

Monday, August 29, 2011

EXCLUSIVE NEWS

AEP finds 2 uses for technology developed with Amperion

American Electric Power (AEP) chose Amperion, of Lawrence, Mass, to provide broadband power line carrier (BPLC) technology to protect 69-KV transmission lines and improve DA, starting this summer, Amperion CEO Nachum Sadan told us Friday. AEP's is the first commercial deployment for the 10-year-old, privately held firm.

AEP and Amperion collaborated for five years to develop the BPLC technology, which will allow removing the dedicated copper cabling that now carries communications, instead carrying digital data through

transmission wires themselves, David Ball, AEP's director of protection and control engineering, told us Thursday from his office in Gahanna, Ohio.

QUOTE OF THE DAY: There is no other option. This niche of Amperion's is one-off right now.

David Ball, AEP's director of protection and control engineering

Currently, AEP uses cables, made up of as many as 12 pairs of twisted copper wire, strung alongside 69-KV transmission lines, to connect protective relays at those lines' endpoints, Ball said.

These cables are called pilot wires. In the alternative, on some transmission lines AEP uses conventional PLC, which requires additional gear like couplers, wave traps and tuners.

The purpose of both pilot wires and conventional PLC in this case is to deliberately cut power on given segments of the grid in case of faults on the protected line. To ensure proper isolation of faults, protective relays communicate with each other over the pilot wire or through conventional PLC, each confirming that the fault is located on a given section of line and that the relay has isolated that segment correctly.

"You need communications from end to end saying, 'I'm seeing the same thing you're seeing,'" Ball said.

Over the years, the copper in pilot wires can corrode or wear, he added. In remote areas, pellets from shotgun blasts aimed at birds perched on the cable can nick its insulation, so rainwater, air and airborne particulates attack the copper, he said. Copper's value makes the cables vulnerable to theft. Overall, "you're probably down to one or two functioning pairs" in some locations, he said.

The protective relays can be connected over the pilot wire through analog circuits leased from the local phone companies, Ball said. But many of these companies are eliminating such circuits or charging more for them, he said.

Using the BPLC technology co-developed by AEP and Amperion, AEP can remove the old cabling, letting the protective relays communicate with each other through the transmission lines themselves. AEP is replacing the old relays with newer, digital models from two vendors AEP declined to name. The couplers used on stretches equipped by conventional PLC, too, can be removed, because the new technology feeds the communications signal into the transmission lines through standard utility lightning arresters.

The BPLC technology can carry a signal about five miles without an amplifier and 10 miles with an amplifier -- about the same range as the pilot wire.

FARUQUI: Will 'smart pricing' solve EV charging problem?

The effect of EVs on the distribution grid "is unlikely to be positive," predicted a 15-page paper released in July for peer review and publicized Friday by the Brattle Group. "The national goal of putting one million EVs on the road by 2015 could easily become the bane of distribution engineers," said the paper, due for October publication in *Public Utilities Fortnightly* and titled "Will smart prices induce smart charging of electric vehicles?"

The paper appears to be among the first to provide concrete examples using hard numbers, rather than generalities, to illustrate the difficulties EVs may pose for the grid.

Even rate structures that significantly favor off-peak charging will save customers less than \$50/month on charging costs, the report said. If consumers' sensitivity to the price of charging is no greater than it is to the price of whole-home power, "the outcome may be disappointing," the consultancy wrote. Some EV owners, for example, buy those vehicles mainly to be green, not to save money.

EVs are not likely to produce unmanageable demands on generation, the report said. But distribution-system

problems could arise well before significant numbers of EVs appear on the road, because clusters of them in tech-savvy neighborhoods could blow the transformers feeding owners' homes.

The Brattle Group simulated the likely response of EV owners under three different TOU rates, Brattle Group principal Ahmad Faruqui told us last week. Under the most aggressive rate -- a 4:1 peak to off-peak ratio -- if EV owners display the type of price responsiveness seen in dynamic-pricing pilots, less than 5% of the peak load would be shifted to off-peak periods, the consultancy found. So almost all the circuit overload would persist.

If owners display six times the responsiveness seen in those pilots, half of the new load would be shifted. Only if they display 20 times the responsiveness will all of the peak load be shifted to the off-peak period, returning the grid to its current status.

"No one knows" EV owners' likely degree of responsiveness to TOU pricing, Faruqui said. "The area is ripe for experimentation. Without experiments, we may be prematurely concluding that smart pricing will solve the smart charging problem."

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The new system “is going to save time and money,” Ball predicted, though he said he could not estimate how much.

BPLC technology will have a second use at AEP, too, Ball said. Many of the utility’s substations -- which house transformers stepping high-voltage transmission-line power down into lower distribution-line voltage -- already have SCADA installed, though nearly half do not, especially those that are remotely located, he said. SCADA is an important part of the smart grid moving forward, he said.

BPLC can carry SCADA data over 69-KV transmission lines linking one substation to another. Once the data arrives at a substation already equipped with SCADA, that data can be linked to the operations center via fiber or other means. The new technology “can eliminate the need to pull fiber or add a communications path” to non-SCADA-equipped substations, Ball said.

Advantages outlined

There are three reasons why BPLC – on which Amperion holds several key patents – is important to utilities, Sadan said.

BPLC uses the utility’s own transmission wires, which are already in place, and eliminates the need for circuits leased from phone companies. Fiber, a third alternative to pilot lines and conventional PLC, is far more expensive

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than either, costing \$75,000-100,000/mile -- so BPLC is a cost-effective alternative.

BPLC is highly secure, because it runs through high-tension wires that “no one in their right mind” would try to tap in to. It uses proprietary protocols resistant to interception. And it gives utilities control over the essence of their business: transporting power. “There’s a debate in the industry over public vs private networks, but the many utility managers I’ve talked to hate being dependent on someone else’s network for critical functions like line protection,” Sadan said. “Control is a big issue.”

Broadband communications, with digital data traveling at hundreds of kilobits/second, is essential for substation automation, Sadan added. As the smart grid progresses, substations will need 500 KBPS communications links to support the sensors, meters, monitors and SCADA

devices they contain, he said, citing a 2009 KEMA study. Conventional PLC carries only analog data, and at speeds in the single-digit KBPS range, he said. “Utilities need broadband -- if not today, then tomorrow,” he said.

BPLC is the only communication technology, aside from extremely expensive fiber, that can carry a protocol called current differential, used by the newer digital relays that AEP plans to install, Sadan said.

Developing commercially usable BPLC required cooperation from AEP on many levels, Sadan said. “They provided access to labs, lines, crews, substations, engineers and managers,” he said. “This is a very involved system.”

Sadan gave us a deep look at his firm and its early development efforts in February (SGT, [Feb-03](#)).

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24 governors urge extension of US tax credits for wind energy

A bipartisan group of 24 US state governors requested extending the wind production and investment tax credits by

seven years to help establish stability in the wind industry market, the governors told the press Friday. The governors

also want to determine transmission and grid integration priorities for interstate power providers, such as the Bonneville Power Administration. Such a task could invite more grid modernization efforts as generators and power providers look for ways to integrate renewable energy.

The Governors Wind Energy Coalition sent the letter to the White House last month, according to the American Wind Energy Association (AWEA), a wind industry lobbying group. The wind industry production tax credit is scheduled to end next year. It provides a 2.1¢/KWH benefit for a generation facility’s first 10 years of operation. The temporary tax credits send a mixed message about US wind policy that has prevented investors from making big plans, wind industry experts told us last week (SGT, [Aug-23](#)). Though many people desire a federal renewable portfolio standard, extending tax credits currently appear more politically achievable, Ellen Carey, an AWEA spokesperson, told us last week.

“Although tax credits for wind energy have long enjoyed bipartisan support, they

7 stories in 2 minutes

Isolux Corsan

Picks ABB: ABB won a contract from Isolux Corsan, of Spain, to provide automation for six substations in northeastern Brazil, it told the press recently. ABB substation-automation and telecommunications systems will serve the Tucuruí-Xingu-Jurupari line and the Oriximina-Jurupari-Laranjal-Macapa line, both located in the Amazon region, ABB said. ABB will supply 125 cabinets for the substations, each equipped with protection-and-control intelligent electronic devices.

New Japanese law

pushes renewables: The Japanese parliament passed laws that could encourage renewable power integration to

the grid, [Reuters reported](#) last week. The plan lets utilities buy solar, wind, biomass, geothermal and small-sized hydro power at preset rates for 20 years. Those rates remain undetermined, [Reuters reported](#). Japan hopes such incentives will supplement the power it lost from nuclear shortages and a potential shift away from that power source, expecting renewable power to provide 30,000 MW during the next decade (SGT, [Aug-10](#)).

China thinks twice

about EV plan: Chinese leaders now think a plan to mass-produce EVs, an attempt to eliminate gasoline-powered vehicles, is unrealistic, the [Financial Times reported](#) last week. Some 90% of Chinese respondents to a 7,000-person

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are scheduled to expire next year,” the letter to the White House said. “Wind-related manufacturing will slow if the credits are not extended, and some of the tax credits’ benefit will be lost if Congress pursues a last-minute extension. It is important to have consistency in policy to support the continued development of wind manufacturing in the US. Extending the production tax credit and the investment tax credit, without a gap, is critical to the health of wind manufacturing in our nation.”

The letter asked DOE to help deploy and develop markets for renewable energy technology. Calling the US “minor players” in the global renewables market, the letter encourages a greater DOE role because “these are precisely the types of efforts other nations are utilizing to successfully compete with the US.” Many EU nations got a head start from their governments through feed-in tariffs, which subsidize renewable power generation relative to its cost and cements long-term contracts with power providers.

The inquiry about incorporating renewables on interstate transmission lines could create a path for grid modernization technology. FERC may have already made that process easier with Order 1000, which encourages regional transmission planning (SGT, [Jul-22](#)). That policy will help bring stakeholders together and include renewable power generators in the planning process.

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7 stories in 2 minutes

From page two

Accenture survey in May said they will certainly or probably consider buying a plug-in EV over the next three years (SGT, [May-20](#)).

Maker of solar inverters

makes monitoring easy: Solar inverters from Advanced Energy can be ordered that include a range of monitoring software already installed, configured and tested, saving \$2,000-5,000/inverter, the firm told the press last week. Available software includes products from Draker Laboratories, ESA Renewables, Locus Energy and Noveda Technologies.

Siemens touts

interop findings: Power-control equipment from Siemens, marketed under the Spectrum Power brand, meets the IEC 61968 and IEC 61850 standards, according to interoperability tests performed by the International Users Assn of the Utilities Communications Architecture, Siemens told the press Friday. That means the equipment can be integrated into systems from other manufacturers “without posing any interface problems,” Siemens said. IEC 61968 deals with the Common Information Model on distribution networks. IEC 61850 governs communications in energy automation, Siemens said.

Conservation incentives weighed in IBM survey:

Financial incentives no longer push consumers to invest in energy efficient products, according to an IBM utility consumer survey publicized last week. Most young consumers buy such products for environmental reasons, while many consumers 55 and older are most concerned about how energy use affects national economies, the report said. It also noted that consumers lack basic knowledge about how power pricing works. Many respondents were uncertain of the basic underpinnings of the power industry. The report identified as areas of concern alternative motivation, information availability and social drivers. More than 30% of respondents to the survey had never heard of the term “dollar/KWH,” and more than 60% did not know smart meters or smart grids existed, the report said.

Report predicts

growth of EVs: The market for hybrids and EVs will reach 2.9 million vehicles/year by 2017, Pike Research said in a 32-page, \$2,800 [report](#) publicized Friday. The report addresses predicted fuel costs over the next few years and the effects of government incentives.

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support@smartgridtoday.com

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