DataCenter Knowledge™

DESIGN > EDGE COMPUTING

Will Lack of Three-Phase Power Blunt the Telco Edge?

Edge computing architects told us telco base stations are perfect for distributed compute, but can we please borrow an extension cord?

Scott Fulton III | Apr 03, 2019

Most equipment vendors in the data center space today will tell you there is more than one "edge" — a multitude of geographic zones where it's strategically more convenient to distribute computing power than it is to centralize it. For members of groups like the newly emergent Kinetic Edge Alliance , the edge zone most likely to strike gold is adjacent to the base stations of 4G and 5G wireless antennas, as close as possible to the point where data from field sensors is collected. The whole point of edge computing is to minimize latency.

So, you'd think the rush would be on to build computing power at the base of every transmitter. Here's the problem: Computing power needs electrical power, and enterprise-grade computing power needs a certain type of power – specifically, three-phase power. Until recently, transmitters were not the place to find it.

Related: Vapor IO Forms Alliance for Full-Service Edge Computing at Its Tower Data Centers

"The reason why telco base stations are not assured of getting three-phase power is due to the fact that traditional use cases for mobile base stations seldom had power requirements greater than 5kW," explained Ashish Moondra, senior product manager for power, electronics, and software for power protection provider Chatsworth Products.

Moondra told us that the typical base station requiring less than 10kW will only be using single-phase power. Three-phase power would be used at apparent power levels of 20kVA of alternating current and above. For the range in-between, it could be a toss-up.

Related: Why Open19 Is Being Designed as an Edge Data Center Standard

With typical data centers built in commercial buildings or in modular units with dedicated power modules built in, availability of the more flexible, adaptable three-phase power has never been a question. It costs less, assures load-balancing across all three phases, and minimizes losses due to harmonics and power distribution, Moondra said.

But, if an edge computing customer wants to distribute computing power as close to the point of data reception as physically possible, it may be up to them to supply the site with the right power.

Steven Carlini, Schneider Electric's VP of innovation and data center, has been searching for answers to this dilemma himself. "It's going to be one of the biggest challenges," Carlini told Data Center Knowledge, "and once they get the power to the site, they're more concerned about what it's going to cost. They're not really thinking of, is it even possible?"

"I would say, the thing at the edge that's presenting an interesting challenge is just the pure availability of power at these remote location sites," said Ty Schmitt, Dell EMC's VP of modular data center solutions. "When the customers wanting to do something, there isn't enough power available. How to provide that is something of a unique challenge."

It's not a challenge that has impacted Dell EMC just yet, Schmitt said. His division produces Edge Gateway devices , many of which are directly powered by wind turbines and solar cells.

That's single-phase power, which may be okay for running an IoT monitor for the turbines or cells themselves. Let's say you're a municipal resources provider looking to fund a 5G buildout by making data center services available for local businesses and municipal offices. The best place to do that

is next door to the wireless transmitter array. Yet you can't exactly run an orange extension cord out to the nearest farm.

"If you have to run a long run of single-phase," said Schneider's Carlini, "technically, you get into these situations where it's unbalanced. If it's any kind of significant power, you want to run three-phase. If you run out of significant power, and you're only running one or two phases, then you'll have to try to balance the other phases somewhere else."

Chatsworth's Moondra agrees. "If the end customers are themselves leasing space for very specific applications with limited power draw, single-phase may work for them," he said. However, "if the lessee is a provider themselves that is setting up a modular data center to serve several customers, single-phase power will limit their scalability and hence long-term profitability."

So, the costs involved in re-conditioning single-phase power could make the whole project cost-prohibitive. In addition, Carlini said the size of the conductor alone for running more than 15kW of single-phase power could be huge.

"To accommodate three-phase, the modular data center should be able to accept incoming three-phase supply from the utility as well as the generator," Moondra said. "The UPS within the modular data center should also be a three-phase version. If equipment cabinets are expected to support densities greater than 5kVA, power distribution downstream of the UPS should be capable of providing three-phase circuits to each cabinet. The rack power distribution unit within each cabinet should also be three-phase."

US telcos have already begun rolling out "4.5G" upgrades to their base stations and radio access gear in advance of 5G upgrades still to come. Included in these upgrades are the first ground-based control systems.

Disconnected from the transmitters, they're based on commodity servers, use less power, and are much less expensive to manage and cool in ground-based locations.

But Carlini warns that even these initial systems are essentially data centers by another name. "When you talk about things like network slicing and some of the advanced things that 5G can do," he said, "it takes a lot more IT equipment than you had with 4G or 3G."

The whole point of the edge was supposed to be bringing data center resources closer to where the action is. This action has been underpowered to begin with, and three-phase power at wireless edge sites is one of the biggest puzzles the people building this new infrastructure have yet to solve.

Source URL: https://www.datacenterknowledge.com/edge-computing/will-lack-three-phase-power-blunt-telco-edge