Liebert®

Industry Solutions White Paper

PROTECTING THE RETAIL INFORMATION CHAIN

EMERSON™
Network Power

Summary

The retail supply chain must support two interdependent processes:

- Product flow
- Information flow

An effective and efficient product supply chain depends heavily on an integrated, visible, “always-on” information chain. Keeping that information chain “always on” is one of the key challenges facing many retailers.

The retail information chain stretches from the data center and distribution center to the store and the retailer’s Web site and catalog, phone or Internet sales operations. Any weak link in the chain can affect the critical flow of both information and product, resulting in lost sales and income.

Protecting critical electronics from negative power and environmental factors is vital to successful retail operations. From the cash register, to the warehouse to the corporate data center, technology must be protected from power interruptions and aberrations as well as heat and humidity that can disrupt business operations. This paper provides solutions for protecting mission-critical functions along the retail information chain so retailers can keep customers happy — and improve their own bottom lines. It includes recommended protection scenarios for:

- Point of sale systems
- Distribution systems
- Data center systems
- E-commerce and catalog systems

The Changing Face of Retail Supply Chains

Today's retailers are more readily turning to the supply chain to increase efficiency — and profits. They are using technology to better predict demand, track supply, reduce inventory, increase inventory turns, streamline purchasing, improve customer service, and enhance communications with their business partners.

A study by National Power Laboratory found that the average computer, left unprotected, is subjected to 289 power problems in a year.

Every retailer — from discount to department store to grocery to big box — has four main mission-critical functions that support the operation:

- Point of Sale (POS)
- Distribution
- Data Storage and Retrieval
- E-commerce/E-business

Although some retailers may not offer online purchasing, most at least have a Web site and nearly all conduct some form of electronic business with partners, vendors or suppliers that depend on reliable power.

Each of these critical business functions is technology based, and even a minute of downtime can create serious consequences not just within the store, but often across the entire network of stores, warehouses and data centers. There are external consequences too, as more retailers' data centers communicate directly with those of their vendors, suppliers, financial institutions, and other business partners.

With the resurgence of e-commerce, the emergence of radio frequency identification (RFID), and the general expectations by consumers of quick, hassle-free electronic check-out, retailers cannot afford to be without adequate power and environmental protection in their stores, distribution centers and data centers.

Protecting Information Flow

With retail operations more dependent than ever on technology, a loss of power means loss of sales and income. Power loss and power disturbances, including spikes, surges, brownouts and blackouts, can come from a variety of sources, both internal and external. Lightning strikes, damage to utility equipment, swings in power demand, overloaded circuits, and even switching on and off large computer systems all can result in power loss or interruption.

A recent study conducted by National Power Laboratory monitored more than 130 sites throughout North America for power "disturbances," defined as any power aberration outside the recognized susceptibility limits for computer equipment as established by the Computer and Business Equipment Manufacturer's Association (CBEMA). The study showed the average computer is affected by the following throughout the course of a year:

- 16 power blackouts (power out for more than 8.35 milliseconds)
- 164 surges/overvoltages usually caused by drops in electrical demand and wide spread equipment shutdown

- 90 sags/undervoltages caused by large loads starting up, line faults in utility power, or rolling brownouts created by utility companies on peak-use days
- 19 transients or spikes, most caused by lightning, some by power coming back on after a blackout

All of the power used by electronic systems is transformed into heat. Unless that heat is removed, it can shut down the equipment that produced it.

Protecting sensitive electronics from downtime doesn't end when the power enters the equipment. All of the power used by electronic systems is transformed into heat within the equipment. Unless that heat is removed, it can shut down the equipment that produced it.

Electronic equipment has a very low tolerance range for heat, usually between 70 to 72 degrees Fahrenheit. For adequate cooling, air conditioning must operate 24 hours a day, 365 days per year.

Cooling electronic equipment takes specialized equipment capable of handling high sensible heat loads and humidity on a year-round basis, with sufficient airflow to break up the concentrations of heat around tightly packed electronic equipment. Temperature control will help prevent equipment damage from both excessive temperatures as well as wide temperature cycles. Large cycles in temperature may not directly cause component failure but will reduce component life.

Controlling relative humidity is also important. Too much moisture can cause corrosion of circuitry while too little will increase static electricity that can short out and damage components. In addition, proper air distribution is required to prevent localized hot spots.

Stresses on the Information Chain

Information is the root of supply chain efficiency. Reduced inventory and carrying costs, increased profits, better sales forecasting and more efficient purchasing processes all result from collecting, moving, analyzing and distributing good, clean data. Any glitch in the information chain can create stock outs, pricing problems, and shortages — all of which can decrease customer satisfaction.

It's important to remember that both equipment and information can be at risk. For example:

- Poor-quality power can corrupt data or shut down systems
- Unexpected shutdown of network systems can cause data loss
- Overheated computer and network components can shutdown unexpectedly and lose valuable data
- High density processing components can create hot spots around high density servers that can reduce performance and lead to premature failure
- Distributed infrastructures increase the likelihood of more severe consequences of power failures

To sum up: A retailer's information technology infrastructure requires both power and environmental protection, particularly in the business-critical areas of POS, distribution centers, corporate headquarters/data centers, and e-commerce/e-business sales channel operations.

Five Keys to Computer System Availability

There are five keys to computer availability that should be evaluated when tailoring a protection system to a retail business:

1. **Power Availability: Uninterruptible Power Supply (UPS)**
   Availability depends on the continuity of power and the ability of an uninterruptible power supply to support equipment during outages. Typically a combination of back-up generators, batteries and UPS systems is required. The UPS is designed to transfer the critical load to batteries, and ultimately the generator, should the primary source of power fail.

   High availability UPS systems have redundancy designed in. UPS redundancy can be achieved through two approaches: symmetrical and asymmetrical. Symmetrical configurations involve two identically sized UPSs that operate in tandem to maintain the entire load. Asymmetrical configurations use one UPS large enough to power the entire load, and one or more smaller UPSs to add redundancy to only those devices that must be available continuously.

   UPS systems also vary by topology. The offline topology is a low-cost solution for convenience-level protection against power outages and is suitable for single-phase workstations.

   The line-interactive UPS provides outage protection and power conditioning for small network, single-phase workstations, process controls, individual cash registers and non-critical server applications.

   The online double-conversion UPS provides the best performance and protection against all power disturbances. It provides continuous power conditioning as well as instantaneous battery backup. This topology is recommended for all critical single-phase and three-phase applications, particularly high-availability, 24x7 applications such as data centers, server rooms, telecommunications, security systems and clustered cash registers.

2. **Monitoring and Service Capabilities**
   A small problem in a critical system can quickly escalate into a disaster. Knowing what is happening with your support equipment and keeping that protective "envelope" at peak operating efficiency are vital to overall system reliability. A centralized monitoring system across the supply chain ensures that service can be there wherever and whenever maintenance is required.

3. **Power Protection: Surge Suppression and Power Conditioning.**
   Incoming utility power can be contaminated with spikes, surges, sags and electrical noise, causing operating problems for sensitive electronics. For these situations, power conditioning systems and transient voltage surge suppression solutions shield electronic equipment

from damaging power anomalies. By regulation, each store should have surge protection at all penetration points, including building main, telecommunications and computer lines.

POS data is transferred from the sales floor throughout the supply chain . . .A loss of data anywhere along the line is critical to operations.

4. **Power Conversion/Distribution: Static Transfer Switches, AC and DC Power Distribution**
   Improper power distribution can actually inject disturbances into your network. Converting and delivering power throughout a facility is an important step in protecting availability. Liebert power distribution products ensure the delivery of clean, high quality power from a UPS or power conditioner to your vital systems. Liebert Static Transfer Switches provide fast, seamless switching between UPS systems in applications where redundant UPSs are utilized.

5. **Heat Removal: Precision Air Conditioning**
   Around-the-clock cooling is vital to ensure the maximum performance of your computer systems. Liebert has a full range of precision air conditioning, humidity control, specialized enclosures and rugged remote solutions to protect against rising heat densities. For retailers, Liebert provides a wide range of solutions from large air conditioning systems for corporate data centers to specialized enclosures at the POS.

Protecting the Point of Sale

Gone are the days when cash registers simply added dollars and cents. Today's point of sale (POS) terminals collect vital information about customers and sales that factor into supply chain decisions.

Power or environmental problems can greatly impact POS terminals. Loss of power can result in more than just loss of sales and data – it can decrease customer satisfaction and loyalty. With many supermarkets going to self-checkout, additional power protection is needed. According to IHL Consulting Group, the self-checkout segment in retail technology should surpass $1 billion in overall market value by 2005.

There is also a "ripple effect" when POS terminals go down. POS data is transferred from the sales floor throughout the supply chain to corporate headquarters, distribution centers, warehouses, and data centers. A loss of data anywhere along the line is critical to operations.

Figure 1 illustrates risks points in POS applications, including outside generators, POS terminals, staff offices with desktop computers and utility rooms housing the panel box for telecommunications, security and data systems.

A number of proactive steps can be taken to protect these risk points. Risk of downtime and data loss can be virtually eliminated through application of centralized protection, including UPS, surge suppression, precision cooling, monitoring and service.

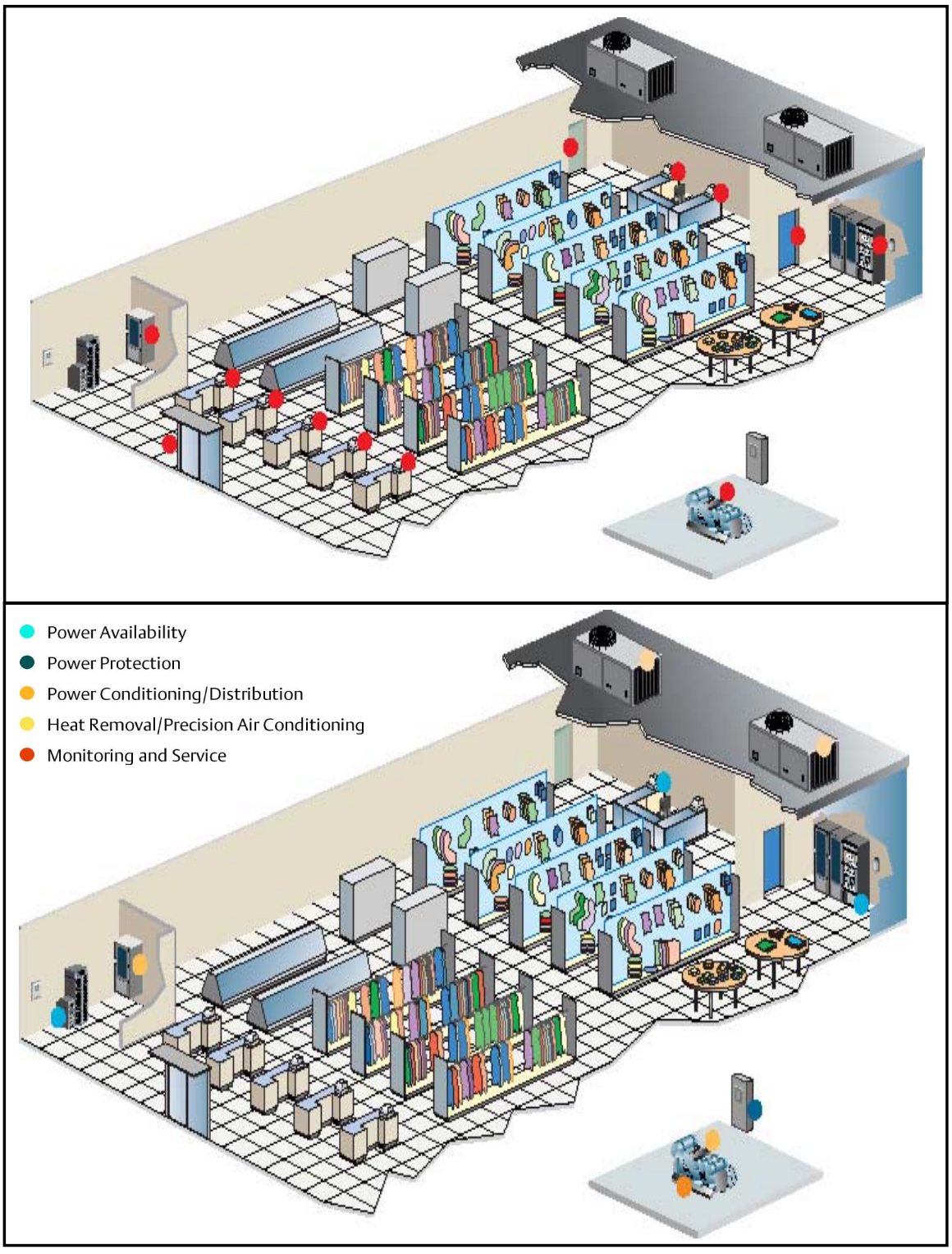

Figure 1 Point of Sale Applications. Top: Organizations are at risk anywhere information is collected, stored or transmitted. Bottom: A UPS system can provide centralized power availability and conditioning for point-of-sale systems.

Keeping the Distribution Center in Business

Risk points for distribution centers include bar-code scanners, in-plant computers for pick-and-pack operations and pallet loading, support staff terminals and building entry points.

The heart — and bottom line — of any retail operation is distribution. The logistics of moving product through the supply chain are often complex. Retailers and their suppliers, distributors and other partners are demanding complete supply chain visibility to make good business decisions.

Technology-based logistics and supply chain visibility are crucial to a number of functions: inventory management, fleet management, processing orders, and communicating with headquarters, stores and partners. Even the physical aspects of the supply chain, including pick-and-pack, bar code scanning, RFID, GPS tracking and operating conveyors and other material-handling systems depend on technology. Handling thousands of products efficiently depends on always-up systems and up-to-date information that can be accessed by all partners in the supply chain.

Many distribution centers house sensitive electronic equipment in computer rooms or offices, but it is also not uncommon to find sensitive electronics directly on the distribution center floor, exposed to harsh conditions. No matter where the equipment is located, it must be protected from environmental and power quality problems.

There are several risk points for distribution center technology as shown in Figure 2, including automatic and handheld barcode scanners, in-plant computers for pick-and-pack operations and pallet loading, support staff (i.e. general manager) terminals and building entry points.

Protection from these is provided by enclosed cabinets with integrated power protection and cooling, as well as by power conditioning and distribution within utility rooms, above-ceiling precision cooling and power availability systems for support staff operations.

Centralized Versus Distributed UPS Protection

The decision to implement a centralized or distributed power protection strategy at the point of sale must consider the total cost of ownership for either solution. A small retail POS station, such as at a pharmacy, probably warrants distributed, one-on-one power protection, but a hypermarket would be better served by a centralized configuration.

For example, a retail operation with 100 stores, 20 registers each, would require 2000 individual UPS systems for adequate power protection. That's 2000 batteries spread across the country that would need to be replaced every two years. The same retail operation with a centralized, double conversion UPS feeding power to all of the POS stations at each location would require only 100 units, making servicing easier and requiring battery replacement only about every five years.

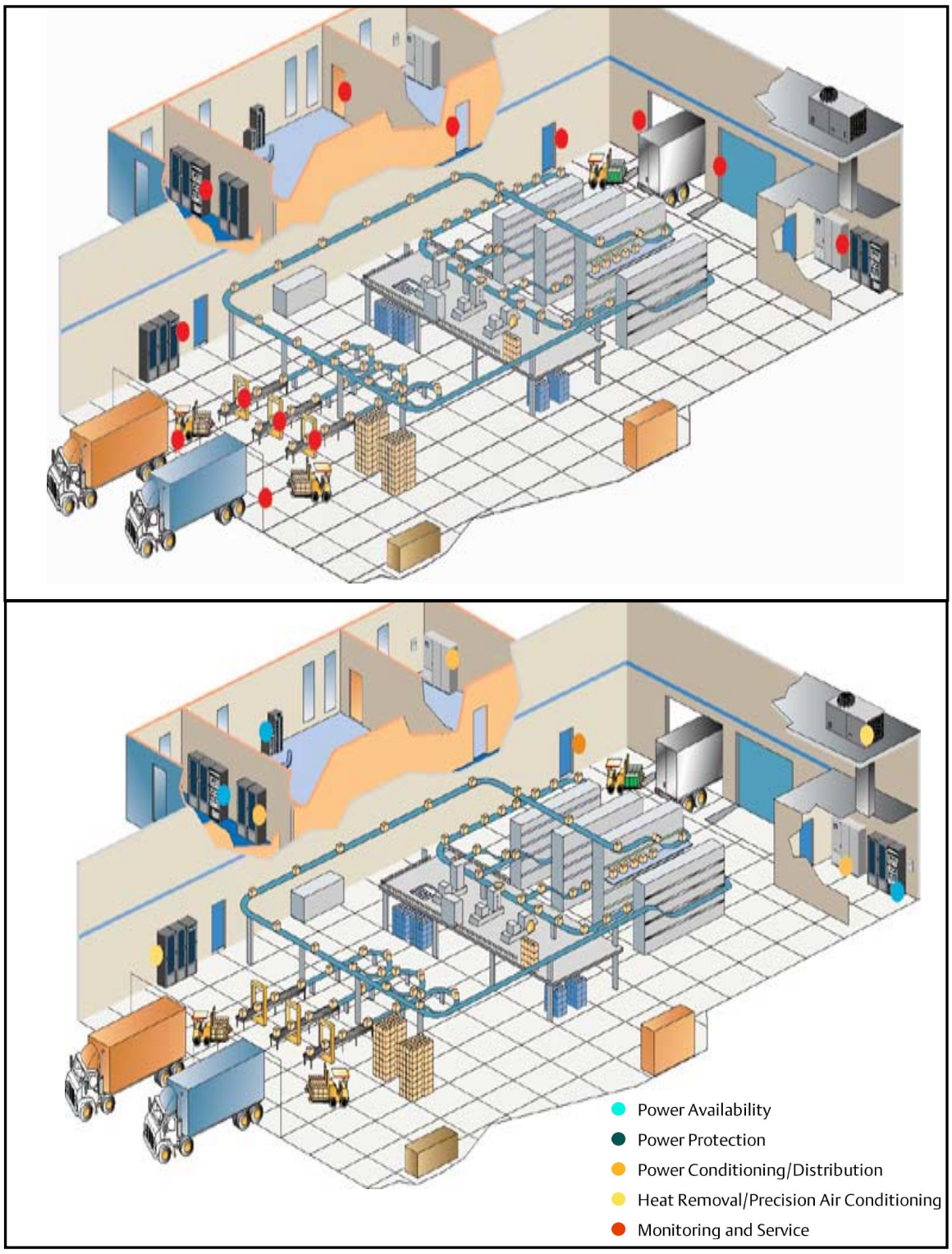

Figure 2 Distribution Center. Top: Sensitive electronic equipment is at risk of power problems and excessive heat in uncontrolled distribution environments. Bottom: Enclosed cabinets, surge suppression systems and UPSs can alleviate the risk of downtime.

Avoiding Data Center Downtime

Information guides both everyday and long-term strategic decisions for retailers. Headquarters buildings or off-site data centers must be amenable to the accumulation, storage and distribution of data that is invaluable to a retailer's profitability.

Jupiter Research reports that almost 30 percent of all retail transactions will be made online by 2007.

Information from the data center affects pricing, accounting, inventory management, marketing, electronic communications such as e-mail and Web pages, and all other points along the supply chain. Computer and communications systems are business-critical to profitability, and any loss or corruption of data will affect both internal communications as well as external transfer of data to suppliers, distribution centers and stores. In many cases, retailers also need to communicate globally, requiring 24x7 data transfer around the world. In addition, with today's faster networks and more advanced equipment, power and environmental protection of data is more crucial than ever. In fact, "high nines" availability is not a luxury anymore, it is a requirement.

Figure 3 highlights routers, hubs, data storage and communications equipment as key risk points. Equipment enclosed in blue fencing illustrates secure equipment such as that powering e-commerce or high-end processes.

To ensure high nines, retailers must adequately protect the integrity of data through power and environmental protection. High availability power protection and precision air conditioning is mandatory in the data center.

E-commerce and Catalog Operations Are Mission Critical, Too

E-commerce, combined with catalog and phone purchasing makes the retail sales channel more dependent than ever on technology. As consumers shop from home with increasing frequency, retailers must ensure their information systems are running 24 hours a day — including electronic storefronts.

A consistent Web presence is also a must in today's economy. Even if a retailer does not offer Internet purchasing, shoppers expect information to be available around the clock through the Web. Catalog call centers, too, face similar detrimental effects when inadequate power or too much heat affect workstations, networking and communications equipment, and therefore, a retailer's sales.

Figure 4 identifies critical risk points in e-commerce and catalog technology applications. Communications equipment such as routers, hubs and switches, in addition to operator workstations, must have proper protection.

To protect these critical sales channels, it is important to have an appropriate UPS, power distribution units, floor and ceiling precision cooling, and monitoring to ensure equipment functionality.

UPS redundancy, support system monitoring and a well-designed service strategy are all key to delivering the continuous availability typically expected of e-commerce operations.

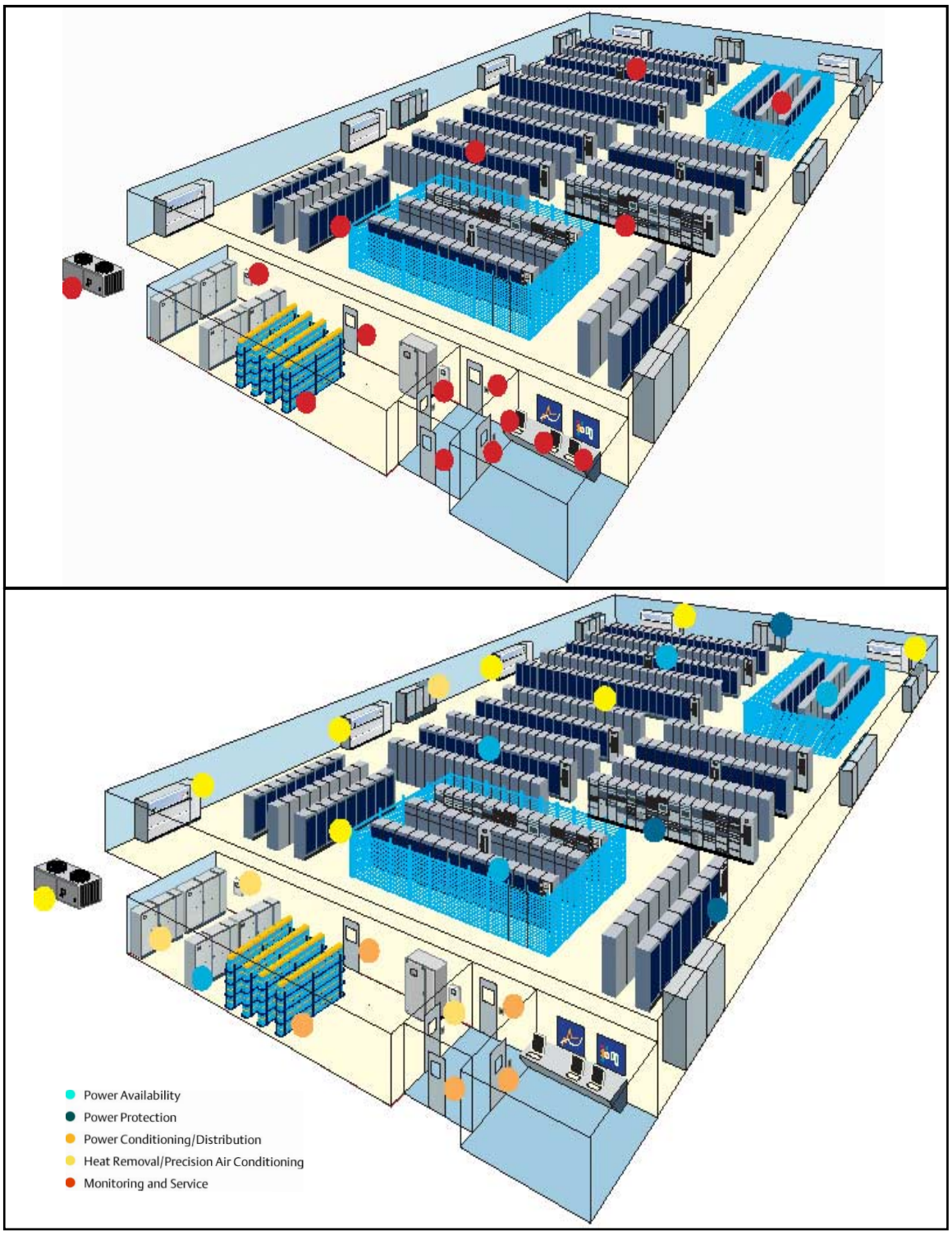

Figure 3 Data Center. Top: Just about every system in the data center can be considered business critical. Bottom: All five keys to computer system availability are required to achieve the high nines availability demanded of today's data centers.

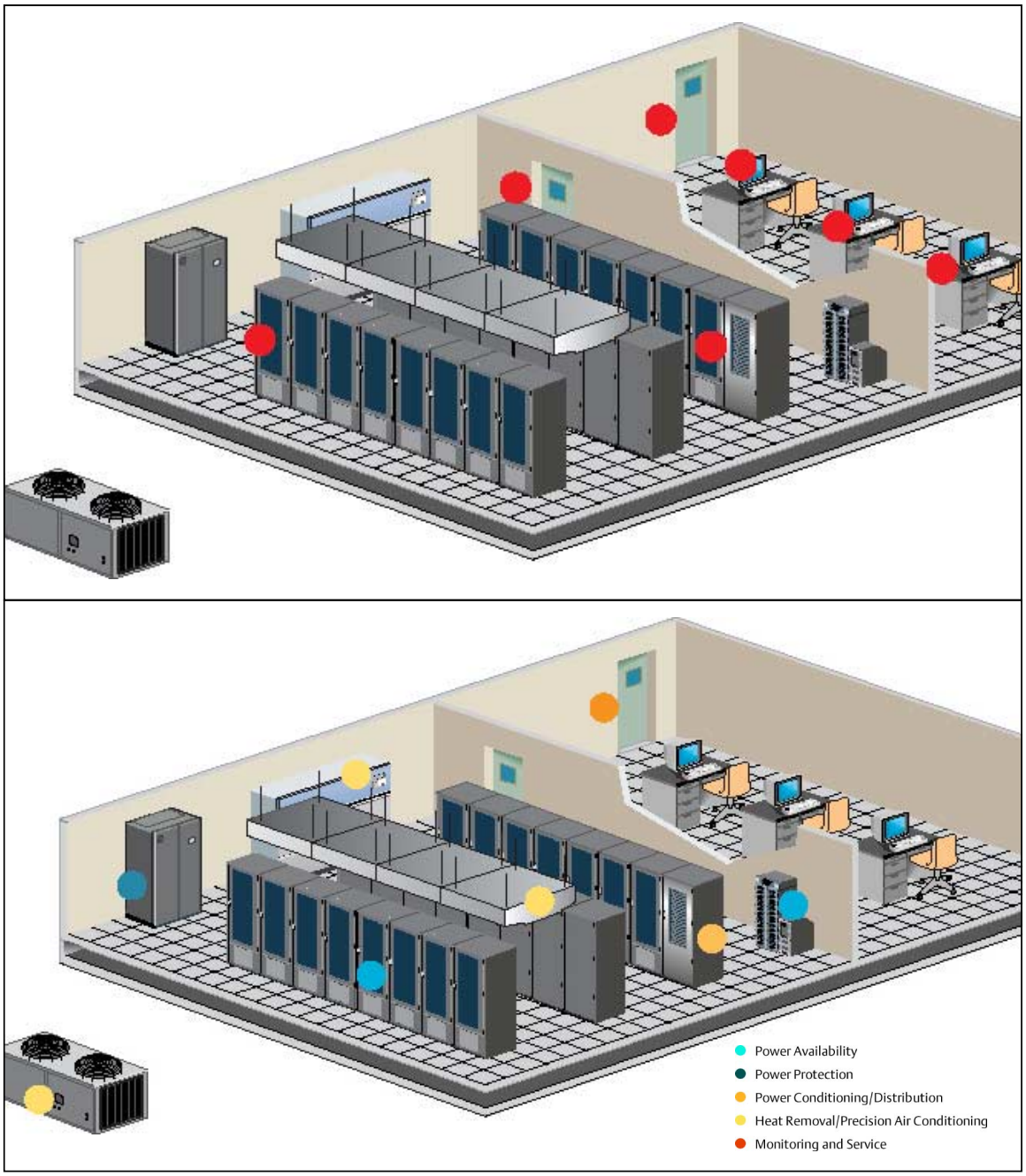

Figure 4 E-commerce and Catalog Operations. Top: This sales channel is powered by advanced information systems that are at risk of downtime from power problems and heat. Bottom: A protection solution should be designed to deliver 24x7 protection.

Case Study: How One Major Retailer Protects Systems — and Revenue

One of the country's largest retailers has one simple philosophy: If the power is out, merchandise isn't being sold. Any glitch in power, from the distribution center to the data center to the store can keep cash register from ringing, and that just won't do.

That's why the company turned to Liebert 25 years ago. And through evolutions in technology, retailing and consumer purchasing habits, the company still depends on Liebert for air and power protection in its distributions centers, data centers and stores nationwide.

Case in point: When the infamous 2003 blackout occurred in the northeastern United States, the retail giant kept retailing, staying completely operational throughout the blackout. Its uninterrupted power was a result of smart planning and the use of Liebert power protection products, including a Liebert Nfinity UPS with internal redundancy at the store level to protect cash registers and supply back-up power during the transition to generator power.

For this retailer, the supply chain starts with the distribution center. If merchandise isn't getting to stores, it isn't being sold. While most retailers protect the power at distribution centers, this company was the first to install fully redundant, dual-bus UPSs at all of its distribution centers, ensuring "high nines" reliability that is critical to moving merchandise to the stores, and translating that into sales.

Two Liebert Nfinity UPS systems power every store — one that protects each POS system and the other for back-office computer system protection. Liebert air conditioners, static switches and PDUs also are found at the retailers' data centers and distribution centers, ensuring complete power back up no matter the power problem. All Liebert products include site monitoring, enabling the retailer to respond quickly to power or air problems.

With this retailer, Liebert also exemplifies its mission to create tailored systems that meet the customer's unique needs. In addition to designing customized air conditioning systems for data and distribution centers, Liebert is currently testing a "smart panel" which will instantly notify the retailers' headquarters if an overloaded circuit is detected in any of its stores. This technology will allow the retailer to quickly call the store and pinpoint the exact circuit that is overloaded so the store can correct the problem.

The Liebert Nfinity UPS

Adequate environmental controls and power protection add up to sales for retailers. Liebert keeps retailers in business with customized systems that keep those registers ringing.

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