Edge Distributed Data Center Power Architecture

Re-Capturing Stranded Data Center White Space when your Existing UPS is at Capacity

As data center equipment density increases it consumes less white space. The space needed to support a megawatt of equipment may be half what it was just two years ago. This can mean that the data center's UPS system may reach its full capacity before all available white space is fully utilized. Unless there is space in the power room for additional UPS and/or batteries, that white space becomes unusable or "stranded" space.

Edge Data Center Power Architecture Installation.

A new backup power architecture can recapture that stranded white space and put it to revenue generating use – our Edge distributed data center power architecture.

Density is Increasing

As electronics have gotten smaller and processors more powerful, computational density has increased. You can now get more work out of the same cabinet space or you can get the same amount of work from fewer total cabinets. With this increase in computational density comes a correlated increase in overall power consumption.

Datacenters.com has reported power densities are now hitting 20 kilowatts (kW) or more per cabinet[1] – it wasn't that long ago that 4 kW per cabinet was considered high density, now we're able to achieve upwards of 5x that.

[1]https://www.datacenters.com/news/understanding-the-interplay-between-data-center-power-consumption-data-center-en

Load Power in a 24" X 48"Enclosure	
4kw	0.5 kw/Sq ft
20kw	2.5 kw/Sq ft
48kw	6 kw/Sq ft

Reliable Power

The traditional uninterruptible power architecture for a data center is the centralized UPS. The operator will install a UPS with enough backup power capacity to support the data center's anticipated load. However, because computing and power equipment is not installed all at once – especially in a co-location application – as the load is built out, and technology progresses, the UPS can reach its full capacity before all available white space is filled. This is exacerbated by the continuous increase in computational density in each cabinet So, while there is still room to add cabinets and additional computational capacity, once the capacity of the UPS system has been reached, any remaining white space becomes stranded, or unusable.

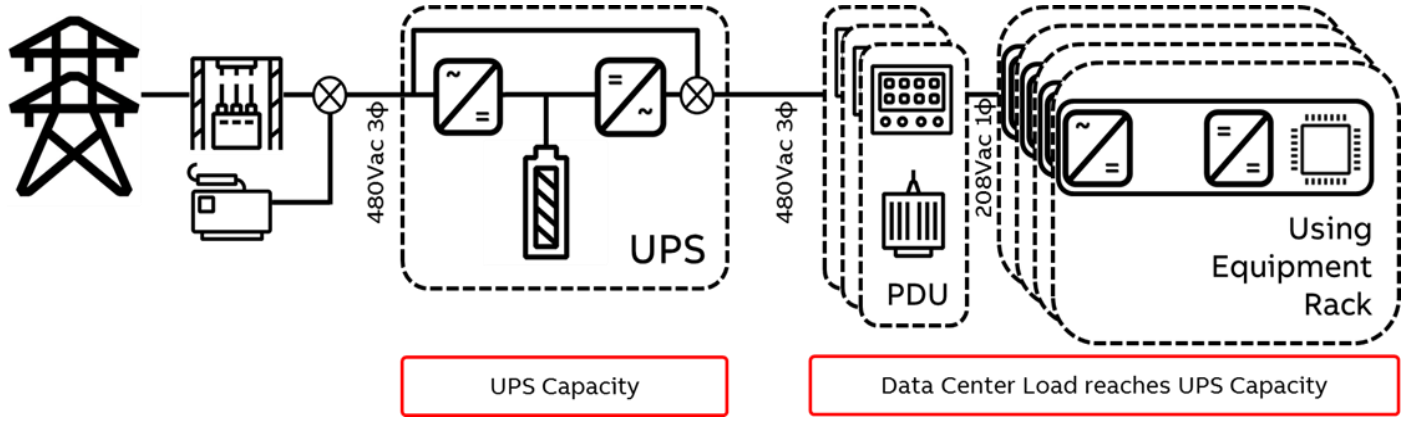


Figure 1 Centralized UPS powering PDUs and data equipment

A New Solution with Its Own Backup Power

We help address this challenge of stranded white space with our Edge power architecture, which houses data center equipment and built-in power supplies into the enclosure. With DC power equipment installed down the vertical space on the side of the enclosure, the Edge enclosure can add capacity and the backup power it requires in this previously unusable white space.

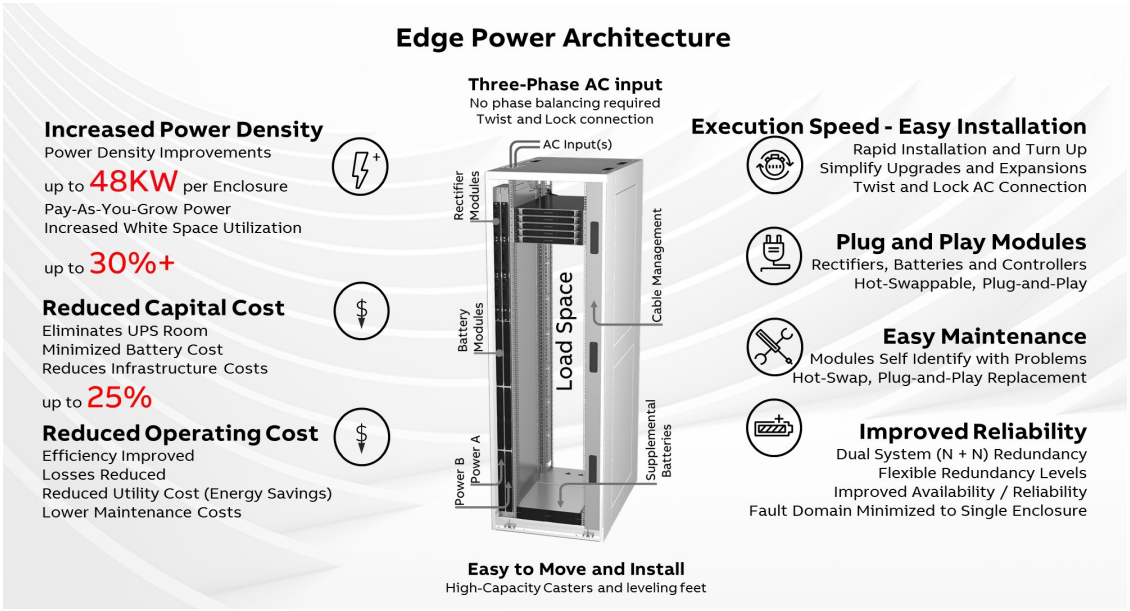


Figure 2 – Edge Distributed Data Center Power Architecture

By designing the DC power supplies into the side of the enclosure we're able to free up valuable space for additional non-power components.

The distributed data center power architecture features plug-and-play rectifiers and plug-in battery modules, and it is configured for 48-volt DC loads. The rectifiers run directly from three-phase, 480-volt AC power with N+1 or full N+N redundancy.

Power distribution within the Edge enclosure is accomplished with plug-in power distribution units that are mounted in the back of the frame, so no additional floor space is required for this equipment.

Using the White Space Without More UPS Capacity

Since the Edge Power Architecture includes its own rectifiers, DC power components, and batteries, it can be connected directly to the 480-volt AC utility feed and does not place additional load strain on the existing UPS system. The image above illustrates how the Edge power architecture can be connected in an existing facility.

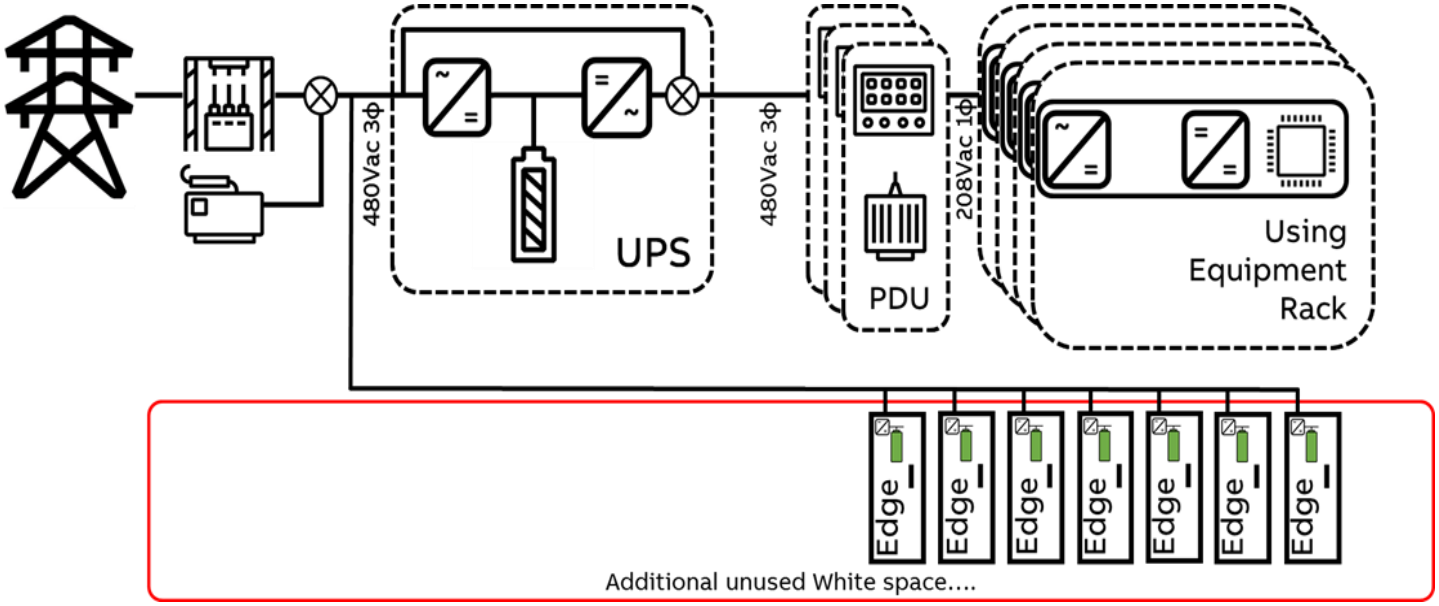


Figure 3 Addition of Edge power architecture to existing data center power infrastructure

The number of units that can be added to the existing equipment is limited by one of three factors:

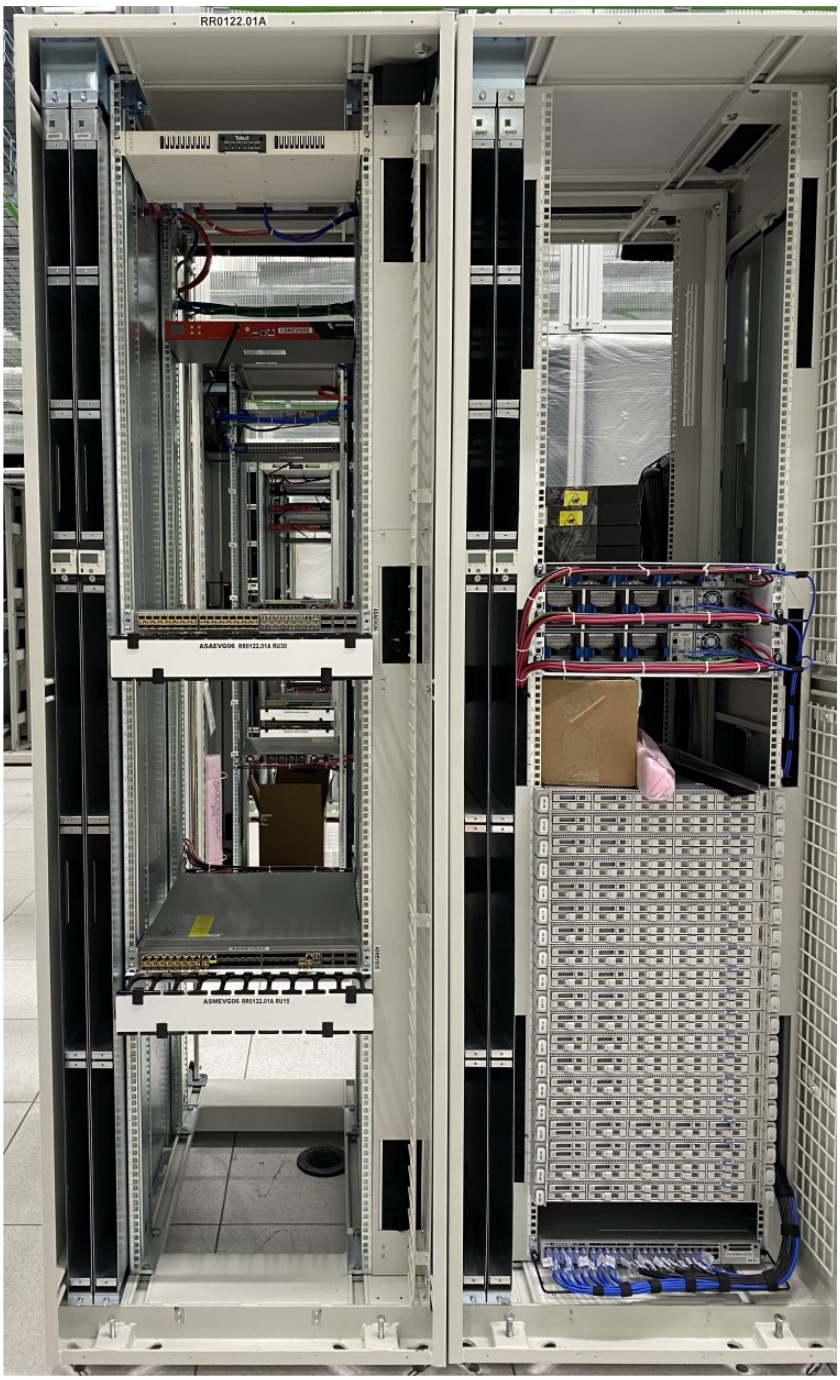
1. The utility feed capacity – which generally is not a limiting factor.
2. The white space available – this is what we set out to utilize.
3. The cooling capacity available in the building – since the additional equipment will generate heat.

Heat generated by the Edge power architecture is minimal due to the high efficiency of the rectifier and the single conversion step utilized. Heat produced by a cabinet full of data processing equipment, on the other hand, is not insignificant. In a cabinet containing 12 kW of load, the heat generated will be almost 12 kW. Should the building require additional cooling, the Edge frames can be fitted with door-mounted cooling systems or adjacent in-row CRAC units.

Summary

As data center equipment has improved it has become denser, stranding unused floor space when the UPS reaches its capacity limit. Our Edge power architecture allows data centers to make use of that stranded white space without requiring upgrades or additions to the existing UPS. Edge is easy to install, simply requiring the frames to be plugged into a 480 volt AC power source. Its design includes modular, plug-and-play DC power components that can be configured to exactly match the requirements of the load equipment, and hot-swappable rectifiers simplify maintenance.

The power architecture is available in an N+1 or N+N redundancy configuration, providing options based on your reliability needs.



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