

# Avoiding Trap Doors

## Associated with Purchasing a UPS System



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- Power protection has become essential for virtually all IT systems and must be properly applied to optimize protection and minimize costs. (Check out [bMighty.com](http://bMighty.com) and Emerson Network Power webcast called, “SMBs: Get More for Less.”) A poor protection strategy can lead businesses through a series of trap doors that lead to increased downtime, premature obsolescence and avoidable maintenance and replacement costs. The risk is especially severe for SMBs, which often can’t afford fallback systems when IT systems fail and deal with longer recovery times when there is an outage. That combination can lead to significant loss of revenue.
- The uninterruptible power supply (UPS) is the centerpiece of most power protection systems; therefore, IT professionals should consider UPS sizing and configuration as key factors when adding or replacing technology. Specifically, IT professionals should evaluate their power protection strategy in terms of:



- Availability:** Is the protection appropriate for the application?
- Growth:** Is the UPS sized properly?
- Maintenance:** Is there an adequate service & maintenance strategy in place?
- Flexibility:** How will the system accommodate future change? (Watch a [Business Innovators Series Webcast: Anticipating Growth: Modular, Scalable Power Protection and Distribution](#))

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■ Case Study: Langan Engineering

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... Addressing each of these issues with your solutions provider can help ensure the UPS system delivers the expected uptime, but also meets organizational requirements for manageability, serviceability and growth.

When evaluating UPS technology, IT professionals should balance the cost of the extra protection delivered by higher-level UPS systems against the benefits of that protection. Ultimately, the decision has to be made on a per-site, per application basis. This paper covers four important responsibilities that IT managers must fulfill to ensure they do not place the availability of their company’s network on a less-than-adequate power backup system.

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## Ensuring THE RIGHT PROTECTION for the Application

- Make sure UPS topology matches application requirements. The two main UPS topologies used in network and data center applications, line interactive and double conversion, provide different levels of protection. Double conversion UPS systems provide constant battery power, eliminating the need for any power transfer in the event of an outage. Double conversion systems have been shown to be more than twice as reliable as line interactive systems and are recommended for applications where tolerance to downtime is low. Line interactive systems provide adequate protection for some applications, but are not recommended for truly business-critical equipment and in areas where utility power is inconsistent.

- Confirm there is enough battery runtime. Battery-related issues are the single highest cause of UPS failure. About 20 percent of all UPS failures can be attributed to insufficient run times. It is important to confirm that there is sufficient UPS battery backup to meet existing needs, as well as anticipated growth. UPS systems that rely on the battery to condition power (line interactive) will drain their battery more frequently than UPS systems that condition power through the double-conversion process (converting AC power to DC and then back to AC). Double-conversion UPS systems may carry a higher initial cost than line interactive systems, but can be 43 percent less expensive in the next three-year period due to batteries. That alone can more than offset the differences in initial cost competing technologies.



- Choose Adequate Protection

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## Ensuring THE RIGHT PROTECTION for the Application

- ... Adverse environmental conditions can shorten battery life as well, increasing both battery replacement costs and the risk of downtime. A general rule of thumb is that the life of a battery is cut approximately in half for every 20 degrees F that the battery temperature rises above room temperature. Keeping batteries in cooler locations, usually outside of the data center, can extend battery life.
- Ensure adequate UPS reliability and redundancy. Selecting a UPS topology with redundancy also significantly enhances overall system reliability and availability. Large data centers have traditionally relied on UPS redundancy to achieve high levels of high availability. Today, a single rack can hold as much computing power as a mid-size data center could just a year ago so UPS redundancy is often warranted in smaller rooms and single rack applications. At minimum ensure utility power can be easily routed around the UPS through the addition of a manual bypass to ensure equipment can continue to function during UPS maintenance or failure. Compact, rack-mount UPS systems make true redundancy, in which there is a backup to the backup, feasible for single rack applications.
- Make sure capacity is sufficient for current load and growth. Adding battery capacity to an existing UPS system can be an economical approach to backup power. With external battery cabinets, UPS systems can be configured with an hour or more of runtime, providing continuity through all but the most extreme outages.

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# Ensuring the UPS is Sized Properly

- Calculate the UPS size needed based on the full load of protected equipment. UPS units must be sized properly to accommodate both the performance requirements and future growth of the IT equipment. It's risky to base UPS sizing on "nominal" loads, which are estimates of average loads. There is a strong likelihood that basing UPS needs on nominal loads will result in undersizing UPS capacity.
- Consider the benefits of consolidating multiple smaller systems into fewer, more powerful systems. Power protection, similar to computing, can benefit from this type of consolidation. When total room load exceeds 20 kW, consider replacing rack-based UPS systems with room-level systems, which provide greater capacity, reliability and redundancy than is available with a rack system. The cost savings when consolidating from six rack-based UPS systems to a single room-level system can be as much as 24 percent up front and higher in a growth scenario.



A single room-level system (Liebert NX 30kVA) costs 24 percent less than six rack-based UPS systems (Liebert GXT2 6kVA), including associated items and expenses.

- Develop the Right System

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# Ensuring Adequate Service/Maintenance Strategy is in Place

- Review and/or upgrade maintenance and service agreements. Any time the IT environment changes—adding servers, for example—the power and cooling requirements change as well. Adding power or cooling equipment provides an ideal opportunity to revisit service and maintenance processes and contracts to ensure a strategy that will extend the useful service life of the power equipment.
- Consistently monitor UPS units and have a battery replacement schedule in place. While some IT departments manually assess UPS systems to see if the battery alarm is sounding or the fault indicator light is on, a major benefit of network monitoring is that it minimizes labor costs and, if properly reviewed, can effectively reduce battery problems.
- Rely on vendor-trained solutions providers for maintenance. They know the equipment better than anyone, can anticipate potential issues before they arise, and are up to date on the latest equipment updates and service techniques.



- Consider a comprehensive service package. There are a number of service packages available that bundle offerings and provide enhanced value. For example, the Liebert Power Assurance Package provides on-site service and battery replacement for rack mount UPS systems.

■ Consistently Monitor

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## Ensuring the UPS Supports Continued Business Growth

- Base UPS system decisions on “future sizing” parameters. A power system that does not adequately consider future growth along with current usage will compromise overall availability and ultimately cost more than a properly sized system. As seen previously, the cost per KW of a UPS system is size dependent; a larger system will be much more economical in the long run than having to purchase multiple small systems. In addition, some newer UPS systems allow users to purchase larger systems while paying only for the capacity they currently need. This reduces initial costs while providing fast, easy capacity growth as needed.

When looking at the earlier comparison between the six rack-based UPS systems and a single room-level system and introducing a growth scenario—100 percent growth over five years—the savings are significant: potentially 33 percent for a room-based system. A room-level UPS with capacity to handle 100 percent growth (Liebert NX 60kVA) requires an initial investment that is 38 percent higher than the initial cost for the six rack-based systems. However, to accommodate 100 percent growth, six more rack-based systems will need to be added over five years, at minimum doubling the initial cost. Add to that the cost for six replacement batteries for the original UPS systems, and the room UPS provides potential savings of 33 percent.



- Consider Future Growth

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# Conclusion

To truly make an informed decision and save unnecessary time and money from being spent, IT professionals must ensure the application and business receive the appropriate level of protection, the UPS is properly sized to handle the full load of the equipment being protected, the necessary service/maintenance agreements are in place, and the necessary flexibility exists for continued business growth.

## Additional Resources

If you're interested in learning more about trends and topics related to powering, cooling or monitoring data centers, [check out these white papers from Emerson Network Power.](#)

Best practice case studies of how other companies have solved data center challenges are available in [narrative](#) and [video](#) forms. Case studies are from small to large companies across numerous industries.

If you have specific questions, a Liebert Representative from Emerson Network Power or a Liebert certified IT reseller can help you out. [Click here to find your local contact.](#)

Finally, be sure to follow [Emerson Network Power on Twitter](#) or visit the [Emerson Network Power YouTube Channel](#) to be one of the first to see new solutions or view new white papers and case studies.

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# Appendix

## Appendix: Applying the Right UPS System

When choosing a UPS system it is important to take into account the application. Here are some examples of how the right UPS can be applied based on the intended use.

### Example 1 Protecting Network Applications

**Objective:** Bridge brief power interruptions and eliminate power-related data loss for desktop workstations in a small engineering firm.

#### Primary Costs to Consider

- Lost productivity of employees unable to work because of power outages or equipment damage
- Lost data resulting from sudden shutdown of workstations because of power interruptions or disturbances
- Equipment replacement costs resulting from power-related damage

**Situation:** Most of the staff spends 75 to 100 percent of the day at the workstation. It's important that systems and applications are available to complete the work and meet important client deadlines.

**Recommended Approach:** Because the value of the equipment is relatively high and it is involved in revenue-generating operations by ensuring network availability allowing employees to work on billable projects, line interactive UPS systems would be appropriate. The line interactive UPS will filter and condition variations in the power coming from the utility before delivering it to connected equipment. These systems represent an appropriate solution for applications that require protection and more power conditioning than passive standby systems provide, but are not business critical.

### Example 2 Protecting IP Telephony Devices

**Objective:** Protect edge-of-network equipment from power-related downtime and operating problems to support deployment of IP telephony.

#### Primary Costs to Consider

- Lost or reduced productivity resulting from unreliable network communications
- Lost revenue from customer impact of unreliable network communications
- Support costs for rebooting or troubleshooting systems
- Damage to equipment from spikes and surges

**Situation:** To be successful, IP telephony must match the high reliability standards of the traditional phone system. The power protection system is instrumental in accomplishing this. Power disturbances can create packet losses that disrupt communications. Power over Ethernet not only increases power consumption, it also increases the impact of a power outage on the end user who expects to have phone service in the event of an outage.

**Recommended Solution:** Line interactive UPS systems have been used in edge-of-network applications in the past, but higher availability standards required by IP telephony make those systems an increasingly imperfect solution. A double conversion UPS fully conditions power and provides longer battery runtimes not found in the field.

A double conversion UPS with extended battery runtime is recommended for this application. A communications card in the UPS to support remote management will help anticipate potential problems. At minimum, the system should include a maintenance bypass. UPS redundancy is becoming more common on the edge, working with dual-cord computer equipment to provide optimum availability.

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### Example 3 Establishing an Economical Path for Growth with a Flexible Power Infrastructure

**Objective:** Take advantage of a server consolidation project to shift from a rack to room-sized UPS system that provides a clear path for expansion as business grows and density increases.

**Primary Costs to Consider**

- Consolidation puts more processing on a single server, making rack-level power outages riskier
- Data center space constraints limit business and IT growth
- As server density increase, UPS capacity must keep pace

**Situation:** To keep up with rapid growth and increasing IT demands, the business undertakes a server consolidation project designed to deliver increased computing and IT performance. Each rack includes a rack-mounted, line interactive UPS system, but business growth is expected to drive the need for more racks in the future.

**Recommended Solution:** The multiple UPS systems create multiple points of failure, increasing potential risks of downtime. In addition, the business is at an ideal stage to transition from rack-scale protection to room-scale protection. Up to about six racks, rack-scale protection makes sense, but above that the challenge of managing multiple UPS units – and maintaining multiple battery systems – becomes cumbersome.

A scalable, double conversion UPS, such as the Liebert NX with Softscale technology, would provide cost-effective protection today and can be expanded to accommodate future growth. It can be sized to current requirements and then scaled with a simple software key as needs change, without having to replace or bring in more equipment.

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