

RagingWire offers a new level of redundancy, reliability, and service for their customers

Designing Data Centers for 100% Availability

PROJECT AT A GLANCE

Project Type

New colocation facility

Locations

Sacramento, CA, USA

Ashburn, VA, USA

Equipment Installed

Low voltage distribution switchgear

Uninterruptible Power Supply (UPS)

Power Distribution Units

Building Management System

Power Monitoring



CUSTOMER BENEFITS

- Increased level of redundancy and reliability
- Enhanced scalability
- Energy efficiency via power and cooling system monitoring and controlling

RagingWire, founded in 2000, designs, builds, and operates mission critical data centers that deliver high-density power and 100% availability. Their patented power delivery systems lead the data center market in reliability and efficiency. The company has 650,000 square feet of critical data center facilities in Sacramento, California and Ashburn, Virginia and the highest customer loyalty scores in the industry. With flexible colocation solutions for retail and wholesale buyers, RagingWire meets the needs of top enterprise, Internet, and government organizations.

The Challenge – Breaking through the availability barrier

Business and government organizations trust data center colocation providers to deliver better facilities and operations with 100% availability. The reality is that many data centers have failed to meet the 100% availability challenge. RagingWire sought to change that.

Through its extensive operational experience, RagingWire knew that power was the life blood of a data center. If you lose power, the data center dies. Clearly, maintaining utility power was a critical element in power delivery. But RagingWire knew that utility outages were just the tip of the availability iceberg. Equipment failures, insufficient maintenance practices, human error, and improper equipment testing and commissioning all lurk beneath the surface. Solving for one part of the equation without addressing the other variables puts data centers and their customers at risk. RagingWire decided to raise the bar in the industry by creating a new data center design model based on 100% availability. This new model would have both redundant infrastructure for failover and automation technology and processes to allow live IT power load to be moved or shared across the entire facility.

Make the most of your energy

“When RagingWire completed our comprehensive data center infrastructure redesign in 2006, we challenged ourselves to a higher standard of data center design and operation – to provide 100% uptime to our customers,” said Charlie Linkhart, chief engineer at RagingWire. “To achieve this unprecedented level of availability, we needed a partner who could deliver a comprehensive and reliable suite of power and IT solutions to implement our pioneering architecture, but whom also embraced our ambitious goal – Schneider Electric was that partner.”

The Solution – A powerful partnership

RagingWire’s long-standing relationship with Schneider Electric dates back to the construction of their first data center facility in Northern California. As RagingWire’s data center infrastructure requirements grew, the company collaborated with Schneider Electric to implement infrastructure designs and data center infrastructure management (DCIM) solutions. Some of those DCIM solutions, while originally created as a one-off for RagingWire, have now been implemented into Schneider Electric’s broad-ranging StruxureWare platform. When RagingWire began the design phase in 2011 for a new data center in Ashburn, Virginia, the company turned to Schneider Electric to fabricate and supply the majority of the site’s electrical distribution infrastructure.

Together, RagingWire and Schneider Electric created an innovative power delivery supply chain that integrated key technologies from Schneider Electric and RagingWire:

- Schneider Electric’s MGE EPS as the core UPS (uninterrupted power supply)
- RagingWire’s patented UPS Switch Points (USP), manufactured by Schneider Electric, which enable RagingWire to transfer load in the facility from any power distribution unit (PDU) on the floor to any UPS system in the facility (UPS).
- RagingWire’s N-Matrix™ infrastructure management system and PLCs (programmable logic controllers) custom coded by Schneider Electric.

The power delivery architecture was the first of its kind in the industry and to this day is recognized as the most efficient, reliable, and cost-effective way to deliver 100% availability. The solution meets or exceeds the highest Uptime Institute Tier IV standards by providing fault tolerance and concurrent maintainability even during a utility outage.

With this approach, RagingWire is able to maintain critical infrastructure at the highest levels, switch to

back-up devices in case of failures, and the end-to-end system can run independent from utility power using onsite generators and batteries.

Benefits – A data center with built-in 100% availability

A New Level of Redundancy and Reliability

RagingWire created the term 2N+2 in order to address their innovative level of redundancy that goes beyond the current data center industry standards. To define 2N+2, RagingWire offers two completely independent power paths (2N) from the customer rack all the way to the backup emergency generator. Within these power paths, two extra components are included for each piece of the critical power infrastructure (N+2).

To power this architecture, RagingWire uses Schneider Electric’s MGE EPS 8000 Multi Module Systems (MMS) for uninterrupted power supply (UPS). Each system consists of two 900 kW modules and a single System Control Cabinet (SCC) housing the System Bypass Breaker (SBB) and static switch. At initial build, RagingWire installed four of these systems in their Virginia data center, with plans to add more up to the total build-out of 14.4 MW of IT load.

Designed with mission critical support in mind, each MGE EPS 8000 comes equipped with local paralleling boards that communicate with each other to create a completely synchronized output voltage. Since the UPS controls reside independently inside each module, if one is removed or receives a fault, the remaining UPS module immediately accepts the load. This equipment redundancy is in addition to RagingWire’s 2N+2 infrastructure redundancy.

“Schneider Electric’s multi-module UPS system enhances our system-wide redundancy,” said Chris Thames, director of critical facilities operations. “Because we can remove one module from service without being forced to use unconditioned power for critical IT load (i.e. bypassing the UPS), it mitigates downtime risk and improves efficiency.”

This extensive system of backups and automatic controls accomplishes RagingWire’s design philosophy: infrastructure that is concurrently maintainable and fault tolerant, with a simultaneous utility outage. This philosophy enables maintenance to be conducted on one system, have another component fault, and have a simultaneous utility outage, and still maintain power delivery to the customer.

Scalable Power to Meet Future Growth

Scalability plays an integral role in RagingWire's model of flexible and reliable IT environments for their customers. A key facet of RagingWire's phased build-out approach is the use of patented UPS switch points (USP), manufactured by Schneider Electric, which enable RagingWire to transfer load in the facility from any power distribution unit (PDU) on the floor to any UPS system in the facility. The switch points allow RagingWire to commission new UPS systems into the electrical distribution system and subsequently balance UPS load across the facility, without declaring a maintenance window for their customers. The switch points and patented designs and operational processes enable the live-load-switching that prevents power interruptions.

"Through RagingWire's redundant architecture, maintenance can be done without any downtime or interruption to customer power," said Jason Weckworth, RagingWire's vice president of data center operations. "As a result, the term 'maintenance window' is not a part of RagingWire's – or our customers' – colocation vocabulary."

Monitoring Enabled by PLC Logic Controls

To ensure that their highly redundant infrastructure works the right way all the time, RagingWire's N-Matrix™ infrastructure management system monitors and controls the data center power and cooling systems. Additionally, N-Matrix provides a comprehensive view of data center health and efficiency: battery performance, branch circuit monitoring, electrical plant configuration, chiller plant temperatures, computer room air handler (CRAH) fan speeds and configurations, data floor temperature and humidity, and chiller plant line-up, to name a few. RagingWire's N-Matrix automatically detects utility power loss and restoration, and reconfigures the electrical plant in response to both scenarios using PLCs coded by Schneider Electric to RagingWire's specifications.

In collaborating with Schneider Electric on the electrical plant controls, RagingWire established the system design, operating principles (no generator parallels, break-before-make load shifts, etc.), breaker sequencing operations, and parameters of the system. Schneider Electric worked with RagingWire to develop the code allowing the crucial integration between the physical electrical equipment and the controls architecture.

A complex layer of Programmable Logic Controllers (PLCs) ties together the physical infrastructure components in the data center with RagingWire's N-Matrix, enabling automatic operation of the electrical plant and 24x7 monitoring that maximizes performance and customer uptime. RagingWire selected Schneider Electric's Modicon Quantum series PLCs for their N-Matrix integration, which provides a scalable, modular architecture that is configurable to meet RagingWire's need for continuous operation and optimum response cycle times.

"RagingWire brings a unique design philosophy and an unmatched availability record to the data center colocation industry. By designing to anticipate unplanned component failures across their infrastructure – they deliver 100% availability," said Richard Fennimore, Executive Account Manager at Schneider Electric. "The combination of Schneider Electric technology and RagingWire innovation has produced a superior power delivery system that customers can trust to run their IT systems."

Conclusion: The multiplier effect of RagingWire and Schneider Electric

RagingWire and Schneider Electric recognize how the operations and maintenance of critical infrastructure are just as important as the design itself. By designing systems that can sustain failures beyond simple loss of utility and by recognizing the need for increased redundancy, RagingWire and Schneider Electric address the major causes of data center downtime. In order to achieve their high level of reliability, RagingWire partnered with Schneider Electric because of their deep understanding of power delivery and their substantial, demonstrated capacity to create innovative technologies in the data center infrastructure space. Additionally, RagingWire continues to partner with Schneider Electric because of their standardized platforms, integrated solutions, efficient supply chain, and quality support.