



Raising the Bar for Higher Power

*The Advantages of Overhead Power Distribution in
Data Centers*

We often take for granted the infrastructure necessary to support our increasingly digitized and interconnected world. This demand for bandwidth is only growing, and with it, so is the demand for power.

Mission critical facilities need to be larger to accommodate for more servers, and facilities managers need to be able to quickly address this constant need for additional capacity. In order to support the extra elements required, worldwide IT spending on servers, power and cooling, and management/administration has rapidly increased over the past decade. But other than just an increase in costs, the need for a higher voltage of power poses additional challenges.

To accommodate this need, overhead power distribution systems emerged within the data center arena within the past decade or two, and quickly began rising to the challenge of providing increasing amperages of power.

Past Power: “The Way It Always Was”

When building a data center, power and cooling are two of the top priorities. Historically, raised floors, or concrete tiles installed onto a steel grid resting on stanchions 2 to 4 feet above a slab floor, have been deployed for cooling purposes. The perforated tiles that make up the floor allow for cool air to flow out of the below passage and onto the server racks.

However, this underfloor area also houses whips and cables that supply power to the racks. As a data center space grows, more server racks are installed which require more power, in turn creating more and more cables under the raised floor; ultimately restricting the flow of cool air and completely contradicting the purpose of the excess space to begin with.

Over time many have realized this drawback of the traditional underfloor method, as well as various others, including the fact that raised floors are costly; maintenance is required to remove unused cables, which tend to be abandoned; and risk of human error while working with circuit breakers and cables that are not clearly associated with a given load.

Higher, Sustainable Busway Power

Overhead power distribution—otherwise known as busway systems—directly combat the traditional power solution of whips and cables beneath a raised floor. These systems have been proven to be both scalable and sustainable solutions to providing power.

Select busway systems also provide a continuous access slot to power- meaning that a data center space will always be prepared for future reconfigurations or expansion. Power 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.



Figure 1: Traditional methods of whips and cables housed under a raised floor

With an overhead bus system, there is no need to work on live panels or schedule outages to add, move or change outlets. Busway systems eliminate the need to remove and scrap short or undersized cable whips and run new longer or larger ones. Therefore, the risk of unintended potential power outages is avoided and racks can be installed or moved without disrupting operations.

Busways are highly sustainable systems: they can be used for years and years and create much less material waste than the traditional whips and cables method does. Also, in order to cope with today's ever-increasing server densities, an increase in kW power density is needed, which equates to a related increase in cooling requirements. Before, this would mean additional power cables under the floor that obstruct air flow and thus make cooling more difficult. With an overhead busway system this threat is eliminated- making it an extremely energy efficient and safe method for distributing power.

Flexible & Scalable

It is often difficult to know the exact electrical design needed at the beginning of a project. This can result in the need to reconfigure electrical outlets and their locations, which increases costs and causes schedule delays.

With a scalable overhead busway system, components and power circuits can be added as needed—without tying up capital and wasting resources—rather than building out the entire facility in the beginning. This is very beneficial for colocation and other facilities that are built out over time. It also means that the cost of maintenance is automatically dropped for the long run, as there is no need to reconfigure electrical outlet locations and types.

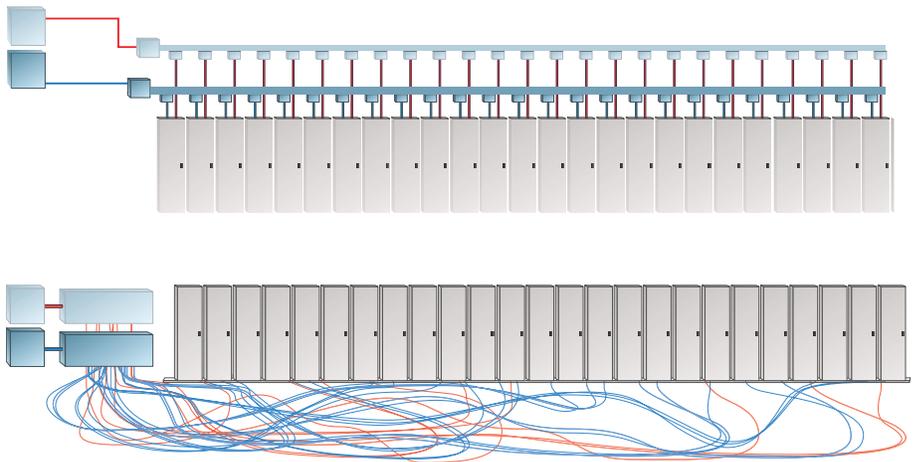


Figure 2: Busway power distribution (above) compared to traditional whips and cables under a raised floor (below)

Increased Usable Space

With data center floor space at a premium, every square foot is critical. Overhead busway systems eliminate 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.



Figure 3: Example of busway with continuous access slot run above server racks

Monitored Power Usage

In a data center it is especially important to accurately monitor the amount of power being used. Uptime is everything for mission critical environments, and thus unplanned outages must be avoided at all costs. Premium overhead power distribution systems are capable of incorporating metering units at both the feed and circuit breaker level. Power and energy measurements are captured instantaneously, providing the granular data necessary to make informed decisions such as enabling phase balancing as needed.

Further potential metering functionality includes optional display, daisy-chain Ethernet to save on network switch ports, alarm functions and remote communication via an integrated webpage. Having all of these capabilities included within your power distribution system makes it simple for data center managers to intelligently track usage and plan for the future.



Figure 4: Example showing the ease of inserting a busway plug-in unit

Installation & Future Cost Savings

Aside from the features and benefits offered by busway manufacturers, this type of system provides immediate monetary advantages in terms of installation and future costs. The installation of traditional methods is labor intensive in nature, and very costly. Compared to installing a raised floor and hundreds or thousands of whips and cables, busway installation is very simple and not time or labor intensive.

When designing a data center with traditional electric systems, engineers or designers must pre-plan every

outlet. Because it is nearly impossible to predetermine the power requirements for each rack in each location when a data center goes live—let alone plan for future requirements—this will result in expensive and time consuming changes that will have to occur in the future. However, with a flexible, adaptable busway system, future changes that require expensive labor charges and potential outages are completely avoided.

With the world around us becoming more and more dependent on the Internet, it is clear that the need for additional bandwidth is only going to increase. This

additional bandwidth results in more and larger mission critical facilities and infrastructure, which require more power. To address this challenge in the most efficient way possible, it's essential to take advantage of the most up-to-date technology available; as opposed to facing the needs of the future with the solution of the past.

About Universal Electric (Manufacturer of Starline)
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