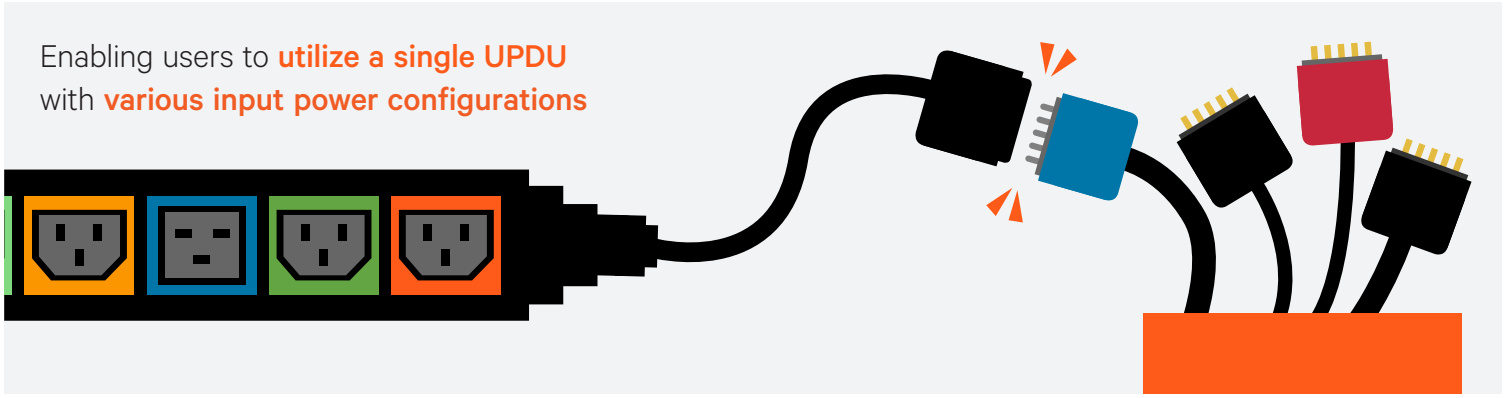
Universal Rack Power Distribution Unit (UPDU): Simplify Infrastructure Deployments with a Single rPDU Globally

A Vertiv Application Brief



Overview

Today's data center coverage is marked by a few descriptions that didn't exist in the recent past. The first term is *hyperscale*. The users that fit this description build internet-scale applications that require vast, geographically-dispersed data center properties to support their business.

The second term is *edge*, often used as shorthand for *edge computing*. While it has different connotations to different people, edge is fundamentally about proximity to users. With smart devices in everyone's hands and in everyone's homes, more local processing is needed to limit network latency that can ruin user experience and, in turn, jeopardize revenue.

At the surface, the worlds of hyperscale and edge couldn't appear more different. A hyperscale provider operates data center campuses sized in multiple megawatts, and edge workloads could be processed in the network room of a local big-box retailer. However, there is a common denominator to them: each model has global ambitions and global footprints.

Challenges

1. Global companies may manage a large portfolio of rack PDUs (rPDUs) depending on the location of their hardware. Different worldwide electrical standards can create rPDU SKU sprawl, resulting in additional supply chain costs and complexity.
2. rPDU upgrades have historically been *rip-and-replace*. Traditionally, rPDU inputs and outputs have been hardwired, resulting in a fixed capacity. If more power is needed at the rack location, a new rPDU would be required.

The Difficulty of Electrical Standardization

Whether a data center operator is classified as hyperscale or edge, they have likely seen the financial benefits of standardizing their data center assets. But, where electrical gear is concerned, product standardization presents specific challenges, namely the diversity of worldwide electrical standards and compliance requirements. If a user, for example, has IT cabinets in Japan, the US, and the UK, the user could have different voltages at each cabinet. Three different voltages would require three (3) different rPDUs—even if the rest of the physical configuration is identical.

Some large operators in North America have realized the efficiency benefits of operating at the typical international voltage (400V) in their company-owned facilities. These same operators also maintain points-of-presence at North American colocation facilities—third-party providers who are more likely to run the prevalent 120/208V North American architecture. The operators must then manage separate rPDU SKUs depending on the deployment location.

Introducing the UPDU

While no vendor can rewrite power standards or rewire power grids, Vertiv has created a product called the Universal Power Distribution Unit (UPDU) to simplify global deployments. It brings a different way of thinking about an rPDU—a conceptual separation of the physical rPDU into its input and output component parts.

Universal Rack Power Distribution Unit (UPDU): Simplify Infrastructure Deployments with a Single rPDU Globally

A Vertiv Application Brief

The output side of the UPDU is familiar. While there are many country-specific outlets/receptacles commercially available, enterprise IT hardware is largely encompassed by both IEC C13 and C19 receptacles, which are rated at all necessary flavors of voltage and amperage. You'll find familiar combinations of both C13s and C19s in the UPDU.

The hallmark of this rPDU is its input power connection. Instead of a factory-supplied cord and plug, the UPDU boasts a unique, 8-wire male connector. A Facility Side Cable (FSC)—with a matching 8-wire female connector at one end and a commercial plug at the other—completes the installation.

The UPDU becomes universal because the physical rPDU—the receptacles, the conductors, the breakers, and the onboard telemetry—remains the same regardless of geography. It can be shipped around the world, and inventory can be shared amongst different sites. The UPDU receives its identity from its FSC. For example, depending on where it's installed or what it needs to power, the same chassis can simultaneously be:

- 208V single phase, 30A
- 208V three phase, 30A
- 208V three phase, 50A
- 400V three phase, 32A

As deployed by a multi-national operator, the UPDU chassis would be consistent throughout all properties, and each site would manage their specific inventory of facility side cables.

How does it work?

The ingenuity of the UPDU lies within the FSC assembly. The conductors are spliced differently within each model so that, once connected to the male end of the UPDU, the downstream components in the UPDU (like breakers and receptacles) are wired to output the connected power configuration (line-to-line or line-to-neutral).

The physical chassis is upgraded with oversized wiring between the female connector and the breakers to accommodate the highest supported amperage. All breakers in the UPDU, furthermore, are double-pole to accommodate all possible power configurations.

From Replace to Re-Use

The UPDU has two models—one supporting up to 11kW and another supporting up to 22kW. The modularity of the FSC provides portability between different capacities, meaning rPDU upgrades no longer have to be *rip-and-replace*. A 30amp 208V UPDU (4.9kW) could become a 30amp 3-phase UPDU (8.6kW) by exchanging the FSC. The initial investment in the UPDU (conductors, receptacles, network intelligence) could thus be repurposed across hardware refreshes.

Conclusion

The UPDU helps to simplify perhaps the most complex task in rPDU deployments—forecasting. For example:

- What countries comprise the footprint today? Will additional sites be needed as the business matures?
- What capacity is required day-one and day-two? What does the upgrade path look like?

There are cost penalties for reading the tea leaves incorrectly. The UPDU can alleviate some of the inherent risks of forecasting.

Vertiv.com | **Vertiv Headquarters,** 1050 Dearborn Drive, Columbus, OH, 43085, USA

SL-70515 (R09/19)