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Sustainable Power Management

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Today's data centers are unsustainable for several reasons: their inability to quickly adapt to changes, the fact that many data centers are nearing or have surpassed the capacity limitations of their systems, and the expense to power and cool the data center. In response, many companies are investigating solutions, like STARLINE Track Busway to create more sustainable IT environments.

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Data center managers seek ways to increase energy efficiency while providing a highly adaptable IT environment to support service-oriented architectures and rapid changes in demand. Although software, systems, and storage are all becoming highly adaptable, nothing in the data center can adapt quickly unless the power infrastructure is also adaptable.

IT equipment is changing with a much higher frequency than the typical life expectancy of the data center. Typical data centers are designed with a life expectancy of 10 to 15 years. However, most IT equipment refresh cycles are 2 to 5 years, and incorporation of more powerful equipment results in the problem of an undersized power supply system. This frequency of change requires a data center electrical design with the capability to handle anywhere between two and four complete IT equipment refreshes during its design life cycle. The design also needs to be able to quickly adapt to equipment relocation within the data center to keep up with the demands of rapidly changing business needs. These requirements drive the need for a flexible, adaptable electrical system.

Unfortunately, traditional data center power implementations are neither flexible nor adaptable and are therefore expensive and time consuming to change. When designing a data center with traditional electrical systems, engineers or designers must pre-plan every outlet—from dedicated hard-wired conductors for each power outlet through overhead or raised floors back to main distribution panels and circuit breakers. It is nearly impossible to pre-determine the power requirements for each rack in each location when the data center goes live, let alone plan for future requirements. As a result, data center managers either overbuild the current system with a much higher investment, or build a system that will meet current planned demand, but will increase the operating expense when costly changes are required.



When inevitable changes occur as a result of growth, equipment upgrades, or changed plans, the costs for electrical changes can be significant, both in terms of labor costs and the risk of outages. In light of these facts, it makes sense to re-evaluate the power distribution system and consider methods to eliminate conversion steps or reduce their power losses.

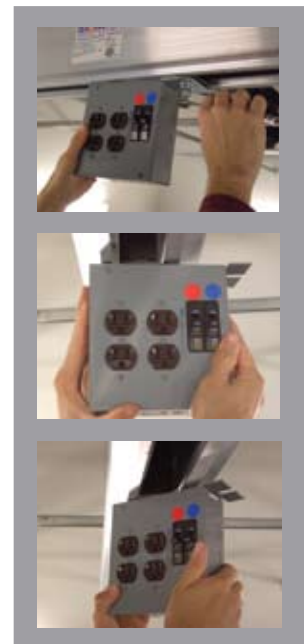


Flexible, Adaptable Power Solutions

Track Busway is an overhead, simple, versatile, fast, and economical solution for supplying and controlling sustainable, adaptable, and scalable power to electrical loads.

The system can be tapped at any location with a variety of plug-in units, eliminating panel boards, long runs of conduit and wire, and expensive installation costs for dedicated power outlets, as well as dramatically decreasing human error.

Dedicated circuit breakers located at the point of use make troubleshooting outages or reconfiguring supplies very easy. Furthermore, individual circuits can be monitored and switched off for greater energy savings.



Sustainable

Overhead bus systems can be reusable for years for future facility changes and growth. With the busway, as compared with individual cables, less copper is used and the reusable components save energy and reduce waste for the cost of mining, smelting, and transporting replacement items.

Ever-increasing server densities are causing an increase in kW power density, resulting in increased cooling requirements in today's data centers. For every kW increase in power, an equal amount of cooling capacity is required. This never-ending cycle of increasing power and cooling requirements translates into more and larger power cables under the floor—stealing valuable cooling space. With an overhead bus system, there is no jungle of wires to obstruct air flow under the floor, making it one of the most energy efficient and safe power systems available in the market today.

Adaptable—Easy, Fast and Inexpensive to Change

The STARLINE system is cost competitive with traditional power distribution systems. Where greater savings come in is when power needs to change. With an overhead bus system, there is no need to work on live panels or schedule outages to add, move, or change outlets. Overhead bus systems eliminate the need to remove and scrap short or undersized cable whips and run new larger ones. Therefore, the risk of potential unintended power outages is avoided.

Overhead bus systems enable a more adaptable data center because systems and racks can be installed or moved without waiting for an electrician to run new cables and install outlets. Any location in the data center can have the power supply added, reconfigured, or removed without affecting anything else in the space, and without risking an unplanned outage.

Completely Reusable Components

Busway runs can be completely disassembled, relocated, and reassembled to any location in the data center—without shutting down main power. Spare components can be ordered and kept in inventory for fast changes as components are fully assembled and factory tested. All parts for busway runs of the same amperage are interchangeable and can be used on other busway runs of the same size in the data center. Changes can be quickly and safely effected by simply adding or replacing components.

Completely Scalable

Data center electrical designs are often outdated before they are ever installed. Day one requirements are often different from the original plan, which forces electrical outlet locations and types to be reconfigured. This increases costs and delays schedules.

STARLINE is completely scalable, enabling components to be added as needed—without tying up capital and wasting resources—rather than completely building out the entire facility in the beginning. This is

very beneficial for co-location and other facilities that are built out over time. It also enables a greener data center because changes to increase resource utilization are not hampered by an inability to quickly supply the correct power to a new location.



More Usable Data Center Space

With data center floor space at a premium, every square foot is critical. Overhead bus systems eliminate Remote Power Panels (RPPs), which result in more usable space in the data center for IT equipment and server racks. In addition, miles of power cables are eliminated when power outlets or drops can be located exactly where they are needed.

Monitored Power Usage

It is important for data center managers to have the ability to monitor and know the exact power usage of the data center. All too often, as new equipment is added to a rack, the cable ratings can be exceeded, trip the circuit breakers, and cause an unplanned outage. STARLINE Track Busway provides monitoring units to measure and display each phase current in real time, perform alarm functions, and provide remote communication. With power monitoring, data center managers can intelligently plan for the future. They know the exact capacity and load of each rack or system and therefore know where they can install new or upgraded equipment. In addition, monitoring helps ensure the electrical system is balanced across phases, leading to better energy efficiency and ultimately costs savings.

Eliminate Conversion Steps/Power Losses

There are many conversion steps when distributing power to data centers which result in a loss of energy efficiency. Direct current (DC) distribution seems to be the simplest way to eliminate conversion steps by distributing DC throughout the building, so that only one alternating current (AC)-to-DC conversion is necessary, however, this concept is still in its infancy. Another approach is to use 400V AC with no step-down transformer and supply the load directly with

this voltage. Whichever approach evolves as the best solution, STARLINE Track Busway is compatible.

“Data Center owners/operators are faced today with ever increasing power densities and are in need of new solutions to satisfy these densities. I personally believe that 400V DC will be the power topology of the future, but it currently exists today at a proof of concept stage. There are also AC voltage solutions currently being investigated as well. Overhead bus systems is an ideal solution for all existing and future topologies because it is UL listed and applicable to all of these current and future uses,” says David Geary, PE, and Vice President of Engineering for Direct Power Technologies Inc.

Powering the Green Data Centers of the Future

Change is inevitable and data centers should be designed with this undeniable precept in mind. Companies that cannot shift with the times or trends because of antiquated technology and infrastructure lose business to more agile competitors. Overhead bus systems play a fundamental role in implementing more versatile data centers that can quickly evolve to address the demands and challenges of the future.

About the Author

Kat Rollin is a PointSource Project Lead, Editor, and Senior Writer. Kat spent over 10 years working for Sun as a Systems Engineer in New York City, covering Fortune 500 commercial and financial customers in nearly every market segment. To meet the demanding requirements and facilitate sales to these customers, Kat frequently worked closely with Sun’s marketing and engineering groups to help shape products to their needs. At Sun, Kat specialized in graphics, multimedia, the introduction of Java, Web technologies, high availability, and thin client deployment on trading floors. Prior to her career at Sun, Kat worked for eight years as a systems engineer at NBI, Inc. She has worked on undergraduate studies in Graphic Arts and Computer Science at Colorado State University, Front Range Community College, New York University, and Hunter College.

About Universal Electric

Universal Electric Corp. provides electrical power distribution systems in the mission critical, light industrial and commercial industries with Starline Track Busway. It was designed to meet the rugged specifications of the *UL857, Busway and Associated Fittings Category*, with the flexible features of track lighting – and is comprised of four physical sizes with 11 different electrical system configurations. Systems Run from 40 to 400 Amps with Isolated Ground. It is

the simple, versatile, fast, and economical solution for supplying power to electrical loads and is unique because the Busway can be instantly tapped at any location, with a variety of plug-in units. UEC is committed to assisting design engineers understand the options features and limitations of each series of Starline Track Busway products. Other Universal Electric Corporation products include STARLINE Plug-In Raceway and U-S Safety Trolley. Visit uecorp.com/busway for your Flexible Power Solutions. For more information, please contact info@uecorp.com.

About the Uptime Institute

Uptime Institute is a leading global authority on data centers. Since 1993, it has provided education, consulting, knowledge networks, and expert advisory for data center Facilities and IT organizations interested in maximizing site infrastructure uptime availability. It has pioneered numerous industry innovations, including the Tier Classification System for data center availability, which serves as a de facto industry standard. Site Uptime Network is a private knowledge network with 100 global corporate and government members, mostly at the scale of Fortune 100-sized organizations in North America and EMEA. In 2008, the Institute launched an individual Institute membership program. For the industry as a whole, the Institute certifies data center Tier level and site resiliency, provides site sustainability assessments, and assists data center owners in planning and justifying data center projects. It publishes papers and reports, offers seminars, and produces an annual Green Enterprise IT Symposium, the premier event in the field focused primarily on improving enterprise IT and data center computing energy efficiency. It also sponsors the annual Green Enterprise IT Awards and the Global Green 100 programs. The Institute conducts custom surveys, research and product certifications for industry manufacturers. All Institute published materials are © 2009 Uptime Institute, Inc., and protected by international copyright law, all rights reserved, for all media and all uses. Written permission is required to reproduce all or any portion of the Institute’s literature for any purpose. To download the reprint permission request form, uptimeinstitute.org/resources.

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