

Technology At Work

'Can We Talk?'

With New Interface, the Answer for Appliances, Utilities, and Demand Response Will Now Be 'Yes'

By Garrett Hering

There's much talk these days about "The Internet of Things"—the vast amalgamation of digital devices, machines, and other "things" that collect and exchange information to unlock new capabilities. For the power grid, such talk focuses on the potential for interconnection among emerging energy technologies to enhance reliability, safety, cost-effectiveness, and efficiency.

But without a common language, the technologies can't talk to each other, and such opportunities and benefits can be lost in a dense digital Babel.

To help technologies talk and to advance grid connectivity, EPRI is co-developing and demonstrating a new interface, or port, based on a 2013 Consumer Technology Association standard known as CTA-2045 (formerly CEA-2045). The port enables customer appliances to connect to any communication network and receive and execute commands using a common language and mechanical interface. The port makes it possible for thermostats, water heaters, electric vehicle chargers, pool pumps, and other devices to participate collectively in automated demand response programs or other services.

"Coordinated control of intelligent customer devices can help to balance supply and demand by reducing their electricity use during peak periods. It can also lead to lower power prices," said Chuck Thomas, EPRI technical leader. "We are helping them to speak the same language."

Refining Prototypes with Manufacturers

In 2015, EPRI launched a three-year project with 23 electric utilities and 14 manufacturers to develop and demonstrate CTA-2045-compliant devices.

Using the standard and functional specifications, manufacturers are developing prototypes of domestic electric and heat pump water heaters, thermostats, variable-speed pool pumps, solar inverters, electric vehicle supply equipment, and packaged terminal air conditioners. They are using EPRI software to support product development and interoperability.

Manufacturers send prototypes to EPRI's Knoxville facility, where Thomas and his team evaluate them with respect to CTA-2045 and functional specifications. Based on the results, manufacturers provide refined prototypes.

"We go through several prototyping cycles," Thomas said.

EPRI and participating utilities are evaluating the prototypes' effectiveness in laboratories and at customer sites. EPRI reports will provide results, recommended changes to the standard, specifications, and product development status.

Approaching Commercialization

One product that EPRI has helped advance to the brink of commercialization is a water heater from a manufacturer that is unnamed for competitive reasons.

“You can’t buy it in retail stores yet, but the company is shipping products to utilities that were manufactured on real production lines, not by hand,” said Thomas.

Development of CTA-compliant pool pumps is also proceeding at a fast pace.

“EPRI’s project is helping to address the chicken-and-egg dilemma with market adoption and product availability,” said Jeff Farlow, program manager of energy initiatives at Pentair Water Quality Systems. “The module allows us to proceed with product development without having to worry about which communication protocol wins the race to mass market adoption.”

Pentair is delivering variable-speed pool pumps for field demonstrations in 2016. While these units are hand-built, Pentair is prepared to transition to CTA-compliant production volumes in coming months if strong demand emerges.

Farlow points out that customers using CTA-compliant pool pumps in EPRI’s field demonstration seldom notice when the devices remotely respond to utility commands.

“It is invisible,” he said.

George Gurlaskie, Duke Energy technology evaluation manager, said that avoiding adverse impacts to customers is critical to increasing their participation in demand response programs. Duke Energy is one of the participants in EPRI’s field demonstrations.

“EPRI’s work with manufacturers to enable demand response, automation, and remote management of devices is giving us more flexibility to design programs that are attractive to our customers,” said Gurlaskie.

Key EPRI Technical Experts

Chuck Thomas