Emerson cranks voltage to 480 on server power distribution

Emerson Network Power released a new 480-volt power distribution unit — a voltage configuration that data center infrastructure experts have been clamoring for recently due to potential energy efficiency gains.

Typically an uninterruptible power supply (UPS) operates at 480 V, and a PDU steps down that power from 480 V to 208 V or 120 V. By eliminating the step-down transformer in the PDU by distributing power at 400 V/230 V and operating IT equipment at higher voltages the power chain would be more efficient.

The rack-sized Liebert FDC was designed for new high-density power servers that can handle 480V power, including new models recently unveiled by IBM, said Bill Barcus, product manager, Liebert AC Power.

Data center managers can achieve an additional two percent energy savings by eliminating the step-down losses, according to Barcus. This doesn’t sound like much, but a data center with 1,000 servers could save around $40,000 annually.

Lately, infrastructure vendors are paying a lot of attention to distribution of power at higher voltages. Virtually all IT equipment is rated to work with input power voltages ranging from 100 volts (V) to 240 V alternating current (AC). The higher the voltage, the more efficiently the unit operates. However, most equipment is run off lower-voltage power: the traditional 120 V.

According to new research from Eaton, a Hewlett-Packard Co. ProLiant DL380 Generation 5 server, for example, operates at 82% efficiency at 120 V, 84% efficiency at 208 V, and 85% at 230 V. A data center could gain that incremental advantage just by changing the input power and the power distribution unit (PDU) in the rack.

“People say that virtually everything is coming at 208 V but they have lots of equipment coming in at 120 V,” said Peter Panfil, vice president of power engineering at Emerson’s Liebert Corp. “The IT people are more comfortable with 120 V, but there is no safety tradeoff.”

Robert McFarlane, data center design expert and principal at New York-based engineering firm Shen Milsom & Wilke Inc. offers advice for data center pros exploring this approach in the future. “The first step is to look at your servers,” he said. “See if they auto-sense 208 volts, and see what you can do about running 208 to your cabinets instead of 120. There are plenty of PDUs that will deliver 208 and 120 to the same strip if you wire it right.”

Taking the voltage directly to 480 and avoiding ther stepdown altogether is even more efficient. Vendors have been rolling out these products in Europe, but Chris Loeffler, product manager at Eaton said the main factor holding users back from distributing power at 400 V/230 V in the U.S. is that the equipment to handle these voltages is CE marked (it contains the manufacturer’s seal that it meets the European Union safety standards) but not approved by Underwriters Laboratories, the U.S. product testing and compliance organization.

“The global UPS manufacturers all make 400-volt systems, and we’ve done a number of Google data centers at 400 volt, bringing in our CE-marked equipment,” Loeffler said. “But UL means something for some people and you would have a tough time looking at this as a partial upgrade.”

Barcus said the typical panel board vendors use is UL listed for 240 volts — while they are rated higher internationally — but the new Liebert FDC uses a higher rated panel board, which is UL listed.

“We’ve had some queries from customers, but not a lot of sales yet,” Barcus said. “This is the tip of the iceberg.”