What is digital electricity?

Bill Schweber - May 17, 2018

While reading an article in the always interesting, informative, and useful publication *Cabling Installation & Maintenance*, I came across a technical term that was both new to me and also quite ambiguous: digital electricity. While the article, “Amtrak HQ renovation employs passive optical LAN technology for long-term campus network connectivity,” was mostly about copper and fiber connectivity rather than power wiring, and only used that new-to-me phrase in a few sentences, it still intrigued me. I could envision many possible meanings for this term, including digitally controlled power converters, but none made sense in the context of the story.

Here’s what the article said that got my attention: “This emerging technology combines DC power and data into packets which are transmitted and received in a manner that is somewhat analogous to how information packets are conveyed over networks. Digital electricity allows us to push power out to much longer distances without having to plan for the normal voltage drop – and without having massive copper wire size; we incorporate this technology into our designs when centralized power is a must and on projects when the facility’s design doesn’t support traditional cable lengths – such as rail stations, airports and sports venues.”

I did some digging and found it is a term which refers to a relatively new, and very different, way of transferring substantial amounts of power over non-power wiring. I also found that there are apparently two vendors prominent in this area: VoltServer Inc. and JMA Wireless (odd name for vendor doing power). What they apparently offer is a way to send very short, very high-voltage pulses for long distances over standard, low-power cabling (such as in Ethernet) to a unit which somehow accumulates and then transforms the energy into a substantial power source (Figure 1). The pulses are halted within 3 msec if there’s a break in the cable, someone touches it, or any other irregularity.
The “digital electricity” system transmits about 700 energy pulses per second, while monitoring the line for any abnormal conditions that would mandate near-instant shut-off. (Source: VoltServer)

The stated benefit is that the energy is so low that the wiring does not need an electrician to do the installation, so it can be done by regular construction crews. It is claimed to be lower cost in materials and highly efficient. It also meets all relevant UL and IEC regulatory requirements for low-power safety. A complete system requires what are called digital electricity transmitters and complementary receivers, (Figure 2), but I could not find data sheets for either, nor a clear statement of what goes into and what comes out of each box, their size, power requirements, speed, or anything similar.
The digital electricity transmitter (top) and matching receiver appear to be modest-size enclosures, but that’s about all I could find out about them. (Source: JMA Wireless)

I studied their web sites and collateral carefully and did some other research, and still don’t really grasp how this set-up works or how it manages to accomplish what seems to be contradictory and almost unsupportable goals. How can you send enough energy, via short pulses, to integrate and convert into a fairly large amount of output power in this type of continuous power-drain application? Pulse-power delivery is a viable technique for some specialty situations, such as high-energy tests, but this is very different.

The greatly simplified discussion, “The Idea” on the VoltServer site, actually raised more questions for me than it answered. In addition, the product page at the JMA Wireless site was of little help, as was this VoltServer “success story” posted in a publication called Connected Real Estate. The hour-long VoltServer presentation “Touch-Safe, High Voltage Digital Electricity Transmission using Packet Energy Transfer,” which you can view below, was somewhat more helpful, but still left me wondering about the technique and the claims.

Overall, I wish I better understood what they are doing and how they do it. Frankly, the skeptic (or cynic) in me was ready to assume this was some sort of “something for almost nothing” scam that seems too good to be true, but VoltServer claims about 200 installations in various commercial buildings as well as named sports stadiums, so I suppose it really does work. I still wonder, though, why I haven’t seen anything about this apparently innovative technology in the various engineering-design publications, especially as it is clearly not a very new approach given the many actual deployments.

What’s your sense of this innovation? Are you familiar with it? Are you comfortable that it can really deliver what they claim? Do you understand how it works? What am I missing—or am I missing the point?

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