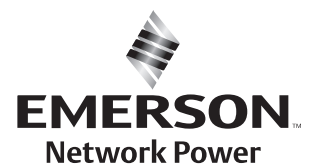




ARE "MISSION CRITICAL
APPLICATIONS" IN YOUR
DATACENTER OUTFRONTING
YOUR SYSTEM PROTECTION?



Executive Summary

Corporate datacenters – even small ones – are supporting more critical business applications such as integrated data/voice/video networks, real-time interaction and e-commerce support for Web sites, and sophisticated knowledge management systems. The backbone of these applications is the new-generation server switch capable of managing gigabit-scale information loads. These rack-mountable switches can become part of a scalable support for a wide range of company and customer-facing functions.

But the increasing sophistication comes at a cost: vulnerability to power anomalies that can cause lost packets, switch outages and other persistent problems. One Fortune 500 company experienced these persistent problems and asked for help to determine the source. Careful testing pinpointed the problem as inadequate UPS technology for a mission-critical application. The testing showed that the only sure protection for this class of network switch is a true double-conversion, online UPS. Lesser technologies, such as line-interactive UPS's, do not provide sufficient protection for these switches. This paper outlines the testing protocol and results.

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Background

A leading entertainment conglomerate was experiencing problems with high-end switches used to manage dataflows within and among several networks, including some that supported consumer Web sites and e-commerce applications. While the switches were protected by a non-Liebert line-interactive UPS, the customer suspected power disturbances, and wanted to pinpoint the exact cause, then take corrective action that provided a permanent solution.

Even though the problem was occurring with non-Liebert UPS protection, the customer asked their local Liebert Rep firm to conduct tests of the switch capabilities by simulating power anomalies. The customer suspected that low input voltages and momentary outages were the cause of their problems, because all of the problem switches were being protected by a non-Liebert line-interactive UPS; none of the switches with true double-conversion online UPS's suffered from these problems.

[Note: Liebert makes both line-interactive and online UPS technologies for different types and levels of protection. For more information, see the sidebar article "Matching Protection Needs with UPS Technologies,"]

Pinpointing The Problem

The Liebert Rep office sent its distributed power expert to the customer site, along with a variable voltage transformer (all Liebert rep offices have on staff at least one expert in distributed power). At the suggestion of the customer, the switches were tested at sustained low-voltage conditions of 85-94 VAC. In addition, momentary outages were introduced at random times during the low-voltage tests. The tests were conducted with three different power inputs: utility power, power from a line-interactive UPS, and power from a Liebert online UPS.

After testing, several conclusions became obvious:

- The switch was capable of operating trouble-free on sustained low voltages, as long as there were no interruptions of power.
- On utility power alone, the introduction of momentary outages during a period of low-voltage -- outages as brief as a single cycle -- caused data error problems when the switch lost communications with individual ports.
- With line-interactive protection, the same data error problems occurred. In addition, voltages below 95 VAC caused the UPS to go to battery. The transfer

triggered a momentary outage caused by the delayed transfer to battery. Consequently, the switch was brought down. The reason for this stemmed from a sustained low voltage condition that rendered the UPS ineffective.

- In all tests, however, the Liebert online UPS successfully prevented the power disturbances from causing data errors with the switches. With a true on-line UPS, there is no measurable outage during a transfer to battery, as with a line-interactive product.

This final conclusion was reinforced by the fact that none of the customer sites protected by online UPS had experienced any data error problems with the same type of switches.

The Solution

Liebert's customer quickly replaced all line-interactive UPS with a Liebert UPStation GXT online UPS to protect vital business processes that were supported by these high-end switches. In addition, the customer specified that each UPS include an SNMP card to re-boot the switch should it actually shut down. While this event was considered highly unlikely with an on-line UPS, the customer specified maximum possible protection for these vital networks.

Applying The Solution To Your Own Networks

Many organizations – not just this particular Liebert customer – are faced with the increasing criticality of applications in common corporate network datacenters. In some cases, mission-critical applications have been installed in datacenters barely larger than an equipment closet and with protection levels unsuited to the role these devices play in the enterprise.

In many cases, mission-critical applications are among the earliest to outpace their protection. The expansion of IT operations in both size and criticality often occurs at a pace slow enough to escape notice. That is, until a problem occurs like the customer's network switch failures. Applications, such as the following, usually require higher levels of protection, especially if they support mission-critical business functions:

- Corporate intranets and extranets with real-time interactive functions common to data-sharing systems
- Web sites with real-time interaction and/or e-commerce capabilities
- A network that accesses or distributes multimedia from a database
- Any network that integrates voice, data and video, such as those supporting a call center with real-time data access
- IP Telephony system

If your business is supported by these or other mission critical applications, the core systems should be protected with a UPS that uses true double-conversion online technology. In addition to preventing problems described in this particular case, online technology can prevent a host of subtle disturbances that can cause data interruption or corruption: EMI/RFI noise, harmonics and voltage oscillations caused by network equipment.

Mission critical systems that should be connected to a true online UPS include:

- Servers supporting real-time data delivery (either internally or to customers via the Web).
- Controlling servers that manage multiple server activities or loads
- Switches that manage data communications between and among server stacks or gateways.
- Routers that handle any form of mission-critical traffic.
- Any server that sits at a nexus of interaction between systems, such as a password or ID authentication server.

Some of these mission-critical applications may be hard to identify. For example, organizations that need to integrate customer information across multiple databases may use a server with a look-up table to integrate data. If that single, often obscure server fails, the entire data integration process goes down.

Safe Steps To A Protected Network

Of course, the safest and often most economical approach is to protect all of your network equipment with a large, online UPS with power distribution equipment that gives you flexibility of configuration. If your organization is committed to a scalable network architecture, however, there is a way to find and protect the mission-critical nodes.

First, get with the business owners of your datacenter applications and identify those that are mission-critical to the enterprise.

Second, pinpoint the specific pieces of equipment that support these applications: servers, routers, switches, etc. Then determine the voltage requirement for each.

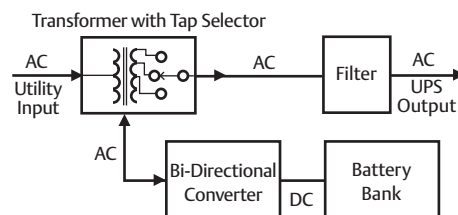
Then determine the voltage and kW requirement for each.”

Finally, identify the amount of power needed and install a true online UPS to deliver power to these critical units.

You local Liebert representative can assist you in specifying the online UPS that is sized for your current and emerging needs.

Matching Protection Needs With UPS Technologies

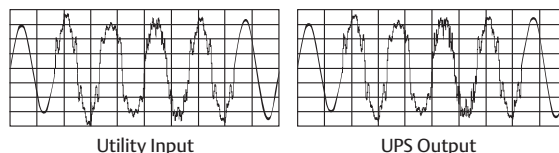
LINE-INTERACTIVE UPS BLOCK DIAGRAM



A line-interactive UPS contains devices that adjust the output voltage to better meet the needs of sensitive connected equipment when the input voltage is higher or lower than optimum. The output voltage is simply the input voltage or – if needed – the line interactive unit increases or decreases the input voltage to provide a broadly regulated output voltage. Line Interactive units are typically used in less critical applications or with equipment that can accept a wider input voltage range.

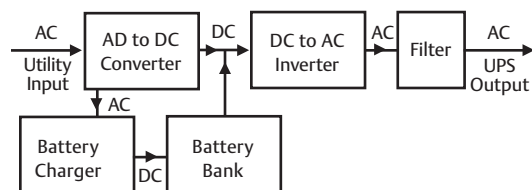
If the power problems become severe, or there is an actual power outage, the UPS switches to battery to provide power to your protected systems. However, persistent problems can drain the battery, leaving your critical systems with no protection at all. Here is a sample output from a line-interactive UPS (the power that supports your critical systems):

LINE-INTERACTIVE WAVEFORMS



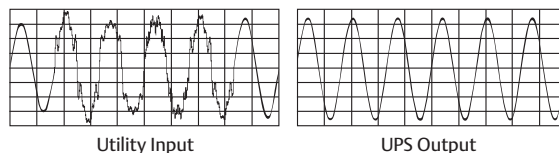
Line-interactive units are typically used in less critical applications or with equipment that can accept a wider input voltage range.

ONLINE UPS BLOCK DIAGRAM



A true online UPS produces power for your sensitive equipment from DC power only (either from batteries or a rectifier); power from the utility is converted into DC and re-converted into perfect AC power for servers, switches, routers and other critical systems. This complete isolation prohibits any undesirable utility power anomaly from reaching the equipment. Voltage fluctuations, transients, noise, and frequency irregularities are completely eliminated, even those generated by other equipment of the network. A sample output from an online UPS looks like this:

ON LINE WAVEFORMS



Both line-interactive and online technologies are appropriate for some applications. The less costly line-interactive UPS works well for protecting non-critical systems. But, true mission-critical applications – those you do not want to go down, even for a few seconds – need true online protection.



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