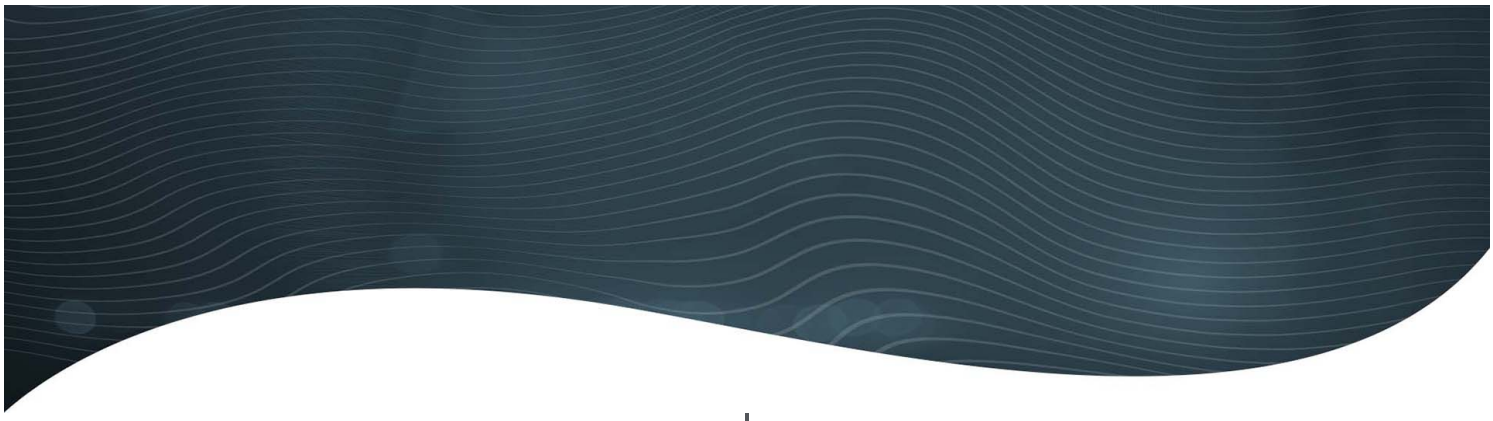
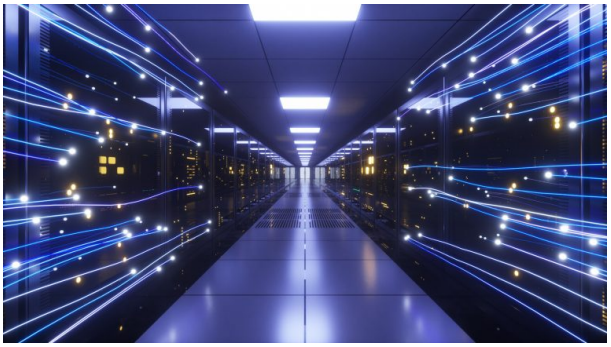


Blog

Efficiency and Standardization Drive 48 V Data Center Power

By Harry Soin • November 4, 2021

Whether it's the explosion in artificial intelligence (AI) and machine learning (ML), the pandemic-accelerated drive to online collaboration, our insatiable appetite for social media or the proliferation of information from the Internet of Things (IoT), one thing is certain – worldwide demand to process, store and share data is increasing exponentially. This trend fuels the need to deliver more cloud computing power by continually *expanding global data center capacity* through the addition of servers and accelerated adoption of next-generation, power-hungry ICs.



From the data center operator's point-of-view, these issues present two fundamental challenges. Firstly, as capital investments range from hundreds of millions to billions of dollars, they must focus on keeping costs as low as possible. Secondly, with data centers already accounting for at least *3% of worldwide electricity use*, they are under intense pressure to drive up processing capacity without significantly increasing energy consumption.

Combined, these two factors drive demand to dramatically improve efficiency and to standardize data center equipment – trends that are converging to propel forward the transition from conventional 12 V power supplies to 48 V architectures.

Growing adoption of AI and ML applications is driving demand for next-generation processors such as Intel's Sky Lake with power requirements up to 450 W, AMD's Milan (up to 300 W), Nvidia's A100 GPUs (up to 400 W) and other custom designed, high-power xPUs, FPGAs and ASICs. These power-hungry processors are one reason that average data center power-per-rack is expected to rise from the current 10-15 kW to between 20-40 kW. By increasing rack voltages from 12 V to 48 V, the current draw for the same power level is reduced by 4X. This translates to 16x lower I^2R distribution

Load	12V 3kW PSU	48V 4kW PSU	Efficiency Improvement
100%	94%	96.3%	2.3%
50%	96.5%	98.1%	1.6%
20%	95.5%	97.3%	1.8%
10%	93.5%	95.1%	1.6%

Because such efficiency improvements equate to better thermal performance and reduced cooling requirements, the size of power bus bars can be reduced, minimizing overall data center power use. This translates directly into cost savings and emission reductions.

Take, for example, a data center with overall power use of 10 MW where servers consume 50% of that energy and power usage effectiveness (PUE) is 1.6. An increase in efficiency of 2% equates to a 1.6% decrease in electricity use representing an annual saving of 1.4 million kWh (or nearly $100,000 assuming energy pricing of $0.07 per kWh) and a reduction in CO_2 emissions by more than 21 million pounds.

At the same time, initiatives such as *Open Compute Project's 'Open Rack'* are creating a

The transition to 48 V architectures is accelerating and it is estimated that up to 50% of data centers will implement 48 V by the middle of this decade. To support this transition, Advanced Energy is leading the 48 V adoption with a range of its Artesyn 48 V power supply solutions, which include a family of ORv3 power shelves featuring 97.5% efficiency. As a key contributor to OCP ORv3, Advanced Energy is collaborating with major OCP users and leaders in the hyperscale data center segment to create a common power platform for customers across deployments. Advanced Energy's highly efficient, high performing power supply solutions power the data center's hardest challenges.

Advanced Energy will present the latest updates to ORv3 power shelves efficiency at the OCP Global Summit 2021 in San Jose. The presentation takes place November 10 at 8:20 AM PDT. Learn more *here*.

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