivity and communications by employees traveling or working remotely.

To its users, an IP telephony system must offer the same level of availability as traditional telephone systems. Downtime



**Figure 1.** IP Telephony systems can be configured in a number of ways, and power protection requirements will change according to their configurations. Online, double-conversion UPSs are used to protect call managers, integrated communications systems, powered switches, voice gateways, desktop IP phones, and the other critical components of the system. Power over Ethernet (PoE) eliminates the need for dedicated power protection at the desktop phone level, but increases power protection requirements at the switch level as the system must be sized for the total load of both the switch and the phones it powers.

that may be tolerable for a data network is intolerable in an IP telephony system because of the convergence of critical applications for data, voice, and video.

Many organizations that can benefit from IP telephony do not have reliability at the edge of the network that matches what is required to support telephone systems or mission-critical data center applications. An IP telephony system is a mission-critical system requiring high-availability power protection. That protection goes beyond just having a UPS.

Existing online, double-conversion UPSs that offer continuous availability are almost always used to protect key data centers and the IP telephony equipment installed there.

However, intermediate distribution frames and wiring closets in remote locations, where IP telephony equipment is located, have often been protected by line-interactive UPSs to ensure power quality. These UPSs may provide reasonable protection for some applications, but when used for IP telephony, they increase the risk of unexpected shutdown and packet loss.

## Understanding UPS Topologies: Why Double-Conversion UPSs Provide Superior Power Protection

The three most widely used UPS topologies are passive standby, line-interactive and double-conversion. There are significant differences in performance between these UPS topologies.

The passive standby topology provides little, if any, power-conditioning capabilities and is generally used only in non-critical desktop applications. This device turns on backup battery power in the event of a power failure.

The next level of UPS protection is line-interactive. It is called interactive because, unlike the off-line technology, it filters a line current to the power load and converts a trickle of DC power to the battery to keep it fully charged at all times. When the power fails, this UPS doesn't need to turn on, but rather switches from the standard utility source to the backup battery. The

line-interactive topology provides some degree of power conditioning and has been promoted by some vendors as a solution for mission-critical applications. However, the difference between a line-interactive and double-conversion system is as significant as the difference between a passive standby and line-interactive system.

The double-conversion system continually supplies power to the equipment directly from its inverter (a device that converts DC to AC power), thus no switching needs to occur. In addition, the online system is designed to deliver other, more advanced capabilities, including power conditioning to eliminate the subtle disturbances that can cause data interruption or corruption, such as EMI/RFI noise, harmonics and voltage oscillations caused by network equipment. An online system effectively isolates equip-



**Double-conversion UPSs are available in a variety of sizes and configurations from 2U rack-mount systems to 1000 kVA data center systems.**

ment from power problems, does not have to go to battery as frequently, and is better able to handle the sags and surges that commonly occur during transition to generator power, as well as the extreme conditions that occur before, during and after extended power outages. Consequently, double-conversion online UPS systems are superior to the other types in protecting IP telephony systems.

## A Customer Example

Liebert recently worked with a leading entertainment conglomerate that was experiencing problems with high-end switches used to manage data flows within and among several networks, including some that supported consumer Web sites and e-commerce applications.

While the switches were protected by line-interactive UPSs, the customer suspected power disturbances were causing the problem. They wanted to pinpoint the exact cause and take corrective action that provided a permanent solution. The company called upon Liebert to conduct tests of its switch capabilities by simulating power anomalies.

The company suspected low input voltages and momentary outages were the cause of the problems, because all of the problem switches were protected by a non-Liebert line-interactive UPS. All of the switches protected by online double-conversion UPSs performed properly. As a result of this testing, the company replaced its line-interactive protection with online double conversion protection.

Depending upon the system architecture, IP telephony systems may be more concentrated than traditional systems. With IP telephony call management components at the headquarters level, the entire distributed organization can become vulnerable to power problems that affect the headquarters-based components.

## High Availability Requires the Right UPS with the Right Support

Working with major telecommunications equipment manufacturers and consultants, Liebert has identified six requirements for ensuring the high availability of IP telephony systems:

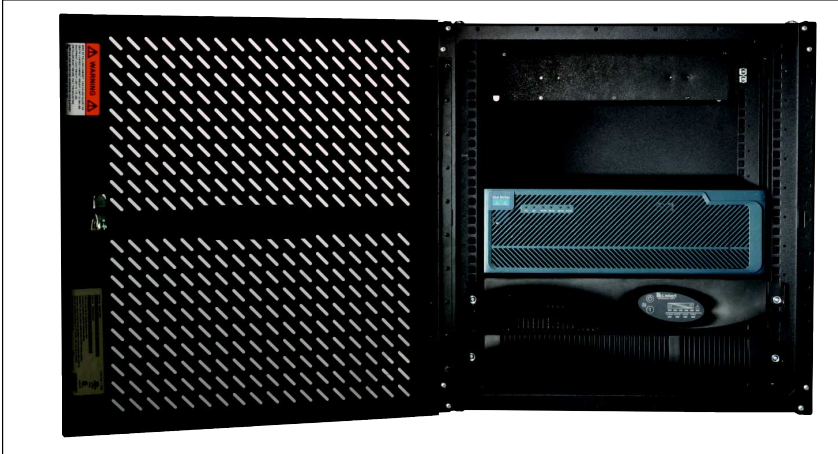
### 1. Power Quality.

While line-interactive UPS systems are solid, cost-effective technology for less-than-critical applications, they cannot protect vital network systems from subtle, but common, power disturbances. IP telephony systems must be protected across the network by online, double-conversion UPSs or DC-based UPS systems.

DC-based systems are emerging as an effective power alternative for IP telephony protection. These systems deliver reliability and power quality and are especially cost-effective in large enterprise deployments.

To ensure power quality, it is important to map the power protection strategy to the entire IP telephony system – desktop, IDF, MDF, and data center. Organizations with multiple offices should include collection points for each facility. An expert in power protection and configuration can help evaluate each site for potential threats.

It is also important to determine how the IP telephony system architecture fits – or doesn't fit – within the current IT infrastructure. The IP telephony deployment can create an



**Figure 2.** The Liebert IP Telephony Availability System is a double-conversion UPS-based systems that features remote management, external maintenance bypass and physical security.



**Figure 3.** The NterpriseIP™ System is a DC-based IP telephony protection system with capacities from 4500 W to 15,000 W.

opportunity to review the current network protection scheme to determine if vulnerabilities have been created as network requirements outgrew protection system capabilities.

**2. Uptime and Redundancy.**

IP telephony systems require greater power backup than IT data networks to ensure communications are functional throughout a prolonged outage. Moreover, power protection must be scaled to match the system’s redundancy.

Most UPSs are designed to keep systems up and running only long enough to ride through brief outages before conducting an orderly shutdown or transferring to generator back up – usually 6-10 minutes. Even extended battery cabinets rarely provide more than 15 minutes of backup. IP telephony, however, may require much more battery time, especially if there is no generator backup. Three or four hours are not uncommon.

Rack-mounted double-conversion UPS systems can have back-up times of up to four hours. Beyond this, it is more cost effective to identify additional approaches to availability, including power feeds from other utilities and back-up generators.

There are multiple ways to match UPS protection to system redundancy. One way is through the use of dual UPSs and power distribution within the network enclosure system. Another method is to employ a UPS with built-in redundancy.

The appropriate method depends in part on the scale of the system and the costs and benefits of the different protection strategies.

**3. Precision Cooling .**

IP telephony equipment is often installed in areas such as wiring closets, which traditionally lack precision cooling. The addition of IP telephony equipment to other areas, such as data centers and main distribution frames, may also require additional cooling. Every remote location for IP telephony equipment should have a temperature sensor to provide prevent potentially damaging increases in temperature.

**4. Monitoring.**

IP telephony equipment and power and cooling protection requires 24x7 monitoring regardless of its location. Every piece of power and cooling protection should have appropriate communications software for remote, Web-based monitoring and management.

**5. Physical Security.**

While remote components of an IP telephony system can be monitored and managed from a central location, portions of an IP telephony system are often located in areas without lock-and-key security. It is important that they be housed in a lockable enclosure, accessible only by approved personnel.

**6. Mission-Critical Service.**

Before purchasing your power and cooling protection, consider who is going to be maintaining it and how quickly they can respond. Having local service and support people who are knowledgeable about IP telephony and power

and cooling protection, is critical. Equipment also plays a role in making repairs easier. For instance, a maintenance bypass switch for the UPS lets service personnel make repairs to the UPS without shutting down IP telephony equipment.

## Helping You Make the Right Decision

Expectations for high availability of IP telephony systems take power protection to a whole new level. Designing and implementing protection for IP telephony is not a simple process, and the biggest mistakes are in assuming that existing IT network protection will work for IP telephony systems and that a UPS is all you need.

For decades, Liebert has been a leader in power protection and precision cooling solutions for mission-critical applications. Our heritage is in protecting data centers, and we have developed products and services to deliver that same level of availability to the network edge.

Our solutions for protecting IP telephony systems meet all of the requirements for high availability systems. They are delivered through our nationwide network of local power and cooling solution representatives who can assist you in evaluating, configuring, installing, and servicing power protection for your IP telephony systems.

*For information on IP telephony protection, contact your local Liebert representative. To find the representative nearest you, call 1-800-877-9222 or visit our web site at [www.liebert.com](http://www.liebert.com).*



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