

■ Power and Cooling Technologies  
for Business-Critical Continuity

*The Power to Adapt. The Power to Succeed.*



When Alliance Systems expanded its main computer room and implemented IP telephony, the company upgraded its critical system infrastructure with Liebert power and cooling technology.



*“Infrastructure improvements were part of our business continuity plan. We identified Liebert technologies as best-of-class and they delivered a mission-critical power and cooling system that gives us the availability and adaptability we need to continue to use technology to grow our business.”*

Rusty Cone, President  
Alliance Systems

# Change is Coming from Every Direction. Can Your IT Infrastructure Support the Future of Your Business?

Critical facilities are experiencing more change and uncertainty today than at any time in the last 20 years. The data center, the computer room, the network closet – the entire IT network – are at pivotal stages in their evolution.

It's no longer just about managing growth; it's about managing uncertainty, density and capacity.

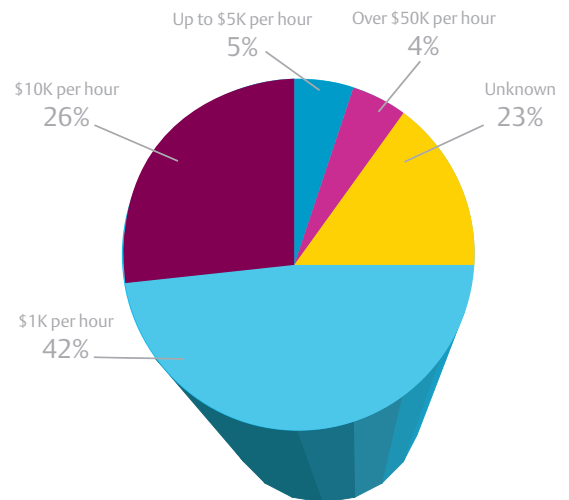
*If the power and cooling infrastructure can't respond to change, your business can't respond.*

What's driving this? Unpredictable growth in capacity. Consolidation of critical facilities. Convergence of voice, video and data. Processor power that doubles every two years. Enterprise-wide standardization.

Today, the entire network is mission-critical. This is driving downtime costs higher, while the resources you have available for critical system management are shrinking.

Whether you are implementing VoIP, consolidating servers or simply adding capacity, the reliability and flexibility of your power and cooling infrastructure will determine how well you can control costs and system availability as you manage change.

## Downtime Costs



*As organizations become more technology dependent, the cost of downtime increases. Mission-critical power and cooling technologies play a key role in preventing downtime.*

Increases in capacity, density and criticality are driving fundamental changes in how data center, computer room, and network closet systems are protected.



## Modularity Isn't Enough. Scalability Isn't Enough. You Need an Infrastructure That Can Anticipate and Adapt to Change.

Today, you need a power and cooling infrastructure that can work across your enterprise and respond to constant change.

You need an infrastructure that allows you to deploy blade servers and other high-density equipment safely and cost-effectively.

An infrastructure that can meet the strict power quality requirements of VoIP switches.

An infrastructure that allows you to add capacity without compromising availability or serviceability.

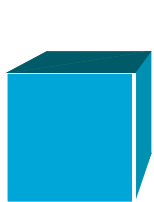
Modularity alone can't get you there. Neither can scalability.

You need an infrastructure that takes it one step further. An infrastructure that can adapt to your needs.

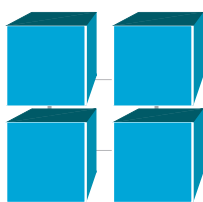


*Successful network convergence requires a power and cooling infrastructure that can adapt to changes in capacity and criticality.*

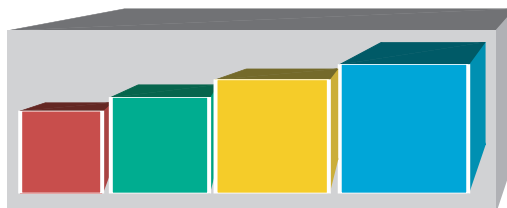
### The Evolution of Infrastructure Systems



Standalone



Modular



Scalable



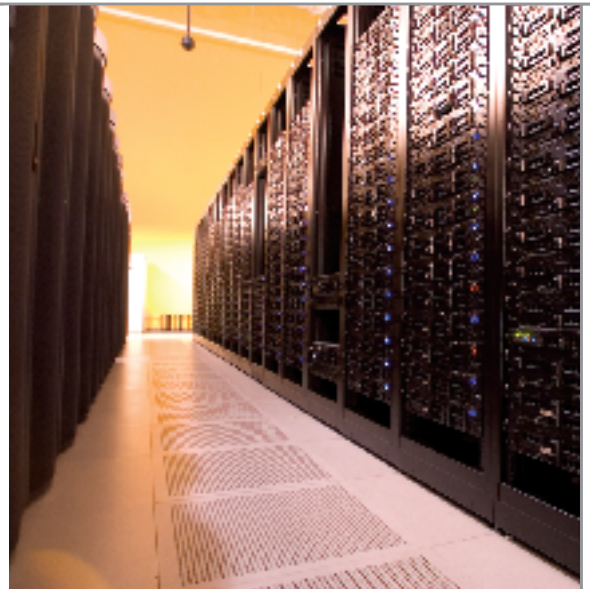
Adaptive

# Discover Why Every Company in the Fortune 500 Relies on Liebert Technology to Protect Mission-Critical Systems

Liebert has consistently developed the power, cooling and monitoring technologies that IT organizations rely on to manage growth and integrate new technologies.

From the first precision-cooling system in 1965, to the first enclosed protection system in 1994, to the first high-density cooling system in 2002, Liebert technology has given IT organizations the reliability and flexibility they need to succeed.

That's why every company in the Fortune 500 uses Liebert technology. And they are not alone: 497 of the *InformationWeek* 500, 97 of the *Computerworld* Premier 100, and hundreds of thousands of small and midsize organizations around the world use Liebert technology to protect business-critical systems.



Liebert technology ensures high availability for Oracle's primary data center in Austin, Texas.

## Enabling Technology with Power and Cooling Innovations



IBM introduces the System/360 mainframe

1964

Intel introduces the 8008, the first 8-bit microprocessor

1972



The IBM PC is released

1980



Liebert introduces the Liebert Deluxe, the first precision cooling system

1965



Liebert enters power conditioning business with introduction of Datawave

1978

Liebert introduces Sitemaster monitoring system

1982

The New York Stock Exchange trusts Liebert technology to protect mission-critical systems. So does every company in the Fortune 500.



## Mission-Critical Technology from the Global Leader in Enabling Business-Critical Continuity

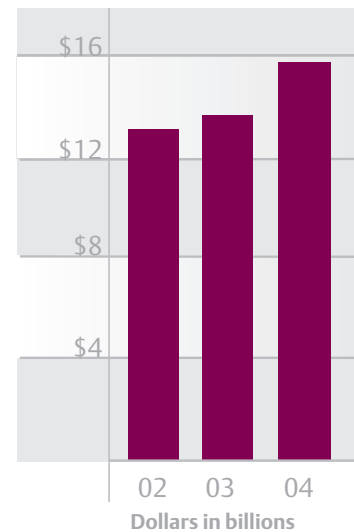
Emerson Network Power, a business of Emerson, ensures network resiliency and adaptability through a family of solutions that protect and power business-critical systems, including Liebert, ASCO, Astec and Lorain technologies.

These complementary technologies provide critical protection from the point your organization connects to the power grid all the way to the processors crunching data in your data center or a remote computer room.

These “grid-to-chip” solutions include automatic switching of utility power to a backup generator; high-availability power protection and distribution; reliable embedded power for servers, switches and other electronic equipment; and precision cooling systems that ensure safe operating conditions for sensitive electronics.

Through joint research and technology sharing, Emerson Network Power is taking critical availability to new levels and enabling organizations like yours to achieve their business continuity objectives.

### Sales



Emerson is a Fortune 150 company that brings together technology and engineering to provide innovative solutions to customers in industrial, commercial and consumer markets.

InterNIC created by National Science Foundation

1993



HP introduces the first dual-processor blade server

2002

Sarbanes-Oxley legislation passes

2002

1990

1995

2000

2005



Liebert introduces the Little Glass House, the first integrated network support system

1993

Liebert introduces first large-model IGBT-based UPS. In 1996, Liebert innovations allowed the first practical use of dual-bus power

1995



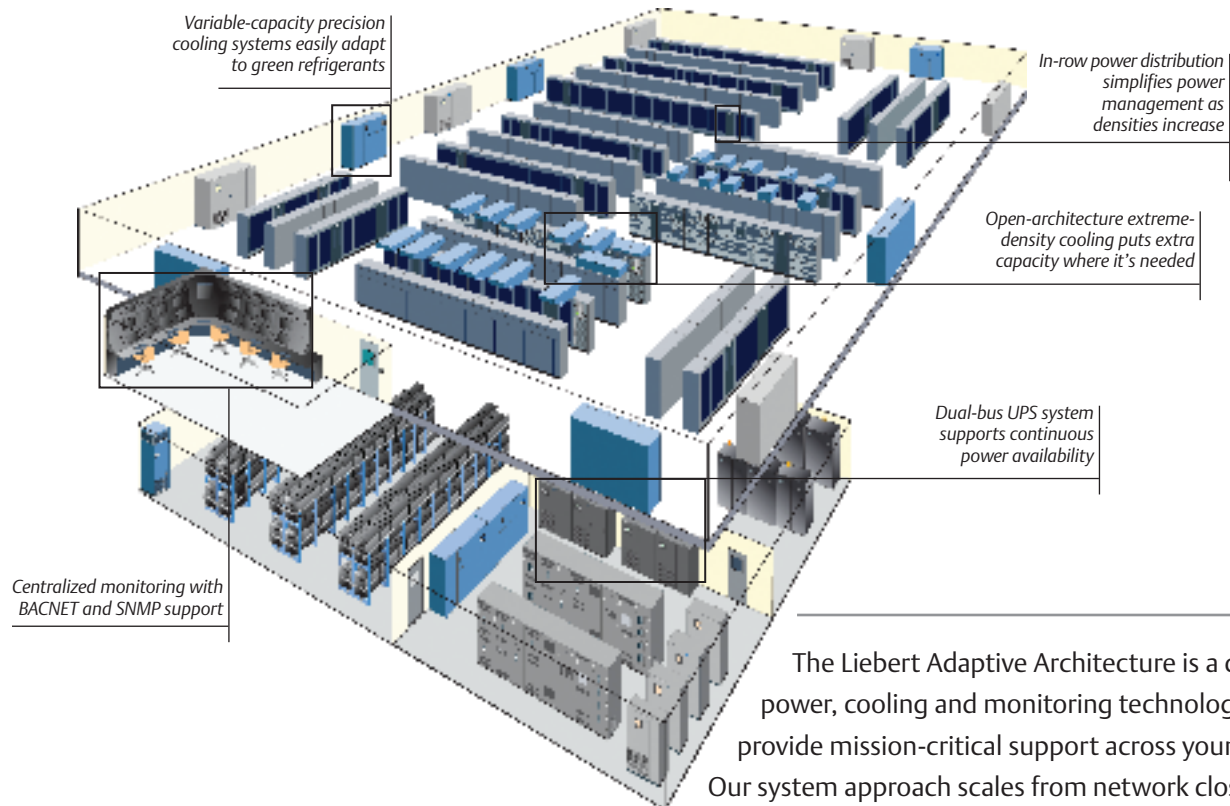
Liebert introduces first high-density cooling system

2002

2005 Liebert Availability Assessment introduced

2005

# The Liebert Adaptive Architecture for Business-Critical Systems



*The Liebert Adaptive Architecture creates an open IT infrastructure that is fault tolerant and reconfigurable.*

The Liebert Adaptive Architecture is a combination of power, cooling and monitoring technologies that provide mission-critical support across your enterprise. Our system approach scales from network closets to small data rooms to large data centers, addressing the widest scope of your applications.

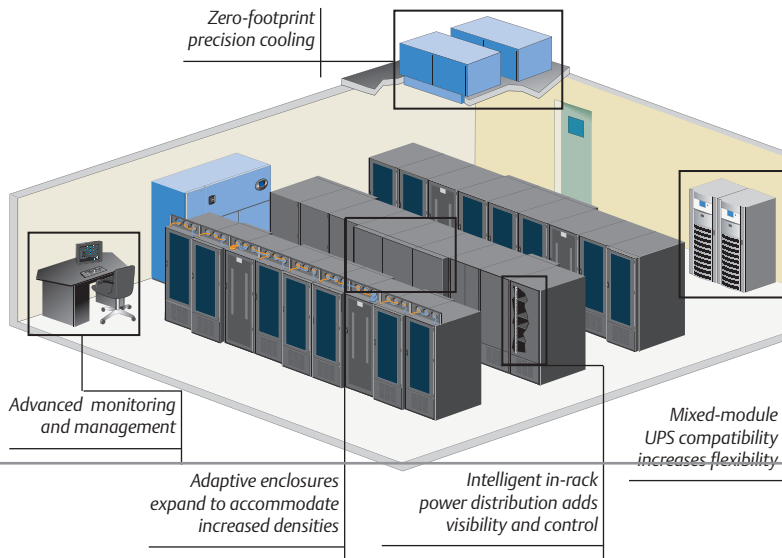
Our open architecture expects change. It's so adaptable it can be reconfigured on-site allowing for component replacement if technology changes. This gives you a well-defined growth path toward higher reliability, availability, flexibility, enterprise-wide standardization and lowest total cost of ownership.



Adaptive power and cooling systems let you implement new technologies with minimal disruption and cost.



## Attributes of the Adaptive Architecture



You can start building an adaptive IT infrastructure with a single rack or a small room and grow as your business grows, responding to change without abandoning your initial investment.

That's because Liebert technologies expect change and can be reconfigured on-site with minimal time, space and resources.

The result is an IT infrastructure that delivers high availability while giving you all of the benefits of modularity, scalability and flexibility.

- **Systems Approach** allows integration from the network closet to small data rooms to large data centers.
- **Standardized Global Technology Platforms** provide the lowest development and manufacturing cost and solutions that work globally.
- **Scalable Capacity and Availability Across the Enterprise** creates a path for meeting future requirements without changing technology.
- **X-treme Density Technologies** handle increased heat and load densities.
- **Modular and Scalable Platforms** enable component replacement as technology changes.
- **Onsite Reconfigurability** provides the lowest transition cost.
- **Common Control Technologies** allow products to communicate globally, today and tomorrow.
- **Optimized Building Blocks** deliver the lowest capital and operating costs.
- **Integrated Rack-Level Technologies** from the network closet to the large data center.

# Adaptive Power: Creating the Foundation for Network Resiliency

■ Liebert adaptive power technologies create a foundation for critical systems that can grow and accommodate new applications and technologies without compromising availability.

## High-Reliability Power Protection

Adaptive power starts with a UPS system that is properly sized for the application and based on proven mission-critical technologies.

Liebert systems use optimal building blocks to achieve the right balance between scalability and reliability. They also feature online double-conversion technology to provide complete protection against all types of power disturbances.

Liebert features the broadest range of double-conversion UPS systems in the industry, from 2U rackmount units to the 1000+ kVA systems that protect the world's most critical facilities.

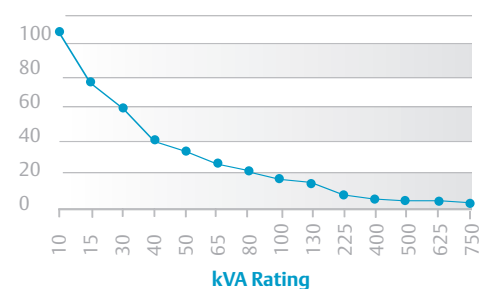
## Flexible Power Distribution

With the number of servers — and the density of those servers — on the rise, you need better ways to distribute power to and manage power within racks.

Liebert technology gives you both with Liebert managed power systems and the Liebert Foundation® enclosure system. Liebert power distribution solutions are designed to bring distribution closer to the rack, ensure sufficient connectivity for new servers and simplify cable management.

The Liebert Foundation is an adaptive rack system that can meet the requirements of virtually any IT system and be reconfigured onsite.

## UPS Cost per kVA

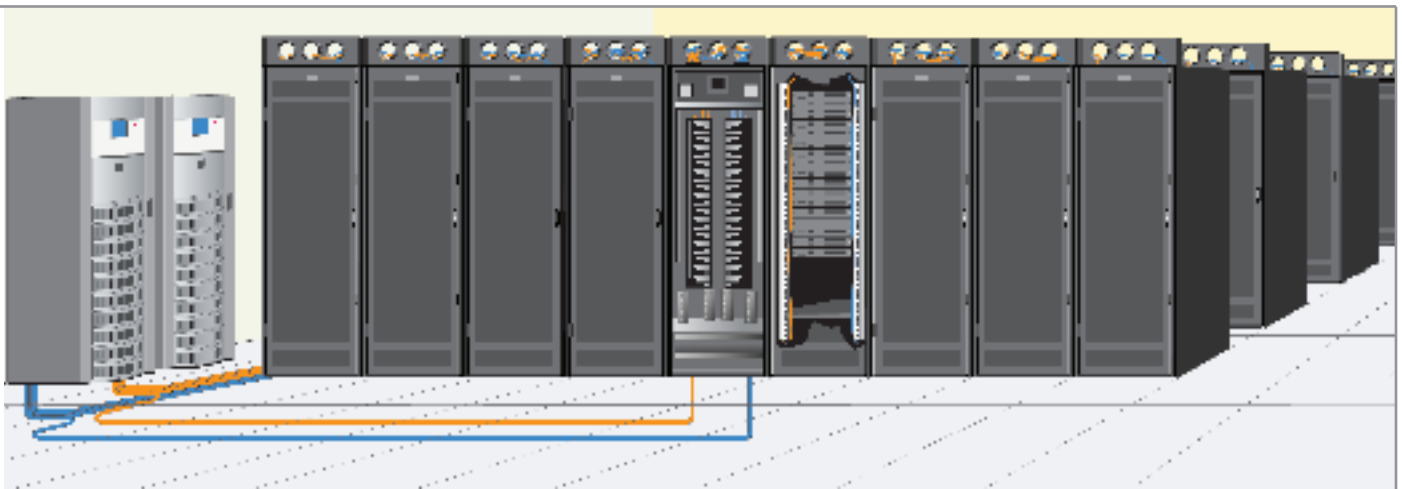


Cost per kVA goes down as UPS size goes up, contributing to higher costs for power systems that rely too heavily on modularity.



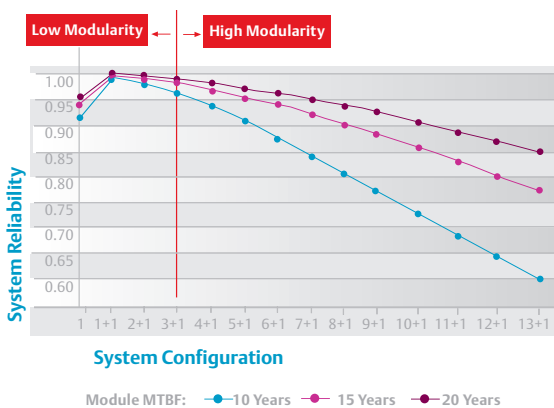
Liebert technologies helped Skyport speed the development of its broadband teleport facility while providing a cost-effective growth strategy.

Adaptive power means clean, uninterrupted power for all your critical systems and the flexibility to deliver that power where it is needed.



Liebert adaptive power systems give you high availability and outstanding flexibility from the point critical power enters your facility to the point of consumption.

### System Reliability as N Increases



High modularity reduces system availability at the very time higher levels of availability are typically needed.



Liebert mission-critical technologies, like the rackmount Liebert GXT2 UPS, are ideal for VoIP and Power over Ethernet applications. The Liebert IP Telephony Availability System, shown here, houses a Liebert GXT2 UPS with remote management and space for your IP telephony switch.



The Liebert IP Telephony Availability System has tested compatible with Cisco CallManager, CallManager Express 3.1, Cisco Unity Express 1.2.2, Cisco Unity 4.0.3 and Cisco Unity Bridge 3.0. Go to [www.IPT1.Liebert.com](http://www.IPT1.Liebert.com) for disclaimer.

# Adaptive Cooling: Scalable, Efficient and Easy to Reconfigure

■ Liebert technology gives you the power to adapt to increasing densities at the room, zone and rack level.

## Extending the Value of Floormount Cooling

For room cooling, there is no substitute for the Liebert DS.

The Liebert DS is the first and only data center cooling system to match its capacity to changing room requirements without cycling compressors; therefore, improving efficiency and reliability.

The Liebert DS also features the iCOM™ control system and operator interface that allows unit-to-unit communication to improve system efficiency, and an innovative maintenance-free blower drive system. It is the only precision-cooling system that can adapt to green refrigerants without swapping out compressors — and without losing capacity.

## High Density Cooling Adds Capacity Where Needed

Liebert XD systems deliver efficient, waterless cooling to a zone, row or rack using a unique pump and piping system that provides safety and scalability.

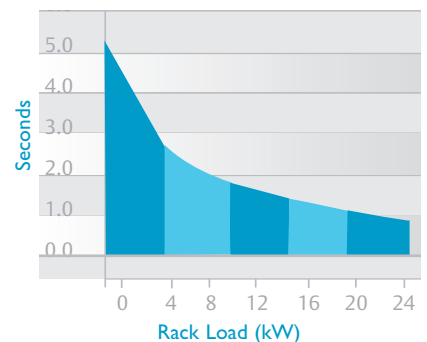
The pumping unit ensures refrigerant exists only as a gas in the controlled environment to eliminate the potential for damage from leaks or condensation.

The system also features quick-connect nozzles and flexible piping that allows refrigerant to be delivered to cooling units mounted in the ceiling or on racks. Need to move equipment racks or cooling modules? Simply disconnect a hose and reconnect where needed. The result is the safest, most efficient, most scalable and most reliable solution to high-density cooling.



The iCOM system provides a common communication platform for Liebert precision cooling systems, enabling increased interunit coordination.

## Time to Thermal Shutdown



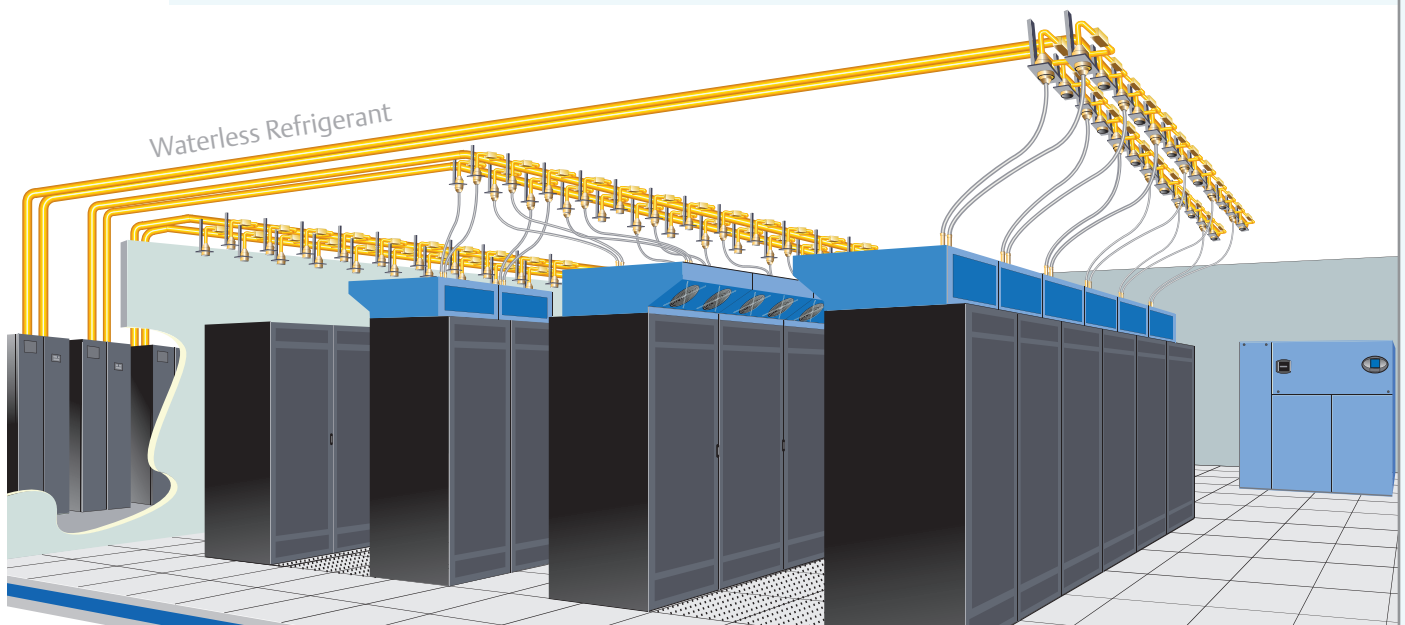
At rack densities of 12 kW, the theoretical time-to-failure of a closed system that loses cooling is under 2 seconds. An open cooling architecture allows the room to act as a buffer against thermal shutdown.

Pomona Valley Hospital added the Liebert XD system to adapt to newer high-density equipment. According to CIO Kent Hoyos, “when we first switched on the system, the help desk got quiet. The problems from unoptimized systems disappeared.”



## Liebert Extreme Density Cooling Solutions

- **Liebert XDP:** A pumping unit that delivers Liebert XD coolant through the building’s chilled water system.
- **Liebert XD Coolant:** Waterless refrigerant ideal for use around electronic equipment.
- **Liebert XDC:** Integrated pump and chiller for applications where a building chilled water system is not available.
- **Liebert XD Piping:** Overhead piping system that provides quick connectivity to Liebert XD cooling modules.
- **Liebert XDV:** Cooling module rack-mounted vertically above the rack.
- **Liebert XDO:** Overhead cooling module mounted above the cold aisle.



*Liebert adaptive cooling is the only open approach to extreme density cooling, delivering scalability and flexibility. This configuration shows the Liebert XDV cooling modules mounted to the racks. Cooling modules can also be ceiling mounted.*

# Adaptive Monitoring: Increase Availability and Reduce Support Costs

Liebert monitoring solutions enable proactive management of critical systems from the data level to the enterprise-wide system.

## Data-Level Solutions

Liebert MultiLink automated shutdown software is an affordable, flexible, and scalable shutdown application for one or

many workstations and servers. In-band network and out-of-band serial cable solutions are available.

## Network-Level Solutions

Liebert OpenComms Nform software provides full-scale monitoring through the existing network. It is scalable and

adaptable to respond to expanding systems and changing needs.

## Data Center and Facility Management Level Solutions

The Liebert SiteScan Web system collects telemetry data, as well as alarms, to predict and prevent failures, including:

### Live Data

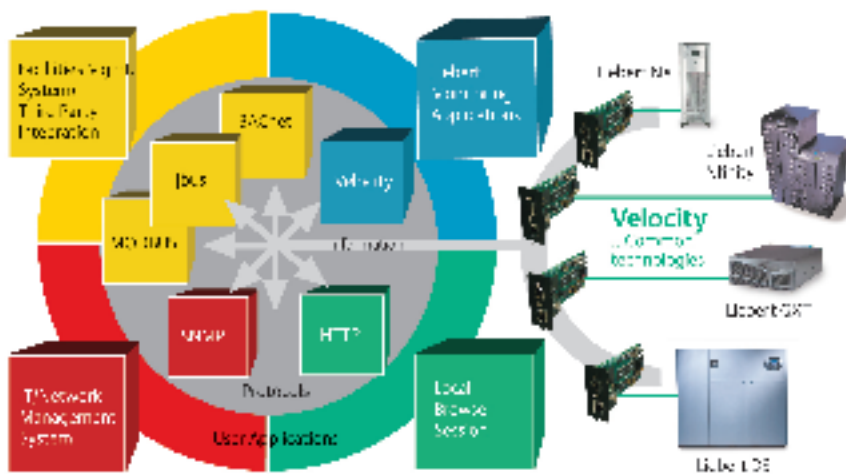
- Critical for support staff
- Demanded by managers
- Essential during the event

### Trend Data

- Where have the values been and where are they going?
- Can I correlate events?

### Forensic Analysis

- What happened last year?
- What happened seconds before the failure?
- Do I have cascading failures?



Liebert monitoring technologies allow easy information maneuverability to key recourses, whether you need to integrate critical system data with your Network Management System, Building Management System or enable a Web browser interface.

Critical systems management speeds emergency response and supports preventive maintenance.



Audit Trails

- Have I truly fixed the problem?
- When did the system degrade?
- When did the system return to normal?

System Health

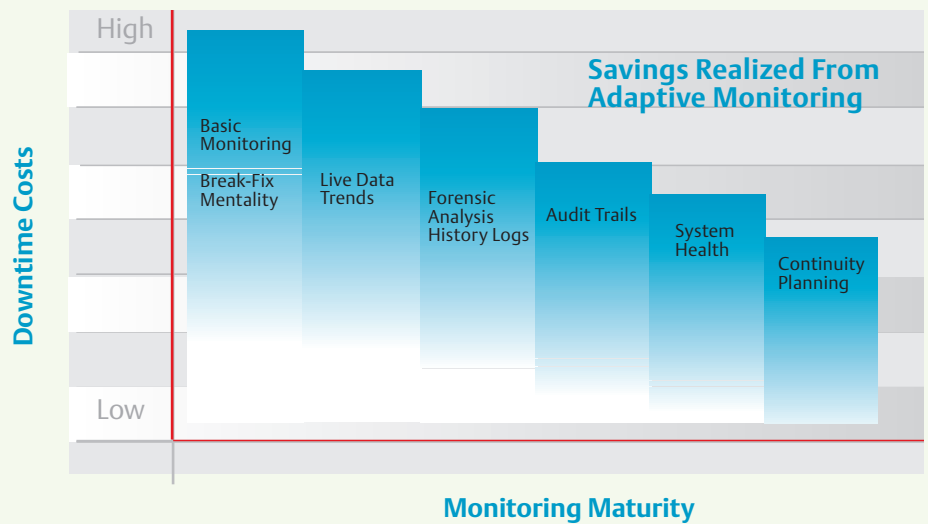
- Tracking degradation
- Tracking life-limited components
- Tracking consumables

Planning and Growth

- Predict space consumption
- Predict power overload
- Predict power purchase
- Predict cooling purchase

Liebert's monitoring technology puts critical systems information at the fingertips of support personnel – wherever they are – addressing the increasing concern for improved internal communication between management groups surrounding a data center.

**Value of Monitoring**



More advanced monitoring systems deliver higher value by enabling forensic analysis, audit trails, system health tracking and continuity planning.



Safelite Glass uses the Liebert SiteScan system to monitor critical power and cooling systems across multiple facilities from the main network operations center.

# Liebert Global Services: Mission-Critical Support for Mission-Critical Systems

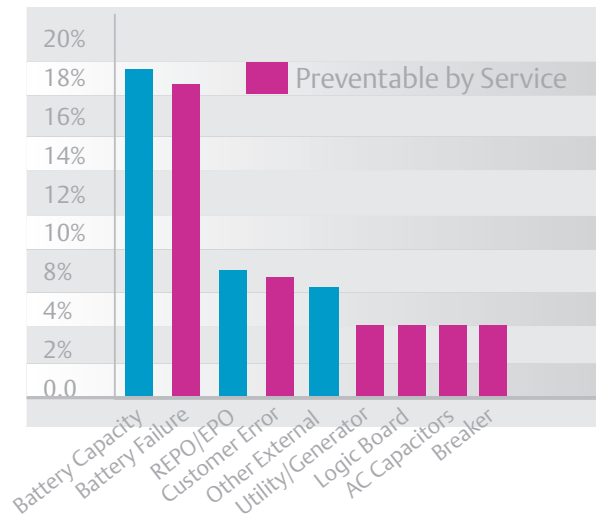
- You can't afford a service strategy that only reacts to failure. That's why our approach is based on proactive maintenance that prevents failure and extends equipment life. And why we've invested significantly in the industry's largest, most experienced service organization with capabilities that include:
  - Over 1400 field service engineers and 570 technical support staff across the global — significantly more than other manufacturers or third party service providers.
  - 24x7x365 live customer response center.
  - Guaranteed 3-hour mean time to respond.
  - ISO 9001-2000 certification by an independent audit agency specializing in service businesses.
  - Multi-level parts distribution with strategically located warehouses for new parts where and when you need them.

These capabilities enable our service organization to deliver unmatched professionalism and value through a range of services that includes enterprise remote monitoring, training, preventive maintenance, emergency response and power infrastructure service solutions.



*Dan Darnell, network engineer at Greater Harris County 9-1-1, the third largest 9-1-1 communications network in the country, trusts Liebert Global Services to maintain the critical systems on which the 9-1-1 network depends.*

## Causes of UPS Downtime



*An effective service program can prevent many of the most common causes of UPS failure.*



Liebert Global Services provides 7x24 monitoring of critical systems for Liebert customers around the world.



## Why Liebert Global Services is Uniquely Qualified to Protect Your Mission-Critical Systems

*Our approach is based on proactive maintenance that prevents failure and extends equipment life.*

- Liebert Global Services can service your entire critical support system, including generators and non-Liebert UPS and precision cooling equipment.
- Liebert service engineers know and respect the critical system environment.
- The Liebert certified customer response center is staffed 24x7x365 with calls answered in less than 30 seconds.
- Liebert service engineers are Liebert employees (not always the case with other service providers), allowing for consistent quality, the most updated technology, more efficient diagnostics and faster resolution.
- Liebert engineers are factory trained and have access to the most current product documentation and new parts.
- Our services cover design changes, factory upgrades and field change notices.
- We track the equipment maintenance history on all the equipment we service to ensure we always have current health status and lifecycle information.
- You can view all your equipment service activities from our Web portal.

# The Liebert Adaptive Architecture Gives You Higher Availability and the Lowest Cost of Ownership

The right technologies, applied in the right way, with the right service and support. That's what you can expect from Liebert adaptive power, cooling and monitoring technologies. And that translates into significant benefits for your organization.

## Higher System Availability

Proven mission-critical technologies that minimize single points of failure produce the highest possible availability of your IT systems. With the Liebert Adaptive Architecture, mission-critical technologies aren't limited to the data center — they extend wherever you have mission-critical equipment.

## Enhanced Operational Flexibility

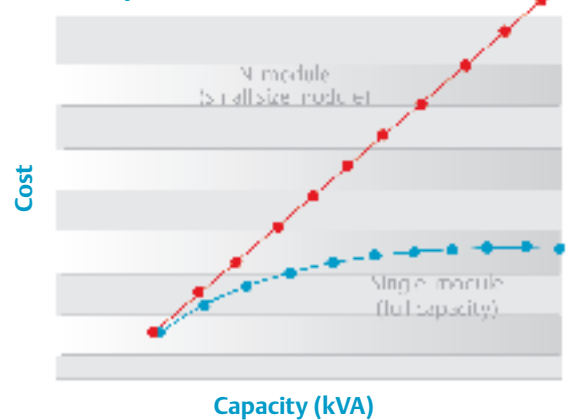
The components of an Adaptive Architecture can be reconfigured to meet the demands of new technologies, achieve higher tiers of availability or support increased densities — with minimal disruption to operations.

## Lowest Cost of Ownership

Liebert technologies are sized to minimize capital equipment expenses and designed for optimum efficiency. Their ability to adapt to change prevents obsolescence and extends their useful life.

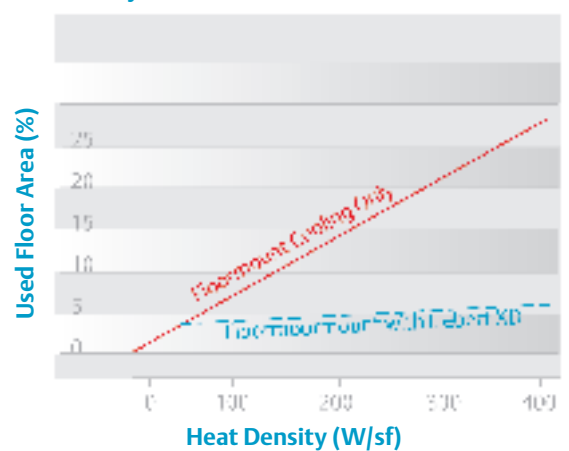
From adaptive power systems that reduce expansion costs to adaptive cooling technologies that increase efficiency and eliminate green refrigerant conversion costs, to adaptive monitoring technologies that enhance performance, the Liebert Adaptive Architecture delivers higher performance with greater flexibility than any other infrastructure design.

UPS System Cost



Highly modular UPS systems cost more to install, maintain and support than Liebert adaptive power systems.

Facility Utilization



By enabling higher densities, the Liebert XD system lets you pack more computing power into your existing facility.

You have to do more with less.  
An Adaptive Architecture  
helps you accomplish that.



## Introducing the Liebert Availability Assessment Service: A Comprehensive, Objective Analysis of Your Protection Strategy

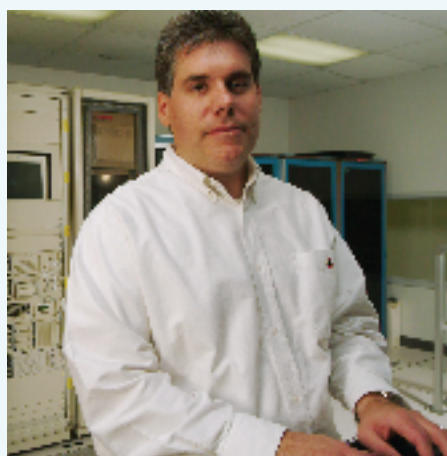
The Liebert Availability Assessment is a ground-breaking service designed to help organizations improve the power and cooling strategies that ensure the integrity and availability of IT data and business-critical networks.

Conducted by a Liebert availability specialist, the assessment gives you a third-party analysis of your protection strategy, including:

- Power, facility and program management audits
- Power and cooling business impact analysis
- Power, cooling and program management gap analysis
- Recommended policies and procedures to improve availability and resiliency

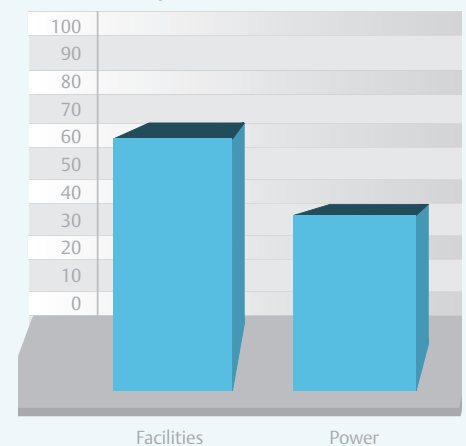
- A risk score that can be used to benchmark availability against future assessments

To learn more about the Liebert Availability Assessment, contact your local representative or call 800-877-9222.



*CompuNet Clinical Laboratories used the Liebert Availability Assessment to identify gaps in their power and cooling infrastructure that could limit growth or threaten IT system availability.*

### Vulnerability to Downtime



*The Liebert Availability Assessment determines vulnerability to downtime for power and cooling systems, providing a quantitative measure of infrastructure improvements.*

Today's critical facilities are undergoing an unprecedented amount of change as capacities, criticality levels and equipment densities all rise simultaneously.

Our response is the Liebert Adaptive Architecture. The first IT infrastructure that anticipates change and gives you standardized power, cooling and monitoring platforms that can scale to support growth within specific facilities, and extend out to support mission-critical systems across your enterprise.

The Liebert Adaptive Architecture ensures high availability, while maintaining operating flexibility and delivering the lowest total cost of ownership.

Isn't it time you started experiencing the benefits of Adaptive Architecture? Contact your local representative or visit [www.liebert.com](http://www.liebert.com) for more information on Liebert technologies.

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- Embedded Power
- Outside Plant
- Connectivity
- Inbound Power
- Precision Cooling
- DC Power Systems
- Integrated Cabinet Solutions
- Monitoring and Service